CULTURAL DIFFERENCES IN PAIN EXPERIENCE AND BEHAVIOR AMONG MEXICAN, MEXICAN AMERICAN AND ANGLO AMERICAN HEADACHE PAIN SUFFERERS

DISSERTATION

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Isabela Sardas, B.A.
Denton, Texas
December, 1995
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Review of previous research on cultural differences in pain experience and/or pain behavior revealed that cultural affiliation affects pain perception and response. Unfortunately, the many inconsistent findings in the literature on cultural differences in pain experience and behavior have made interpretations and comparisons of results problematic. These inconsistent findings could be attributed to variations in acculturation level among cultural groups.

The purpose of this study was to investigate cultural differences in pain experience (assessed by McGill Pain Questionnaire, the Box Scale, the Headache Pain Drawing, and the Headache Questionnaire) and pain behavior (measured by determining medication use and interference of daily functioning due to headaches) among Mexican (n = 43), Mexican American (n = 36), and Anglo American (n = 50) female chronic headache pain sufferers. The contribution of acculturation to differences in pain experience and behavior among cultural groups was measured by the Acculturation Rating Scale for Mexican Americans.
The three cultural groups of women significantly differed on pain experience and pain behavior. Specifically, Mexican women experienced their headache pain more intensely, severely, and emotionally than Mexican American and Anglo American women. Furthermore, Mexican women were more willing to verbally express their pain than the other two groups. As for pain behavior, Mexican women took more medication and reported more severe inhibition of daily activities due to headaches than Mexican American and Anglo American women. Ethnic identity, ethnic pride, and language preference were factors in the acculturation process which contributed the most to women's chronic pain experience and behavior. The greatest variability occurred within the Mexican American group of women who perceived themselves as being more Mexican in attitudes and/or behaviors, but more similar to Anglo American in their pain experience and pain behavior.

Results are explained using biocultural multidimensional pain theory, social learning theory, and acculturation theory.
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CHAPTER I

INTRODUCTION TO THE STUDY

In 1986, the World Health Organization promoted the study of pain behavior by developing the Cancer Pain Relief Program in its quest to draw attention to the need for improved care and relief of pain. Specifically, headache pain has been reported to be "one of the ten most common complaints of patients visiting physicians" (Diehr et al., 1981, p. 147). Between 1971 and 1976, headache pain was the reason given for 1.7% of visits to physicians amounting to nearly 10 million visits each year (National Center for Health Statistics (cited in Diehr et al., 1981)). Household surveys from 1969 and 1970 indicated that approximately 2.7 million persons with headaches received medical treatment or had daily activities (approximately 5.5 million days) hampered due to their headaches (National Center for Health Statistics (cited in Diehr et al., 1981)). Based on these statistics, headache pain contributes significantly to health care expenditure, job performance, and job participation.

Pain shapes people's compliance with medical treatment and lowers their quality of life (Andersen, 1992). Culture shapes people's pain experience (the way pain is perceived and interpreted) and pain behavior (the way pain is verbally
and nonverbally expressed) so that different cultures express and experience pain differently (Craig & Prkachin, 1978; Wolff & Langley, 1968). Increased understanding of cultural differences in pain experience and resulting pain behavior would improve practitioners' awareness of cultural differences in pain experience and behavior (Good & Good, 1980), improve the physician-patient relationship, and lead to a more sensitive and accurate evaluation of patient needs.

Wolff and Langley (1968) were the first to analyze the literature in the study of cross-cultural differences in pain experience and behavior. They concluded, from their review of the literature, that inconsistent results and methodological problems "leave the question as to whether or not there are basic differences between ethnocultural groups in response to pain unanswered" (Wolff & Langley, 1968, p. 494). Zatzick and Dimsdale's (1990) extensive analysis of the literature on cultural differences in response to laboratory-induced pain also revealed that inconsistent results and methodological problems persist.

The objectives of the subsequent review of the literature on cross-cultural differences in pain experience and/or behaviors presented below are (a) to illustrate various trends in clinical and field research on cross-cultural differences in pain experience and behavior evident from the late 1800s to the present, (b) to present a comprehensive
review of definitions of pain and culture, (c) to review theories of pain mechanisms and acculturation, and (d) to evaluate research methods employed in the investigation of cross-cultural differences in pain experience and behavior. This review will provide the groundwork for the basis of this study on cultural differences in pain experience and behavior among Mexican, Mexican American and Anglo American headache pain sufferers.

Review of the History of Studies on Pain

Philosophical theories of sensation and pain have existed for several centuries. The argument on sensation began between the rationalists (Protagoras, 490 B.C.; Socrates, 399 B.C.; Plato, 348 B.C.) and the empiricists (Empedocles, 450 B.C.; Aristotle, 350 B.C.). The rationalists, also known as cultural relativists, believed that "of all things, the measure is man....pleasure and pain are individual sensory experiences, so it follows that ethically each person is the only judge of what is right for her or him" (Leahey, 1987, p. 42). The empiricists believed that "we know reality by observing it, thought can create nothing new" (Leahey, 1987, p. 40). One view postulates that pain is a motor reaction to sensory stimuli and the other view postulates that pain is part of a complex physiological and psychosocial process. These antithetical convictions describe the views which have guided studies on pain from 1880 until the present.
Originally, pain was considered to be primarily a physiological process similar to the other senses. In the late 1800s, Schiff's and Funke's writings (cited in Wolff & Langley, 1968) postulated that pain was distinguished from other sensory functions and they began to study it separately from other sensory mechanisms. One way of confirming that pain experience is a distinct sensory process which is influenced by environmental factors is to study cultural differences in response to pain. For example, if a person suffers from pain due to migraine headaches or surgery or burns, does that person's cultural background influence how he or she will experience and react to that pain? Several studies which attempted to answer this question are presented here.

Early studies on comparisons of how different cultures react to pain focused on pain behavior alone, without assessing pain experience. Subjects' responses to pain were assessed by inducing pain in the laboratory setting as a way of assessing pain tolerance and pain threshold. Studies on cultural differences in induced-pain behavior were initiated by Blix (1884) and Goldscheider (1884) in laboratory settings where pain sensitive points on the skin were discovered (cited in Wolff & Langley, 1968). The focus of these studies was to establish cultural differences in pain threshold and pain tolerance. Pain threshold is a sensory-discriminative process determined by "that point on a
continuum of increasing stimulus intensity that distinguishes painful from non-painful experience" (Turk & Melzack, 1992, chap. 8). Pain tolerance is defined as the highest intensity of a pain stimulus an individual is willing/able to withstand and is believed to be more influenced by psychosocial factors (Weisenberg, 1977).

The studies that ensued for the following century followed Blix's (1884) and Goldscheider's (1884) examples and focused on sensory and behavioral rather than experiential aspects of pain. As Wolff and Langley's (1968) and Zatzick and Dimsdale's (1990) reviews indicated, results from these laboratory studies on cultural differences in pain tolerance and pain threshold showed that cultural differences exist in response to pain, but not in the discrimination of pain.

It was not until the 1950's that the first studies on pain experience were conducted. During the time period from the 1950's to 1970's, there were only two publications on cultural differences in pain experience based on clinical interviews of patients with neurological disorders (Zborowski, 1952; Zola, 1966) and one publication based on studies on cultural differences in scores on questionnaires measuring anxiety levels in dental pain patients (Weisenberg et al., 1975).

Although findings confirmed cultural differences in pain experience, these three studies were charged with
methodological problems, including a lack of controls for extraneous variables. Given that age, gender, experimenter ethnicity, hospital conditions, and other confounding variables may affect responses to pain (Greenwald, 1991; Padilla, 1979; Weisenberg, 1977), interpretation of results from studies that did not control for confounding variables must be viewed with caution.

From the 1980's until the present, the focus of research shifted toward biopsychological and psychosocial investigations of pain. In the 1980s, two studies provided evidence for cultural differences in the experience of pain by using psychophysical methods in field (using non-patient populations) and clinical settings (using pain patients in a medical setting) (Clark & Clark, 1980; Schoenfeld & Hoffman, 1989). In 1991, one field study found cross-cultural differences in subjects experiencing pain outside the laboratory and clinical setting in order to control for the "expectancy" factor (Thomas & Rose, 1991). These studies revealed cross-cultural differences in the meaning attributed to pain-related descriptor words. However, methodological problems continued to pervade the literature on this topic.

In summary, review of the literature on pain experience revealed shortcomings in research methodology that have led to inconsistencies in results and have made interpretation and comparison of results problematic. The literature on
this topic revealed discrepancies on several dimensions. First, there was a lack of consensus over both the selection and definition of terminology used in research on cultural differences in pain. Second, the very few studies on cross-cultural differences in pain experience and behavior that incorporated social learning theories, psychophysical theories, or neuropsychological theories to explain their results, disregarded theories of acculturation. Instead, varying criteria for the inclusion of subjects into cultural groups were used. The examination of cultural differences in pain experience and behavior must take into account variations in intra-ethnic acculturation in order to avoid the misinterpretation of group differences. Third, the few studies that investigated gender differences did not control for gender and did not incorporate this variable as a focus of their study. Fourth, variations in assessment techniques used to measure similar constructs made comparisons of results difficult. Finally, information about the reliability and validity of assessment methods were often omitted.

Research studies on pain behavior and acculturation indicated that pain behaviors and levels of acculturation differed according to subjects' gender, age, socioeconomic level, education, generation level, and frequency of medication requests (Merskey, 1965; Merskey & Spear, 1964; Padilla, 1979; Szapocznik & Kurtines, 1979; Weisenberg,
1977). However, most research on pain and culture compared different sets of cultural groups and rarely took into account demographic variables. Furthermore, the few studies citing existing biopsychosocial and biocultural pain theories to explain results disregarded theories of acculturation.

Comparison of Studies on Cultural Influences on Pain Experience and Behavior

It was generally difficult to compare studies on cross-cultural differences in pain experience and behavior because, as described above, they used different methods, different definitions of ethnicity, and different criteria for categorizing cultural groups. Although studies on this topic varied so much in their purpose and design, one way of simplifying the presentation of this material was to separate studies according to the setting in which subjects were studied (clinical and field studies) and studies on the meaning of pain descriptor words to non-pain subjects. Within this category, studies were separated further according to the time period in which they were conducted. This section presents studies in that manner.

Clinical Studies

Clinical studies are studies which investigate pain patients in a medical setting or experiencing non-lab-induced pain. Common research methods in clinical studies included the study of cancer, childbirth, cholecystectomy,
dental pain, and chronic pain. These clinical studies on cultural differences in pain experience and behavior were thoroughly reviewed and discussed below.

Common shortcomings in clinical pain studies were representative of those often found in most cross-cultural studies on pain. These flaws included a scarcity of definitions for pain and culture, poor integration of theoretical perspectives to explain results, little information about assessment measures, cultural groups that were not well defined in terms of their demographic variables, no control for or thorough discussions of gender differences (in the few studies which used both genders), problems comparing groups who were administered translated versions of pain questionnaires, and little control for dosage and frequency of medication use.

The above-mentioned methodological problems commonly found in cross-cultural studies on clinical pain are generalizations and, as such, they do not give credit to those few studies in this field that have used more sophisticated research methods, such as Bates et al.'s (1993) study presented below.

Early Studies From the 1950's to the 1970's

Investigations of psychological variables involved in cross-cultural differences in pain experience and behavior began in the early 1950's. Bonica (1953) was instrumental in shifting the focus of pain research from a purely
physiological view to one which encouraged the assessment of the physiological and psychological components of pain. This view was supported by Beecher's (1956) observation of soldiers returning from World War II, which established that the meaning of pain plays an important role in pain experience and behavior.

The two most frequently cited clinical studies on cross-cultural differences in pain experience and behavior are those conducted by Zborowski (1952) and Zola (1966). Zborowski pioneered research on how attitudes, values and experiences influence psychological, verbal and behavioral reactions to pain. Zborowski distinguished between pain which subjects expect ("self-inflicted and other-inflicted") such as self-mutilation or sport injuries, and pain which is unexpected ("spontaneous pain") which results from disease or injury.

Zborowski's results were based on interviews and observations of female patients from the following four cultural groups of patients suffering from a neurological disease (information about disease type or pathology is not provided in his study): Caucasian Protestants born in U.S.A. (Old Americans), Jews, Italians, and Irish (results from this last group are not discussed in Zborowski's study). Zborowski observed that Jews and Italians, who had been described by physicians as exaggerating their pain, seemed to exhibit similar reactions to pain but they differed in
their attitudes toward pain. The Italians were more concerned about immediate pain relief and were satisfied when it was relieved by drugs, for example. Jews, however, continued to complain after obtaining pain relief.

Zborowski (1952, p. 23) interpreted these differences as meaning that Italians have "present-oriented apprehension" and Jews have "future-oriented anxiety." Zborowski (1952, p. 22) defined apprehension as a "tendency to avoid pain sensation" and anxiety as "anxiety about pain experience which is focussed on various aspects of the causes of pain, the meaning of pain, or its significance to the welfare of the individual." Thus, as Zborowski observed, culturally similar reactions to pain have different cultural purpose and meaning.

Zola (1966) studied Boston hospital male and female patients of Italian Catholic, Irish Catholic, and Anglo-Saxon backgrounds. Results indicated support of Zborowski's (1952) results. Italian patients expressed feelings more than the other two groups. The Irish Catholic and Anglo-Saxon patients tended to deny the presence of pain. Gender differences were only reported for location of pain.

In summary, Zborowski (1952) and Zola (1966) investigated cultural differences in pain experience among pain patients. Results from verbal reports and behavioral observations indicated that American White Protestants (Old American) and Irish patients had lower pain ratings than Jewish and
Italian patients. Thus, certain cultural groups tend to be more expressive than others in their responses to pain.

Weisenberg et al. (1975) studied ethnic and racial differences between American Black, White, and Puerto Rican-born male and female emergency room dental out-patients. Cultural differences in anxiety and attitudes toward pain were investigated. Results indicated that income, occupation, marital status, and age were not significantly different. Puerto Ricans scored higher on the State-Trait Anxiety Inventory than Blacks, and Whites scored lowest. Puerto Ricans also scored highest on the Dental Anxiety Scale (dentists' report based on observations of patients), Whites next and Blacks scored lowest. Puerto Ricans scored highest and Whites lowest on attitudes toward pain, reflecting a denial or avoidance of pain.

The authors explain (Weisenberg et al., 1975, p. 132) that such racial and ethnic differences in reactions to pain attitude and anxiety indicate differences in tolerance to pain based on "motivational-affective-cognitive pain systems (tolerance) rather than with the discriminative system (threshold)." Thus, American Caucasian dental patients rated pain lower than Puerto Ricans, but higher than African Americans based on ratings of the State Anxiety Scale and the Dental Anxiety Scale. Within cultural groups, females tended to rate dental pain higher than males on the anxiety scales, but statistical differences were not obtained.
There were several methodological problems in these three early studies which cannot be ignored. First, results from Zola's (1966) and Zborowski's (1952) studies were based on interviews and may be subject to interviewer bias. Second, although Zola and Weisenberg et al. used Zborowski's explanation for cultural differences, none provided an explanation based on a well-defined theoretical perspective. Third, Zborowski did not provide information about the type and stage of patients' neurological disease or information about medication taken by patients in his study. Fourth, attributing significant results obtained in Weisenberg et al.'s study (1975) as evidence of cultural differences in pain experience is complicated by the absence of controls for education, socioeconomic status, and religious affiliation. Fifth, ethnicity and pain were not operationally defined. Finally, reliability and validity information about assessment scales were not presented by Zola and Zborowski.

Weisenberg et al. (1975) provided reliability and validity values for the State Trait Anxiety Scale and reliability values for the Palmar Sweat Print, but not for the other scales used in his study. Without relevant information about assessment techniques used to measure the constructs being investigated, it is difficult to evaluate results from research studies.
Even with these complicating factors, a pattern of responses among these three studies was found. That is, it is clear from these studies that the Caucasian, Anglo-Saxon Protestant cultural group was not as overtly demonstrative of pain as other cultural groups, especially groups of Italian, Puerto Rican or Jewish descent.

Clinical Studies From 1980 to the Present

From 1980 to the present, studies focused on assessing cross-cultural differences in clinical pain experience and behavior of pain patients (in a medical setting) as they experienced the pain, instead of inducing pain in the laboratory setting or having to rely on patients' past pain experiences, as earlier studies had done. The main advantage was that a) this method prevented errors inherent in having to rely on subjects' memories of past events and b) implications for the treatment or research of pain could be directly applied to the clinical setting.

However, methodological differences continued to pervade in studies from the 1980s to the present, complicating comparison of studies on cross-cultural differences in pain experience and behavior. These methodological difficulties are described below, subsequent each study in which they occurred. The following is a review and discussion of clinical studies on pain experience and behaviors. In order to simplify comparisons of these studies, they were categorized by type of clinical pain investigated.
Cancer pain. Overall, comparisons of adult cancer patients from different cultures were similar to earlier studies; that is, Anglo American groups were more stoic than other groups. However, results from one study of children with cancer was very much in contrast to earlier studies mentioned above. Results on cancer pain revealed that adult Anglo American cancer patients were less overtly expressive of their pain experience than other cultural groups, but that Anglo American children were more expressive.

Cleeland, Ladinsky, Serlin and Thuy (1988) compared ratings of American and Vietnamese cancer patients. The subjects comprising the American group were in-patients and out-patients in two different hospitals in Madison, Wisconsin. The Vietnamese patients were living in a Vietnam cancer in-patient unit. Information about gender of subjects was not provided. The two groups rated their pain using the Brief Pain Index (BPI) and the Profile of Mood States (POMS). The BPI is a questionnaire developed to measure the severity of pain cancer patients experience and the impact the illness has on patients' lives (interference). The POMS was used as an indicator of mood associated with different pain-related descriptors. The advantage of the BPI is its shortness, an important feature in the study of cancer patients because cancer patients are often too ill to fill out long forms.
The purpose of this study was three-fold: (a) to assess the validity of a shorter questionnaire, the Brief Pain Index, (b) to evaluate cultural differences in the degree of pain relief associated with analgesic drugs, and (c) to improve measurement of translated versions of English questionnaires. Results indicated that cancer patients from two cultural groups and linguistic backgrounds gave similar responses to rating the severity of their cancer-related pain and the interference caused by their pain. Both groups rated the severity of pain as independent of its interference with other daily activities and functions. However, when a subset of the Wisconsin sample was compared to the Vietnamese sample, results indicated that the Vietnamese group had higher pain severity ratings but not higher interference ratings than the American group.

These contrasting results can be attributed to problems with Cleeland et al.'s (1988) study which are delineated below. The first relates to problems inherent in the use of questionnaires that have been translated into various languages spoken by members of different cultural groups. In this case, the Vietnamese subjects could not answer questions on the POMS because words were confusing to them. Therefore, results from the POMS were not valid because the Vietnamese group could not understand subtle differences between the various mood words. Second, information about the type of cancer and degree of pathology from which
patients suffered was not provided. Third, the authors reported that the Vietnamese group did not receive any analgesic stronger than acetaminophen with codeine whereas the American group was given access to much stronger analgesics. Given that the strength, dosage, and type of medication prescribed to the two different cultural groups were not controlled, comparisons between these are not valid. Fourth, the study did not integrate a theoretical perspective to explain results.

Greenwald (1991) investigated interethnic differences in pain perception of American patients who had recently been diagnosed with primary malignancy lung, pancreas, prostate, and uterine cancer. Subjects (age range: 20-80 years) from English, Scottish, Wales (254), German (155), Irish (141), Scandinavian (95), French (56), Eastern European (38), Italian (14), and Jewish (9) backgrounds were selected from the Cancer Surveillance System (CSS) in Seattle, Washington (a method used by the U.S. Bureau of the Census). Again, no information about subjects' gender was provided. Greenwald aimed at measuring how these eight different cultural groups scored on the GRS (pain intensity measure) and MPQ (sensory, affective, and evaluative pain).

Results indicated no cultural differences in pain sensation. However, differences were found in pain expressed in affective terms based on results from the McGill Pain Questionnaire Affective subscale. Results also
indicated that Old Americans (English, Germans and
Scandinavian immigrants to the United States of America)
expressed pain less than the rest of the group. Italians
and Jews did not express more pain as was suggested in
Zborowski's (1952) and Zola's (1966) study.

Thus, even though Greenwald's study (1991) indicated no
group differences in the intensity of pain attributed to
pain-related descriptor words, group differences were found
on the affective component of pain such that Anglo American
patients reported less pain than other cultural groups.
These results provide support for those results from earlier
studies by Zborowski (1952) and Zola (1969) which found that
Anglo Americans report less pain than other cultural groups.

Even with the absence of controls for cancer type
(pancreas, lung, prostate, and uterine cancer), gender,
socioeconomic status, and education, there were several
aspects of this study which were promising. Although a
theoretical perspective was not used to explain results,
this was one of the very few studies that provided a clear
definition of ethnicity and the concept of acculturation to
explain results. First, ethnicity was defined as "the group
subjects identify with the most" (Greenwald, 1991, p. 158).
Second, effects of acculturation (albeit not an
acculturation theory) were provided as an explanation for
significant differences between cultural groups.
Additionally, choosing subjects from an area with a low
proportion of recent immigrants and only a small
collection of distinct ethnic minorities provided a
control for effects of acculturation on pain experience and
behavior.

One study by Van Aken and Van Lieshout (1989)
investigated age, gender, and cultural differences in
distress reactions to bone marrow aspirations in children
suffering from acute lymphatic leukemia. Van Aken and Van
Lieshout (1989) compared pain behavior of children with
cancer from Southeastern Netherlands and America using the
Procedural Behavioral Rating Scale (PBRS). In contrast to
previous studies, Anglo American cancer patients exhibited
more pain behaviors than patients from the Netherlands.
Boys' anticipatory distress behaviors decreased at an
earlier age than girls'.

These results confirmed suggestions by Ekman, Davidson,
and Friesen (1992, p. 264) that "cultural differences are
manifest in situations that elicit emotions" such that the
Dutch children may be expected to be more stoic than the
American children. Thus, cultural differences in patterns
of emotional reactions are dependent on situational factors.
The authors explained that these results may be due to the
differences in hospital settings. That is, the Dutch
hospital was small and more personal, providing more support
and decreasing anticipatory distress, whereas the American
hospital was large and more impersonal. Other factors
contributing to cultural differences could be ascribed to differences in medical practices, such as allowing parents to hold children or physical support from the nursing staff.

Although Van Aken and Van Lieshout (1989) introduced their study citing the effects of socialization such as Observational Learning Theories (Craig & Prachkin, 1978) and Corrective Feedback (Weisenberg, 1977) on emotional and facial expressions (Ekman, Friesen, & Elsworth, 1983) associated with pain behavior, these theories were not integrated into their discussion of results. In addition, Van Aken and Van Lieshout's study did not provide information about sample selection criteria, income level, or education level. Yet another problem with Van Aken and Van Lieshout's study is their use of the PBRS which has been faulted on the limited range of behaviors for which it is designed to code (Romano et al., 1991).

In summary, these studies on cancer pain found conflicting results. Some studies on cancer pain showed that American cancer patients have lower pain ratings than patients of other cultures, and one showed that Scandinavian children with cancer have lower pain ratings than American children (Cleeland et al., 1988; Greenwald, 1991; Van Aken & Van Lieshout, 1989). It is conceivable that because Van Aken and Van Lieshout studied children and not adults with cancer pain, the appropriate culture-specific pain behaviors
were not yet completely in-grained in these children, giving rise to conflicting results.

It is important to consider the nature of comparison groups chosen in studies on this topic because, as results above indicated, they are important in determining differences among cultural groups on pain experience and/or behavior. For example, it is also possible that when compared to Italian and Hispanic cultures, Anglo Americans will report relatively less pain. However, in comparison to Scandinavian or Irish cultural groups, Anglo Americans will report equal or more pain.

Furthermore, it is possible that, although cultural differences in pain behavior are observed by clinicians, that they do not necessarily imply different pain experiences. It is therefore important that studies on this topic use Melzack's (1985) multidimensional definition of pain, as a sensory, affective, and evaluative process, and incorporate in their design the assessment of both pain behaviors and pain experience.

**Dental pain.** Two studies on dental pain varied greatly in their goals but both indicated cultural differences in pain experience. One investigated cultural differences on ratings of anxiety secondary to dental pain and the other compared descriptor words chosen to describe pain experience. The first study provided support for those earlier studies which maintained that Caucasian Anglo
Americans are less demonstrative of their pain. The second study revealed that the language of pain differs among subcultures in the United States.

Weisenberg et al.'s study (1975), described in more detail above, compared male and female African American, Caucasian, and Puerto Rican out-patients in an emergency dental clinic who were experiencing pain at the time of the study. Results from measurements of anxiety levels attributed to dental pain experience indicated that American Caucasians rated pain lower than Puerto Ricans, but higher than African Americans based on the State Anxiety Scale and the Dental Anxiety Scale. No significant differences were found for gender.

These authors provided a good example of a well designed study. First, both psychological (State Trait Anxiety Inventory, Dental Anxiety, interview) and physiological (palmar sweat) information was gathered. Second, validity and reliability data for these assessment methods were provided. Third, the authors also provided a lengthy list of subjects' demographic variables, and provided pre- and post-treatment information. This study can be faulted on only one major point. Although Weisenberg et al. (1975) measured cultural differences in sensory, perceptual, and emotional qualities of pain experience, theories of pain or acculturation were not incorporated in the explanation of results.
Moore and Dworkin (1988) investigated cross-cultural differences in the perception of dental pain-related word descriptors using translated versions of the McGill Pain Questionnaire. These authors used male and female patients from a dental registry who were not experiencing pain at the time. This study compared 25 Mandarin Chinese and 25 Western dental subjects (first generation Anglo American) and 35 Scandinavian subjects (Swedish and Danish) and a group of dental professionals. The study was based upon the Health Care Communication Model (Chrisman & Kleinman, 1983; Kleinman, 1980) which asserts that "there are professional and popular ways of thinking about health care which can be judged to be culturally congruent or incongruent" (Moore & Dworkin, 1988, p. 197).

Results indicated greater East-West differences than Anglo-Scandinavian differences. The Western group defined dental pain as sharp and intense, whereas the Chinese group defined dental pain as pain in the bones, itchy and painful, "as if 100 needles were stabbing" (Moore & Dworkin, 1988, p. 201). Dental professionals and patients of same subgroups did not differ in their perceptions of pain. Results also indicated that the development of tests in one culture may not be valid in another culture. Gender differences were not mentioned.

Comparison of these two studies was complicated due to their investigation of a different set of cultural groups.
Although both investigated dental pain, Moore and Dworkin (1988) aimed to improve assessment methods used to find cultural differences in the meaning attributed to pain-related words and the pain intensity associated with those words. Weisenberg et al. (1975), on the other hand, focused on the patients' pain experience. The different paths these two studies have taken is an indication of variations in methods used in the study of pain experience and behavior.

**Childbirth pain.** There were three studies on cultural differences in childbirth pain. Even though only one study obtained significant differences between groups, differences occurred in the order found in studies described earlier on cancer pain and dental pain. That is, Caucasian Anglo Americans reported or expressed less pain than the other groups (Flannery, Sos, & McGovern, 1981; Pesce, 1987; Weisenberg & Zahava, 1989).

It is interesting to note that the two studies in which no differences were found measured pain experience and the study where differences among groups were found assessed pain experience and behavior. This indicates that, in order to obtain a complete picture of subjects' pain, it is important to assess not only the multidimensional qualities of pain experience but also pain behavior.

Flannery et al. (1981) investigated ethnic differences in the expression of pain of childbirth in 75 women based on interviewers' behavioral observations. These authors used
the following experimental controls: pain stimulus, patient's attention span, social reinforcement, history of pain, and education. No significant differences were found. The authors suggested that when experimental variables and anxiety over medical procedures are held constant, and when the patient's attention span is focused, no differences are found. Although Flannery et al. (1981) did not link results to existing models of acculturation, they did suggest that certain pain behaviors are learned, that pain behaviors may be more culturally-related than others, and that cultures differ as to which behaviors are culturally salient and which behaviors are not.

In order to assess this in future research, they suggested that studies must separate different levels of acculturation between first, second, and third generation immigrants in order to properly explain results in cross-cultural differences of pain experience and behavior. These suggestions are well taken, especially with regard to using existing scales, which can reliably and validly assess generation level and salience of values; for example, the Acculturation Scale for Mexican Americans, or ARSMA (this and other such acculturation scales are described in more detail below).

Flannery et al. (1981) also suggested that, as studies on cross-cultural differences in pain become more sophisticated in their research design; for example, controlling for
variables such as education, age, gender, and socioeconomic status, it will be more difficult to attribute results to cultural differences in pain experience. However, this suggestions ignores observations by physicians and medical staff members of culturally-related patterns of pain behaviors in pain patients (Bates, 1987).

Pesce (1987) investigated childbirth pain in native Australians and native Italians. Results indicated no significant differences between groups of women and provided support for other studies in which no differences were found among Australian and Italian subjects in their response to cold pressor task (Pesce, 1983).

Weisenberg and Zahava (1989) took a social learning theory perspective to explain cross-cultural differences in the response to childbirth pain. These authors compared childbirth pain in Middle Eastern and Western women. They found cultural differences in pain experience and pain behavior. The Western groups had lower pain ratings on the Pain Perception Scale than did Middle Eastern groups (Weisenberg & Zahava, 1989). That is, the Middle-Eastern women ranked pain higher than the Western group. Lower education subjects ranked pain higher than subjects with more education. No significant cross-cultural differences were found in coping styles or extroversion. According to Weisenberg and Zahava (1989), attitudes toward pain are learned from parents' responses to pain and their attitudes
toward painful situations. Problems with this study lie in the use of scales that are standardized according to one cultural group and translated to assess a different culture. Also, this study controlled for education, but not age or socioeconomic status.

There were similarities among these studies on childbirth pain. Flannery et al. (1981) and Pesce (1987) investigated cultural differences in the sensory, affective and evaluative aspects of pain experience. Both studies found no significant differences among cultural groups. Another similarity between these studies on childbirth pain was that both Pesce (1987) and Weisenberg et al. (1975) used the same sample selection criteria. Namely, native-born and raised subjects whose parents were also born in that country.

Variability in results could be attributed to the following two main differences among these studies in a) cultural groups studied and b) measurement tools used to assess pain experience and behavior. For example, Flannery et al. (1981) compared African American, Italian, Jewish, Irish, and Anglo American Protestant subjects, and Pesce compared Australian-mothers living in Italy, mothers born in Italy, and women born in Australia of Italian parents. Flannery et al. (1981) used a semantic differential scale, pain attitude measure, physiological awareness scale, global episiotomy pain index, urogenital anxiety scale, and a manifest anxiety scale. Pesce (1987) used the McGill Pain
Questionnaire. Reliability and validity values were frequently not provided for all the scales administered in these studies.

**Cholecystectomy pain.** Most studies presented so far indicated that Anglo Americans either experienced or responded to various types of pain not only differently from other cultural groups, but also to a relatively lesser degree than comparison groups. However, one study on cholecystectomy pain behavior revealed conflicting results.

Streltzer and Wade (1981) compared anesthesiologist's ratings of pain behaviors among male and female Caucasian Anglo American, Filipino and Hawaiian patients with cholecystectomy pain. Results showed that Caucasians and Hawaiians required significantly more medication than Filipinos, Japanese, and Chinese cholecystectomy patients. Further investigation of anesthesiologists' behavioral ratings revealed no differences across cultural groups in length of hospitalization. Moreover, post-operative medication demands were the same across all groups. The amount of medication given to patients from different groups seemed to be mostly related to the nurse-patient interaction. Surgeons' treatment of patients did not differ across cultural groups. Age and gender were found to contribute to group differences in the amount of medication received.
Streltzer and Wade's conflicting results can be attributed to difficulties inherent in using others' ratings of subjects' pain behavior. That is, this study used anesthesiologists' ratings, physicians' observations of surgeon-patient interactions, or nurse-patient interactions to assess patients' pain behavior. Further research needs to control for these factors.

**Chronic pain.** Results on cancer pain, dental pain, childbirth pain, and cholecystectomy pain showed variable results. However, more often than not, Anglo Americans were found to score lower on measures of pain experience and/or behavior. The variability in the results of studies described above could be ascribed to several factors (as described above), including a lack of control over the length of time patients experienced pain: that is, whether they were experiencing chronic pain or acute pain.

Chronic pain is defined by the International Association for the Study of Pain (IASP) as any pain which is experienced for three or more months. For example, childbirth pain is acute pain, cancer pain is considered to be chronic pain. The following two studies were specifically designed to study cultural differences in chronic pain.

An early study by Lawlis, Achterberg, Kenner and Kopetz (1982) compared pain experience and behavior among African American, Mexican American and Caucasian American men and
women with persistent spinal pain. Results showed cultural and gender differences such that Mexican American women reported the highest levels of pain (a measure of pain experience). However, these women did not differ from other groups on pain behavior ratings conducted by the subject's physical therapist. Lawlis et al. (1982, p. 751) concluded that "while ethnic and sex differences were found, stereotypic responses were not uniform, and tended to be related to the manner in which that pain was assessed."

One later study by Walsh, Schoenfield, Ramamurthy, and Hoffman (1989) used cold pressor tasks to measure cultural differences in pain tolerance in a clinical setting. The authors assessed 135 male and female Anglo-Saxon, African Americans, and Hispanic chronic pain patients' responses to cold pressor pain. Anglo subjects were more tolerant to cold pressor tasks than non-Anglo subjects. However, differences were not found between African Americans and Hispanics. Gender differences were not reported.

Bates et al. (1993) compared chronic pain patients' multidimensional pain experience from various cultural backgrounds (Old Anglo Americans, Hispanics, Irish, Italians, French Canadians, and Polish). The Hispanic group obtained the highest pain intensity ratings (Italians second) and the highest scores on sensory, affective and evaluative dimensions of pain experience (Italians second). These results support the notion that there are certain
cultural groups, such as Hispanics and Italians, who are more open about and more willing to share their pain experiences with others. Within cultural groups, there were no statistical differences on generation, gender, diagnosis, pain medications, religion, age, workers' compensation status or socioeconomic status.

Bates et al.'s (1993) study was one of the very few well-designed studies with a clear definition of cultural groups and controls for demographic variables. Bates et al. (1993) also integrated Melzack's (1975) multidimensional theory of pain (described in detail below) and Festinger's and Bandura's social learning theory and social comparison theory to support her findings.

Field Studies

The previous listing of studies on cross-cultural differences in pain experience and/or behavior focused on studies conducted in clinical settings with pain patients who were usually experiencing pain at the time of the study. Field studies are distinct from other types of studies in that they are conducted outside of the laboratory and outside of the hospital/clinic setting. There are two such studies described below.

Clark and Clark (1980) were the first to bring psychophysical methods into field studies. These authors used Sensory Decision Theory methods which distinguish between sensory and attitudinal components of the report of
pain. Information about subjects' gender was not provided. Results indicate that Nepalese subjects had higher pain tolerance than Occidentals to electrical stimulation, a method previously used by Sternbach and Tursky (1967). Discriminability (pain threshold) was the same for both groups indicating no neurosensory differences.

These results provide support for the early studies on pain sensation, described above, in which cultural differences were found for pain tolerance (a sociopsychobiological component of pain) but not for pain threshold (a physiological component of pain). The main problem with Clark and Clark's (1980) study was that subjects' cultural backgrounds were not well defined; some were born and raised in Nepal, some were Westernized Indian, and information about the Occidental subjects was not provided.

A more recent, and interesting field study by Thomas and Rose's (1991) differed from all others reviewed here in that it investigated ear-piercing pain in order to control for the psychological expectation of experiencing pain in a hospital and laboratory setting. Additionally, by studying ear-piercing pain outside of the hospital or lab setting, the authors controlled for subjects' expectations of appropriate pain behaviors. This study also differed from other cross-cultural studies on pain in that it investigated cultural differences in subjects' self evaluation of coping
ability and their perceived parental attitudes toward minor childhood injuries.

Thomas and Rose (1991) investigated cultural differences in the experience of ear-piercing pain in 28 Afro-West Indian, 28 Anglo-Saxon, and 28 Asian subjects in Southeast London (age range: 15-25; equal number of males and females) using the McGill Pain Questionnaire. The different cultural groups were further subdivided into one group with whom the word pain was used and the other group with whom that word was not used. Results indicated that American Anglo-Saxon subjects had higher ratings on the McGill Pain Questionnaire than Afro-West Indian subjects and lower ratings than Asian subjects. The condition where the word pain was used, yielded higher pain ratings. Afro-West Indians who reported the lowest pain ratings also gave the lowest ratings to parents' concerns about minor injuries in childhood and highest ratings of their coping ability. The authors explained that although it is common practice for Afro-West Indian women to get their ears pierced as infants, which explains their matter of fact view, it is also common among Asian women, who reported higher ratings. Gender differences were not reported.

There were several commendable aspects of this study. These authors used a well-defined pain stimulus (ear-piercing), a setting which reduces behavioral expectations normally associated with those settings, and a theoretical
model (Festinger's social comparison theory) upon which to base their explanations of results. Although controls for the expectancy factor associated with lab and clinical settings were used, there were some drawbacks to this study. First, it was not representative of clinical pain behavior. Second, it did not incorporate acculturation theories into its study, a problem present in all cross-cultural studies of pain experience and behavior reviewed.

The variability in the results among Afro-West Indian women and Asian women in Thomas and Rose's (1991) study can also be explained using findings from the literature on the influence of family models of pain on people's pain experience and behavior. These studies determined that pain beliefs and behaviors, such as pain-related coping skills and pain reactions, are learned from family models and these learned attitudes and behaviors influence pain experience and/or behavior (DeGood & Shutty, 1992; Edwards, Zeichner, Kuczmierczyk, & Boczkowski, 1985; Merskey, 1965; Merskey & Boyd, 1978; Turkat, 1982; Violon & Giurgea, 1984).

Studies on Meanings Inferred onto Pain Events and Efficacy of Methods Used in the Translations of Assessment Questionnaires

There is yet one other type of study in which subjects are a) not pain patients and b) not experiencing pain at the time of the study. These studies provide information about the meaning the general population places on the language of
pain. Three cross-cultural studies assessing pain ratings of pain descriptor words have been published. Results from these three studies indicated that cultural differences exist in the meanings attributed to similar descriptor words. Most importantly, these results clarified the difficulties inherent in comparing cultural groups based on their ratings on questionnaires which have been translated.

Results from Morse and Morse's (1988) investigation of men's and women's pain ratings attributed to pain-related events indicated that all groups rated burns, heart attacks and kidney stones as most painful on the Morse Pain Stimulus Scale. Most groups disagreed on the intensity of pain attributed to childbirth pain. Canadians and Ukrainians rated childbirth pain lower than the Hutterites and East Indians. Dental pain was rated as the least painful by most groups. Gender differences were found among the Hutterite and Ukrainian groups, with women perceiving gallstone pain, childbirth pain, and migraines as more painful than males.

These results provide support for the view that different cultural groups use different pain descriptor words to describe their pain. It is therefore imperative for studies which use translations of pain questionnaires to be aware of this when comparing cultural groups on pain experience. Although Morse and Morse (1988) were among the few authors who cited Bates' (1987) new theoretical model which combines social learning theory (Schoenfeld, 1981) and social
comparison theory with the gate control theory (Melzack & Wall, 1970) to explain cultural differences in pain experience and behavior, they did not integrate these theories to explain their results.

Gaston-Johanson, Albert, Fagan, and Zimmerman (1990) compared male and female American Hispanic, American Indian, Black and White subjects' intensity ratings attributed to pain-related word descriptors based on the Visual Analog Scale and the McGill Pain Questionnaire. This study investigated the meaning attributed to pain-related words which had been used in non-crosscultural studies (Agnew & Merskey, 1976; Fabrega & Tyma, 1976; Gaston-Johansson, 1984; Melzack & Torgerson, 1971). The purpose of this study was to determine which pain descriptors are commonly used by people from different cultural backgrounds and to determine if different groups assign the same intensity value to basic pain terms.

Results indicated that all subjects rated the word ache as lowest in intensity and the word pain as highest. There were no differences between groups in how words were ordered. There were, however, significant differences in ratings of each word on the Visual Analog Scale. Ache was rated, from highest to lowest in intensity in the following order: the American Indian, then Hispanics, Whites and Blacks rated the word ache lowest in intensity. The word hurt was rated from highest to lowest in intensity in the
following order: Blacks rated hurt highest in intensity, Hispanics, Whites, and American Indians rated that word lowest in intensity. The word pain was rated highest by Blacks, then Whites, Hispanics, and the American Indians rated the word pain as lowest in intensity.

Although age, education, and religion did not influence Visual Analog Scale scores, there were gender differences on pain intensity values attributed to pain descriptor words. White males rated the term ache as higher than white females; black males rated the term hurt lower than black females.

The main problem with this study was one which is also attributed to all field studies; namely, the use of a non-patient sample made generalization to the clinical setting difficult. Furthermore, results may not be representative of the cultural groups because of small sample sizes.

Moore and Dworkin's (1988) study compared Chinese and Anglo Americans from a dental registry who were not experiencing pain at the time of the study, differed from others in five ways: (a) it was conducted in an area with low immigration to provide evidence for the conservation of cultural differences in second and third generation groups, (b) it took into account the affective interpretation of pain descriptors, not just their translation, (c) it expanded Zborowski's (1952) studies by providing both qualitative and quantitative data, (d) it was one of the
first to explore the sensitivity of questionnaires for comparing pain descriptions across cultural contexts, and (e) it matched subjects across groups by social variables and ethnic self-identifications. However, the use of a small sample size made it difficult to interpret results as representative of the cultural group. Results indicated cultural differences words chosen to describe pain. The Western group defined dental pain as sharp and intense, whereas the Chinese group defined dental pain as itchy and painful.

Comparisons of Morse and Morse's (1988) study and Gaston-Johansson et al.'s (1990) studies indicated that rating of painful conditions provided information about attitudes toward health and illness. The rating of pain intensity of specific pain descriptors seemed to provide information about the meaning and perceived intensity levels subjects attributed to pain (Gaston-Johansson et al., 1990).

Consequently, it would have been ideal if Morse and Morse's study had controlled for such variables as subjects' experience with an illness. The rationale for this statement is that some disease conditions (such as social reactions to AIDS versus cancer or heart attacks) may be more influenced by sociocultural factors because they carry with them more socially based meanings than pain descriptor words.
In summary, review of the literature on clinical and field studies of cross-cultural differences in pain experience and behavior indicated inconsistencies in results on the existence of cultural differences in pain experience and/or behavior. These inconsistencies can be attributed to the following factors. First, there was a lack of consensus over both the terminology and the operational definition for terminology used in these studies. Second, in the rare instances when studies cited theoretical perspectives, their research designs did not include corresponding measurement scales to determine if existing theoretical perspectives could be supported. Third, shortcomings in research methods employed include (a) variations in assessment techniques and sample selection criteria, (b) the absence of controls for demographic variables, and (c) the investigation of different sets of cultural groups. Fourth, not one study from the literature review on cross-cultural differences in pain experience and behavior assessed interethnic differences in acculturation. Fifth, different results, due to the use of various statistical and research design methods, made interpretations and comparisons of studies problematic.

In order to study cross-cultural influences in pain experience and behavior, it is important to operationally define the words pain and culture. Surprisingly, most studies on this topic neither attempted to define these
constructs nor incorporated theoretical approaches into their research design and explanation of research outcomes.

Definition, Theories, and Assessment of Pain in Cross-Cultural Research on Pain

Definition of Pain

Defining pain is problematic because its mechanism is still unclear. Although various definitions of pain exist, the majority of studies on pain do not provide a formal definition of pain. Definitions of pain can be divided into two main categories; mainly, biological and neuropsychological. First, pain has been defined biologically as (a) a change in intensity of the same kind of stimulus (Rosenzweig & Leiman, 1982), (b) nociception, pain caused by a disease (Brechner, 1985), (c) deafferentiation, pain caused by medication used to treat a disease (Brechner, 1985), (d) mechanical stimulation which activates high threshold receptors that produce a sensation of pain (Carlson, 1985), or (e) as biochemical changes caused by tissue damage (Keele, 1966). Beecher (1959) identified three categories of pain behaviors: (a) skeletal muscle reactions, (b) autonomic nervous system reactions, and (c) sensory information processing by the central nervous system. A more detailed explanation of sensorimotor pain functions is beyond the scope of this review (see Carlson, 1985; Dubner, 1991). Second, pain has been defined neuropsychologically by Melzack and Casey (1968) as (a) "a
sensory and emotional response to unpleasant stimuli which is dependent on social contexts and cultural norms about pain" (cited in Turk & Melzack, 1992, chap. 10).

Melzack and Casey's definition of pain has several advantages. It is general enough to include all types of pain. Moreover, it recognizes that pain is multidimensional in that sensory, psychological, and social influences are involved in the experience of pain. Therefore, Melzack and Casey's definition of pain is recommended in cross-cultural studies of pain.

The neuropsychological definition of pain based on Melzack and Casey (1968) was selected for this study. The main reasons for this choice were that a) it is the only definition which accounts for psychological, physical, and cultural aspects of pain and b) it is the basis for the development of the McGill Pain Questionnaire used in this study.

Theories of Pain

Explanations for the mechanism of pain can be divided into biological theories (which explain sensory pain perception) and biopsychological and social learning theories (which propose biopsychological and psychosocial influences in pain perception). A review of these theories are be presented in order to establish the basis for the theories of pain used in this study.
Biological Theories of Pain

First described are biological theories of pain. The four predominant neurophysiological models that explain the pain mechanism are the Specificity Theory, the Pattern Theory, the Biochemical Theory, and a model which describes areas of the central nervous system responsible for processing pain-related information.

First, the Specificity Theory (Mountcastle, 1974) suggests that there are, in the spinal cord, a set of nerve fibers which are specialized in the transmission of pain. These are the A-delta fibers, specific for short-term pricking sensations, and the C-fibers, specific for long-term burning sensations. According to this theory, when these fibers in the spinal cord transmit information traveling from the periphery, they synapse at the Reticular Formation which causes arousal. These fibers then project to the brain (thalamus) and finally to the cortex.

Second, Goldscheider's Pattern Theory (cited in Melzack & Wall, 1965) suggests that "pain perception is based on stimulus intensity and central summation" (cited in Melzack & Wall, 1965, p. 973). According to the Pattern Theory, nerve fibers do not have specialized functions. Nerve fibers do not respond to specific stimuli but to any stimulus. It is the synergistic effect of spatial and temporal patterns of input that causes pain (Melzack & Wall, 1965). Support for this theory is provided by studies
indicating that neural adaptation occurs after exposure to continuous and intermittent stimuli (Hillman & Wall, 1969; Mendel & Wall, 1964).

Third, the Biochemical Theory (Lindahl, 1974a, 1974b) suggests that pain involves chemical imbalances at or near a nerve fiber. According to this theory, pain is caused by a high concentration of hydrogen ions (acid pH) or potassium ions. Support for this theory comes from laboratory studies showing that tissue damage causes release of a chemical which is high in potassium and hydrogen (Keefe, 1966). Other studies have shown that treating blisters with a chemical high in potassium causes pain (Keefe, 1966). Studies have also shown that high levels of histamine, acetylcholine, and serotonin cause pain (Sinclair, 1969).

Fourth, Mark, Ervin, and Yakovlev (1962) provided evidence for specific areas of the central nervous system responsible for different classes of pain sensation. Their functional model provided evidence for two types of pain: sharp and dull pain, and two categories for the mechanisms involved in pain: pain perception (sensory) and pain tolerance (emotional component). The purpose of their study was to reduce pain in patients with advanced stages of cancer. They found that stereotaxically placed lesions in the sensory relay nuclei of the thalamus caused different effects in cancer patients. Lesions of the ventral posteromedial and ventral posterolateral nuclei caused loss
of superficial cutaneous sense, such as touch and temperature.

These results indicated that the ventral posteromedial and ventral posterolateral nuclei are associated with the perception of dull pain. Lesions of the parafascicular nucleus and the intralaminar nucleus reduced deep pain but not cutaneous sensitivity. Thus, these nuclei are involved in the perception of deep pain. Lesions of the dorsomedial and anterior thalamic nuclei had no effect on cutaneous sensitivity or perception of pain, but patients were not bothered by pain. Thus, the dorsomedial and anterior thalamic nuclei seem to be involved in the emotional aspect of pain (pain tolerance).

There are several problems with these theories. The main criticism of the Specificity Theory and the Pattern Theory is that they do not account for psychological aspects of the pain experience. Second, the biochemical theory of pain has also been criticized. Studies conducted to provide support for the biochemical theory are laden with methodological problems mainly because standard biochemical research methods involve observing mechanisms in isolation of their usual context. The consequence is that it is difficult to generalize results to the complex pain process. Third, the functional model explains somatic perception of pain. However, as with the other three theories, psychological mediators of the pain experience are not explained.
Social Learning and Biopsychological Theories of Pain

Review of the literature on cultural influences in pain experience and behavior reveals that the most popular learning theories in cross-cultural research on pain experience and behavior are the Sensory Decision Theory (also called Signal Detection Theory), the Social Comparison Theory, and the Social Learning Theory. The most frequently cited biopsychological theory is the Gate-Control Theory. These three theories, which are common to pain studies, as well as a few others which could provide explanations for cultural differences in pain experience and behavior, will be the focus of the subsequent review.

Social learning theories and biopsychological theories of pain include, in their explanations of the pain process, perceptive, evaluative, and affective components of the pain experience. Furthermore, some psychosocial and biopsychological theories incorporate learning models to explain sociocultural influences in pain experience and behavior, and others link existing biological and social learning models to form a new model of pain.

Social learning theories of pain. Several social learning theories have been proposed to explain the pain phenomenon. The earliest studies on cross-cultural differences of pain used psychophysical measurement methods to assess cross-cultural differences in pain experience and
behavior (Chapman, 1944; Chapman & Jones, 1944; Hardy, Wolff, & Goodell, 1940; Meehan, Stoll, & Hardy, 1954).

The Sensory Decision Theory is the most frequently used theory in research using psychophysical pain measurement techniques. The Sensory Decision Theory offers two hypotheses about social influences involved in pain behavior (Clark, 1969; Clark, 1974; Lloyd & Appel, 1976; Pastore & Scheiner, 1974; Weisenberg, 1989). The first states that social influences can produce voluntary suppression of evidence revealing distress. The second suggests that social influences lead to decreases in distress which explains a reduction in the evidence of discomfort.

Thus, modeling influences decrease verbal reports of distress which, in turn, decrease autonomic reactivity. Psychophysical methods, such as electrical stimulation and mechanical pressure, are used to determine if the modeling of tolerant behaviors alters the congruence of verbal reports of pain and subjective experiences of pain (Sternbach & Tursky, 1965).

The Social Comparison Theory (Festinger, 1954) suggests that people use others' behaviors as a reference to determine the appropriateness of their own behavior. Thus, people compare their pain behaviors to observations of pain behaviors of others who are similar to themselves (Thomas & Rose, 1991).
Bandura's (1986) Social (Observational) Learning Theory advances that overt behaviors, cognitions, and the environment constantly influence one another in what he called reciprocal determinism. Thus, we learn pain behaviors by observing how others react to pain (Morse & Morse, 1988).

The Operant Conditioning Theory (Skinner, 1961) suggests that a response to a stimulus which rewards certain behaviors is more likely to be repeated the next time the stimulus is encountered. Fordyce (cited in Weisenberg, 1977) combines the Operant Conditioning theory and his Stimulus Generalization Theory to describe how pain behaviors are learned from the social context. He suggests that individuals are more likely to engage in pain behaviors when they are socially rewarded (attention from physicians, nurses, family) or when their pain behavior provide secondary gains, such as avoiding undesirable events (work, housework) (Fordyce, 1976). Initially, the pain behaviors are adaptive in that they signal the occurrence of tissue damage or a nociceptive stimulus. Then, a response associated with a particular stimulus becomes reinforced through the process of operant conditioning, and, over time, becomes generalized to other stimuli (Fordyce, 1983).

According to Fordyce's (1983) and Chapman's (1986) theories, pain patients who have been exposed to an experimental stimulus might overreact, have lower pain
threshold and/or pain tolerance because they are overly aware of the pain stimulus and have, through operant conditioning, generalized earlier pain responses to the experimental pain stimulus. Fordyce (1976) suggested that the range of pain behaviors that serve to communicate to others the experience of pain and suffering are (a) verbal complaints, (b) non-language sounds, (c) body posturing and gesturing, and (d) display of functional limitations or impairments. Chapman's Hypervigilance Theory (1986) suggests that patients, because of social reinforcement, become increasingly aware of pain symptoms (hypervigilant) which may lead patients to perceive non-painful sensations as painful.

In contrast to Fordyce's (1983) and Chapman's (1986) theories, Rollman's Adaptational Level Theory (1983) proposes that pain patients make judgements about current pain experiences based on other previous pain experiences. Internally-based pain criteria, developed from earlier pain experiences, are compared to external painful stimuli. This model suggests that pain patients should have higher pain thresholds and tolerance and judge external stimuli as less severe than pain-free individuals because they are comparing their current pain experience to internal and subjective criteria.

In summary, social learning theories have been used to explain how social factors influence pain tolerance and pain
thresholds. Unfortunately, these theories tend to place too much emphasis on social factors and too little attention to the interaction between psychological, sensory, and environmental factors in the experience of pain.

Biopsychological theories of pain. There are three main biopsychological theories of pain. The Gate-Control Theory (Melzack & Wall, 1965, 1970), Bates' Biocultural Theory (Bates, 1987), and the Information Processing Theory of Chronic Pain (Jerome, 1992) are three theories which have been developed by integrating previously existing theories. The following review will provide a description of these theories as well as their strengths and shortcomings.

The Gate-Control Theory (Melzack & Wall, 1965, 1970), the most influential theory in the research and clinical treatment of pain, incorporates aspects of both the Specificity Theory and the Pattern Theory to explain the pain mechanism. According to Melzack and Wall's theory, a gate controls how much pain information is transmitted to the brain. This theory suggests that the small-diameter A-delta fibers and the large-diameter C-fibers of the spinal cord either inhibit or facilitate transmission of pain from sensory neurons to the thalamus (Bernstein, Roy, Srull & Wickens, 1991; Weisenberg, 1977).

This gate can be closed in two ways which incorporate the spatial and temporal factors of the Pattern Theory. First, sensory input can reach the spinal cord at the same time as
pain impulses and take over pathways that the pain impulses would have used (down-up mechanism). Support for this process comes from studies which reduce pain by stimulating the skin near injured areas. Second, the brain can close the gate by sending signals down the spinal cord and blocking incoming information when they synapse at the spinal cord (up-down mechanism). Support for this explanation comes from studies in which reduction of pain is achieved by electrical stimulation of specific brain areas which cause the pain signal to travel down the spinal cord and, consequently, reduce pain.

By incorporating aspects of the Specificity and Pattern Theories, the Gate-Control Theory opened the door for research in the psychophysical (sensory and discriminative) as well as psychological (evaluative and affective) components of pain experience and behavior. It is not surprising, then, that the Gate-Control Theory has been the focus of attention in studies on pain mechanisms (Barbaro, 1988; LaMotte, 1992; Reynolds, 1969; Willis, 1985). The Gate Control Theory was implemented in Melzack's (1975) development of an increasingly popular questionnaire (the McGill Pain Questionnaire, MPQ).

Bates (1987) advanced a biocultural model which takes into account not only psychological, attitudinal, and behavioral responses to pain, but also sociocultural influences in pain experience and behavior. This
biocultural model incorporates the Gate-Control Theory (Melzack & Wall, 1965), Social Learning Theory (Bandura, 1986), and Social Comparison Theory (Festinger, 1954) to explain sociocultural influences on psychological and physiological mechanisms of pain perception.

According to Bates (1987, p. 48), "attitudes, expectations, meanings for experiences, and appropriate emotional expressiveness are learned through observing the reactions and behaviors of others who are similar in identity to oneself." Bates proposed that the family is the most important instructor of values and beliefs held by the social group. Bates submitted that we learn socially appropriate pain behaviors by comparing one's own behavior to family members' reactions to pain. Support for this theory is provided by research studies demonstrating that social modeling influences pain tolerance (Buss & Portnoy, 1967; Craig & Neidermayer, 1974).

More recently, Jerome (1992) proposed the Information-Processing Theory. This model defines pain as the activation of physiological arousal which leads to motor responses (novelty appraisal) and the appraisal of (a) the stimulus as a dangerously harmful or benignly unpleasant experience (harm/hurt appraisal), (b) the level of control the individual has over the pain event (coping appraisal), and (c) the long-term consequences of the pain experience (global appraisal). The appraisals of new pain events are
based upon the retrieval of cognitive, affective, and evaluative brain processes associated with pain memory. A pain response is selected based on the appraisal of the pain event. This theory has not been experimentally studied.

The Gate-Control Theory (Melzack & Wall, 1965, 1970) provides a psychological and biological explanation of pain, but disregards sociocultural influences involved in the pain process. Thus, the Gate-Control Theory includes sensory, evaluative, and affective explanations, but it does not explain cultural differences in pain behavior. The Information Processing Theory of Chronic Pain proposes an exhaustive theory in that it includes both pain experience and pain behavior components. However, as with all the studies presented, the effects of culture and acculturation are not acknowledged.

Bates' biocultural model of pain seems, to this day, to be the best theory in that it accounts for biological, psychological, and sociocultural factors in nociception. However, Bates et al.'s study on cross-cultural influences in pain experience did not employ measures of acculturation. Although Bates et al. (1993) provided information about heritage consistency between cultural groups based on Estes and Zitzow (cited in Bates et al., 1993) and Spector (cited in Bates et al., 1993), this information provides a measure of only one or two rather than multidimensional aspects of
acculturation (Marin, Sabogal, VanOss Marin, Otero-Sabogal, & Perez-Stable, 1987).

Discussion of biopsychological and psychosocial theories of the pain mechanism. The gate-control theory provides a psychological and biological explanation of pain, but disregards social and cultural influences involved in the pain process. In contrast, the Social Learning, Social Comparison, and Operant Conditioning Theories (described in this section) focus on pain behaviors which are learned from observations of appropriate and rewarded responses. These theories explain how we learn to behave according to society's demands but they do not incorporate in their definition sensory and cognitive processes involved in pain. Thus, they explain pain behavior but not the subjective pain experience.

The Information Processing Theory of Chronic Pain proposed by Jerome is an exhaustive theory in that it includes both pain experience and pain behavior components. However, its main disadvantage is that it places too much emphasis on the functions of the central nervous system in processing stimulus information from the environment and it does not acknowledge the role of social and cultural factors in the experience of pain.

Several biopsychological and psychosocial theories have been submitted to explain the influence of culture on pain experience and pain behavior. The main criticism of these
theories is that they do not incorporate acculturation theories to explain the effects of culture on the pain phenomenon.

Based on this review of the literature, the one theory which incorporates a multidimensional explanation of pain (that is, sensory, emotional and affective qualities of pain experience) and sociocultural influences in pain behaviors is Bates' biocultural model of pain. Hence, Bates' model was used to explain results in this study. However, Bates' model does not explain how social and cultural influences differ from each other by definition and how they may differ in the degree to which they influence the pain experience.

The main question here is, are differences in pain experience between groups due to current social pressures or to cultural mores passed onto the group from many generations? This distinction is important because, if social pressures are involved, then pain experience differences can be attributed to the way the society treats its patients, to the techniques available to patients due to socioeconomic limitations, or to how the society treats individuals from varying social strata. If cultural influences are involved, then pain experience differences can be attributed to the values and belief systems held by that group, to how the individual compares his/her own behavior to standards of behaviors that have been placed on them from generation to generation. It is proposed here
that social pressures influence behaviors (social modeling) and cultural pressures influence cognitions which then influence behaviors. In order to address this issue, several studies on the influence of family models on pain beliefs, behaviors and pain-related coping skills were reviewed and described below.

Family Model Theories of Pain Beliefs, Behaviors, and Pain-Related Coping Skills

Attitudes, beliefs and behaviors learned from the cultural setting are first taught to the child by caretakers in the home. Markus and Kitayama (1991) describe possible avenues by which one's culture and family models influence people's beliefs and behaviors. They suggest that "people in different cultures have strikingly different construals of the self...these construals can influence the very nature of individual experience" (Markus & Kitayama, 1991, p. 224).

These authors described Hispanic cultures as promoting or modeling interdependence, such that Hispanics use referent others as a way to gauge their behavior. On the other hand, Anglo American culture encourages and models independence in its members so that they are less influenced by others' reactions. Hence, Hispanics and Anglo-Americans use models for different purposes. Models are more influential in shaping cognition, motives, expression and experience of emotions among Hispanics. For Anglo-Americans, however, models are used as a way of confirming an individual's
already established perception of the self (Markus & Kitayama, 1991).

Given this information, it would be surmised that these family models also teach culture-specific beliefs and responses to pain. In fact, Wrubel, Benner, and Lazarus (1981) provide evidence that pain beliefs are culturally-based. Others have also established that pain beliefs and behaviors, such as pain-related coping skills and pain reactions, are learned from family models and these learned attitudes and behaviors influence pain experience and/or behavior (DeGood & Shutty, 1992; Edwards, Zeichner, Kuczmierczyk, & Boczkowski, 1985; Merskey, 1965; Turkat, 1982; Violon & Giurgea, 1984).

Assessment of Pain Experience and Pain Behavior

Central to this section is the need for a consensus on the definitions of pain experience and pain behavior in order to have a consistent interpretation of assessment techniques used in the investigation of the pain phenomenon. Without such an agreement, studies will attribute different definitions to similar labels or attribute similar definitions to different labels, creating havoc in the research literature on cross-cultural differences in pain experience and behavior.

The words pain experience and pain behavior have been used in research titles interchangeably and assessed in many different ways. Pain experience has been assessed using
self-report questionnaires measuring sensory, affective, and evaluative components of pain. Pain behavior has been measured as facial expressions, body movements, verbal report of pain intensity, and observation of patient behavior. This study defines pain experience as "the way pain is perceived and interpreted" (Melzack & Casey, 1968; Price, McGrath, Rafii, & Buckingham, 1983) and pain behavior as "the way pain is verbally and non-verbally expressed" (Fordyce, 1983).

Definition of Culture, Theories, and Assessment of Acculturation

Before cultural influences in pain experience and behavior can be assessed, it is imperative to have a clear understanding of the process involved in the individual's internalization of culture-specific attitudes, beliefs and behaviors. This process has been termed acculturation, and it has been operationally defined in several ways. In addition, several theories have been proposed to explain the acculturation process. These definitions and theories are described below in order to clarify reasons for choosing the one which best fits the purpose of this study.

Definitions of Culture

Before 1957, various definitions of culture and acculturation had been formulated. The lack of consensus over the definition of culture is exemplified by the fact that the majority of studies that investigated the influence
of culture on pain experience did not provide a formal definition of these concepts and relied on the reader's common sense understanding of the words.

As more studies on cultural differences in various psychological phenomena were conducted and published, the need for an operational definition of culture and acculturation became more evident. Goodenough (1957) was the first to provide a definition of culture. He defined culture as "behaviors, actions, and customs associated with a group" (cited in Padilla, 1979, p. 25).

Geertz (1973) proposed a more precise definition of culture with which most theorists agreed (Levy, 1984; Ochs & Schieffelin, 1984; Schweder & LeVine, 1984). Geertz defined culture as "an historically transmitted pattern of meanings embodied in symbols, a system of inherited conceptions expressed in symbolic form by means of which men communicate, perpetuate, and develop their knowledge about and attitudes towards life" (cited in Padilla, 1979, p. 28). Geertz's definition suggests that culture signifies shared meaning systems within a group.

More recently, LeVine (1984, p. 89) went a step further to define culture as "an inherited system of ideas that structures the subjective experiences of individuals." According to LeVine's definition, culture entails the coding of meanings which are learned. The individual's awareness of culturally-based meanings determines the extent to which
these meaning systems are verbalized. Thus, LeVine emphasizes the importance of language acquisition in learning cultural matters. Because LeVine's definition is the one which is most inclusive; that is, it incorporates beliefs, attitudes and the influence language to define culture, it has been chosen to define culture in this study.

Theories of Acculturation

Examination of the literature on the acculturation process reveals three models of acculturation: (a) the traditional unidimensional model, and the more modern (b) two-dimensional and (c) multi-dimensional models of acculturation. All three theories are described below in order to establish the benefits of choosing the multi-dimensional model of acculturation in this study.

Unidimensional model of acculturation. Traditional views of acculturation have held that acculturation is a unidimensional process by which "groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original culture patterns of either or both groups" (Redfield, Linton, & Herskovits, 1936, p. 150). According to this definition, over time, the migrant accommodates to the host culture and gives up the culture of origin. Therefore, acculturation is a function of the amount of time spent in a host country, the latter being dependent on the age and gender of the individual (Berry & Annis, 1974; Szapocznik & Kurtines,

Two-dimensional model of acculturation. In a bi-cultural context, acculturation is defined as a process of accommodation involving "changes in overt behaviors and changes in internalized value orientations" (cited in Padilla, 1979, p. 45). Therefore, acculturation is a two-dimensional process in which migrants participate in both communities (overt behaviors) and retain the culture of origin (internalization of values) as evidenced by the Cuban immigration to Dade County, Florida in the 1970s (Szapocznik & Kurtines, 1979). The most important factors here are the amount of time migrants have been exposed to the host culture and the degree of availability of community support from the culture of origin. The migrants' age and gender are related to the rate of change in both cases (Szapocznik & Kurtines, 1979). Studies on Cuban immigrants' acculturation into the American culture, using bicultural scales, provide support for the bicultural model (Scopetta, King, & Szapocznik, 1977).

Multidimensional model of acculturation. Berry (1979) proposes a multidimensional model of acculturation. He defines acculturation in terms of the purpose and duration of contact between two cultural groups. He explains that
"acculturation requires contact between at least two independent groups that are autonomous, with one dominating the other and having more impact on the cultural context in which acculturation is occurring. If the length of contact is short and the purpose of the interaction is undefined, the likelihood of acculturation is reduced. If, on the other hand, contact between the two groups is of long duration and the purpose is the takeover of a society's skills or beliefs, acculturation is more likely to occur" (Berry, 1979, p. 385).

When one group experiences pressure to give up its own values and beliefs, there is some degree of resistance, and conflict occurs. Reduction of conflict is obtained through the process of adaptation.

Berry's acculturation theory is multidimensional in that it integrates four types of acculturation (assimilation, integration, rejection, deculturation) with three types of adaptation (adjustment, reaction, withdrawal). Assimilation and integration require a movement toward the larger society, rejection is a movement against the larger society, and deculturation is a movement away from the larger society. A group is assimilated into a host culture when it adjusts its own cultural identity in order to adapt to the host culture. Adjustment requires making behavioral and cultural features more similar to the host country.

Integration is the maintenance of cultural integrity with
movement toward the larger society. Rejection is self-imposed withdrawal or withdrawal imposed by the larger society, in which case, segregation occurs. Deculturation occurs when the individual is alienated from the culture of origin and rejects the larger society.

The most important components of Berry's acculturation model are knowledge of the language of the host culture, attitudes toward the host culture, and duration of contact. Berry suggests that knowledge and usage of the host language is a measure of degree of acculturation. Thus, those groups who become bilingual would be differently acculturated to the larger society than those who form a new language which combines languages of the country of origin and that of the host culture. Attitudes toward the host culture can be assessed as a willingness by the smaller group to relinquish its own values and beliefs and to seek positive relations with the larger society. Sommerland and Berry (1979) developed four scales, one each for attitudes toward assimilation, integration, rejection, and deculturation which have provided evidence for Berry's model. However, reliability and validity values for these scales have not been investigated.

Cuellar, Harris and Jasso (1980) provide further evidence that language usage is important in distinguishing level of acculturation. Previous studies of Mexicans living in Mexico and Mexican Americans indicated differences in
acculturation between the two groups (Cuellar et al., 1980). Mexican American groups living in the U.S.A. have assimilated to and identified with the host English-language culture (Cuellar et al., 1980). This may be due to overt language assimilation pressures exerted by the American culture, as seen by recent efforts in some states to pass English only laws.

Padilla (1979) submits yet another multidimensional model of acculturation. According to Padilla's multidimensional perspective, acculturation requires cultural awareness and ethnic loyalty. Cultural awareness is the "degree to which migrants have knowledge about the cultural material of the host culture and the culture of origin; for example, language, history, and foods." Ethnic loyalty is defined as "migrants' preference for a cultural orientation" and provides information about the degree of acculturation (Padilla, 1979, p. 70).

According to this multidimensional view, acculturation is a function of (a) cultural preference, (b) language familiarity and usage, (c) cultural heritage (knowledge of the cultural material), (d) ethnic pride, affiliation and loyalty, and (e) interethnic interactions (social contacts). Padilla's multidimensional model of acculturation appears to be the most integrated and complete theory which explains the acculturation process. Results from studies comparing acculturation levels between various cultural groups provide
evidence for Padilla's multidimensional theory of acculturation (Pierce, Clark, & Kiefer, 1972). Support for Padilla's multidimensional theory also comes from studies investigating possible mediators of Mexican Americans' acculturation into the American society using scales developed by Keefe, Padilla, and Carlos (1978).

These mediators to the acculturation process among the Hispanic community living in the United States of America have been related to the concept of familism. Earlier studies were conducted to determine the influence of familism on acculturation level among Mexican-Americans and Anglo Americans. Familism (defined as strong identification and attitudes toward the family, family loyalty, and reciprocity and solidarity with the family) was found to be stronger among Mexican Americans than Anglo Americans (Mindel, 1980). Sabogal, Marin, Otero-Sabogal, VanOss Marin, and Perez-Stable (1987) suggest that family obligation and the influence of family as referents for behaviors (two aspects of familism) decrease with increased level of acculturation.

The strong family loyalty among Mexican-Americans indicates that this group uses the family as a model from which to learn appropriate gender-specific behaviors determined by the culture of origin. For example, it has been established that Mexican American women expect to endure suffering (Marianismo, after the Virgin Mary). These
women's priority is to sacrifice oneself, to care for the welfare of their home and the family more so than Anglo American women (Dana, 1993). This concept is also related to hembrismo, a concept which refers to sacrifice and femaleness (Comas-Diaz, 1989). It can be postulated then, that beliefs about gender roles will also become more similar to those of the host culture as level of acculturation increases.

Two more recent models of acculturation have been supported by research studies investigating interethnic variations in levels of acculturation. Bond and Yang's (1982) results confirm that the degree to which the smaller group acculturates to the host culture is a function of the salience of values held by the smaller group. Triandis, Kashima, Shimada, and Villareal's (1986) results provide evidence indicating that overt behaviors are more easily changed than covert behaviors.

Bond and Yang (1982) differentiate between affirmation (conservation of one's cultural norms) and accommodation (yielding to cultural norms of the larger group) in their investigation of 184 male Chinese bilingual students who spoke English fluently. Results indicated that the more important (salient) the questionnaire item was to the subject, the more likely the subject was to show cross-cultural affirmation. The authors explain that the subjects were not responding based on their own evaluations of the
questionnaire items but as beliefs representative of their cultural group. The authors suggest that the level of acculturation attained is dependent on three mediating factors. Namely, perceived anonymity, identification with a cultural group, and salience of attitudes and ethnicity in different situations.

According to Triandis et al. (1986), acculturation from one culture to another can take three forms (a) accommodation (changing to fit the cultural norm), (b) overshooting (changing too much in the direction of the new culture), and (c) ethnic affirmation (not changing). Results indicated that role perception and behavioral intentions (involvement in behaviors associated with the host culture) are characterized by accommodation, and stereotypes are characterized by ethnic affirmation.

The authors propose that overt behaviors, such as behavioral intentions and role perceptions (directly related to behavior), are more subject to social and personal pressures to conform to the larger group. In contrast, stereotypes, attitudes, and values are more a function of intra-personal judgement and are linked only indirectly to behavior.

Thus, Triandis et al. (1986) suggest that work-related behavioral intentions and role perceptions are more likely to be adopted by individuals acculturating to the second culture than domestic-related private behaviors. The reason
for this is that overt events are directly exposed to social scrutiny. In contrast, stereotypes, attitudes and values are covert events which are less exposed to social judgement and are less likely to change. Covert processes are not as influenced by social and personal pressures because they cannot be directly observed by the society.

Acculturation theories provide a wealth of explanations for the influence of culture on diverse behaviors and psychological processes. The theories selected for this analysis have been well-documented in other cross-cultural studies (Pierce, Clark, & Kaufman, 1978-1979; Szapocznik & Kurtines, 1979). It is surprising, then, to find a large gap in the use of acculturation theories in behavioral research (Padilla, 1979).

**Comparison of Acculturation Theories**

In comparison to the bidimensional and multidimensional theories of acculturation, the traditional explanation of acculturation as a unidimensional process seems most problematic. The unidimensional theory of acculturation does not provide information about the degree to which an individual has acquired the characteristics of the host culture, on one hand, and relinquished characteristics associated with the culture of origin, on the other. Furthermore, this theory is limited because it can only explain the acculturation process in a monocultural context, that is, where a subculture does not yet exist; for example,
the original Cuban migration to Miami in 1959 (Szapocznik & Kurtines, 1979).

Padilla developed a multidimensional theory which incorporates not only the acculturation of overt behaviors and internalized values, but also frequency of social interactions, social support from the ethnic group to either accommodate to the host culture or resist acculturation to the host culture, and a perceived group discrimination. Thus, Padilla went a step further by combining integral components of most of the other theories presented (Berry, 1979; Pierce et al., 1979; Triandis et al., 1986; Szapocznik & Kurtines, 1979).

Most importantly, Padilla's theory is most exemplary, in comparison to other acculturation theories in that (a) the validity and reliability for the scale designed to support its hypotheses has been thoroughly investigated in other studies and (b) it takes into account different degrees of acculturation. The Cultural Awareness and Ethnic Loyalty Scale (CAELS) is highly reliable and valid. However, Padilla's theory does not take into account Bond and Yang's (1982) findings which indicate that the degree to which acculturation occurs is dependent on the salience of values to members of a cultural group.

Assessment of Acculturation

Most studies examining cultural differences in clinical pain used self-report questionnaires and/or observational
methods to assess pain experience and behavior. However, acculturation scales have essentially been disregarded in research studies in this field. Because acculturation theories have not yet been presented in research on cross-cultural differences in pain, a thorough description of assessment scales developed specifically to support acculturation theories will be presented. Several of the acculturation scales described below were developed and validated using mostly American and Hispanic populations (Dana, 1993).

The Behavioral Acculturation Scale (BAS) was developed to measure components of the unidimensional acculturation theory (Szapocznik & Scopetta, 1976). The BAS was developed to assess the individual's degree of exposure to the larger society as a measure of acculturation. The BAS is a reliable (alpha= .97) scale which uses a 5-point Likert scale to measures the frequency with which individuals engage in language usage, music listening, reading and recreational activities associated with the host culture. The Value Dimension Scale (VDS), is a highly reliable (alpha = .77) scale which measures individual's value systems, is administered in conjunction with the BAS. However, its validity has not been established (Berry & Anis, 1974).

Szapocznik, Kurtines, and Fernandez (1980) developed the Bicultural Involvement Questionnaire (BIQ), a modified version of the behavioral acculturation scale, to provide
support for the two-dimensional model of acculturation. In contrast to the unidimensional scale, which makes the assumption that preference for activities related to one culture signifies a negative attitude toward the other culture, the two-dimensional scale assesses the degree to which a person feels comfortable in each culture independent of the other. Thus, the two-dimensional scale does not make such assumptions. The BIQ is a reliable \( \alpha = .98 \) questionnaire which measures the degree to which an individual feels comfortable in one or the other culture by measuring the degree of involvement in one culture.

Szapocznik and Kurtines (1979) developed the Value Acculturation Scale (VAS), which assesses internalized value orientations by measuring preferred relational styles which has good test-retest reliability \( r = .90 \). The Value Acculturation Scale and the Bicultural Involvement Questionnaire have been used to provide support for the bidimensional model of acculturation.

According to Berry (1979), measurement of acculturation must be made at both the group level and individual level. At the group level, the history, persistence and purpose of the cultural contact must be considered. At the individual level, the individual's exposure to the other culture, the inter- and intrapersonal conflicts experienced, and the personal adaptations made to the situation need to be assessed. Sommerlad and Berry (1970) developed three scales
to measure acculturation at the group and individual level. These scales tap the assimilation, integration, and rejection components of the acculturation process. However, the reliability and validity of these three scales have not been thoroughly investigated.

Pierce, Clark and Kaufman (1978-1979) developed the Acculturation Balance Scale (ABS) which measures "the individual's knowledge of traditional popular cultures compared with the contemporary American popular group." The main criticism of this scale is that it is too short (only three items) to provide enough information (Padilla, 1979, p. 74).

Padilla (1979) developed a questionnaire which is designed to assess ethnic loyalty and cultural awareness, two major factors of his multidimensional theory of acculturation. The Cultural Awareness Ethnic Loyalty Scale (CAELS) assesses ethnic loyalty and cultural awareness on the following five dimensions (a) preference, which refers to preference for one cultural orientation, (b) language familiarity and usage, (c) cultural heritage, which refers to knowledge about the cultural material associated with the host culture, (d) ethnic pride and identity, and (e) interethnic interactions.

The Multicultural Acculturation Scale (Wong-Rieger & Quintana, 1987) is a useful instrument used to measure and compare several different cultural groups. This instrument
is composed of three subscales; namely, Ethnic Orientation Index, Anglo American Orientation Index, and Overall Acculturation Index. It has been validated against Southeast Asians, Hispanic Americans and Anglo Americans. It differentiates between Anglo Americans and members who are foreign-born.

The Hispanic Acculturation Scale (Marin et al., 1987) is useful in distinguishing between assimilated, bicultural, traditional, or marginal assimilation. However, it does not provide specific information about the moderator variables involved in differences in acculturation between different cultural groups (Dana, 1993).

Most recently, the Cultural Life Style Inventory was developed to measure "interfamily and extrafamily language usage, social affiliations, cultural familiarity, and cultural identification and pride" (Mendoza, 1989, p. 380). It is a multidimensional instrument developed to account for cognitive, affective and behavioral changes secondary to the acculturation process (Dana, 1993).

The one acculturation scale designed specifically to measure levels of acculturation between Mexicans, Mexican Americans, and Anglo Americans is the Acculturation Rating Scale for Mexican Americans (Cuellar, Harris, & Jasso, 1980). This 20-item scale measures "language preference, ethnic identity and generation, ethnicity of friends, and direct contact with Mexico" (Montgomery & Orozco, 1984, p.
55). It is based on Padilla's theory of acculturation described above.

In summary, several acculturation scales have been developed to provide quantitative support for acculturation theories. Many of these scales measured degree of acculturation based on at least one of the following six variables (a) time spent in the host country, (b) knowledge of the host language and linguistic experience, (c) attitudes toward the host culture, (d) ethnic loyalty, (e) community support, and (f) salience of values. The use of these scales to investigate cross-cultural differences in pain experience and behavior would provide information which accounts for variations in acculturation levels between comparison groups. For the purpose of this study comparing Mexicans, Mexican Americans and Anglo Americans, the ARSMA deems most appropriate.

Concluding Remarks

Review of the literature on clinical and field studies in cross-cultural differences in pain experience and behavior indicated that most studies on this topic found differences among comparison groups. Of particular interest were those studies which compared Hispanic cultures with Anglo American cultures. Most studies comparing these two groups showed that Hispanics report higher ratings on measures of pain intensity, pain affect and pain sensation.
Variability of results in studies on cross-cultural differences in pain experience and behavior could be attributed to several factors associated with acculturation. Inconsistencies in research outcomes could be caused by (a) interethnic variations in acculturation level, (b) different cultures having different views about the importance of retaining their cultural ethnicity (ethnic identity and loyalty), (c) host cultures differing in their support and acceptance of the smaller group (community support), or (d) different cultures placing more importance in some beliefs and customs than others (value orientation and salience).

In order to account for differences in acculturation levels, acculturation scales must be implemented into cross-cultural pain research.

Several studies which compared Hispanics, in particular Mexican Americans, with Anglo Americans on the concept of familism and the use of family models to gauge behaviors were also presented. These studies revealed that Mexican Americans have greater feelings of familism (defined as strong identification and attitudes toward the family, family loyalty, reciprocity, and solidarity with the family) and therefore are more committed to their family than Anglo Americans. It was also found that Hispanics tend to be interdependent and gauge their behaviors according to others' reactions. Anglo Americans tend to be more
independent and use referent others as a way of confirming their already-established sense of self.

These findings suggest that, because the family teaches (models) culture-specific attitudes, beliefs, and behaviors, that Mexican Americans are drawn toward the family to establish cultural identity and ethnic loyalty. This commitment to the culture of origin is exemplified by Mexican Americans' commitment to learn Spanish as a second language, even with pressures from the Anglo society against bilingualism. However, Mexican Americans are also considered to be interdependent and more influenced by society to behave in ways deemed appropriate to the host culture.

How do Mexican Americans reconcile this pull toward the family and culture of origin on one hand and toward the host culture on the other? It is clear that this group does not choose one culture over the other in gauging attitudes and behaviors. That is, Mexican Americans seem to be committed to their beliefs and attitudes associated with their culture of origin. But, because their behaviors are more open to scrutiny in a society which is not very supportive of ethnic differences, Mexican Americans adapt their behaviors to fit those of the host country. Hence, we would expect Mexican Americans' experience of pain to be more influenced by their culture of origin and their pain behaviors to be more influenced by the Anglo American culture.
Based on the findings of studies presented above, we would expect the following: a) men to be more stoic, consequently, be more reluctant to participate in the study than women (this effect would be likely to occur about equally among Anglo American and Hispanic males); b) Anglo American women to be more stoic than Hispanic women; c) cultural groups to be more likely to differ on pain affect than pain intensity, with the Hispanic group being more emotionally expressive than Anglo Americans, and d) cultural groups to differ in behaviors to relieve pain.

Given the results of the studies reviewed so far, including theories of acculturation and pain processes described above, one important question relevant to this study arises: how do the mediating factors involved in or influenced by the process of acculturation (such as, generation level, language preference, cultural and social interactions, and ethnic identity) contribute to differences among cultural groups in the sensory, emotional and evaluative qualities of pain experience and in pain behaviors?

In order to test the predictions and to answer the question raised above, this study used questionnaires to assess cultural differences in a) the sensory, affective, and cognitive components of pain experience, b) pain behaviors, and c) acculturation level. This study also examined the acculturation dimensions which contributed the
most to cultural group differences on pain experience and behavior. This work was built upon previous studies comparing chronic pain patients from Hispanic and Anglo American cultures which indicated significant differences in the intensity of pain experienced, which suggested a relationship to culture-appropriate expressions of pain (Bates et al., 1993; Weisenberg, 1975). Additionally, this study used methods commonly employed in research studies on headache pain (Rasmussen, Jensen, & Olesen, 1991; Rasmussen, Jensen, Schroll, & Olesen, 1992; Saper, 1986).

Research has indicated that fluency in the language of the host culture has implications for the process of assimilation (Berry, 1979). If non-American cultures assimilate to the American culture, differences found between U.S. groups on pain ratings may be reduced and cannot clearly be attributed to cultural factors. Therefore, this study compared Spanish and English speaking Mexican Americans, Mexicans living in Mexico, and Anglo Americans. The main advantage of studying Mexican subjects in Mexico lied in a) obtaining samples of chronic headache pain sufferers which best represented authentically acculturated subpopulations, b) being able to compare Mexican subjects with Mexican American subjects on an acculturation scale specifically designed to study Mexican Americans, and c) the fact that more is known about Mexican Americans' belief systems and behaviors than any other
Hispanic group because many more research studies have been conducted on Mexican Americans (Geisinger, 1992).

**Aim of Study**

The primary purpose of this study was to investigate cultural differences in pain experience and pain behavior in headache pain sufferers from three cultural groups; namely, Mexicans living in Mexico, Mexican Americans living in the U.S.A., and Anglo Americans living in the U.S.A. (Caucasian Americans). Level of acculturation was be measured using the Acculturation Rating Scale for Mexican Americans (ARSMA); pain experience was measured using the Headache Questionnaire (HQ), the Headache Pain Drawing (HPD), and the McGill Pain Questionnaire (MPQ); pain behavior (non-verbal) was measured by determining the frequency and amount of analgesic use and reported inhibition of daily functioning due to headaches. In all cases, Spanish versions of questionnaires were used with the Spanish-speaking Mexican and Mexican American subjects.

The following is a summary of definitions and theories of pain, culture and acculturation which were incorporated in this study. First listed are the definition and theory of pain chosen for this study. Melzack's multidimensional definition of pain is the most comprehensive definition of pain because it includes the sensory, affective and evaluative components of pain experience. Bates' multifaceted biocultural model of the pain mechanism was selected
because it incorporates psychosocial, physiological and cultural influences in pain experience and behavior.

Second, the definition of culture and theory of acculturation incorporated into this study are provided below. LeVine's definition of culture was selected for its inclusion of the importance of language acquisition in influencing awareness of culturally-based meanings and beliefs. Padilla's acculturation theory was the most complete theory. It included the following factors in the acculturation process: time spent in the host country (generation level), knowledge of host country's customs (for example, language preference and foods eaten), attitudes toward original or host culture (for example, ethnic pride and identity, role perceptions, family loyalty).

This study hypothesized that a) differences in pain experience and responses would exist among the three cultural groups, b) that Mexicans would experience the multidimensional aspects of pain more intensely and report more pain behaviors than Mexican Americans, and Anglo Americans less than Mexican Americans, and c) that certain aspects involved in the process of acculturation to a host country would contribute to the differences observed in pain experience and behavior within the more mixed group, that is, among Mexican Americans.
CHAPTER II

METHOD

Subjects

Originally, men and women from three different cultures were to be selected to participate in this study. These were arranged as follows: a. first generation Mexican American subjects living in the U.S.A. (n = 30: 15 males, 15 females); b. Mexicans born and living in Mexico (n = 30: 15 males, 15 females); and c) Old Anglo Americans living in the U.S.A. (n = 30: 15 males, 15 females).

However, gender, originally considered an independent variable, was dropped from the study design due to an insufficient number of male subjects obtained in the M-A and A-A groups. Appropriate changes were made to ensure a large enough sample size within each cultural group. The changes were as follows: a. Mexican American women living in the U.S.A. (n = 45); b. Mexican women born and living in Mexico (n = 38); and c. Anglo American women born and living in the U.S.A. (n = 54).

Subjects were selected according to the following criteria: no major medical illness, no prior history of psychiatric disorders or currently seeking psychotherapy; no history of any major physical injury or surgery. Furthermore, in order to ensure that the women in this study
experienced chronic pain, only subjects who experienced headaches for at least three months were selected.

Cultural grouping was based on the subjects' country of birth, number of years resided in Mexico or U.S.A., parents' generation level, language spoken, and their stated identification with an ethnic origin, as described below. Mexican Americans were defined as subjects who were born in and had lived in the U.S.A. for at least ten years, whose parents are Mexican-born and speak Spanish at home; Mexicans were defined as subjects who had lived in Mexico for at least ten consecutive years. Anglo Americans were characterized as third generation U.S.A. born, non-Hispanic Caucasians who did not identify themselves with an ethnic group but defined themselves as Americans.

Mexican American and Anglo American adult women were recruited from the Denton and Dallas-Fort Worth areas. Mexican adult subjects were recruited from Ciudad Guzman, an immediate suburb of the city of Guadalajara, as described below in Procedures.

Sample Characteristics

Before elaborating on materials and procedures, it is necessary to discuss subjects' generalizability. Hence, subjects' demographic and medical characteristics and whether the sample chosen from each of the three cultural groups was exemplary of the population which it is supposed to represent are presented here.
First described are demographics of subjects who participated in this study. There were significant differences between cultural groups in age, marital status, and education. More specifically, age ranged from 18 to 47 years, with Mexicans (Mex) in the higher range and Anglo Americans (A-A) in the lower range. Most Mex and Mexican American (M-A) subjects were married, with the greatest frequency occurring within Mex. A-A had the greatest variability in marital status, with the least number of married subjects occurring within this group, and an equal number of married subjects and single subjects.

Although there were significant differences between groups in education level, the majority of subjects across all three groups did not have more than a high-school education. Mex women were least educated with the majority not obtaining more than a grade school education. Most M-A women and A-A women obtained a high school education or less, with the greatest variability occurring within M-A.

Interestingly, comparisons of education level among M-A women who chose the Spanish version of the questionnaire (Spanish) and those who chose the English version (English) indicated that the distribution of education level for English women strongly resembled the distribution of A-A women's education level. That is, a greater percentage of M-A women who chose the English version of the questionnaire obtained no more than a high school education.
No significant differences were found between the three cultural groups on income level and on occupation, both of which are measures of socioeconomic status. Income level was measured by yearly income in U.S. dollars. Mexican currency (pesos) was converted to U.S. dollars using the exchange rate at the time of the study (3.4 new pesos per U.S. dollar). This exchange rate was listed in Barron's National Business and Financial Weekly Newspaper (March, 1994). Subjects' occupations were categorized according to the Dictionary of Occupational Titles (U.S. Department of Labor, Employment, and Training Administration, U.S. Employment Service, 1991). It is important to note that cultural differences in the meaning given to various income levels and occupation types makes it difficult to compare income level and occupation among groups living in Mexico and those living in the U.S.A. (that is, a medical doctor in Mexico is socioeconomically different than someone in the same profession in the U.S.A.).

Second, medical characteristics of the study population included pain duration, pain location, type of medication taken to relieve headaches, and whether subjects perceived themselves to be healthy. Although all subjects reported having headaches for three months or longer (this was a subject selection criterion to indicate chronic pain experience), there were significant differences between groups in headache pain duration, with a greater percentage
of Mex and A-A reporting longer headache (4 to 24 hours) duration than M-A (30 minutes to 4 hours). The three groups did not differ on location of pain or type of medication taken to relieve headaches.

As expected, the greater percentage of spatial distribution of areas in pain (indication of pain location) across all groups were the upper shoulders, neck and head regions (usually bilateral). These results correspond with the results in this study on pain location questions of the HPQ in which most subjects reported headaches to be localized bilaterally or alternating unilateral and bilateral.

Another criterion for participation in this study was that subjects not have a history of any major medical illness. Although all subjects fit this criterion, there were still significant differences between groups on whether subjects perceived themselves to be healthy or unhealthy. The majority of M-A and A-A stated they were healthy. There was more variability within the Mex group. Approximately 50% of Mex stated they were healthy and the other 50% stated they were unhealthy.

Third, an additional comment about the generalizability of this study population is deemed necessary. Although the data obtained from these subjects may not be representative of all Mex, M-A and A-A chronic headache pain sufferers, they reflect the distribution of these three cultural groups
in the Denton and Dallas-Fort Worth regions (Valdivieso & Davis, 1988).

Materials

The currently developed Spanish and English versions of the following scales were administered to each subject who consented to participate in this study. Pain experience was measured using the McGill Pain Questionnaire which assesses sensory, evaluative, and emotional aspects of pain; a visual analog scale (Box Scale) which assesses pain intensity; and a Pain Drawing (referred to here as the Headache Pain Drawing, HPD) which assesses headache pain intensity and location. Pain behavior was measured by the Headache Questionnaire which determined a) whether subjects took medication for headaches, b) type of medication taken to alleviate headache pain, c) total dosage of medication taken for headaches (frequency x dosage = total dosage), d) total number of medications taken for headaches, and e) the extent to which headaches interfered with daily functioning. This method was based upon similar studies (Rasmussen et al., 1991, 1992). This questionnaire (the HQ) also quantifies and qualifies headache pain symptoms (Rasmussen et al., 1991). Headache pain was assessed based on the criteria of the International Headache Classification System of the International Headache Society (1988).
Level of acculturation was assessed using the Acculturation Rating Scale for Mexican Americans (ARSMA) developed by Cuellar et al. (1980). Language preference, one factor found to influence acculturation, was also determined by noting those Mexican American subjects who chose the Spanish or English version of the questionnaire.

Descriptions of Assessment Scales Used in This Study

Demographic Questionnaire (DQ). The DQ provided information about subjects' age, gender, marital status, education, occupation, income, country of birth, and residence in U.S.A. and/or Mexico. The DQ also asked if subjects had ever received psychological treatment (by a psychiatrist or psychologist) or been diagnosed with a psychological disorder (English version: Appendix A; Spanish version: Appendix B).

McGill Pain Questionnaire (MPQ). The MPQ was used to provide a quantitative measure of pain (Spanish version: Laheurta, Smith, & Martinez-Lage, 1982). The MPQ is a 3-dimensional scale measuring sensory, evaluative, and affective pain experience. The MPQ consists of the Pain Rating Index (PRI), the Number of Words Chosen, and the Present Pain Intensity Index (PPII). The PRI consists of a set of 78 verbal descriptors presented as 20 lists of 2-6 words each. Each list is arranged on a continuum from low to high intensity. The subject ranks those words in each subclass which describe their pain. A value of 1 is given
to the word which represents the least pain, the next word chosen is given a value of 2, and so on. The rank values are summed to give separate values for sensory (subclasses 1-10), affective (subclasses 11-15), evaluative (subclass 16), and miscellaneous (subclasses 17-20). The MPQ has been shown to have high test-retest reliability (Love, Leboeuf, & Crisp (1989), consistency across five studies (Chen, Dworkin, Haug, & Gerhig, 1989), internal validity (Lowe, Walker, & McCallum, 1991), and construct validity (Pearce & Morley, 1989).

Headache Questionnaire (HQ). The HQ (Spanish version: Appendix C) is an 8-item questionnaire identical to the one used by Rasmussen et al. (1991, 1992). The questionnaire consists of questions about headache frequency, duration, location, severity, character of pain, and accompanying symptoms. HQ categorical scores measure headache frequency and severity. The severity of a headache was divided into three types: a) mild pain (daily activities not inhibited), b) moderate pain (inhibiting, but not preventing daily activities), and c) severe pain (daily activities suspended). Additionally, headache types were classified by using information gleaned from the Headache Questionnaire. A Spanish version of the HQ was constructed using the back-translation procedure developed by Brislin (1970) with the help of two translators. The HQ is reported to be a valid measure of headache in comparison to clinical interviews.
(87% agreement rate, kappa = .43) and to have a positive predictive validity value of 50% (Rasmussen et al., 1991). The HQ is considered to be a reliable measure with an internal consistency kappa value of .79.

**Headache Pain Drawing (HPD).** The HPD (Spanish version: Appendix D) uses the Pain Drawing Technique developed by Toomey, Gover, and Jones (1984) to assess the spatial distribution of pain sensation. The HPD consists of several copies of a line drawing of the front and back of the upper human body. Subjects were asked to mark areas of the diagram that were in pain (one area per diagram). The line drawing is divided into 10 regions. Subjects' scores are equal to the number of regions that are shaded (based on the method used by Toomey, Gover, and Jones, 1983). The number of marks placed in the pain areas was also assessed. This measure has often been used to assess level of psychopathology in chronic pain patients.

**The Box Scale.** The Box Scale is a valid and reliable visual analog scale (Downie et al., 1978) which assesses pain intensity on a continuum from no pain at one extreme to "pain as bad as it can be" at the other extreme. Subjects were asked to put an X through the number indicating the pain intensity that corresponded to headache pain most often experienced. This scale facilitated comparisons of ratings between cultural groups speaking different languages (Spanish version: Appendix E).
Acculturation Rating Scale for Mexican Americans (ARSMA).
The ARSMA is a 20-item questionnaire which identifies five
different levels of acculturation. The ARSMA is scored on a
5-point Likert scale which ranges from very Mexican/Spanish
(1), Mexican-oriented bicultural (2), Equal, true, or
syntonic bicultural (3), Anglo-oriented bicultural (4), to
Very Anglicized (5). The five types of acculturation level
were derived based on the following scores: Type 1: ARSMA
score of 1.0-1.99; Type 2: ARSMA score of 2.0-2.79; Type 3:
ARSMA score of 2.80-3.20; Type 4: ARSMA score of 3.21-4.0;
Type 5: ARSMA score of 4.01-5.0. The ARSMA is based on five
dimensions reported by Padilla and Carlos (cited in Cuellar,
Harris, & Jasso, 1980) to be significant in the measurement
of acculturation. The five dimensions are: language
familiarity and usage (inside and outside the home), ethnic
social interaction, ethnic pride and identity, cultural
heritage/knowledge, and generational proximity. The total
score is the sum of all 20 multiple-choice items that were
circled. The ARSMA is a reliable measure of acculturation
(internally consistency coefficient alpha = .88 and test-
retest reliability correlation coefficient = .72 at the .01
level of significance). The ARSMA is a valid (content and
predictive validity) scale which differentiates Mexicans,
Mexican Americans, and Anglos. Comparisons of ratings of
Mexican Americans to scores on the ARSMA yielded a
correlation coefficient of .75 at the .01 level of significance (Cuellar et al., 1980).

Procedure

Subject Recruitment

Mexican subjects were obtained from Ciudad Guzman, an immediate suburb of the city of Guadalajara. Mexican subjects were invited to present to the Red Cross headquarters in Ciudad Guzman where this researcher conducted individual interviews in a private office. Potential participants in the study were informed about the study from radio announcements made at a local radio station. In addition, at the time of the study, a group of American ophthalmologists were offering free eye exams at the same Red Cross headquarters. While waiting in line for their eye exam, several Mexican clients saw a large sign posted on the front door of the Red Cross building announcing the headache study. Those who were interested in participating in the study scheduled their appointment with this researcher for that week or the following week.

Mexican American and Anglo American subjects were recruited from various resources within the Denton and Dallas-Fort Worth areas. These included, newspaper advertisements in the Dallas Morning News (a large newspaper distributed in the areas mentioned above) and the University of North Texas newsletter; letters sent (English version: Appendix F and Spanish version: Appendix G) and phone calls
made to parents of children who attended Dallas school district high schools (with the permission of the Dallas school district); and mothers attending educational tapes at Women Infants and Children (W.I.C.) in Denton county (described below).

Most of these subjects (over 80%) were recruited from two W.I.C. offices in Denton County (a small town near the city of Dallas). W.I.C. is a government funded organization which provides prenatal and postnatal care and education to indigent mothers receiving food stamps. Although income level and occupation type across countries are difficult to compare (as explained earlier), the economic, educational, and occupational status of these women were relatively comparable to those of the Mexican women who participated in this study.

Data Collection

Subjects were informed (either by letter, phone, or in person at W.I.C. and the Red Cross in Mexico) that a survey of people's general headache, pain experience, and behavior would be conducted whereby subjects would be asked to complete a questionnaire in an individual interview led by this researcher, a University of North Texas graduate student. All subjects were first asked to read and sign a consent form (English version: Appendix H and Spanish version: Appendix I) and were briefed about the confidentiality of their responses on the questionnaires.
Because of time constraints, many subjects at W.I.C. were given the questionnaires while they were waiting for the educational tape sessions to begin. They were completed by subjects, in the presence and with the assistance of this researcher, but not in an individual interview setting.

All subjects were informed that participation in this study would offer them the opportunity to register, on a voluntary basis, for a free stress management and relaxation therapy session conducted by the author of this proposal. These sessions would be available for two hours, at least twice a week, for consecutive weeks following completion of questionnaires. Subjects were then asked to indicate if they wanted to participate in the stress management sessions offered following the completion of questionnaires. Subjects were also asked if they wanted a copy of the results sent to them. If so, their name and address was placed on a mailing list. All questionnaires were number-coded and placed in a locked file after completion in order to secure subject confidentiality.

Data Analysis Plan

Preliminary Analyses

Several preliminary analyses were conducted. First, a series of analyses were performed to verify that the assumptions of Multivariate Analysis of Variance (MANOVA) were met; namely, a test of multicollinearity between dependent variables, a test of multivariate normality, a
test of the homogeneity of variance-covariance matrices, and outliers were identified and removed from subsequent analyses. Second, analyses were conducted to provide information about the medical and demographic characteristics of the study population, including the possible contribution of these characteristics to differences found between groups on pain measures. Fourth, an analysis was executed to obtain information about differences between groups on acculturation level. Lastly, correlations between dependent variables were also conducted to provide information about how related these measures were to each other.

Also prior to analysis, the possibility of covariation between demographic variables and dependent variables was analyzed. Correlations among income, health of subjects, number of years lived in U.S.A. and/or Mexico, cultural identity, acculturation level, age and education level were examined separately to provide information about their relative contribution to scores on the dependent pain measures. The independent variables were cultural group and gender. The dependent variables were: pain experience (sensory, cognitive, and evaluative) and pain behavior as measured by: medication type, dosage, and frequency of use.
Hypothesis Testing

Because males were not included in this study, the hypotheses to be tested were modified from the original version. This study tested the following hypotheses:

Hypothesis 1, main effects for cultural group (Mexican/Mexican American/Anglo American): The groups' MPQ, Box Scale, HPD, and HQ scores and medication dosage and frequency will follow a linear ordering such that Mexicans would obtain the highest scores, Mexican Americans lower, and Anglo Americans lowest.

Hypothesis 2, main effects for acculturation levels (Very "Mexican/Spanish", "Mexican-oriented bicultural", "Equal, true syntonic bicultural", "Anglo-oriented bicultural", and "Very Anglicized"): the levels' MPQ, Box Scale, HPD, and HQ scores were expected to follow a linear ordering such that "Very Mexican/Spanish" women would be greatest, "Equal, true, syntonic bicultural" lower, and "Very Anglicized" lowest. Based on the validity of the ARSMA and previous research (Cuellar et al., 1980), acculturation levels were expected to be high for the Anglo group, lower for the Mexican American group, and lowest for the Mexican group.

Two multivariate analyses of variance were conducted to test the null hypothesis that no differences existed between a) the three cultural groups and b) five levels of acculturation on pain experience and behavior. The independent variable for the first MANOVA was cultural group
[Mexican (Mex), Mexican American (M-A), and Anglo American (A-A)], and level of acculturation for the second MANOVA ("Very Mexican/Spanish", "Equal, true syntonic bicultural", and "Very Anglicized"). In all cases, the dependent variables were pain experience operationalized by the McGill Pain Questionnaire (MPQ: MPQmiscellaneous, MPQsensory, MPQaffective, MPQevaluative, NWC (number of words chosen), the Headache Pain Drawing (HPD: HPDareas, HPDmarks), the Boxscale (BOX) and pain behavior operationalized by a) number of medication taken to relieve headache pain (TOTmeds), and b) total dosage and frequency of use (dosage x frequency = TOTdosage).

A discriminant function analysis was conducted to determine 1) which pairs of groups differed on the dependent variables (discriminant function analysis) and 2) how the groups differed from each other, that is, which of the pain measures contributed most to group differences (canonical discriminant function). Similarly, discriminant analyses were conducted for acculturation level.

Ancillary Analyses

Ancillary analyses were conducted to obtain information about differences between cultural groups on a) the five dimensions of the Acculturation Rating Scale for Mexican-Americans (ARSMA) and b) items of the headache pain questionnaire (HPQ). In addition, ancillary analyses were conducted to compare differences on demographic variables
and scores on the dependent variables among those M-A who chose the Spanish version of the questionnaire and those who chose the English version.
CHAPTER III

RESULTS

This section presents the results, obtained using various SPSS\textsuperscript{x} programs, of analyses conducted to determine differences on pain experience and pain behavior among women who identify themselves as belonging to a distinct cultural group and who have achieved varying levels of acculturation.

First presented are preliminary analyses to examine a) the accuracy of data entry and missing values, b) the degree to which the assumptions of Multivariate Analysis of Variance (MANOVA) were met, c) correlations among demographic variables and pain measures, d) cultural group differences on demographic and medical characteristics, and e) differences between cultural groups on acculturation level. Gender, originally considered as an independent variable, was dropped from the analysis due to an insufficient number of male subjects obtained in the Mexican American and Anglo American groups.

Hypothesis tests and post-hoc tests were conducted to examine differences on the dependent pain experience and pain behavior measures among women who affiliated themselves to one of three cultural groups (Mexican, Mexican American or Anglo American) and differences among women who had achieved one of three distinct levels of acculturation.
("Very Mexican/Spanish", "Equal, true, syntonic bicultural" or "Very Anglicized"). First presented were analyses on cultural groups, followed by analyses on acculturation level.

The null hypothesis that no differences exist between Mexican, Mexican American and Anglo American women on pain experience and pain behavior was tested. A MANOVA of the three cultural groups (Mexican = Mex; Mexican-American = M-A; Anglo-American = A-A) on the dependent pain experience variables [McGill Pain Questionnaire (MPQ): MPQsensory, MPQaffective, MPQevaluative, MPQmiscellaneous, NWC; Box Scale (BOX); Headache Pain Drawing (HPD): HPDareas and HPDmarks] and dependent pain behavior variables [number of medications used to relieve headaches (TOTmeds); total dosage and frequency of medication used (TOTdosage)].

To determine which pain measures contributed most to differences among women in the different cultural groups and to determine the relative contributions of pain experience and pain behavior to differences that exist between these groups of women, post-hoc discriminant function analyses were conducted.

As with cultural groups, a MANOVA was used to test the null hypothesis that no differences exist between the three levels of acculturation ("Very Mexican/Spanish", "Equal, true, syntonic bicultural" and "Very Anglicized") on dependent pain variables. Similarly, post-hoc discriminant
analyses were used to determine which pain measures contributed most to differences among women who attained distinct levels of acculturation and to determine the relative contributions of pain experience and behavior to differences that exist among these groups of women.

Several ancillary analyses were conducted. First, ancillary analyses were conducted to examine differences between cultural groups of women on five dimensions of the Acculturation Rating Scale for Mexican-Americans (ARSMA). Second, ancillary analyses were conducted to determine differences between cultural groups on the following items of the Headache Pain Questionnaire: severity of headaches (HAseverity), perceived cause of headaches (HAcause), type of headaches experienced (HAtype), whether or not subjects took medication to relieve headaches (HAMeds), and type of medication taken to relieve headaches (TYPEmeds). Third, ancillary analyses were conducted to determine demographic characteristics and differences on pain measure scores among M-A women who chose the Spanish version of the questionnaire and those women who chose the English version.

Preliminary Analyses

This section presents several preliminary analyses. First, accuracy of data entry and missing values were analyzed. Second, a series of analyses were performed to verify that the assumptions of MANOVA were met. Third, correlations among demographic and dependent measures were
examined. Fourth, analyses were conducted to provide information about the medical and demographic characteristics of the study population, including the possible contribution of these characteristics to results found between groups on pain measures. Fifth, an analysis was executed to obtain information about differences between cultural groups on acculturation level.

Data Checking

Prior to analysis, accuracy of data entry and missing values were analyzed. All 137 participants completed all measures and thus, no participants were removed from the analyses due to missing data.

Testing Assumptions of MANOVA

Preliminary analyses were conducted to determine the degree to which the assumptions of MANOVA were met; namely, a test of univariate and multivariate normality, correlations among dependent variables, a test of multicollinearity between dependent variables, and a multivariate test for homogeneity of dispersion matrices. Several assumptions of the MANOVA were not met and transformation of data and removal of outliers were considered. These analyses on the assumptions of the MANOVA were conducted again after a) transformation of data and b) removal of outliers.
Assumption of Univariate Normality

First, the assumption of univariate normality was examined to determine the degree to which multivariate normality was met, because if the dependent variables are each not normally distributed within each cultural group, they cannot be multivariately normal. Several indicators of univariate normality were considered. These included univariate statistics such as kurtosis values, skewness values, and the Kolmogorov-Smirnov statistic (with a Lilliefors significance level for testing normality) as well as visual indicators such as stem and leaf plots and normal probability and detrended probability plots. These indicators showed that women's MPQSensory and MPQmiscellaneous scores best met the assumptions of univariate normality for all groups, with MPQaffective departing slightly from normality within two of the cultural groups of women, MPQ-NWC and Box Scale within one of the cultural groups of women, and the remaining variables departing considerably from normality (see Table 1, Appendix K).

Transformation of data. As is common practice (Tabachnick & Fidell, 1989; p. 83-87), several transformations of the dependent variables not meeting univariate normality assumptions were conducted (see Appendix J for codes used in transformations). The results of the transformations were minimally helpful on some of the
variables and did not help at all on others. That is, transformed data did not improve the distribution of dependent variables (see Table 2, Appendix K). Because of the borderline results, it was determined that the transformations would not be used, that is, the reduction in the ability to interpret the results of analyses conducted on transformed variables outweighed the small benefits gained by the transformations. In order to improve univariate normality, the identification and removal of outliers was considered (see section below on Analyses After Removal of Outliers for more details).

Correlations Among Dependent Variables

Second, correlations among dependent variables were also conducted to provide information about how related these measures are to each other. If the dependent variables are not somewhat correlated, separate univariate analyses are more appropriate. Results showed 44% of correlations between variables to be > .30. High correlations were found among MPQ variables (range of $r = .26$ to .73). This is consistent with other studies which found intercorrelations among MPQ factors to range from .64 to .81 (Turk et al., 1985; Melzack et al., 1981). Of particular interest are high correlations found among MPQaffective and MPQmiscellaneous ($r = .62$), MPQsensory and NWC ($r = .66$); MPQmiscellaneous and MPQsensory ($r = .62$), TOTdosage and TOTmeds ($r = .61$). Although these strong relations imply a
good deal of common variance (37 to 44%), there is still strong evidence that these variables are separate from each other and that they contribute unique variance (Table 3, Appendix K).

Results from this study also showed high correlation among all subsections of MPQ and the Box Scale (range of r = .26 to .44). HPDareas and HPDmarks (r = .46) were found to be highly correlated with each other. Furthermore, HPDareas was correlated with MPQsensory (r = .28) and negatively with TOTmeds (r = -.21). These results are consistent with other studies which found HPDareas scores to be related to MPQsensory and medication use (such as TOTmeds) and unrelated to measures of pain intensity and pain affect, such as MPQsensory and MPQaffective (Hildebrandt, Franz, Choroba-Mehnen, & Temme, 1988; Toomey, Gover, Jones, 1983).

Although these strong relations put into question whether these are distinct variables, it is clear that combining them would prevent a) clarification of the reasons for differences on pain measure scores between the three cultural groups and b) disregard findings in the literature which indicate that subtests of the MPQ vary between cultures (Bates et al., 1993; Greenwald, 1991; Thomas & Rose, 1991).

Assumption of Multicollinearity

Next, the assumption of multicollinearity was tested. Multicollinearity is desired in MANOVA because if the
dependent variables are not somewhat correlated, separate univariate analyses are more appropriate. Bartlett's test of sphericity tests the null hypothesis that the population correlation matrix of dependent variable correlations is the identity matrix. If the null is rejected, this indicates that the dependent variables are not independent of each other, and thus, MANOVA is an appropriate analysis. The results of Bartlett's test of sphericity indicated that the null hypothesis was, in fact, rejected [Bartlett's Test (45) = 364, p < .0001]. Therefore, the assumption of multicollinearity was met.

**Multivariate Assumption of Homogeneity of Dispersion**

Finally, the assumption of homogeneity of dispersion was tested. This assumption is that the variance-covariance matrices are equal for the three groups. The null hypothesis of equal variance-covariance matrices is tested with Box's M test (a multivariate test for homogeneity of dispersion matrices). The results of Box's M test using the 137 participants and all 10 dependent variables indicated a statistically significant result [$F(110, 41980) = 2.95; p < .001$]. Thus, the results do not support the null hypothesis that the variance-covariance matrices are equivalent.

To determine the degree to which the assumptions were met, the determinant of the variance-covariance matrices, which is used as a measure of generalized variance, was examined for each group. The ratios of the determinants for
the three groups were 1:6:3,087. The sizable difference between the generalized variance in the third group, primarily, and the other two groups indicated extreme departure from the assumption of homogeneity of dispersion.

**Analyses After Removal of Outliers**

Because participant-outliers can have a large influence on the variance, univariate within-cell outliers were examined (Tabachnick & Fidell, 1989). Eight outliers were identified as having values more than 3 standard deviations from the mean on one or more dependent variables. K-S Lilliefors test of univariate normality, Bartlett's Test of multicollinearity, and Box's M for testing the assumption of multivariate homogeneity of dispersion were conducted on the 129 remaining participants.

The results of tests for the assumption of univariate normality after removal of the eight outliers were similar to those with all subjects. The results of Lilliefors showed that MPQsensory and MPQmiscellaneous best met the assumptions of univariate normality for all groups, with MPQaffective departing slightly from normality within two of the cultural groups, NWC and Box within one of the cultural groups, and the remaining variables departing considerably from normality (see Table 4, Appendix K).

Second, the results of the Bartlett's test of multicollinearity indicated that the MANOVA assumption of
multicollinearity was met [Bartlett's Test (45) = 467 $p < .0001$].

Third, multivariate analysis of homogeneity of dispersion (Box's M test) indicated a statistically significant result [$F(110, 37638) = 1.82; p < .001$]. Thus, the results still did not support the null hypothesis that the variance-covariance matrices are equivalent for the three groups. However, an examination of the ratios of the determinants of the three matrices revealed that the differences between the measures of generalized variance were greatly reduced (1:2:26) when compared to the previous analysis that included the outliers.

Thus, eliminating the 8 subjects who were identified as univariate outliers considerably reduced the differences between the dispersion of the three groups. For this reason, the remaining analyses were conducted on the 129 non-outlier participants and the 8 univariate outliers were dropped. The removal of within-cell outliers reduced the total size of the Mex group from 45 to 43, the size of the M-A group from 38 to 36, and the size of the A-A group from 54 to 50. In order to understand how the eight outliers differed from other subjects, descriptive statistics and t-tests on the demographic variables for the eight outliers were performed and compared to the demographic variables of the rest of the sample.
First, means on demographic variables of outliers for each group were compared to non-outliers demographics of that same group (e.g., Mex outliers were compared to Mex non-outliers). Results revealed that the outliers fell within the range of mean and standard deviations observed in demographic variables for the appropriate group. Thus, based on these results, the demographic characteristics of these outliers cannot explain their existence (see Table 5, Appendix K). Second, t tests compared outlier demographic variables (n = 8) to non-outlier demographics (n = 129). No significant differences were found for any of the demographic variables (see Table 6, Appendix K).

Another possible explanation for the existence of these outliers is that, as with most tests, the pain measures used are designed to best measure individuals within a reasonable normal range accurately and they do not accurately measure data outside of this normal range. In addition, one would expect that, with a large enough sample size, outliers will exist due to chance alone. Finally, pain experience is a volatile subject, and one could expect to find extremists simply because of individual differences in how people experience pain. Some people may be prone to exaggerate their pain more than others, to experience pain more intensely, or some may have learned that there are secondary gains to exaggerating their pain experience.
As described above, removal of outliers improved the homogeneity of variance-covariance dispersion, but variance-covariance matrices between groups were still significantly dispersed and distributions were not normally distributed in each group; therefore, the possibility of statistical alpha error must be addressed.

Fortunately, the possibility of alpha-error is reduced by a) having fairly equal group sample sizes (43, 36, 50) and b) the larger variance is within the cultural group with a larger sample size. Even so, in order to ascertain that differences between groups are due to actual differences on pain measure scores and not to a liberal test statistic, a more conservative alpha-level of .01 was used for determining significant differences.

**Correlations Among Demographic and Dependent Variables**

The possibility of covariation between demographic variables and dependent variables was analyzed. Correlations among women's income, health, number of years lived in U.S.A. and/or Mexico, cultural identity, acculturation level, age and education level were examined separately to provide information about their relative contribution to scores on the dependent pain measures.

Results revealed that correlations among women's demographic variables and their dependent measures were < .30. This was true for 80% of pain behavior and pain experience variables. Since these variables shared less
than 9% percent of their variance, they were considered to be independent of each other and to contribute minimally to differences among cultural groups on pain measures. However, higher correlations were found between women's total number of medication taken for headaches (TOTmeds) and their age ($r = .43$) and TOTmeds and women's income ($r = .35$). These stronger correlations imply that women's age and income level may be in some way related to group scores on this pain behavior measure (see Table 7, Appendix K).

As hypothesized, as women's affiliation toward the Mexican culture increased, their willingness to express pain also increased. That is, negative correlations were found between women's willingness to express pain (NWC) and their generation level (based on the country of birth of subjects, their parents, and grandparents), acculturation level (based on total scores on the ARSMA; high values indicate affiliation with A-A), and ethnic identity (based on women's self-identification with a cultural group).

**Cultural Group Differences on Acculturation Level**

Analyses were also conducted to determine whether there were significant differences between women who identified with a particular cultural group and their achieved level of acculturation. There were indeed significant differences between cultural groups on how acculturated they were to the Anglo American culture [$\chi^2(4) = 171, p < .001$]. More specifically, all Mex women (100%) and all A-A women (100%)
obtained scores indicating they were affiliated with the "Very Mexican/Spanish" and "Very Anglicized", respectively. As expected, more variability was observed among the M-A women, with 53% perceiving themselves as affiliated with "Very Mexican/Spanish" and 47% with "Equal, true, syntonic bicultural".

These results indicated that M-A women tended to either have a mixed affiliation with Mexican and Anglo American cultures or to be more affiliated with those attitudes, beliefs, and/or behaviors which are characteristic of the Mexican culture. It was also clear from these results that M-A women did not perceive themselves as affiliated with the purely Anglo American culture.

**Cultural Group Differences on Demographic and Medical Characteristics of the Study Population**

Finally, descriptive statistics and significance tests on demographic and medical characteristics of subjects in each cultural group were examined. Frequency, mean values, and significance tests on women's demographic characteristics are shown in Table 8 and Table 9 (Appendix K). Frequency, mean values, and significance tests for medical characteristics of women in this study are shown in Table 10 (Appendix K).

**Demographic Characteristics of the Study Population**

First described are women's demographic characteristics. ANOVAs and Chi-Square tests were conducted to compare
demographic and medical traits of the study population. No significant differences were found for women's income and type of occupation. However, significant differences were found between groups of women on several other demographic variables, some of which differences were expected and others which were not.

It was anticipated that the women in this study would differ on generation level, ethnic identity, number of years they resided in the U.S.A. and/or Mexico. Indeed, significant differences were found on women's generation level [$\chi^2(3) = 123$, $p < .0001$]. Not surprisingly, the greatest variability for generation level occurred among the M-A women. These three groups of culturally diverse women also differed on their ethnic identity [$\chi^2(3) = 165$, $p < .0001$]; number of years resided in U.S.A. [$F(2,126) = 143$, $p < .0001$] and/or number of years resided in Mexico [$F(2,126) = 258$, $p < .0001$].

These results are not surprising, given that there would be variability among the three cultural groups of women on all these demographic variables. That is, two of the cultural groups, M-A and A-A, are more likely to a) belong to a more advanced generation level, and b) identify themselves more with the Anglo American culture, c) have lived in the USA longer than Mex, and d) have been educated in the U.S.A.
It was not however predicted that women in this study would differ on marital status, age, and education level. Unfortunately, the women did significantly differ on these three variables: marital status $[\chi^2(10) = 25, p < .01]$; age $[F(2,126) = 8.9, p < .001]$; and on education level $[\chi^2(4) = 45.6, p < .0001]$. More specifically, education level between groups of women indicated that 44% of Mex women, 36% of M-A women and 0% of A-A women had a grade school education; 42% of Mex women, 47% of M-A women, and 70% of A-A women had middle school education; 14% of Mex women, 17% of M-A women, and 30% of A-A women had post-high school education.

Medical Characteristics of the Study Population

To determine whether the women in this study differed on headache characteristics, headache pain location and pain duration were analyzed. Although women did not differ in their reports of pain location $[\chi^2(10) = 15.8, p = .10]$, they did differ in the length of time they experienced their headaches $[\chi^2(12) = 30.5, p < .01]$. Most of the Mex women (42%) and A-A women (48%) reported their headaches as lasting 4 hours to 24 hours. The greatest variability was found among the M-A women, with 28% reporting their headaches as lasting 30 minutes to 4 hours, 22% stated they lasted 24 to 72 hours.

Furthermore, women's perceived health was also assessed. Significant differences were found on whether women
perceived themselves to be healthy \( \chi^2(2) = 25, p < .0001 \), even though they reported not having any major medical illness (which, as described earlier, was an inclusion criterion for subject participation in this study).

Hypothesis Testing

Two multivariate analyses of variance were conducted to test the null hypothesis that no differences existed on pain experience and pain behavior among a) the three cultural groups of women and b) women who had achieved one of three distinct levels of acculturation. The independent variable for the first MANOVA was cultural group [Mexican (Mex), Mexican-American (M-A), and Anglo-American (A-A)] and level of acculturation for the second MANOVA ("Very Mexican/Spanish", "Mexican-oriented bicultural", "Equal, true syntonic bicultural", "Anglo-oriented bicultural", and "Very Anglicized"). In all cases, the dependent variables were pain experience operationalized by the McGill Pain Questionnaire (MPQ: MPQmiscellaneous, MPQsensory, MPQaffective, MPQevaluative, NWC (number of words chosen), the Headache Pain Drawing (HPD: HPDareas, HPDmarks), the Box Scale and pain behavior operationalized by a) number of medication taken to relieve headache pain (TOTmeds), and b) total dosage and frequency of use (dosage x frequency = TOTdosage).
MANOVA for Cultural Group Differences on All Pain Measures

Mexican, Mexican American and Anglo American women significantly differed in their experience and response to chronic headaches. The results of the primary MANOVA analysis which tested the null hypothesis of no difference among the three cultural groups on the 10 dependent pain variables (8 measures of pain experience and 2 measures of pain behavior), indicated that the three groups of women significantly differed on the set of dependent pain measures \([F(20, 236) = 4.52 \ p < .001]\). Thus, affiliation with a cultural group was related to headache pain experience and behavior.

Univariate MANOVA. Differences between cultural groups on scores obtained on all ten pain measures were further analyzed by review of univariate MANOVA results. Results indicated that Mexican, Mexican American and Anglo American women significantly differed in their pain experience (pain intensity, affect, and spatial distribution of pain sensation) and pain behavior (total number of medication taken for headaches). That is, univariate MANOVA results showed significant differences between groups for NWC, MPQaffective, BOX, HPDareas, and TOTmeds \([F(2, 126) = 13.5, 5.6, 4.7, 4.8, \text{ and } 9.2, \text{ respectively, } \ p < .01]\).

Mean scores. Mean scores on all pain measures were also analyzed. Only those patterns of differences between groups of women on mean scores with significant F-tests are
presented here. As described above and shown in Figure 1 (Appendix L) and Table 11 (Appendix K), the Mex, M-A and A-A women significantly differed on only five of the ten pain measures.

The Mexican women obtained the highest mean scores on all five measures of pain, except for HPDareas (a measure of the spatial distribution of pain sensation). More specifically, the hypothesized order (Mex women obtaining the highest mean scores on dependent measures, M-A women lower, and A-A women lowest) occurred with only two of these five pain measures (NWC and MPQaffective). However, the difference between mean scores for M-A women (X = 5.4) and A-A women (X = 5.2) on MPQaffective was very small, leaving only NWC as the pain measure occurring in the predicted manner. Mean scores for TOTmeds and BOX followed a pattern, similar to that seen with MPQaffective, in which M-A and A-A women obtained similar scores and Mex women the highest scores.

Surprisingly, A-A women obtained the highest mean score on HPDareas, Mex and M-A women obtained the same mean scores on this measure of pain sensation.

To summarize, the three cultural groups of women did indeed significantly differ in their pain experience and behavior. The Mex women clearly differed more from the other two groups of women in their pain experience and behavior. In fact, despite the acculturation issue, M-A and A-A women scored very similarly on sensory and affective
aspects of pain experience as well as on pain behavior. The hypothesized order with Mex women averaging highest, M-A lower, and A-A lowest occurred only with the expressive aspect of the pain experience, NWC, and not with any pain behavior measures. Interestingly, A-A women obtained the highest mean score on HPDareas, a measure of pain sensation, with M-A women scoring lower and Mex women lowest.

Post-hoc Analyses of Cultural Group and All Pain Measures

In order to determine which pairs of groups of culturally diverse women differed on the dependent variables (discriminant function analysis) and how these groups of women differed from each other, that is, which of the pain measures contributed most to group differences (canonical discriminant function), a discriminant function analysis was conducted.

The discriminant function analysis creates a function composed of a linear combination of all pain experience dependent variables and pain behavior dependent variables that maximally separates the three cultural groups. In all analyses where discriminant were analyses performed and discriminant functions produced, none of the functions were rotated.

Canonical Discriminant Functions

In order to determine which pain measures best separated the three groups of women and whether pain measure scores could be used as predictors of women's cultural group
affiliation, two canonical discriminant functions were produced by the analysis but only the first, which accounted for the greatest percentage of variance, was considered for interpretation of results.

The first discriminant function, with an eigenvalue of .89, accounted for 91% of the variance [Wilks Lambda = .48, p < .001]. The second discriminant function produced an eigenvalue of .09 and accounted for only 9% of the variance. Therefore, only results from the first function are described below.

First, the discriminant function analysis used pain measures as predictors of cultural group membership (Mex, M-A, and A-A). Results indicated that Mex women differed significantly on pain measures from M-A women (F(8, 117) = 4.82; p < .001] and A-A [F(8, 117) = 10.14; p < .001], but that M-A and A-A women did not differ significantly [F(8,117) = 1.81; p = .07). Thus, two of the three pairs of cultural groups differed on the dependent pain measures. These results are consistent with those described above on mean scores and univariate F tests in which M-A and A-A women were similar to each other.

In order to determine whether the three groups of women were indeed separate from each other and that their pain scores followed a linear relationship, with Mex women highest, M-A women lower, and A-A women lowest, a canonical discriminant function evaluated at group means was
conducted. Results indicated that the women in the three cultural groups were indeed distinct groups which differed from each other on pain measures in the linear order described above. Mex women had a discriminant function value of 1.26, M-A women had a discriminant function value of -.25 and A-A women had a discriminant function value of -.91.

The two methods recommended to interpret the discriminant function are 1) examination of the standardized canonical discriminant function coefficients, which may be interpreted analogously to beta coefficients in multiple regression, and 2) the structure coefficients, which are the pooled within-groups correlations between the pain measures and the canonical discriminant function (Cooley & Lohnes, 1971; Tabachnick & Fidell, 1989 p. 538). There is some disagreement about which of the two methods is best to interpret; therefore, both are presented here.

In order to a) provide a more cohesive presentation of the data from all analyses performed, and b) identify that method of interpreting the discriminant function which best represents patterns in the results of all the data, the results from the standardized canonical discriminant function coefficients and the pooled within-group correlations were compared to the univariate MANOVAs and group means for all pain measures, presented above.
To identify those pain variables which contributed the most to differences among Mex women, M-A women and A-A women, the standardized canonical discriminant function coefficients were analyzed. These three groups of women differed the most on their sensory pain experience (MPQsensory), their willingness to express pain (NWC) and on the total number of medication taken to relieve headaches (TOTmeds) (coefficients = 1.51, -.71, and .62, respectively). However, only NWC and TOTmeds were similar to the univariate MANOVAs for the three groups of women on all pain measures.

As with the standardized canonical discriminant analyses, the pooled within-groups correlations showed that Mex, M-A and A-A women differed significantly on their willingness to express pain (NWC) and the on the total number of medication they took to relieve headaches (coefficients: .49 and .38, respectively). Unlike the standardized canonical discriminant analyses, the pooled within-groups found that women in these three cultural groups significantly differed in their emotional experience of pain (MPQaffective coefficient = .31) but not in their sensory pain experience (MPQsensory). Although this analysis did not identify MPQsensory as one of the variables with high loadings, it did identify three variables which were also found to be significantly different by the univariate MANOVA.
Classification Results

The degree to which the first discriminant function was able to classify women into cultural groups based on their pain measure scores was also assessed and the results are presented here. The discriminant function classification procedure for the total sample used (129 cases) resulted in 65.12% of the women classified correctly into cultural group based on scores on pain experience and behavior measures.

However, there were substantial group differences in the accuracy of classification. In particular, 84% of Mex women, 42% of M-A women, and 66% of A-A women were correctly classified. Among Mex women, 12% were misclassified as M-A and 5% as A-A. In the M-A group of women, 22% were misclassified as Mex and 36% as A-A. For the A-A women, 8% were misclassified as Mex and 26% as M-A.

These results revealed a pattern in which a) both Mex and A-A women were correctly classified with greater accuracy than the M-A women, b) the Mex and A-A women were more often misclassified as M-A, and c) the M-A women were nearly equally often misclassified into the Mex and A-A groups of women. These results indicated that a) there was more cultural variability among M-A women than in the other two groups of women and b) that these pain measures could accurately classify subjects who affiliate themselves with the Mex or A-A culture.
Analyses for Pain Experience and Pain Behavior Alone

The next question addressed was how much of the overall difference found between groups of women was due to pain experience alone and to pain behavior alone. Two other MANOVAs and discriminant analyses, one with only pain experience scores and the other with only pain behavior measures, were conducted to identify the relative contribution each made to the overall differences between groups.

MANOVAs for pain experience alone and pain behavior alone

As with results for all ten pain measures, MANOVA results, using the Pillais criterion, indicated that a statistically significant difference between the three cultural groups is obtained on measures of pain experience alone, \[F(16, 240) = 4.58, p < .0001\] and pain behavior alone \[F(4, 252) = 5.98, p < .0001\]. Univariate MANOVA F-Tests indicated a significant difference between groups for HPDareas \[F(2, 126) = 4.8, p < .01\], Box Scale \[F(2, 126) = 4.7, p < .01\], MPQaffective \[F(2, 126) = 5.6, p < .01\], and NWC \[F(2, 126) = 13.5, p < .01\].

Post-hoc Analyses for Pain Experience Alone and Pain Behavior Alone

Discriminant function analyses. The results from the discriminant analysis for pain experience alone and pain behavior alone were analyzed. As with results for all measures of pain, results for pain experience alone
indicated that the two pairs of groups of women
significantly differed from each other at .01 alpha: Mex and
M-A, $F(8, 119) = 3.84, p < .0001$; and Mex and A-A, $F(8, 119) = 10.52, p < .0001$. Unlike results for all dependent
measures, M-A and A-A women also differed significantly at $p < .05 \ [F(8, 119) = 2.19 \ p < .03]$. However, for reasons
described earlier, the more conservative alpha-level of .01
was chosen to determine significant differences in this
study. Therefore, differences among M-A and A-A women on
pain experience measures will not be considered significant.

Differences between pairs of groups on pain behavior
measures also showed results similar to differences
described above in the analysis on all measures of pain.
That is, Mex women significantly differed from M-A women
$[F(2, 125) = 7.7, \ p < .001$ and A-A women, $[F(2, 125) = 10.2, \ p < .001$, respectively. For these pain behavior measures,
M-A and A-A women did not differ from each other.

Two canonical discriminant functions for each of the two
analyses were produced and, as with the analysis for all
dependent measures, the first function accounted for the
largest percent of the variance for both analyses and
therefore was used to analyze data. The first function for
analyses on pain experience, with an eigenvalue of .71,
accounted for 93% of the variance [Wilks Lambda (16) = .50, \ $p < .001$]. The first function for pain behavior analyses,
with an eigenvalue of .19, accounted for 93% of the variance [Wilks Lambda (4) = .80, p < .001].

In order to determine which pain experience measures and which pain behavior measures contributed the most to differences among women of three diverse cultural backgrounds, the two methods described above were used to interpret the canonical discriminant functions for pain experience alone and pain behavior alone.

First, the standardized canonical discriminant function coefficients for pain experience revealed similar results to those for all pain measures. That is, the three groups of women differed significantly on pain sensation (MPQsensory), on their willingness to express pain (NWC) and on their reports of the number of areas in which they experienced headaches (HPDareas) (coefficients .89, 1.6, .45, respectively).

Second, pooled within-groups correlations also indicated that Mex, M-A and A-A women differed the most on their willingness to express pain (NWC) (correlation = .54). However, in contrast to correlations on all pain measures, correlations for pain experience alone revealed that the three groups of women did not differ on the sensory qualities of pain experience (MPQsensory).

Consistent with findings from the discriminant analysis for all pain measures, the standardized canonical discriminant function coefficients and pooled-within group
correlations for pain behavior alone revealed that the three
groups of women differed the most on the total number of
medication they took for headaches (coefficient = 1.26;
correlation = .87).

Classification results. The discriminant function
classification procedure revealed great accuracy in
classification of cultural groups for pain experience, but
less so for pain behavior, and a pattern of classification
of groups for pain experience similar to that found in the
analysis for all measures of pain. Results revealed a
pattern similar to that found with all pain measures
included in the analysis, where Mex and A-A women were more
accurately classified than M-A women. Results for pain
experience alone indicated that 62% were correctly
classified, of these 84% were Mex women, 39% were M-A women,
and 60% were A-A women.

There are two outcomes from misclassification of women's
pain experience which are of interest. First, A-A women
were misclassified more often as M-A than as Mex. Second,
misclassifications for the M-A women occurred equally, with
30.6% in Mex and 30.6% in M-A; whereas both A-A and Mex
women were more accurately classified into their own group.

As with classification results for pain experience
alone and all measures, both Mex and A-A women were most
often misclassified as M-A on their pain behaviors. The
discriminant function classification procedure for pain
behavior resulted in 48% of the total sample used (129 cases) being correctly classified. Specifically, 56% Mex women, 67% M-A women, and 28% A-A women being correctly classified. Among Mex women, 35% were misclassified as M-A and 9.3% as A-A. The M-A women were fairly equally misclassified, with 14% misclassified as Mex and 19% as A-A. For the A-A group of women, 18% were misclassified as Mex and 54% as M-A.

MANOVA for Differences Among Acculturation Levels and All Pain Measures

To determine whether women in the five levels of acculturation differed significantly on pain experience and pain behavior a MANOVA analysis was conducted. The MANOVA tested the null hypothesis of no differences between acculturation level (Level 1 = "Very Mexican/Spanish"; Level 2 = "Mexican-oriented bicultural"; Level 3 = "Equal, true, syntonic bicultural"; Level 4 = "Anglo-oriented bicultural"; Level 5 = "Very Anglicized") on the 10 dependent variables (8 pain experience measures and 2 pain behavior measures). However, sample sizes within Level 2 and Level 3 were very small (n = 4 and 3, respectively) and the statistical interpretation of results would have been questionable. Therefore, Level 1 and 2 were combined with the "Equal, true, syntonic bicultural" group (n = 17). Sample sizes for the "Very Mexican" and the "Very Anglicized" women were n = 62 and n = 50, respectively. Although the sample size for
the "Equal, true, syntonic bicultural" group of women is relatively small, it considered appropriate [Feldt & Mahmoud, 1958; Winer, 1962. As Yates (1982, p. 193) wrote about unequal \( n \) 's:

"As long as individual [cell] \( n \) 's don't differ by, say, more than 10 to 15 percent of the average [cell] \( n \), analysis of variance is OK [even] if you're doing more than a one-way analysis of variance...most computer packages will automatically take unequal \( n \) 's into account. At the worst you'll lose a little sensitivity to the significance of manipulation effects."

Results indicated that the women identified as pertaining to one of the three acculturation levels (Level 1 = "Very Mexican/Spanish", Level 2 = "Equal, true, syntonic bicultural", Level 3 = "Very Anglicized") significantly differed on the set of ten dependent variables \([F(20, 236) = 4.59, p < .0001]\). Thus, acculturation level influences headache pain experience and behavior.

**Post-hoc Analyses for Acculturation Level and All Pain Measures**

**Discriminant function analyses.** To determine which pairs of women in the three acculturation levels differed on the dependent variables, a canonical discriminant function analysis was conducted. Results were similar to those described earlier for discriminant analyses for the three culturally different groups of women on pain measures. That
is, the "Very Mexican/Spanish" women significantly differed from the "Equal, true, syntonic bicultural" women and the "Very Anglicized" women on how they experience and react to headache pain ($F(10, 117) = 5.34$ and $10.09$, $p < .0001$, respectively). The "Equal, true, syntonic bicultural" and "Very Anglicized" women did not significantly differ from each other. The discriminant analysis produced two canonical discriminant functions, but as with cultural groups, only the first was used for analysis because it accounted for 99% of the variance, whereas the second function accounted for only .07% of the variance.

It was important to determine which group of women with different levels of acculturation obtained higher scores on all pain measures. Results were consistent with those for women from varied cultural groups and their pain measure scores. The canonical discriminant function evaluated at group means revealed a linear relationship such that the women who perceived themselves as "Very Mexican/Spanish" obtained significantly higher scores on pain measures than the women in the other two levels of acculturation (group centroids = 1.03, -.96, and -.94, respectively). In addition, the "Equal, true, syntonic bicultural" and the "Very Anglicized" women were more similar to each other.

Results from the standardized canonical discriminant function coefficients for acculturation level were similar to those from the standardized discriminant function which
compared women from three cultural groups on all pain measures. That is, women who achieved differing levels of acculturation also differed in their experience of pain intensity, in their willingness to express pain, and in the total number of medication they took for headaches (NWC, MPQsensory, and TOTmeds, respectively: coefficients = 1.55, -1.25, and .34 respectively).

Results from the pooled within-groups correlation coefficients on all pain measures for women in either of the three levels of acculturation were similar to those for the three groups of culturally different women. Pooled within-groups correlations between discriminating variables and canonical discriminant functions indicated that women who have achieved different levels of acculturation differ in a) their emotional experience of pain, b) in their willingness to express pain, and c) in the total number of medication they take for headaches (NWC, MPQaffective and TOTmeds: correlations = .39, .31, .23, respectively).

Classification for acculturation level and all pain measures. The degree to which the discriminant function was able to classify subjects into three types of acculturation based on the ten pain measures was also assessed and the results are presented here. The discriminant function classification procedure for the total sample used (129 cases) resulted in 68.22% of the subjects classified correctly into acculturation group based on scores on pain
experience and pain behavior measures. In particular, 84% of "Very Mexican/Spanish" women, 59% of "Equal, true, syntonic bicultural" women, and 52% of "Very Anglicized" women were correctly classified. Among the "Very Mexican/Spanish" women, a higher percentage of subjects was misclassified as "Very Anglicized" than as "Equal, true, syntonic bicultural". For the "Equal, true, syntonic bicultural" women, 18% were misclassified as "Very Mexican/Spanish" and 24% as "Very Anglicized". Of the "Very Anglicized" women, 16% were misclassified as "Very Mexican/Spanish" and 32% as "Equal, true, syntonic bicultural".

These results indicated that a) the "Very Mexican/Spanish" women are clearly different from the other two groups of women, b) there is more variability in the "Equal, true, syntonic bicultural" women and that these women are about equally misclassified as either "Very Mexican/Spanish" or "Equal, true, syntonic bicultural", and c) the "Very Anglicized" women are more similar to the latter. These results also indicate a strong similarity on pain measure scores among women who identified themselves as belonging to a particular and their achieved level of acculturation. Finally, women who identified themselves to belong to a particular cultural group have internalized those attitudes, beliefs and behaviors which are characteristic of that cultural group.
Univariate MANOVAs and mean scores on all dependent measures for acculturation levels. As with results from univariate MANOVAs and mean scores on the ten dependent variables for the women in the three cultural groups, results from univariate MANOVAs among women with different levels of acculturation, shown in Figure 2 (Appendix L) and Table 12 (Appendix K), significantly differed in their emotional experience of pain (MPQaffective), their willingness to express pain (NWC), and on the number of areas in which they experienced headaches (HPDareas). In contrast to cultural group differences on all pain variables, women with different levels of acculturation did not significantly differ on the intensity with which they experienced pain (Box Scale).

However, as with cultural groups, these women's pain scores occurred in the predicted order only on NWC, a measure of their willingness to express pain. The "Very Mexican/Spanish" women scored highest on NWC, the "Equal, true, syntonic bicultural" women higher, and "Very Anglicized" women lowest. Another pattern similar to cultural groups was observed in which the "Very Anglicized" women obtained the highest mean scores on HPDareas.

MANOVAs for Pain Experience Alone and Pain Behavior Alone on Acculturation Levels

To identify the relative contribution pain experience alone and pain behavior alone made to the overall
differences among women who attained one of the three levels of acculturation, two other MANOVAs and discriminant analyses, one with only pain experience scores and the other with only pain behavior measures were conducted. MANOVA results, using the Pillais criterion, indicated a statistical difference between the differently acculturated women on measures of pain experience, \( F(16, 240) = 5.58, p < .0001 \) and on measures of pain behavior \( F(4, 252) = 3.60, p < .007 \).

**Post-hoc Analyses for Pain Experience alone and Pain Behavior Alone on Acculturation Levels**

The results from the discriminant analysis for pain experience scores among the pairs of women who attained different levels of acculturation resulted in findings similar to those described for all ten pain measures. Significant differences were found only between "Very Mexican/Spanish" women and "Equal, true, syntonic bicultural" women \( F(8, 119) = 6.43, p < .0001 \) and between "Very Mexican/Spanish" women and "Very Anglicized" women \( F(8, 119) = 11.96, p < .0001 \). However, differences between pairs of acculturation types on pain behavior measures showed that the only significant difference occurred between the "Very Mexican" women and the "Very Anglicized" women \( F(2, 125) = 6.73, p < .002 \).
Discriminant function analyses for pain experience alone. In order to determine which pain experience measures contributed the most to differences among women belonging to one of the three acculturation levels, the standardized canonical discriminant function was produced. Results were very similar to those which compared groups of culturally different women on pain experience alone. Coefficients for pain experience revealed that women with varied acculturation levels are significantly different in their willingness to express pain (NWC = 1.6) and in their sensory experience of pain (MPQsensory = -1.3).

Results from pooled within-groups correlations between discriminating variables and canonical discriminant functions were also similar to those for cultural groups and pain experience alone. Results indicated that acculturation level among the women in this study was related to their emotional experience of pain (MPQaffective) and their willingness to express pain (MPQaffective, coefficient = .41) and NWC, coefficient = -.32).

Discriminant function analyses for pain behavior alone. As for pain behavior, the standardized canonical discriminant function coefficients and pooled within-group correlations also revealed similar results to those comparing women from the three cultural groups. That is, women who achieved distinct levels of acculturation differed the most in the total number of medication they took to
relieve chronic headache pain (TOTmeds coefficient = 1.29; TOTmeds correlation = .67).

**Classification for pain experience alone.** The discriminant function classification procedure, for the total sample used (129 cases), resulted in 66% of women correctly classified for pain experience. In particular, 81% of "Very Mexican/Spanish" women, 59% of "Equal, true, syntonic bicultural" women, and 50% of "Very Anglicized" women were correctly classified. Misclassifications results were similar to those for all pain measures (see section above).

**Classification for pain behavior alone.** The discriminant function classification procedure for pain behavior resulted in 42% of the total sample used (129 cases) being correctly classified. Specifically, 50% of "Very Mexican/Spanish" women, 53% of "Equal, true, syntonic bicultural" women, and 28% of "Very Anglicized" women being correctly classified. As with results for all measures on cultural group and acculturation level, results for pain behavior alone indicate that there is greater variability in the middle group of women ("Equal, true, syntonic bicultural") and that this group is most similar to "Very Anglicized" women than to "Very Mexican/Spanish" women. In addition, the "Very Mexican/Spanish" women were more similar to the "Equal, true, syntonic bicultural" women than they were to the "Very Anglicized" women.
Summary

In summary, analyses of cultural group and acculturation level on pain measures revealed some similarities. Women who identified themselves as belonging to one of three cultural group or acculturation level significantly differed on similar pain measures. It was interesting to find that Mex and "Very Mexican/Spanish" women obtained similar scores on most pain measures. The same was true for M-A and "Equal, true, syntonic bicultural" women, and A-A and "Very Anglicized" women.

Pain measure scores were reviewed to find whether there existed a particular order (highest, lower, lowest) on scores for all ten pain measures among women who identified themselves with one of three cultural groups and among women who had achieved different levels of acculturation. This linear order occurred with only one pain measure which assesses people's willingness to express their pain experience. The Mex ("Very Mexican/Spanish") women were significantly more willing to express their pain experience, M-A ("Equal, true, syntonic bicultural") women less so, and the A-A ("Very Anglicized") were the least.

Furthermore, as with results described for the Anglo American women, the "Very Anglicized" women obtained the highest scores on HPDareas, a pain experience measure which assesses the number of areas in which someone senses pain.
More variability was observed in the M-A and "Equal, true, syntonic bicultural" on pain measure scores and on classification results. Results showed that M-A ("Very Mexican/Spanish") women perceived themselves as affiliated with those attitudes, beliefs, and/or behaviors characteristic of the Anglo American culture, and not with the Mexican culture.

Correlations Among Acculturation Level and Pain Measures

Further confirmation that "Very Mexican/Spanish" women are more emotional in their experience of chronic headache pain, are more willing to express pain, and take more medication to relieve their headaches was obtained from correlations of acculturation level and pain measures (see Table 13, Appendix K).

As expected, the "Very Mexican/Spanish" women were more emotional in their experience of headaches, were more expressive and took more medication for their headaches. That is, low scores on the acculturation scale, which are associated with being "Very Mexican/Spanish", were correlated with high scores on MPQaffective, MPQ-NWC, and TOTmeds.

In addition, as was found in the results from analyses on cultural group differences on pain measures, only one pain measure, HPDareas was found to be negatively correlated with level of acculturation. This indicates that the "Very
Anglicized" women reported more areas in which they experienced headache pain.

Ancillary Analyses

Ancillary analyses were conducted to obtain information about differences between cultural groups on a) the five dimensions of the Acculturation Rating Scale for Mexican-Americans (ARSMA) and b) items of the headache pain questionnaire (HPQ). In addition, ancillary analyses were conducted to compare differences on demographic variables and scores on the dependent variables between those M-A who chose the Spanish version of the questionnaire and those who chose the English version.

ARSMA Dimensions

First presented are results from analyses providing information about how the three cultural groups differed on the following five dimensions of the ARSMA: 1) Language familiarity and usage: intra-family (in the home), 2) Language familiarity and usage: extra-family (outside the home), 3) Ethnic pride and identity, 4) Cultural heritage and knowledge, and 5) Ethnic and social interactions.

A summary of descriptive statistics on the five acculturation dimensions and cultural group are described in Table 14 (Appendix K). As MANOVA results show, there was a statistically significant difference between the three groups of culturally diverse women and the five dimensions of the ARSMA \( F(10, 246) = 38.9, \ p < .001 \). In addition,
univariate MANOVA results show that all three cultural groups of women significantly differed on all five dimensions of the ARSMA. A pattern was found in which scores on all five dimensions of the acculturation scale were lowest for Mex women, lower for M-A women and highest for A-A women.

To determine the relative contribution of the five dimensions of acculturation to differences that exist among women who identified themselves as belonging to one of three cultural groups, a discriminant function analysis was conducted. Indeed, all three pairs of groups significantly differed from each other. More specifically, Mex women differed from M-A and A-A women \( [\mathbb{F}(5, 122) = 17.7, 185.6, p < .001] \); M-A and A-A women differed from each other \( [\mathbb{F}(5, 122) = 113.3, p < .001] \).

As with all canonical discriminant function analyses described above, only the first function shared a greater percentage (95%) of the variance than the second function produced; therefore, only results from the first function are presented. The canonical discriminant function evaluated at group means also revealed a linear relationship such that Mex women obtained the highest scores on all dimensions, M-A women lower, and A-A women lowest (group centroids: Mex = -2.8; M-A = -1.6, A-A = 3.6).

In order to determine which dimension of the ARSMA contributed the most to differences among women who
identified themselves with one of three cultural groups, a standardized canonical discriminant function coefficients and pooled within-groups correlations from the first function were analyzed. Results showed that the following two dimensions of the acculturation scale to be the greatest contributors to differences between cultural groups: Intra-family language familiarity and usage familiarity and usage (coefficients = .74; correlations = .82) and Ethnic pride and identity (coefficients = .84; correlations = .92).

Classification results indicated relatively high accuracy (86.1%) in the classification of subjects into their cultural group based on how they scored on the five dimensions of the ARSMA. In fact, 100% of Mex women and 100% of A-A women were correctly classified. However, results for M-A women showed that only 50% were correctly classified. In fact, 36% of the M-A women were misclassified as Mex women and 14% misclassified as A-A women.

Summary. In summary, results reveal that the three cultural groups significantly differ from each other on the five dimensions of the ARSMA. Ethnic pride and identity and Intra-family language familiarity and usage were the greatest contributors to group differences. Both Mex and A-A women were all correctly classified into their appropriate group. M-A women were not as accurately classified, with
the highest percentage of misclassification occurring toward
the Mexican culture.

**Cultural Group Differences on the Headache Pain Questionnaire**

The second ancillary analysis was conducted to determine differences between the three cultural groups on the following HPQ items: a) severity of headaches (HAseverity), b) cause of headache (HAcause), c) types of headaches subjects experienced (HAtype), d) whether they took medication to help with their headaches and e) types of medication taken to help with their headaches. The sample sizes for all of the HPQ items were very small, making interpretation of results of Chi-Squares questionable. Therefore, those categories with very small sample sizes were combined. In order to interpret these results, a more conservative alpha level of .01 was used to determine statistical differences (see Table 15, Appendix K).

This section first presents data and patterns of results for those HPQ items for which statistically significant differences on pain experience and behavior between cultural groups were obtained; namely, type of headache (HAtype), severity of headaches (HAseverity), and whether women took medication to relieve their headaches. Next, the rest of the HPQ items which were not significantly different, but which were of particular interest, were described.
There were significant differences on types of headaches (HAType) women of varying cultures experienced [$\chi^2(4) = 26.50, p < .001$]. The majority of women reported headaches as pulsating pain (53%), with Mex women having the highest percentage and A-A women the lowest (81% Mex, 47% M-A, 32% A-A). 33% of all women described headaches as pressing tightening pain, with A-A women having the highest percentage and Mex women the lowest (16% Mex, 27% M-A, 50% A-A). Stabbing pain was reported by 15% of the women, with A-A women having the highest percentage and Mex women the lowest (2.3% Mex, 25% M-A, 18% A-A).

Significant differences were also obtained on severity of headaches among women in the three cultural groups [$\chi^2(4) = 5.64, p < .01$]. Half (50%) of women in the three groups reported that headaches severely hindered daily activities, with Mex women having the highest percentage and A-A women the lowest (65% Mex, 44% M-A, 42% A-A). The other 50% of women reported headache pain to mildly hinder daily activities, with A-A women having the highest percentage and Mex women the lowest (35% Mex, 56% M-A, 58% A-A). In both cases, M-A women experienced headache pain similarly to A-A women.

Analyses of whether women took medication for their headaches revealed a significant difference between cultural groups [$\chi^2 (2) = 7.89, p < .02$]. 63% of the women stated they did take medication for their headaches, with Mex women
having the highest percentage and M-A women the lowest (42% Mex, 22.4% M-A, 35.8% A-A).

There were no significant differences between cultural groups in the types of medication they took to relieve their headaches or in the causes they attributed to their headache pain. 50.4% of the women used analgesics and 40% reported not using any medication for headaches. In addition, there were no significant differences between the three groups of women on cause of headaches (measured as due to stress, physiological reasons, both of these reasons or subject did not know the cause). Interestingly, 54% of the women across all groups reported that stress was the major contributor to their headache pain, 28% stated both stress and physiological causes for headaches, 13% stated only physiological reasons and 5% stated they did not know what caused their headaches.

Summary. In summary, as with results of cultural group and the pain measures described above, analyses of HPQ items indicated that pain experience and behavior for M-A and A-A women were similar to each other but different from Mex women. Mex women experienced their headache pain as severely hindering their daily activities. M-A and A-A women reported their headache pain as mildly hindering their daily activities. Furthermore, the terms pulsating pain best described Mex women's pain and pressing tightening pain best described M-A and A-A women's headache pain experience.
In addition, the majority of subjects reported taking medication to relieve their headache pain and most of these were Mex women.

**Differences Among M-A women Who Chose Different Language Versions of the Questionnaire: Demographic Variables, Dependent Variables, and Acculturation Level**

Finally, ancillary analyses were conducted to determine differences on demographic variables, on scores on the dependent variables, and on acculturation level among those M-A women who chose the Spanish version of the questionnaire ("Spanish") and those who chose the English version ("English").

First described are demographic characteristics and differences among these two groups on acculturation level (see Table 16, Appendix K). There were no significant differences between "Spanish" and "English" on income or whether subjects perceived themselves to be healthy. However, the two groups significantly differed on education level, generation level, and ethnic identity. The M-A women who chose the Spanish version of the questionnaire obtained significantly lower levels of education, were from lower generation levels, and identified themselves more as belonging to the Mexican cultural group than women who chose the English version of the questionnaire.

As mentioned earlier, these results are not surprising, given that those who chose the English version of the
questionnaire are more likely to a) have been educated in the U.S.A., b) belong to a more advanced generation level, and c) identify themselves more with the Anglo American culture than those who chose the Spanish version.

These two groups within the M-A women also differed significantly on acculturation level ($t = -9.2, p < .0001$), with women who chose the Spanish version of the questionnaire scoring lower than women who chose the English version on the acculturation scale. Thus, "Spanish" identify themselves more with being "Very Mexican/Spanish" and "English" with "Equal, true, syntonic bicultural".

Second, significant differences on all pain measures between those M-A women who chose the Spanish version and those who chose the English version of the questionnaire are presented (see Table 17 and Table 18, Appendix K). MPQsensory was the only measure for which a significant difference was found ($t = -3.0, p < .006$) between these two groups of M-A women. Surprisingly, "Spanish" women scored lower than "English" women on this measure of pain sensation. Although M-A women significantly differed in their emotional experience of pain (MPQaffective), they did so only at the .05 level of significance. For reasons described above, only alpha level of .01 is used to determine statistical difference.

Summary. To summarize, results of analyses of M-A women revealed significant differences on pain measure scores and
on acculturation level between those women who chose to complete the Spanish version of the questionnaire and those women who chose the English version on demographic characteristics. First, "Spanish" and "English" women differed on several demographic variables. The M-A women who chose the Spanish version of the questionnaire obtained significantly lower levels of education, were from lower generation levels, and identified themselves more as belonging to the Mexican cultural group. Second, "Spanish" women identified themselves as having beliefs, attitudes, and/or behaviors which are more affiliated with being "Very Mexican/Spanish". On the other hand, "English" women perceived themselves as having those characteristics more associated with being "Equal, true, syntonic bicultural". Finally, "Spanish" women experienced the sensory aspect of headache pain significantly less intensely than "English".

Summary of Findings

This study investigated differences in pain experience and pain behavior among Mexican (Mex), Mexican American (M-A) and Anglo American (A-A) women with chronic headache pain. Pain experience was measured using the following measures: McGill Pain Questionnaire (a measure of sensory, affective and evaluative dimensions of pain experience), Box Scale (a measure of pain intensity), Headache Pain Drawing (a measure of the spatial distribution of pain sensation).
Furthermore, pain experience and pain behavior were also assessed by the Headache Questionnaire. Questions on women's headache type, severity, cause, duration, and location assessed pain experience. Pain behavior was assessed by a) determining if women in the study took medication to relieve their headaches; if so, type and quantity (total dosage and total number) of medication taken for headaches was noted and b) noting the extent to which daily activities were inhibited due to women's chronic headaches.

In order to determine if level of acculturation contributed to differences in pain experience and pain behavior among cultural groups of women, the Acculturation Scale for Mexican Americans (ARSMA) was administered. This scale separated the women in this study according to their beliefs, attitudes and/or behaviors associated with being "Very Mexican/Spanish", "Equal, true, syntonic bicultural", or "Very Anglicized".

Overall, results indicated that women who affiliated themselves with one of the three distinct cultural groups (Mex, M-A, or A-A) and who had achieved varying levels of acculturation (determined by the ARSMA) differently reported and responded to the experience of chronic headaches.

In general, Mex and "Very Mexican/Spanish" women obtained significantly higher scores on dependent pain measures than the other two groups of women. M-A ("Equal, true, syntonic
biculural") and A-A ("Very Anglicized") women obtained very similar scores on those pain measures. More specifically, Mex/("Very Mexican/Spanish") obtained the highest scores on the emotional quality of pain experience, on their willingness to express pain, and on the total number of medication they took to relieve chronic headache pain.

There were some surprising and unexpected results. First, pain intensity was significantly different among women who affiliated themselves with being either Mex, M-A or A-A but not among women with varying levels of acculturation. Second, although the discriminant function analysis identified the sensory quality of pain experience (MPQsensory) to contribute to group differences, the univariate MANOVAs did not identify this measure of pain sensation to be significantly different among either the cultural group of women or the group of women with varying levels of acculturation. In addition, Anglo American women surprisingly obtained the highest mean scores on the number of areas described in pain (HPDareas, a measure of spatial distribution of pain sensation).

Classification analyses provided information about the accuracy with which a particular measure could correctly classify subjects into their appropriate grouping. Classification results in all analyses for cultural group and acculturation level revealed a pattern in which more variability was observed in the M-A/"Equal, true, syntonic
bicultral" women. This is supported by the finding that a) Mex ("Very Mexican/ Spanish") and A-A ("Very Anglicized") women were more often misclassified as M-A ("Equal, true, syntonic bicultural") and b) among the M-A ("Equal, true, syntonic bicultural") women, misclassifications occurred almost equally into the other two groups.

Correlations among women on scores on the ARSMA and all pain measures revealed, as expected, that the "Very Mexican/Spanish" women experienced headaches more intensely (Box Scale), more emotionally (MPQaffective), were more willing to express their pain (NWC), and took more medication (TOTmeds) than the other two groups of women.

Three separate ancillary analyses were conducted to determine a) differences between cultural groups on five dimensions of the ARSMA, b) differences between cultural groups on HPQ items, and c) differences on demographics and pain measure scores between subjects who chose to complete the Spanish version ("Spanish") of the questionnaire and those who chose the English version ("English").

First, results of the ancillary analysis on cultural group differences and the five dimension of ARSMA are reviewed. Results revealed that the three groups of women significantly differed from each other on the five dimensions of the ARSMA. Ethnic pride and identity and Intra-family language familiarity and usage were the greatest contributors to group differences. In addition, a
pattern was observed among all five dimensions in which the Mex women identified with those aspects of the dimensions which are characteristic of being "Very Mexican/Spanish". Likewise, M-A women identified with beliefs, attitudes and/or behaviors characteristic of the "Equal, true, syntonic bicultural" aspects of the dimensions, and A-A women affiliated themselves with the "Very Anglicized" aspects of the dimensions.

A review of results of the second ancillary analysis revealed an expected pattern in which Mex women experienced their headaches as severe (a measure of pain intensity) and as severely inhibiting their daily activities, a measure of pain behavior (Frederiksen, Lynd, & Ross, 1978). A-A women experienced their headaches as mild, and not inhibiting their daily activities. More variability was found among the M-A women, with about half stating they experienced their headaches as mild (and mildly inhibiting activities) and half stating they were severe (and severely inhibiting activities).

A closer look at results on the type of headaches women experienced showed that Mex and M-A women described their headaches as "pulsating pain" and the A-A women more often described them as "pressing tightening pain". Although few subjects described their headaches as "stabbing pain", the majority of those who did were M-A women.
There were no significant differences between women on the type of medication they took for headaches (MEDtype) and on the causes they attributed to their headaches (HAcause). Most women reported, about equally, either not taking any medication for headaches or taking analgesic medication to relieve their headache pain. Although there were no significant differences for the cause attributed to headache pain, it is important to note that all three groups of women perceived stress as being the major cause of their headaches and some reported both stress and physiological reasons for their headaches.

Finally, the third ancillary analysis compared demographic and mean scores on all pain measures among those M-A women who either chose the Spanish version of the questionnaire ("Spanish") and those who chose the English version of the questionnaire ("English"). Results on the demographic variables among these two groups of M-A women revealed that there were no significant differences between "Spanish" and "English" on income or whether subjects perceived themselves to be healthy. However, the M-A women who chose the Spanish version of the questionnaire obtained significantly lower levels of education, were from lower generation levels, and identified themselves more as belonging to the Mexican cultural group.

As with ancillary analyses on the five dimensions of the ARSMA, results on pain measures indicated that "Spanish"
women experienced the sensory facet of headache pain significantly less intensely than "English" women. In addition, "Spanish" women affiliated themselves with those beliefs, attitudes, behaviors associated with ""Very Mexican/Spanish", whereas "English" women were more affiliated with being "Equal, true, syntonic bicultural". It can be concluded from these results that factors involved in the acculturation process do indeed influence differences in people's pain experience and pain behavior.
CHAPTER IV

DISCUSSION

The purpose of this study was to determine whether a) differences exist in how people of different cultural backgrounds experience and respond to pain, b) a pattern of pain experience and responses could be predicted based on that person's cultural affiliation and based on findings from previous research on this topic, and c) inconsistencies in past research could be attributed to oversight of the influence of level of acculturation of subjects from foreign cultures living in the host country. In order to provide clarification for these questions, pain experience and pain behavior among female chronic headache pain sufferers from three cultural groups were investigated. Two of these groups were clearly identified as pertaining to a specific cultural group (Mex and A-A) and one cultural group was more mixed (M-A).

This study hypothesized that a) differences in pain experience and responses would exist among the three cultural groups, b) a linear order would exist such that Mex women would experience the sensory, affective and evaluative qualities of pain more intensely (high scores on pain experience measures) and report more pain behaviors than the other two groups of women (high scores on pain behavior
measures), with the M-A women scoring lower and A-A women lowest, and c) certain factors involved in the process of acculturation to a host country would contribute to the differences observed in pain experience and behavior within the more mixed group, that is, M-A.

Review of Results

Overall, cultural groups differed in their pain experience and behavior. Results indicated that women who identified themselves with a particular cultural group and who had achieved a distinct level of acculturation had very similar results on most pain measures. That is, Mex (cultural groups)/"Very Mexican/Spanish" (acculturation level) women were more willing to express their affective and sensory pain experience and reported significantly more pain behaviors than the M-A/"Equal, true, syntonic bicultural" women and the A-A/"Very Anglicized" women.

Acculturation level was an important contributor to cultural group differences in pain experience and pain behavior. More specifically, ethnic identity and pride and language preference (defined by language spoken at home and language version of question chosen) contributed the most to cultural group differences on pain measures.

This chapter will provide a review and interpretation of results from this study on differences in pain experience and pain behavior among Mex, M-A and A-A female headache sufferers and the contribution that level of acculturation
made to differences among these women's scores on pain measures. Interpretation of results from this study which are supported by earlier studies will be presented first. Next, interpretations and explanations for unclear or surprising results are provided. Finally, implications for theory and past research are delineated and recommendations for future research are presented.

Generalizability of the Study Population

Before elaborating on results, it is necessary to discuss their generalizability in terms of a) the demographic and medical characteristics of the study population and b) whether the sample chosen from each of the three cultural groups is exemplary of the population which it is supposed to represent. Certain characteristics of this study population were consistent with the characteristics of the sample chosen in an earlier study (Bates et al., 1993). As with results of this study, the earlier study found significant differences between groups on occupation and education level.

Bates et al. (1993, p. 103) reported that "Hispanics had a higher percentage of members in the unskilled, semi-skilled and no salaried occupations than the other five groups." The education level of subjects in the earlier study were such that a) all subjects had no more than a high school education and b) Hispanics had the lowest mean for years of education than the other five groups. Furthermore,
certain medical characteristics of this study population were also similar to Bates et al.'s (1993) earlier study. In line with results of this study, there were no significant differences between cultural groups in type of medication taken for headaches and in pain location.

An additional comment about the generalizability of this study population is deemed necessary. Although the data obtained from these subjects may not be representative of all Mex, M-A and A-A chronic headache pain sufferers, they reflect the distribution of these three cultural groups in the Denton and Dallas-Fort Worth regions (Valdivieso & Davis, 1988).

This study provides evidence contrary to Flannery et al.'s (1981, p. 43) suggestion that "as studies on cross-cultural differences become more sophisticated in their research design, controlling variables such as education, age, gender, and socioeconomic status, it would be more difficult to attribute results to cultural differences in pain experience". Indeed, several of these demographic variables listed by Flannery et al., 1981) were controlled in this study and, still, significant differences between groups were found on pain experience and pain behavior.
Interpretation of Results

Cultural Group Differences in Pain Experience and Pain Behavior Exist

Results for differences between cultural groups indicated that the three groups of women did indeed differ from each other in how they experienced headache pain and in the actions they took to relieve that pain. More specifically, the three cultural groups significantly differed on pain experience (pain intensity, sensory and affective pain experience, total number of words endorsed to describe their headache, total number of areas in pain, and pain severity) and pain behavior (total number of medications taken for headaches and daily functioning affected by headaches). However, differences were not significant for the evaluative aspect of pain experience, the number of marks placed in areas in pain (also a measure of pain experience), and the total dosage of medication taken for headaches (a pain behavior measure).

These results provided support for earlier studies on cultural differences in pain experience and behavior which used similar pain measures as those used in this study. This is especially true for studies which investigated pain experience and/or responses among cultures for which expression of internal experience is considered appropriate as compared to those cultures for which avoidance of expression of internal experiences is deemed more

Cultural Group Differences Occur in a Particular Order

Several studies have indicated that cultures of purely Hispanic origin tend to experience the affective and sensory qualities of pain more intensely and tend to respond to pain such that it interferes with their daily activities more so than Old American Anglo-Saxon Protestant cultures (Bates et al., 1993 & 1994; Weisenberg et al., 1975). This study provided support for these earlier findings. Mex women significantly differed from both A-A and M-A women on pain experience and behavior, whereas M-A women were more similar to A-A women. More specifically, Mex women scored significantly higher than M-A and A-A women on pain experience (pain affect, pain intensity, and pain severity) and pain behavior (total number of medications taken for headaches and daily activities inhibited due to headache pain).

Cultural group differences in pain experience. There is some ambiguity in the literature on cultural differences in the experience of pain intensity and pain affect. Some studies found that those cultural groups which differed on the affective experience of pain also reported their pain as more intense (Gaston-Johansson et al., 1990; Weisenberg & Zahava, 1989). Other studies which used a visual analog
scale to assess pain intensity found cultural differences on pain affect but not on pain intensity (Bates et al., 1993; Flannery et al., 1981; Greenwald, 1991).

Possible sources for these conflicting results in the literature could be related to the different cultural groups compared. For example, Weisenberg and Zahava (1989) compared Middle Eastern and Western cultures and Bates et al. (1993) compared Anglo Americans, Hispanics, and Italians (to name a few). The Middle Eastern group in Weisenberg and Zahava's study was found to be more expressive and experienced pain more emotionally and more intensely than the Western comparison group. In Bates et al.'s study, Hispanics experienced pain more affectively than Old Anglo Americans, but they did not differ on the intensity with which they experienced pain. It can be concluded that, because pain intensity is a dimension of pain experience which is separate from pain affect and pain evaluation, it cannot be assumed that results of cultural differences on one measure will automatically mean the same for other dimensions of pain experience.

Conflicting results could also be due to different ways in which pain intensity has been assessed. This study used the Box Scale to measure pain intensity, Bates et al. (1993) used a pain intensity scale which was part of a larger questionnaire used at the Pain Control Center from which she collected data, and still others used the Visual Analog
Scale (Gaston-Johansson et al., 1990; Weisenberg & Zahava, 1989). Some authors believe that comparison of results among different analog scales is considered appropriate, as stated by Jensen and Karoly (1992, p. 143), "Most self-report measures of pain intensity are strongly related and can be used interchangeably in many situations." However, inconsistent results on cultural differences in pain intensity from earlier studies and this study, suggest that this assumption may need to be reconsidered.

Greenwald (1991) provided one interesting explanation for differing results among cultural groups on the affective and sensory qualities of pain experience. He suggested that the affective component reflected the way subjects interpreted their pain experience and the sensory component reflected the perception of pain. Hence, as was found in this study, the interpretation of pain is influenced by culturally-specific beliefs about pain but the sensory perception of pain is not.

The predicted linear order of scores on pain measures (Mex highest, M-A lower, and A-A lowest) occurred only with that aspect of pain experience which reflects a willingness to report and verbally express pain. This is consistent with Bates et al.'s study (1993) which found that Hispanics reported the expression of pain as an appropriate behavior whereas the Old Americans reported that not expressing pain is the more appropriate behavior. These results are also
consistent with previous research studies which found that certain cultures are more expressive, such as Hispanics and Middle-Eastern cultures (Weisenberg et al., 1975), than others which are considered to be less expressive and more stoic, such as Old Anglo Americans (Zborowski, 1952).

Surprising and Unexpected Results on Pain Experience

There were some surprising and unexpected results on cultural differences in pain experience which differed either from the original hypotheses stated in this study or from results of earlier studies. Contrary to what was originally hypothesized, there were no group differences in the evaluative dimension of pain experience and on causes attributed to headaches. Furthermore, A-A women, not Mex women, scored highest on two distinct measures of pain sensation.

There are two possible reasons for the finding of no differences between groups on pain evaluation. The first reason is based on difficulties inherent in having just one item on the MPQ which assesses the evaluative quality of pain experience. As Lowe, Walker, and MacCallum (1991, p. 59) stated,

"because the evaluative subscale is based on one item, the ability to evaluate its reliability by an estimate of internal consistency is prohibited. From a psychometric standpoint, the basing of a subscale on one item is one of the most severe limitations of the MPQ and may be the
primary reason why the evaluative dimension has received equivocal support through exploratory factor analysis."

The second reason relates to findings cited in a review by Reading (1979) on studies of the validity of the 3-dimensional framework of the MPQ which revealed that the sensory and affective dimensions are easily identified. On the other hand, the affective and evaluative dimensions may not be as easily separated. However, there have been more recent studies which have identified a distinct evaluative dimension (McCreary, Turner, & Dawson, 1981; Prieto et al., 1980; Reading, 1979). As Melzack and Katz (1992, p. 159) explain, "The major source of disagreement seems to be the different patient population used to obtain data for factor analyses." This explanation for varying result applies to this study. That is, cultural groups in this study differed from those used in studies on the internal consistency of the MPQ.

That headache is stress-related is a well-documented finding (Henryk-Gutt & Rees, 1973; Howarth, 1965). However, what is most interesting is that, in this study, both stress and physiological reasons were not endorsed by more subjects. It is possible that stress was identified by most subjects as the major cause of their headaches because information about the effects of stress on health is widespread and well disseminated. However, most individuals have less knowledge about the physiological reasons for
headache pain (Deyo & Diehl, 1986), and for this reason may not have endorsed that item as a major cause of headache. In fact, Deyo and Diehl (1986) reported that "the most common patient complaint was failure to receive adequate explanation of their pain problems" (cited in Turk & Melzack, 1992, p. 218) and they have misbeliefs about the diagnosis and treatment of pain (DeGood & Shutty, 1990, chap. 13).

Pain drawings are commonly used in the assessment of chronic pain in clinical settings. They provide crucial information about the extent and location of pain over time (Margolis, Chibnall & Tait, 1988) and about pain perception and description (Toomey et al., 1983). Pain drawings have also been described as being useful in predicting functional, behavioral, and psychological disturbances among chronic pain patients (Toomey et al., 1983). Given this description of the usefulness of pain drawings in assessing chronic pain, this study used a pain drawing developed by Toomey et al. (1983) as part of a multidimensional assessment of chronic headache pain.

The fact that pain sensation differed significantly between the cultural groups indicates that the women from the three distinct cultures physically experienced their pain differently. Interestingly though, the Anglo American women, and not the Mexican women, scored higher on both pain sensation (MPQsensory) and the spatial distribution of pain
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(number of areas marked). This makes sense in light of the fact that they are both considered measures of pain sensation (Toomey et al., 1983).

In fact, an earlier study by Toomey et al. (1983) indicated that spatial distribution of pain sensation (HPDareas) was found to be highly correlated with pain sensation (MPQsensory), willingness to express pain (MPQ-NWC), interference of daily functioning due to pain, and medication use. However, it was not related to pain affect, pain intensity, pain duration. These findings indicated that the number of areas in pain reported by subjects is distinct from their experience of pain intensity and pain affect. These results also provided further evidence that pain intensity cannot be used as the only measure of pain experience, as is usually the case in most clinical settings (Philips, 1983), because pain experience is a multidimensional process (Melzack, 1975).

There are several reasons for the finding that A-A scored higher on the sensory quality of pain experience than Mex. First, Anglo Americans' sensory pain experience may be intensified because of the tendency of this group to verbally suppress pain experience, more so than the other two groups. Given this explanation, one would expect Mexicans, contrary to the results, to have the lowest scores on the measure of pain sensation (MPQsensory) since this group was found to be more willing to endorse items
associated with the verbal expression of pain (NWC) and with the emotional experience of pain (MPQaffective).

Alternative explanations are that a) the Anglo American women were more comfortable revealing information which was less associated with emotional aspects of their experience (which is true of MPQsensory and TOTmeds); that is, A-A women may be more willing to admit to pain in a concrete, sensory way where sharing of the affective dimension of pain experience is not required, and b) the Mexican women were generally more open to self-disclosure about pain experience and therefore did not obtain the lowest score on these measures. This is in contrast to findings by Bates et al. (1993) in which differences between groups on pain sensation occurred with Hispanics obtaining higher scores than Anglo Americans.

It is striking that significant differences were found between groups on HPDareas but not on reports of pain location from the HQ. There are several possibilities for varying results. First, it could be that the HQ provided more detailed information about the exact location of pain. If this is true, its disadvantage would be that it tried to force the patient's pain experience into specific categories. Second, HPDareas was a more ambiguous measure, reflecting more how the subjects thought on their own. Finally, it is possible that these two methods of measuring
pain location assessed different aspects of the pain experience.

It is difficult to find a reasonable explanation for no significant differences between groups on HPDmarks, the number of marks placed on the Headache Pain Drawing. This difficulty is based on the nature of this pain measure; that is, that it provided more information than HPDareas. It is possible that if several marks are placed in one area of the drawing, for example, all in the neck area, it would provide more complete information about all the areas of the neck which are in pain. However, HPDareas is a more general indicator of the location of the headache pain than HPDmarks, therefore, one would expect that there would be more room for error and loss of information with that measure of pain experience.

Furthermore, number of marks placed to indicate areas in pain has been associated with psychopathology (Ransford, Cairns, & Mooney, 1976). Although this relationship has been reported to be weak (Ginzburg, Merskey, & Lau, 1988; Schwartz & DeGood, 1984; Tait, Chibnall, & Margolis, 1990; Von Baeyer, Bergstrom, Brodwin, & Brodwin, 1983), it could explain the result of no group differences on this measure. That is, one of the criteria for subject participation in this study was that a) subjects did not have a psychiatric history and that b) they were not seeing a psychologist for the past year until the time of the study.
Language of Pain: Words Chosen to Describe Pain Experience

Cultural affiliation seems to influence the words chosen to describe pain experience. Cultural groups were found to use different descriptor words to express headache pain sensation and attached to them different severity values. Most Mex women reported their headache as severe and described it as **pulsating pain**. A higher percentage of subjects of the A-A women reported their pain as mild and chose the words **pressing, tightening pain** to describe their pain. The greatest variability occurred within the M-A group, with most women reporting their pain as mild and describing their pain as either **pulsating, pressing, tightening pain**, or **stabbing pain**.

The aforementioned hypothesis that Mex women experience their pain not only differently from other groups but also with greater intensity was supported by the results of this study. Therefore, it was not surprising to find that Mex women reported their pain as severe, M-A women either severe or mild, and A-A women as mild. Furthermore, that two of the three groups chose different descriptor words to characterize their headache pain is yet more evidence that a) Mex and A-A women experience their headache pain differently and b) that M-A women are more similar to Mex women in their experience of the sensory aspect of pain.

These results support findings from earlier studies which showed that different cultural groups use varying words to
describe their pain (Lipton & Marbach, 1984; Zborowski, 1969). For example, results from Lipton and Marbach's (1984) study indicated that African Americans and Anglo Americans used the words dull and ache as pain descriptors with greater frequency than Puerto Ricans. Zborowski (1969) found that Old Anglo Americans used the words sharp, burning, dull, stabbing, and aching, more so than the Jewish and Italian groups, to describe their pain.

**Cultural Differences in Pain Behavior**

As hypothesized, significant differences were found between groups on pain behavior; more specifically, on total number of medications taken to relieve headache pain and on daily activities inhibited due to headache pain, such that Mex women took significantly more medications for their headaches and reported more inhibition of daily functioning than the other two groups. This hypothesis was based on earlier findings that cultural groups do indeed differ in pain behavior (Bates et al., 1993). Although Bates et al. did not find significant differences between cultural groups on total medication used to relieve pain, the Hispanic group in their study reported significantly more inhibition of daily functioning than the Old Anglo American group secondary to chronic pain.

Results on total number of medications taken for headaches showed that Mex women obtained the highest scores, A-A women lower and M-A slightly but not significantly lower.
than A-A women. Explanations for these findings on cultural affiliation and pain behavior are as follows. If A-A women are considered more stoic, as hypothesized in this study and indicated in the literature, they would be more likely to grit their teeth and bear the pain and view taking medication or doing something to relieve or mask their pain as a weakness. On the other hand, if Mex women are considered to be more expressive and open about their pain experience, also based on the literature, it would be reasonable to expect that Mex women are more likely to be given the care they need and also to take action to care for themselves.

An alternative explanation is based on influences of the Anglo American society in which it is encouraged to be independent and succeed on one's own, to find one's own solutions for problems, without asking for help or care from others (Markus & Kitayama, 1991). This attitude may spill over into the individual's pain behavior. Consequently, this group would tend to be less demonstrative of pain and therefore not ask for pain relief remedies. This explanation is supported by the finding on TOTmeds in which Mex women took more medication than M-A or A-A women. However, this would not explain results from TOTmeds which indicated that, many A-A women did indeed take medication to relieve their headache pain. Yet another explanation could be that A-A women may not be as willing to take the time to
take care of themselves because they are more likely, as a group, to prioritize work (Markus & Kitayama, 1991). Support for this suggestion is provided by the observation that most M-A and A-A women did not take the time to come to the free stress management sessions offered to all participants in the study. In Mexico, however, the classes were fully attended by Mexican women.

Lastly, it is possible that the above results indicate that M-A and A-A women are less confident and more distrustful of medicine and medical care than Mex women, whose attitude toward medicine and physicians is one of great respect, deference, faith, confidence and trust. If this is true, it would be expected that the A-A women would be less dependent on physicians about how and what they do to relieve pain and that M-A women may be more like A-A women in this respect. In fact, studies have shown that non-Anglo cultures living in the U.S.A. tend to utilize the health care system less and be more distrustful of the care they receive from physicians or systems that are not familiar with their culture (Andrulis, 1977; Hough, Landsverk, & Karno, 1987; Sue & Zane, 1987).

It is concluded, from the results on types of medication and total number of medications subjects reported taking, that the Mex women were more willing to admit to pain and to ask for help. It seems plausible that A-A women tend to seek medical attention only when their pain interferes with
their work. Since most A-A women stated that their headache pain was mild and did not interfere with their work, it is not surprising that they did not report taking medication to relieve their headache pain.

**Unexpected Results for Pain Behavior**

There were, however, some unexpected results in the pain behaviors exhibited by these three groups of culturally diverse women. That is, there were no differences between groups on medication use (whether subjects took medication to relieve pain, type and total dosage of medication taken for headaches). This is contrary to Streltzer and Wade's findings (1981) in which significant differences were found between Anglo American and Asian cultures on the amount of medication taken to relieve pain. These authors' findings could be attributed to reports that Asian cultures differ from Western cultures in their beliefs about the nature of pain, the correct expression of discomfort, and what types of remedies are considered to heal. For example, Asian cultures believe a) that imbalances in yin-yang forces cause physical symptomatology, b) that "repression of affect is required to maintain correct social behavior", and c) in the use of herbal remedies and acupuncture to relieve pain, treatments which are not readily accepted in Anglo American culture (Dana, 1993, chap. 3).

It has also been determined by various authors that Hispanic cultures vary greatly in their beliefs about pain
and illness, explained in more detail below (Dana, 1993). Hence, an interpretation for the finding in this study of no differences on medication use (where differences were expected) remains difficult to answer. Furthermore, it would seem that if differences between groups exist for total number of medications used, that differences would exist in these other measures of pain behavior.

One conclusion to be made is that, in order to determine diagnoses and appropriate treatment plans for patients, it is important for physicians to know the details of patients' medication use (for example, type, frequency, and dosage). However, determining medication use does not seem very helpful in differentiating cultural groups.

There is some relationship between measures of pain behavior and pain sensation (Toomey, Gover, & Jones, 1983). These authors found that chronic pain patients who reported greater spatial distribution of pain on the Headache Pain Drawing also reported greater analgesic use. In this study, however, Mex women reported the greatest total number of medication use and A-A women reported greatest number of pain areas marked, suggesting that these two measures may not be related to each other as Toomey et al. (1983) believe.

These are two main speculations about the implications of these results. First, if it is true that taking medication (a measure of pain behavior) is an indication of "trying to
tough it out" (Turk & Melzack, 1992, chap. 20), we would expect the opposite of what was found in this study, that is, that A-A women would score highest on this measure instead of Mex women. If, however, it is believed that medication intake or medication request is a behavior motivated by how intensely one experiences pain (Andrasik, Blanchard, Ahles, Pallmeyer, & Barron, 1982) and an indication of the belief that one's pain is out of one's control, then we would expect, as the results indicated, that Mex women would be the cultural group to use more medication than the A-A group.

The latter suggestion is supported by Bates et al. (1993) who found that Hispanics attributed their pain to external causes and Anglo Americans perceived their pain to be caused by internal factors. This is also in agreement with the literature on multicultural assessment perspectives which indicated that Hispanics have external locus of control and that they tend to delegate responsibility to someone else more so than Anglo Americans (Dana, 1993).

Although there were some unexpected results, in general results were as originally hypothesized. That is, Mex women a) were more willing to disclose information about their pain experience, b) related their pain more in affective terms, c) experienced pain more intensely and severely, d) had more heightened responses to headache pain than the other two cultural groups.
The Contribution of Acculturation to Differences Among Cultural Groups

The contribution of acculturation level to differences between groups on pain measures is reviewed here. Results resembled those for cultural group differences on pain measures, with significant differences found between the three levels of acculturation on willingness to express pain, on pain affect and pain sensation, and on pain behavior. The Mexican ("Very Mexican/Spanish") women differed significantly on pain measures from the Mexican American ("Equal, true, syntonic bicultural") women and the Anglo American ("Very Anglicized") women. As with cultural group differences on pain measures, the "Equal, true, syntonic bicultural" women were similar to the "Very Anglicized" women on pain measure scores.

A closer look at the five dimensions of the Acculturation Scale for Mexican Americans (ARSMA) reveals some interesting information. First, the M-A women were identified about equally as either "Very Mexican/Spanish" or "Equal, true, syntonic bicultural". These findings are in contrast to findings on differences among cultural groups and acculturation levels in which M-A women scored more similarly to A-A women on pain measures.

Second and more importantly, "Ethnic pride and identity" and "Intra-family language familiarity and usage" were the two items on the ARSMA which contributed highly to cultural
group differences on pain measures, with the former item contributing the most. This suggests that M-A women perceived themselves as being more Mexican in attitudes, beliefs and/or behaviors, but when it came to pain experience, M-A women were more similar to A-A women. Explanations for this variability among M-A women are provided in the next section.

Language preference among the M-A women was also assessed by allowing subjects to choose to complete either the Spanish or English version of the questionnaire. Findings indicated that language preference was related to generation level, ethnic identity and cultural affiliation, and influenced the report and description of sensory and affective qualities of pain experience.

First, it is important to note that there were significant differences on generation level among M-A women. All women who chose the Spanish version of the questionnaire were first generation Americans. There was more variability within that subgroup of M-A who chose the English version of the questionnaire, with most being second generation Americans, some fifth generation or fourth generation Americans, and very few were first generation Americans.

This finding is important given the impact that generation level (that is, number of years living in the U.S.A.) has on the amount of exposure M-A subjects have to the American culture. Sabogal et al. (1987) provided
evidence that familism is a function of acculturation level. They explained that attitudes and behaviors among the Hispanic-American community are affected by generation level. They concluded that, among second and third generation Hispanic-Americans, attitudes toward familism decreased but behaviors associated with familism increased.

Second, language preference also seemed to be an indicator of ethnic identity and cultural affiliation. There were significant differences among M-A women on mean scores on the acculturation scale. The majority of M-A women who chose the Spanish version of the questionnaire identified themselves as "Very Mexican/Spanish" and the majority of M-A women who chose the English version identified themselves as "Equal, true, syntonic bicultural". Those M-A women who chose to speak English, were more mixed in their cultural affiliation, indicating more variability within this group.

Third, language preference had an influence on pain experience, but not pain behavior. The two subgroups differed significantly only on the sensory quality of pain experience. Previous studies found that Anglo American groups either did not differ or reported less pain sensation than comparison groups (Bates et al., 1993; Weisenberg et al., 1989). It was surprising, then, to find that the women who chose the English version of the questionnaire reported pain sensation as more integral to their pain experience.
than those who chose the Spanish questionnaire. However, these results support those described above in which A-A women obtained the highest scores on pain sensation measures.

Based on all these results, it was concluded that language preference played an important role in pain sensation but not in the other dimensions of pain experience or pain behavior. Consistent with findings from this study are those from earlier studies which indicated a strong aspiration for bilingual education, Spanish-language fluency, and community membership within the Mexican American population (Arce, 1987). Padilla et al. (1991, pp. 66-67) reported that "90% of Mexican Americans continue to speak Spanish with some degree of fluency despite national opposition toward bilingualism." Given this information, it is not surprising to have found that those items on the acculturation scale which represent cultural identity and language preference were the greatest contributors to differences between groups.

Unexpected Results on the Measure of Acculturation for Pain Experience

There were some unexpected results on acculturation levels and pain experience measures. Interestingly, although cultural group differences were found for pain intensity, no such differences on pain intensity were found among acculturation levels. These results suggest that the
use of an acculturation scales in studies on cultural
provides more accurate information about cultural groups
because it categorizes groups according to many factors, not
just cultural self-identification.

This statement is further supported by an earlier study
by Greenwald (1991) in which differences among cultural
groups were found on MPQaffective but not on GRS (a visual
analog scale measuring pain intensity). Although Greenwald
did not use an acculturation scale, his was the only study
to use acculturation level to explain results on cultural
group differences in pain experience. As Greenwald (1991,
p. 162) explained,

"the process of acculturation into the American
mainstream may have caused the children and
grandchildren of immigrants to develop attitudes and
behaviors different and even opposite from those of
their forbearers...The impact of these ethnicities
appear to remain important even when 'diluted' by
cross-cutting ethnicities with different implications
for health attitudes and behavior...interethnic
variations occur in 'interpretation' of pain, but not
its actual perception."

Thus, Greenwald suggested that even with exposure to the new
host culture, Mexican culture plays an important role in
influencing the emotional meaning Mexican Americans give to
chronic pain, but it is less influential in shaping the intensity of pain experience.

That a difference on pain intensity was found among acculturation levels but not among cultural groups for this same measure is evidence that a) acculturation level may be more accurate in separating groups according to culturally-specific attitudes, beliefs and/or behaviors, information which is not obtained by self-report of cultural identification and b) that clinicians should not rely, as many do, on pain intensity judgements alone because it does not provide information about the complex multidimensional experience of pain described by Melzack (1975) (Philips, 1983).

In summary, results of this study provided support for a) earlier theories stating that pain experience is multidimensional (Melzack, 1975) and that cultural differences in pain behavior are linked to cultural beliefs about what is appropriate to do and express and what is not (Bates, 1987), b) earlier studies which found cultural differences in the affective and sensory experience of pain and in pain behavior, c) the hypothesis that level of acculturation would contribute to cultural group differences in pain experience and behavior.

Interestingly, this study found that determining the acculturation level achieved by women in the three cultural groups provided more information about what differentiated
the three groups from each other, more so than self report of ethnic identity. That is, the ARSMA identified two factors which contributed the most to groups differences: a) language spoken at home, and b) cultural identification and cultural pride. This added information is what differentiates this study from others and therefore could explain some of the results which were not supported by earlier findings.

Classification Results

The discriminant function analyses (described in Chapter III) used in this study are not commonly found in the literature on cultural differences in pain experience and behavior. Therefore, this study provided new information about which pain measures correctly classified the three cultural groups of women.

Because the Mex and A-A women and the "Very Mexican/Spanish" and "Very Anglicized" women were most accurately classified by scores obtained on the MPQ, it is maintained that results on MPQ can predict, with reasonable accuracy, the cultural group with which the headache sufferer is most affiliated or to which headache sufferers are most similar.

We cannot ignore, however, that misclassifications did occur. The M-A women were more often misclassified than either Mex or the A-A women. Where misclassifications occurred within the Mex and A-A group, they erred toward the
M-A group. Given these observations, precautions should be taken to avoid categorizing patients' pain experiences just on the basis of results on the MPQ. Such precautions would require clinicians to use information from personal interviews in addition to information from self-report scales, such as the MPQ.

Implication for Research and Theory

Results reflect differences not only in the physical (pain sensation, pain location, spatial distribution of pain), psychological (pain affect, pain intensity and severity), and expressive (number of words chosen, pain descriptor words) aspects of pain experience but also with what individuals in varying cultures do to relieve their pain (type of medication taken to relieve pain, total number of medication taken for headaches, daily activities affected by chronic pain). These differences between groups were found to be related to acculturation level. Implications of these findings for research and theory on cultural differences in pain experience are provided in this section, and are followed by recommendations for future research.

Although there are no studies on cultural differences in chronic pain which used an acculturation scale to assess level of acculturation among cultural groups, cultural differences on pain behavior have been attributed to social learning and social comparison theories (Bandura, 1977; Bates et al., 1993; Festinger, 1954); namely, that pain
behaviors are learned by observing others and that individuals choose as models those who are similar to themselves. It is by observation of these models, in the family and culture, that one learns appropriate ways of expressing emotions and responding to pain (Shorben & Borland, 1954). Furthermore, family models have been found to influence pain tolerance levels and the meaning a person places on pain symptoms (Buss & Portnoy, 1967; Craig & Neidermayer, 1974; Wooley & Epps, 1975; Linton & Gotestam, 1983).

If pain behavior is learned by social comparison, then it implies that cultures would differ in the interventions used to relieve their pain and in how pain affects their general activity level. This study found significant differences between groups on two measures of pain behavior: a) somatic intervention used to relieve pain (TOTmeds) and on b) how much their pain impaired daily activities (HAseverity), providing support for the notion that individuals learn to respond to pain in ways which are demonstrated by the culture in which they live or with which they are affiliated.

The results from this study also provide support for those earlier studies on the influence of familism on acculturation level among Mexican Americans and Anglo Americans. Familism (defined as strong identification and attitudes toward the family, family loyalty, and reciprocity
and solidarity with the family) is stronger among Mexican Americans than among Anglo Americans (Mindel, 1980). Sabogal et al. (1987) suggest that family obligation and the influence of family as referents for behaviors (two aspects of familism) decrease with increased level of acculturation.

Of particular interest is an article by Markus and Kitayama (1991, p. 224) who suggested that "construals of the self are culturally-based and can determine the very nature of individual experience." They go on to explain that Hispanics tend to be more "interdependent and to be significantly shaped by a consideration of the reaction of relevant others" (or models) to behave in a way that is considered appropriate by others in that society. Whereas Anglo Americans use these models for different purposes: as Markus and Kitayama (1991, p. 226) wrote: "Western cultures use referent others primarily as standards of reflected appraisal to strategically determine the best way to express or assert the internal attribution of the self." In other words, Markus and Kitayama (1991) showed that Hispanics are interdependent and more influenced by referent others than Anglo Americans. Therefore, Mexican Americans tend to move away from the family and toward the society in which they live to seek approval for their behaviors.

Thus, Hispanics and Anglo Americans use models for different purposes. Models are more influential in shaping cognition, motives, expression and experience of emotions
among Hispanics. For Anglo Americans, however, models are used as a way of confirming an individual's already established perception of the self (Markus & Kitayama, 1991). Given this information, it is not surprising to have found that "Ethnic pride and identification" (representing the cognitive component: self identity, self schema, beliefs/attitudes) and "Intra-family language familiarity and usage" (representing the expressive and cognitive component: language and meaning) were the greatest contributors to differences between groups on the ARSMA.

If the above-stated claims are true for the study population, then it can be said that M-A women's strong link to the family and culture of origin weakens in light of their increased exposure to Anglo American models. Consequently, M-A women's pain attitudes, beliefs and/or behaviors will more likely be shaped by pain models from the Anglo American culture than pain models from their culture of origin.

Variability of results for M-A women can be explained by integration of the social comparison theory and familism literature, described above. That is, the M-A group may choose to learn appropriate behaviors from models of different cultures. Some may be more influenced by models associated with the host culture, through the media and school friends, some may be more influenced by models associated with their own culture, through family members,
and still others may be equally influenced by both but use the family model to learn cultural beliefs and attitudes and models from the host culture to learn appropriate behaviors.

The ethnic origin of models chosen by M-A women may be influenced by two factors. First, language preference may be a strong influence on model choice. For example, if an M-A person only speaks Spanish, that person will be limited to understanding only those models who speak their language and thus incorporate attitudes, beliefs and behaviors which are culturally-specific to those Spanish-speaking models. If, however, an M-A individual speaks both Spanish and English, that person is more likely to speak Spanish with the family and English with others outside the home. Consequently, M-A women's attitudes and behaviors may be influenced by both Mexican and Anglo American cultures. As discovered from results described above, it is the language spoken at home that has the greatest influence on group differences in pain experience and behavior.

The second factor is related to the findings in the literature on acculturation, generation level, and familism which indicate that Mexican Americans use the family as referents for beliefs and attitudes shared by the Hispanic community. However, behaviors among Mexican Americans are gauged by extra-familial referents from the Anglo American society at school or through the media. This latter process becomes stronger as Mexican Americans' exposure to the Anglo
American culture increases. It has been suggested that behaviors are more influenced by extra-familial factors because they are observable by others in the society, whereas attitudes and beliefs are not (Sabogal et al., 1987).

These findings are directly related to generation level. The longer the exposure is to Anglo American culture, feelings of familial obligation and the perception of family decrease. Although attitudes and perceived family support do not change with acculturation level or with generation level, the influence of familial models on behavior decreases (Sabogal et al., 1987). Thus, for the M-A individuals who speak Spanish and English, behavior is more likely to be influenced by models representative of the Anglo American culture and attitudes and beliefs by the Mexican culture.

If these earlier claims are true of this study population, we would expect those M-A women who chose the English version of the questionnaire (that is, those M-A women who have resided in the U.S.A. longer and have been educated in American schools) to be more like the Mex women in their pain experience and to be more likely to use pain models representative of the Anglo American culture to gauge their pain behaviors. Such a trend was observed for pain experience but not for pain behavior, possibly because a) many more measures of pain experience were used in this
study than pain behavior measures, and b) the validity and reliability of pain experience measures are better established than pain behavior measures. Results may have been different if another behavior measure, such as a behavioral observation scale, had been added to the design of this study.

There is yet another explanation for the variability in results among M-A women. Although M-A women perceive themselves to be very Mexican in what they do and how they think, they unconsciously incorporate more of the Anglo American culture into their daily lifestyle than they care to admit. This last speculation comes from what we know about familism (Dana, 1993; Mindel, 1980) among Mexican Americans and coping mechanisms used to manage chronic pain (Dalton & Feuerstein, 1988). Because familism is strongly encouraged and inherent in the Hispanic culture (Mindel, 1980), the thought of this cultural bond weakening may induce feelings of anxiety and stress. Consequently, Mexican Americans use denial as a defense against the fear/anxiety/stress associated with the possibility of not belonging as strongly to their culture of origin.

The use of defense mechanisms to cope with chronic pain was suggested in an extensive review published by Dalton and Feuerstein (1988) of the literature on psychological and environmental factors in cancer pain. They cited several studies which identified cognitive coping strategies,
including denial used among chronic pain patients (Dansk, 1978; Keefe & Dolan, 1986; Keefe, Brantley, Manuel, & Crisson, 1985; Rosenstiel & Keefe, 1983; Weisman & Sobel, 1979). One study explained that chronic pain patients used either passive or active coping responses (Rogentine et al., 1979). Some patients tended to either use emotion-focused or problem-focused strategies to cope with chronic pain (Feuerstein, Labbe, & Kuczmiczzyk, 1986).

There are several studies about pain belief dimensions and others about belief systems in the Mexican American and Anglo American cultures which help explain results from this study of cultural group differences in pain experience and behavior, and thus merit inclusion here. First, there are basic deep seated assumptions about self and others, about what is fair, just, ethical; about suffering, and responsibility which influence pain experience and behavior. As reported by DeGood and Shutty (1992, p. 216): "If one believes that life should be pain free, that particular value can intensify the feelings of suffering associated with pain." Some pain beliefs are more generalizable and stable and become linked to personality traits. Beliefs are "meanings that people carry around" (Lazarus, 1991, p. 216), coping skills, attributional styles, or people's sense of self (Abramson, Seligman & Teasdale, 1978; Rotter, 1966; Wallston, Wallston & DeVellis, 1978). Furthermore, pain beliefs are: "directly related to the context of pain and
its treatment: what the individual should do to control pain. These belief systems are intimately associated with patient responses to treatment recommendation [and] to beliefs about the etiology of pain" (DeGood & Shutty, 1992).

That belief systems are culture-specific is made obvious when one compares Mexican American and Anglo American belief systems. For example, it has been established that Mexican and Mexican American women expect to endure suffering (Marianismo, after the Virgin Mary). These women's priority is to sacrifice oneself, to care for the welfare of their home and the family more so than Anglo American women (Dana, 1993). This concept is also related to hembrismo, a concept which refers to sacrifice and femaleness and described by Comas-Diaz as "The hembrista behaviors ensure survival and power through the children" (cited in Dana, 1993, p.70). Thus, women of Mexican descent tend to be less egocentric than Anglo American mothers.

Second, pain beliefs have been established to be personally formed or culturally-based (Wrubel, Benner, & Lazarus, 1981). These descriptions correspond well with Markus and Kitayama's suggestion (1991), referred to above, that Hispanics' behaviors and attitudes are more influenced by environmental factors than Anglo Americans. These authors describe Anglo Americans as independent, less influenced by referent others, thus having more personally formed beliefs. On the other hand, Hispanics were described
by these same authors as interdependent, more influenced by society's beliefs of what is appropriate behavior, consequently having beliefs which are more culturally-based. These earlier findings are supported by results from this study in which the Mexican women scored higher on certain pain measures than A-A women.

There are a series of events, described below, which clarify the reasons for cultural differences found in this study on pain expression and behaviors which are specific to Hispanic and Anglo American women. These explanations integrate findings from the literature on women's family and work responsibilities and the effect of these stressors on women's well-being. This is followed by an explanation for how these factors come to influence pain expression and behavior.

First a review of these events is warranted. Society exerts expectations of gender-specific appropriate behaviors. Beliefs about traditional female roles (for example women's role in the community, family and workplace) are conveyed by society/community. Consequently, community approval for one's behaviors (for example, expression of affect) is sought and used to guide the individual's experiences and behaviors. These gender-specific beliefs of the society/community which become internalized affect the individual's beliefs about appropriate behaviors in times of stress/illness, about available resources from the
community, as well as attitudes about using these resources in times of stress. Provided below is a description of how this process affects Hispanic and Anglo American women. Similarities and differences between these two cultures are described below in the sequence of events described in this paragraph.

Mexican and Anglo American women are both pressured by society to keep traditional female roles. However, the two groups differ in how they experience society/community pressures. Mexican Americans are known to be more influenced by referent others in gauging their behaviors (Markus & Kitayama, 1991). Anglo Americans tend to be individualistic and independent in their concept of self, and rely on others to confirm their uniqueness, rather than to gauge their behaviors (Katz, 1985; Markus & Kitayama, 1991). Thus, there are cultural differences in the extent to which social pressures pervade the individual's experience and behavior, such that Mexican American women think and act more according to social expectations and pressures whereas Anglo Americans are expected not to do so.

Although Mexican Americans use others in the community as models from which they learn appropriate behaviors, it has also been well established that Mexican Americans have stronger ties to their family than Anglo Americans and use the family as a major source of support (Dana, 1993; Markus & Kitayama, 1991). This commitment to the family has
ensured traditional family values and traditional female roles among Mexican American women (Comas-Diaz, 1989). The Anglo American's family, however, is "a nuclear family structure, [albeit], with stereotyped sex-roles" (Katz, 1992, p. 14). Therefore, Mexican Americans use others to gauge their behaviors but their strong sense of familism helps to preserve beliefs and attitudes characteristic of their culture of origin.

Because of socioeconomic pressures, more Mexican American and Anglo American women have entered the labor force. Even though they have become part of the labor force, these women's family responsibilities do not abate. There seems to be a covert expectation for Mexican American women to fill both roles. It seems covert because it is not outwardly challenged by Mexican American women. As is expected by their culture, they have resigned themselves to the situation and accepted their fate (Castro, Furth, & Karlow, 1985). Mexican American women are pressured to prioritize caring for the family. Working is seen as a necessity to help nurture the family.

Anglo American women, on the other hand, have experienced two sources of pressure to enter the labor force: a) women's liberation movement in the 1960's and non-traditional female role models, and/or b) socioeconomic pressures. Despite this movement, Anglo American women who enter the labor force are also still faced with the responsibility of caring
for their family, just as Mexican American have. However, contrary to Mexican American women's experience, Anglo American women experience more pressure to work than to care for the family.

Furthermore, Anglo American women are motivated toward self-actualization (Waterman, 1981) and are less likely to take time off from work because they tend to prioritize work over self and family (Markus & Kitayama, 1991). As described by Bellah, Madsen, Sullivan, Swidler, and Tipton (1992, p. 14): "By means of the utilitarian component, human life becomes an effort to maximize self-interest in the form of power", instead of in the form of enhancing one's well-being. An example of this can be obtained from the observation, during sample selection process, that more Mex women than M-A or A-A women attended the free stress management/relaxation sessions offered to all participants by this researcher.

All these factors (i.e. working and family responsibilities), when combined, increase the level of stress in Mexican American and Anglo American women's lives. These stressors are triggers for the onset of headaches among subjects with a biological predisposition for headaches (Andrasik, 1992).

Although Mexican American and Anglo American women both experience these stress factors, they may experience and respond to them in culture-specific ways. For example, it
has been determined that Hispanics view expression of pain as an appropriate behavior (Bates et al., 1993). Anglo American women, on the other hand, reported that avoiding expression of emotions is considered to be most appropriate (Bates et al., 1993), hence, they are more likely to "tough it out" (Turk & Melzack, 1992, chap. 20).

It would follow then that, because expression of pain is considered appropriate behavior and there is family/community support to do so, Mexican American women are more likely to express emotions and seek help, but selectively choose that help from their own community. In fact, people of Hispanic descent are less likely to seek help from those outside the community (Sue & Zane, 1987). For example, Mexican women may go to curanderos (folk healers) or try homeopathic medication and/or concoctions developed by others in their community (Vega, 1982). Several Mexican women in this study, but not Mexican American or Anglo American women, indicated using herbs, rituals, curanderos, and/or homeopathic medicines for their headaches and stated that they felt it helped relieve their pain.

Anglo American women differ from Mexican American women in that they tend to have less support from the family and the community. Therefore, they are compelled by social pressures to keep their experiences to themselves or seek help from professionals. Although Anglo American women tend
to be more action-oriented in their coping style, all the factors just listed contribute to Anglo American women being more alone in their personal experiences, and consequently more stressed. Higher stress levels have also been linked to experiencing pain more intensely, this phenomenon has been specifically characterized for headaches and is called "headache-related distress" (Andrasik, 1992, p. 351). Based on this finding, it is reasonable to expect that Anglo Americans would experience pain more intensely.

This line of reasoning seems to apply well to the findings in this study, described earlier, about the reported pain experience and behavior among Mexican American and Anglo American women. For example, Anglo American women obtained higher scores on two measures of pain sensation than Mexican American women. In addition, they scored lower than the other groups on measures of pain affect and on willingness to overtly express their pain experience.

Recommendations for Future Research
Several recommendations for future research are proposed here. First, because the acculturation scale provides a wealth of information about where differences between groups occur, (for example, are differences related to language, ethnic pride, familiarity with host culture, or interethnic interactions), it is recommended that acculturation scales be used consistently in studies on cultural differences in pain experience and pain behavior.
Secondly, comparing M-A to other Hispanic cultures would provide more information about differences between these cultures and prevent clumping them together into one category. Indeed, it is of utmost importance not to stereotype patients from certain ethnic groups, especially since there was significant variation within the M-A in pain experience and behavior.

Third, language is used by patients with different cultural backgrounds to express the amount and type of pain experienced. Nurses and physicians use this information in order to determine pain intensity and treatment plans. Therefore, medical staff should be sensitive to language differences and avoid using a common method to assess pain with pain patients of various cultures.

Furthermore, comparing male and female headache sufferers with male and female non-headache sufferers and explaining differences with the Alexithymia construct could answer the following questions: a) do chronic pain sufferers have more difficulty expressing affect verbally and thus tend to somatize their experience?, b) is this tendency culturally-based?, and c) what role does gender play in cultural group differences in chronic pain experience and behavior? Finally, a closer look at familial expressions and meanings given to pain experience and behavior could provide more information about how attitudes toward pain experience and behavior are acquired.
This study strongly suggests that attention to cultural factors in chronic pain sufferers is essential if treatment programs are to succeed in becoming more attentive to patients' needs. Some cultures, for various reasons described above, are more expressive than others and may obtain the care they need, whereas other cultural groups, because of their tendency to be more silent about their pain, may not get their needs met. Furthermore, some patients may have stronger ties to their traditional culture and may not give the same attention, meaning, or response to their pain as A-A. Finally, it is important that medical providers, in their assessment of patients' pain experience, consider not only cultural background and attitudes of their patients toward pain but also that they place more importance in the multidimensional aspect of pain experience, especially the emotional and sensory ones.
APPENDIX A

DEMOGRAPHIC QUESTIONNAIRE (ENGLISH VERSION)
DEMOGRAPHIC QUESTIONNAIRE: ENGLISH VERSION

I.D. NUMBER__________________

PLEASE ANSWER THE FOLLOWING QUESTIONS BY PLACING A CHECK
MARK NEXT TO YOUR SELECTION OR WRITING YOUR ANSWER WHERE
APPROPRIATE. PLEASE ANSWER ALL QUESTIONS ON ALL PAGES.

*** I WOULD LIKE TO PARTICIPATE IN A RELAXATION AND STRESS
MANAGEMENT SESSION     (1) YES__    (2) NO__

1. Gender: (1) Male____    (2) Female____
2. Age: _________ (years)
3. What is the last grade you completed in
   school?_________________________
4. Marital status: ______________________
5. How many years have you lived in the United States of
   America?____________
6. Where were you born?____________
7. Have you ever lived in Mexico? (1) Yes__    (2) No__
   If Yes, When?: Month(s)       Year(s)
   ______ from 19__ until 19__
   ______ from 19__ until 19__
   ______ from 19__ until 19__
8. What is your yearly income?____________
9. What is your occupation?____________
10. Where do you work?__________________
11. Do you consider yourself to be:

1. ___ healthy
2. ___ unhealthy/disabled
3. ___ other (please specify): ____________________________

12. Have you been seen by a psychologist or psychiatrist?

   (1) Yes ___   (2) No ___

13. I have been diagnosed with a psychological disorder:

   (1) Yes ___   (2) No ___

   If Yes, please explain below: ________________
APPENDIX B

DEMOGRAPHIC QUESTIONNAIRE (SPANISH VERSION)
DEMOGRAPHIC QUESTIONNAIRE: SPANISH VERSION

I.D. NUMBER________________________

POR FAVOR, RESPONDA A LAS PREGUNTAS SIGUIENTES Y PONGA UNA MARCA CERCA DE LA SELECCION QUE SE APLICA A TU CASO. POR FAVOR RESPONDA A TODAS LAS PREGUNTAS EN TODAS LAS PAGINAS.

*** QUIERO PARTICIPAR GRATUITAMENTE EN UNA SESION ACERCA DE COMO MANEJAR EL ESTRES Y LOGRAR RELAJACION

(1) SI____ (2) NO____

1. Sexo: (1) Masculino ___ (2) Feminino (Mujer)___

2. Edad: __________ (quantos anos)

3. Cual es el ultimo ano (grado) que terminastes en la Escuela?

4. Estado Civil:

5. Cuantos anos ha vivido usted en Mexico?_______

6. En donde nacio usted?_____________________

7. Has vivido en los Estados Unidos continental?

(1) Si___ (2) No____

Si la repuesta es Si, por favor ponga el mes y ano aqui:

Cuando? Mes(es) Ano(s)

________ de 19__ hasta 19__

________ de 19__ hasta 19__

________ de 19__ hasta 19__

8. Cual es su ingreso anual?___________________

9. Cual es su profesion, oficio o
empleo?____________________________________

10. Donde trabaja usted?____________________________________

11. Usted se considera:
   (1) ___saludable
   (2) ___enfermo(a)/incapacitado(a)
   (3) ___otro

(explique):____________________________________

12. Ha visto usted un psicologo o un psiquiatra?
   (1) Si___  (2) No___

13. He sido diagnosticado con un desorden psicologico.
   (1) Si___  (2) No___

   Si la respuesta es Si, por favor explique.
   ______________________________________
APPENDIX C

HEADACHE QUESTIONNAIRE (SPANISH VERSION)
14. Anota el número de ataques de dolor de cabeza de tipo migrana/tensión que has tenido durante su vida hasta el presente.
   1. ___1-4
   2. ___5-9
   3. ___10 o más

15. Durante los últimos 12 meses por cuántos días has sufrido de dolor de cabeza de tipo migrana/tensión?
   1. ___0 días
   2. ___1-7 días
   3. ___8-14 días
   4. ___15-30 días
   5. ___31-180 días
   6. ___mas de 180 días

16. Duración usual del dolor de cabeza de tipo migrana tensión si usted no toma ninguna medicina o si está no es efectiva
   ___(1) menos de 30 minutos
   ___(2) entre 30 minutos y 4 horas
   ___(3) entre 4-24 horas
   ___(4) entre 24-72 horas
   ___(5) entre 3-7 días
   ___(6) mas de 7 días
   ___(7) varía entre menos de 30 minutos a más de 7 días

17. Localización usual del dolor de cabeza tipo
migrana/tension?

___(1) solamente dolor en la parte derecha de la cabeza (unilateral)

___(2) solamente dolor en la parte izquierda de la cabeza (unilateral)

___(3) alternadamente en la parte derecha y izquierda de la cabeza (bilateral)

___(4) alternadamente bilateral y unilateral

___(5) siempre bilateral

___(6) varía demasiado

18. Cual de los siguientes tipos de dolor es el mas característico que describe su dolor de cabeza de tipo migrana/tension?

___(1) dolor punzante

___(2) dolor con presión

___(3) dolor cortante

___(4) otro

19. Usualmente como es su dolor de cabeza de tipo migrana/tension en caso de que no tome ninguna medicina, o si esta no es efectiva?

___(1) dolor moderado no inhibe las actividades diarias (incluyendo tareas de la casa)

___(2) dolor moderado que inhibe, pero que no previene las actividades diarias

___(3) dolor severo, las actividades diarias se suspenden
20. Su dolor de cabeza de tipo migrana/tension se empeora cuando subes o caminas por las escaleras?

(1) Si  (2) No

21. Es su dolor de cabeza tipo migrana/tension acompañado por:

(1) Nausea?  (1) Si  (2) No

(2) Vomito?  (1) Si  (2) No

(3) Perdida de apetito?  (1) Si  (2) No

(4) Fotofobia (intolerancia a la luz)

(1) Si  (2) No

(5) Fonofobia (temor de hablar en voz alta)

(1) Si  (2) No

Por favor indica si alguna de las siguientes preguntas se aplican a su caso.

22. El dolor de cabeza es el primer dolor que has sentido en los pasados 12 meses.

(1) Si  (2) No

23. Mi dolor de cabeza empieza después:

(1) Que tomo una bebida alcoholic

(1) Si  (2) No

(2) Que fumo cigarillos  (1) Si  (2) No

(3) Que he tenido resfriado o sinusitis

(1) Si  (2) No

(4) Que tomo medicamentos  (1) Si  (2) No

(5) Otro (explique)  (1) Si  (2) No

   (1) Si  (2) No

Por favor escriba el medicamento, dosis, y frecuencia se actualmente toma medicinas para el dolor de cabeza:

<table>
<thead>
<tr>
<th>Nombre del Medicamento</th>
<th>Dosis (mg)</th>
<th>Frecuencia o Substancia (Veces por día)</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

25. Algunos o todos los medicamentos que tomo me causan síntomas físicos y/o psicológicos (efectos colaterales).

   (1) Si  (2) No

Si la respuesta es Si, por favor explique.

26. Que piensa usted es la causa de su dolor de cabeza? Por favor explique.

27. Tengo problemas físicos mayores: (1) Si  (2) No
28. Por favor indica cual de la lista siguiente se aplica a su caso.

(1) Enfermedad fisica  (1) Si  (2) No
(2) Accidente fisico  (1) Si  (2) No
(3) Alergia (o alergias)  (1) Si  (2) No
(4) Enfermedad  (1) Si  (2) No

29. Estoy actualmente tomando medicamento(s) o substancias para esos problemas fisicos.  (1) Si  (2) No

Por favor escriba la dosis por dia y la frecuencia de los medicamentos que usted esta actualmente tomando:

<table>
<thead>
<tr>
<th>Nombre del Medicamento</th>
<th>Dosis (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frecuencia (Veces por dia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O Substancia</td>
</tr>
</tbody>
</table>

30. Alguno o todos de estos medicamentos me causan simptomas fisicos y/o psiquiatricos (efectos colaterales):

(1) Si  (2) No

Si la repuesta es Si, por favor explique.
31. Actualmente estoy en tratamiento por:

(1) problemas físicos  (1) Sí  (2) No
(2) Dolor de cabeza  (1) Sí  (2) No

Si la respuesta es Sí, por favor explique el tratamiento por:

Los problemas físicos:_____________________

El dolor de cabeza:_____________________

32. Estoy tratando de recibir tratamiento para:

(1) Problemas físicos  (1) Sí  (2) No
(2) Dolor de cabeza  (1) Sí  (2) No

33. En los últimos 5 años, tuve una cirugía:

(1) Sí  (2) No

Si la respuesta es Sí, por favor explique.

34. Por favor indica las operaciones que usted haya tenido para ayudarle con el problema del dolor:__________________________

35. Indique las operaciones que usted haya tenido para solucionar problemas no relacionados con su dolor; escriba también los otros problemas médicos que tenga actualmente.

__________________________
APPENDIX D

HEADACHE PAIN DRAWING (SPANISH VERSION)
65. En este diagrama, ponga usted una "X" (equis) en la parte (o partes) del cuerpo donde siente usted el dolor.
APPENDIX E

BOX SCALE (SPANISH VERSION)
66. En una escala de 0 a 10, en la cual el cero (0) indica ningún dolor, y el número 10 indica el dolor más fuerte (o más intenso), ponga usted una "X" (equis) sobre el número que mejor describe la intensidad de su dolor.
APPENDIX F

LETTER (ENGLISH VERSION)
Dear parent(s),

I am a fourth year doctoral student in Clinical Psychology at the University of North Texas in Denton, Texas. I am conducting a survey of headache pain experience and behavior in people from different cultures. The study of cross-cultural differences in pain experience and pain behavior can help doctors become more aware of the needs of patients from different cultures. We are asking you to complete a questionnaire about headache pain and about your family background. It is expected that it will take approximately two hours to complete this questionnaire. As a thank you for completing the questionnaire, you may participate in my free two-hour stress management and relaxation session, which will be conducted in a group setting immediately following the completion of the questionnaires. These sessions will be supervised by a physician and/or psychologist. You will also be given a summary of results of this study, upon request, when they are available.

If you are interested in participating in this survey, you can come to the location listed below during the dates and times provided. There is no personal risk or discomfort directly involved with this research and you are free to withdraw your consent and discontinue your participation at any time without prejudice or penalty. A decision to
withdraw from the study will not affect the services available to you. You will not be identified by name. Any information obtained in this study will be recorded with a code number and stored in a locked file to protect confidentiality. If you have any questions, please contact Isabela Sardas (principal investigator) at (817) 565-2671 or Dr. Sharon Rae Jenkins (faculty advisor) at (817) 565-4107.

Information about where you should come to participate in this study: Location: Dates: Times:

Sincerely yours,

Isabela Sardas, B.A
Doctoral Trainee
Clinical Psychology Program
University of North Texas
APPENDIX G

LETTER (SPANISH VERSION)
LETTER: SPANISH VERSION

Estimados Padres de Familia,

Primeramente, quisiera presentarme con ustedes. Soy una estudiante de Doctorado en Psicología Clínica de la Universidad del Norte de Texas en Denton, Texas. Estoy llevando a cabo una encuesta, acerca de personas de diferentes culturas que sufren de dolores de cabeza, y de sus experiencias y conducta. El estudio de las diferencias en las maneras de sentir y reaccionar al dolor en diferentes culturas pueden ayudar a los doctores a ser más comprensivos de las necesidades de pacientes de otras culturas.

Quisieramos pedirles que contesten un cuestionario acerca de dolores de cabeza y de su historia familiar. Probablemente les tome unas dos horas para llenar este cuestionario, pueden ustedes participar gratuitamente en una sesión de dos horas, acerca de cómo manejar el estrés y cómo lograr relajación que se llevará a cabo en grupo al terminar de llenar el cuestionario. Estas sesiones serán supervisadas por un Doctor y/o un Psicólogo. También pueden obtener un resumen de los resultados de este estudio, si ustedes así lo piden, al terminar dicho estudio.

Si les interesa participar en este estudio, pueden asistir al lugar que se indica más adelante, durante las horas y fechas indicadas. No hay ningún riesgo o incomodidades asociadas con este estudio, y ustedes pueden retirar su consentimiento y dejar de participar en cualquier
momento. Si deciden no participar, de cualquier manera pueden ustedes tomar ventaja de los servicios ofrecidos. No se les identificará por sus nombres. Cualquier información obtenida en este estudio se les asignará un número codificado y estará guardado con llave para proteger su confidencialidad.

Si tienen dudas o preguntas, por favor llamen a Isabela Sardas (investigadora principal) al (817) 565-2671 o a la Dra. Sharon Rae Jenkins (profesora a cargo) al (817) 565-4107.

Para participar en este estudio pueden asistir a la siguiente localidad:

Lugar: Fechas: Horas:

Sinceramente,

Isabela Sardas
Estudiante de Doctorado
Programa de Psicología
Universidad del Norte de Texas
Denton, Texas
APPENDIX H

CONSENT FORM (ENGLISH VERSION)
CONSENT FORM: ENGLISH VERSION

I.D. NUMBER __________

INFORMED CONSENT FORM

I, (please print name) ________________________, agree to participate in a study investigating people's headache pain experience and behavior. The purpose of this study is to investigate cultural differences in pain experience and pain behavior. I understand that my participation will involve the completion of a questionnaire about headache pain as well as questions about my family background. I will also be given a choice of participating in a free two-hour group stress management and relaxation session conducted by Isabela Sardas (under the supervision of a physician and/or psychologist), a doctoral student at the University of North Texas Clinical Psychology Program, immediately following the completion of the questionnaire. I understand that in order to participate in the group relaxation and stress management session I must mark "Yes" by the appropriate question on the first page of the questionnaire. I have been informed that the relaxation and stress management session will consist of listening to a relaxation music tape, in a group setting, as Ms. Sardas asks me to relax my muscles, breathe deeply, and visualize a pleasant scene or desired goal. Ms. Sardas will then provide a brief lecture on how the relaxation technique I
learned can help me cope with and reduce stress.

I have been informed that any information obtained in this study will be recorded with a code number that will allow the researchers to protect confidentiality. I understand that I will receive a copy of the informed consent form that I can keep. At the conclusion of this study, the key that relates my name with my assigned code number will be destroyed. Under this condition, I agree that any information obtained from this research may be used in any way thought best for publication or education.

I understand that there is no personal risk or discomfort directly involved with this research and that I am free to withdraw my consent and discontinue my participation at any time without prejudice or penalty. A decision to withdraw from the study will not affect the services available to me. The gains I can expect involve participation in stress management and relaxation techniques to help me cope with headache pain and I will be given a summary of the results of this study, upon request, when they are available.

If I have any questions or problems that arise in connection with my participation in this study, I should contact Isabela Sardas (principal investigator) or Dr. Sharon Rae Jenkins (faculty advisor) at (817) 565-4107 or office #371 in Terrill Hall at the University of North Texas; In Guadalajara contact Dr. Raphael Toledo (Red Cross
Headquarters) at (0-11-52) 341-30794.

Date Signature of participant

THIS PROJECT HAS BEEN REVIEWED BY THE UNIVERSITY OF NORTH TEXAS COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (Phone: 817-565-3940).
APPENDIX I

CONSENT FORM (SPANISH VERSION)
CONSENT FORM: SPANISH VERSION

I.D. NUMBER______________

FORMA DE INFORMACION Y CONSENTIMIENTO

Yo, (por favor escriba su nombre aqui)
_______________, estoy de acuerdo en participar en un estudio dedicado a investigar la conducta y experiencias de personas que padecen de dolores de cabeza. El propósito de este estudio es investigar las diferencias culturales en conducta y formas de reaccionar al dolor.

Entiendo que mi participación incluye completar un cuestionario acerca de dolor de cabeza, así como preguntas acerca de mi historia familiar. También tengo la opción de participar gratuitamente en una sesión (con un grupo) de dos horas, acerca de cómo manejar el estrés y lograr relajación, que impartirá Isabela Sardas (bajo supervisión de un Doctor y/o Psicólogo) estudiante del Programa de Doctorado de Psicología de la Universidad del Norte de Texas, inmediatamente después de completar el cuestionario. Se me ha informado que, para participar en esta sesión (con un grupo), tengo que marcar "Sí" cerca de la cuestión pertinente en la primera página del cuestionario. Entiendo que la sesión acerca de cómo manejar estrés y lograr relajación consiste en escuchar, con un grupo, un casete de música relajante durante que Sra. Sardas me pregunta de relajar los músculos, de respirar profundamente, y visualizar un escenario agradable o una meta deseable.
Después, la Sra. Sardas proveerá una breve lección sobre cómo el método de relajación que aprendí puede ayudarme a manejar estres.

Se me ha informado que cualquier información obtenida en este estudio será identificada con un número codificado que ayudará a los investigadores a proteger la confidencialidad. Entiendo que voy a recibir una copia de la forma de información y consentimiento para guardar conmigo. Al terminar este estudio se destruirá el registro que asocia mi nombre con el número codificado que me asignaron. Bajo estas condiciones, estoy de acuerdo que la información obtenida de esta investigación puede ser usada de cualquier manera, ya sea para publicación o educación.

Tengo entendido que no correré riesgo o incomodidades durante esta investigación, y que puedo retirar mi consentimiento y participación en cualquier momento sin perjuicio o castigo. La decisión de retirarme del estudio no me afectará en cuanto a los servicios que me ofrecieron. El participar en la sesión me puede ayudar a manejar mejor el estres y a lograr aprender técnicas de relajación que me ayudaron a aliviar los dolores de cabeza, también recibiré un resumen de los resultados de este estudio, si yo lo pido, cuando lo terminen.

Si tengo preguntas o problemas en conexión a mi participación en este estudio, debo ponerme en contacto con Isabela Sardas (investigadora principal) o la Dra. Sharon
Rae Jenkins (profesora a cargo) al (817) 565-4107 o a la oficina #371 en Terrill Hall en la Universidad del Norte de Texas en Denton, Texas; o en Cd. Guzman, Jalisco con el Dr. Rafael Toledo por medio de Cruz Roja Mexicana, Delegacion Cd. Guzman al (91-341) 3-07-94.

_________________________  __________________________
Fecha                     Firma del participante

ESTE PROJECTO HA SIDO REVISADO POR EL COMITE DE PROTECCION A SUJETOS HUMANOS DE LA UNIVERSIDAD DEL NORTE DE TEXAS (tel. (817) 565-3940).
APPENDIX J

CODES USED FOR TRANSFORMATIONS OF DATA
CODES USED FOR TRANSFORMATION OF DATA

Transformation codes for MPQ-NWC

\[ N_1 = \sqrt{N_{WC}}; \quad N_{1A} = N_1/7 \]
\[ N_{WC1} = \arcsin(N_{1A}); \]
\[ N_{2A} = N_{WC}/50; \]
\[ N_2 = N_{2A}/(1 - N_{2A}) \]
\[ N_{WC2} = \log_{10}(N_2) \]
\[ N_3 = (1 + N_{2A})/(1 - N_{2A}) \]
\[ N_{WC3} = 0.5\log_{10}(N_3) \]

Transformation codes for Box Scale

\[ B_1 = \sqrt{\text{BOXSCALE}} \]
\[ B_{1A} = B_1/4 \]
\[ \text{Box Scale1} = \arcsin(B_{1A}) \]
\[ B_{2A} = \text{BOXSCALE}/16 \]
\[ B_2 = B_{2A}/(1 - B_{2A}) \]
\[ \text{Box Scale2} = \log_{10}(B_2) \]
\[ B_3 = (1 + B_{2A})/(1 - B_{2A}) \]
\[ \text{Box Scale3} = 0.5\log_{10}(B_3) \]

Transformation codes for HPDareas

\[ \text{HPDareas1} = \log_{10}(1 + \text{HPDAREAS}) \]
\[ \text{HPDareas2} = \sqrt{\text{HPDAREAS}} \]

Transformation codes for HPDmarks

\[ H_1 = \sqrt{\text{HPDMARKS}} \]
\[ H_{1B} = H_1/5 \]
\[ \text{HPDmarks1} = \arcsin(H_{1B}) \]
\[ \text{HPDMARK} = \text{HPDMARKS}/25 \]
\[ H_2 = \frac{\text{HPDMARK}}{1 - \text{HPDMARK}} \]

\[ \text{HPDmarks2} = \log_{10}(H_2) \]

\[ H_3 = \frac{(1 + \text{HPDMARK})}{(1 - \text{HPDMARK})} \]

\[ \text{HPDmarks3} = 0.5 \log_{10}(H_3) \]

Transformation codes for TOTmeds

\[ \text{TMEDA} = \sqrt{\text{TOTMEDS}} \]

\[ \text{TMEDB} = \frac{\text{TMEDA}}{3} \]

\[ \text{TOTmeds1} = \arcsin(\text{TMEDB}) \]

\[ \text{TMD1} = \frac{\text{TOTMEDS}}{5} \]

\[ \text{TM2} = \frac{\text{TMD1}}{1 - \text{TMD1}} \]

\[ \text{TOTmeds2} = \log_{10}(1 + \text{TM2}) \]

\[ \text{TM3} = \frac{(1 + \text{TMD1})}{(1 - \text{TMD1})} \]

\[ \text{TOTmeds3} = 0.5 \log_{10}(1 + \text{TM3}) \]

Transformation codes for TOTdosage

\[ \text{DTMEDA} = \sqrt{\text{TOTDOSES}} \]

\[ \text{DTMEDB} = \frac{\text{DTMEDA}}{70} \]

\[ \text{TOTdosage1} = \arcsin(\text{DTMEDB}) \]

\[ \text{DTMD1} = \frac{\text{TOTDOSES}}{4600} \]

\[ \text{DTM2} = \frac{\text{DTMD1}}{1 - \text{DTMD1}} \]

\[ \text{TOTdosage2} = \log_{10}(1 + \text{DTM2}) \]

\[ \text{DTM3} = \frac{(1 + \text{DTMD1})}{(1 - \text{DTMD1})} \]

\[ \text{TOTdosage3} = 0.5 \log_{10}(1 + \text{DTM3}) \]
Table 1

**Descriptive Statistics and K-S Lilliefors Test of Normality for All Samples**

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**Note.** K-S refers to Lilliefors test of univariate normality.  
* *p < .05. ** *p < .01. *** *p < .001.
Table 2

Descriptive Statistics and K-S Lilliefors Test of Normality for All Samples After Transformations

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**Note.** K-S refers to Lilliefors test of univariate normality.

*p < .05.  **p < .01.  ***p < .001.
Table 3

Correlations Among Pain Experience and Pain Behavior

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(Table Continues)
## Correlation Coefficients

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(Table Continues)
### Correlation Coefficients

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**Note.** K-S refers to Lilliefors test of univariate normality.

*\(p < .05\).  **\(p < .01\).  ***\(p < .001\).
Table 4

Descriptive Statistics and K-S Lilliefors Test of Normality for All Samples After Removal of Outlier

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<td></td>
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| Mex                | 43 | 17.7  | 3.5 | .26*** | -2.1 | 4.5 |}
| M-A                | 36 | 14.2  | 4.8 | .11  | -.54 | -.27 |
| A-A                | 50 | 12.9  | 5.2 | .09  | -.08 | -1.1 |
| **Box Scale**      |    |       |     |     |          |          |
| Mex                | 43 | 8.5   | 1.7 | .19*** | -1.2 | 1.4 |
| M-A                | 36 | 7.1   | 2.6 | .14  | -.26 | -1.3 |
| A-A                | 50 | 7.4   | 1.9 | .12  | -.58 | .21  |
| **TOTmeds**        |    |       |     |     |          |          |
| Mex                | 43 | 1.5   | 1.2 | .20*** | .61  | -.18 |
| M-A                | 36 | .69   | .82 | .27*** | 1.3  | 1.7  |
| A-A                | 50 | .78   | .84 | .24*** | 1.3  | 2.9  |

*(Table Continues)*
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**Note.** K-S refers to Lilliefors test of univariate normality.  
*p < .05.  **p < .01.  ***p < .001.
Table 5

Means and Frequency Values for Demographic Variables for Outliers

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<th>Mexican American</th>
<th>Anglo American</th>
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<td>((n = 2))</td>
<td>((n = 4))</td>
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<td>2</td>
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<td>Divorced</td>
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<td>1</td>
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<tr>
<td>Education Level(^b)</td>
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(Table Continues)
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<th>Mexican American</th>
<th>Anglo American</th>
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<td>1</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
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<td>1</td>
<td>1</td>
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Note. Education Level values are in years. All Mexican American outlier chose the English version of the questionnaire. \(^a\)Values represent means. \(^b\)Values represent frequencies.
Table 6

**T-tests and Demographics Comparing Outliers and Non-Outliers**

<table>
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<th>Non-outlier Mean SD (n = 129)</th>
<th>T-Ratio</th>
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<td>38 14</td>
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<tr>
<td>Marital</td>
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<td>1.4 .74</td>
<td>.72</td>
</tr>
<tr>
<td>Income(^a)</td>
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<td>13 94</td>
<td>-.26</td>
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<td>16.7 14.8</td>
<td>21.6 19.7</td>
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<td>16.0 19.1</td>
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**Note.** T-test values were all non-significant at p < .01.

\(^a\)Values represent yearly income in U.S. dollars (in thousands).
Table 7

Correlations Among Demographic Variables and All Dependent Pain Measures

<table>
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<td>-.19*</td>
<td>-.06</td>
<td>.18*</td>
<td>-.05</td>
</tr>
<tr>
<td>TOTmeds</td>
<td>.43**</td>
<td>.35**</td>
<td>-.08</td>
<td>.00</td>
</tr>
<tr>
<td>TOTdosage</td>
<td>.21*</td>
<td>.17</td>
<td>.02</td>
<td>-.06</td>
</tr>
</tbody>
</table>

(Table Continues)
<table>
<thead>
<tr>
<th>Generation Level</th>
<th>Ethnic Identity</th>
<th>Acculturation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPQsensory</td>
<td>.13</td>
<td>.13</td>
</tr>
<tr>
<td>MPQaffective</td>
<td>-.25**</td>
<td>-.24**</td>
</tr>
<tr>
<td>MPQevaluative</td>
<td>.05</td>
<td>.01</td>
</tr>
<tr>
<td>MPQmiscellany</td>
<td>-.08</td>
<td>-.08</td>
</tr>
<tr>
<td>MPQ-NWC</td>
<td>-.35**</td>
<td>-.34**</td>
</tr>
<tr>
<td>Box Scale</td>
<td>-.18*</td>
<td>-.17</td>
</tr>
<tr>
<td>HPDmarks</td>
<td>.01</td>
<td>.03</td>
</tr>
<tr>
<td>HPDareas</td>
<td>.23**</td>
<td>.28**</td>
</tr>
<tr>
<td>TOTmeds</td>
<td>-.19*</td>
<td>-.24**</td>
</tr>
<tr>
<td>TOTdosage</td>
<td>.08</td>
<td>.04</td>
</tr>
</tbody>
</table>

*E < .05. **E < .01.
Table 8

**Descriptive Statistics and F Tests on Demographic Characteristics of the Study Population**

<table>
<thead>
<tr>
<th></th>
<th>Mexican</th>
<th>Mexican</th>
<th>Anglo</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>American</td>
<td>American</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n = 43)</td>
<td>(n = 36)</td>
<td>(n = 50)</td>
<td></td>
</tr>
<tr>
<td>M ± SD</td>
<td>M ± SD</td>
<td>M ± SD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Mexican</th>
<th>Mexican</th>
<th>Anglo</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>American</td>
<td>American</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n = 43)</td>
<td>(n = 36)</td>
<td>(n = 50)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M ± SD</td>
<td>M ± SD</td>
<td>M ± SD</td>
<td></td>
</tr>
</tbody>
</table>

|        | 37.4±10       | 30.4±9.7     | 28.9±10     | 8.9*** |
| Age    |               |              |             |       |

|        | 11±13         | 9±12         | 13±16       | .65   |
| Income |               |              |             |       |

|        | .14±.56       | 19.7±9.6     | 28.8±10     | 143*** |
| Reside/USA |           |              |             |       |

|        | 37.3±10       | 10.8±11      | .02±.14     | 258*** |
| Reside/Mex |            |              |             |       |

Values represent yearly income in U.S. dollars (in thousands). Values represent years. **p < .01. ***p < .001.
Table 9

Descriptive Statistics and Chi-Square Tests on Demographic Characteristics of the Study Population

<table>
<thead>
<tr>
<th></th>
<th>Mexican American</th>
<th>Mexican American</th>
<th>Anglo American</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( (n = 43) )</td>
<td>( (n = 36) )</td>
<td>( (n = 50) )</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td>25.01**</td>
</tr>
<tr>
<td>-Married</td>
<td>34</td>
<td>24</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>-Single</td>
<td>7</td>
<td>8</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>-Divorced</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>-Separated</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>-Widow</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>-Common Law</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Education (in years)</td>
<td></td>
<td></td>
<td></td>
<td>45.6***</td>
</tr>
<tr>
<td>0-6</td>
<td>16</td>
<td>13</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>7-9</td>
<td>10</td>
<td>5</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>10-12</td>
<td>8</td>
<td>12</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>&gt; 2</td>
<td>5</td>
<td>1</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

(Table Continues)
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Mexican (n = 43)</th>
<th>Mexican (n = 43)</th>
<th>Anglo (n = 36)</th>
<th><em>χ²</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>27</td>
<td>23</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Professional, Technical, &amp; Managerial</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Clerical &amp; Sales</td>
<td>10</td>
<td>5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Medical Services</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Machine Trades</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

| Generation Level              |                  |                  |                |      |
| First                         | 43               | 20               | 0              |      |
| Second                        | 0                | 8                | 1              |      |
| Third                         | 0                | 0                | 2              |      |
| Fourth                        | 0                | 3                | 6              |      |
| Fifth                         | 0                | 5                | 41             |      |

*(Table Continues)*
<table>
<thead>
<tr>
<th>Ethnic Identity</th>
<th>Mexican</th>
<th>Mexican American</th>
<th>Anglo American</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Mexican</td>
<td>43</td>
<td>21</td>
<td>0</td>
<td>165***</td>
</tr>
<tr>
<td>-Chicano</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-Mexican American</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-Spanish, Latin, Hispanic American</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-Anglo American</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Values represent frequencies. **$p < .01$. ***$p < .001$.**
### Table 10

**Descriptive Statistics and Significance Tests on Medical Characteristics of the Study Population**

<table>
<thead>
<tr>
<th></th>
<th>Mexican (n = 43)</th>
<th>Mexican (n = 36)</th>
<th>Anglo (n = 50)</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy ( ^d )</td>
<td></td>
<td></td>
<td></td>
<td>25.1***</td>
</tr>
<tr>
<td>Healthy</td>
<td>22</td>
<td>26</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Unhealthy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/Disabled</td>
<td>21</td>
<td>8</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Pain duration ( ^d )</td>
<td></td>
<td></td>
<td></td>
<td>30.5**</td>
</tr>
<tr>
<td>30 min</td>
<td>0</td>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>30 min to 4hrs</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>4 to 24hrs</td>
<td>18</td>
<td>7</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>24 to 72hrs</td>
<td>11</td>
<td>8</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3 to 7 days</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>More than 7 days</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Varying Less Than</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 min to &gt; 7 days</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

(Table Continues)
<table>
<thead>
<tr>
<th>Pain location</th>
<th>Mexican (n = 43)</th>
<th>Mexican (n = 36)</th>
<th>Anglo (n = 50)</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Right</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>15.8</td>
</tr>
<tr>
<td>-Left</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>-Alternating, Unilateral</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>-Alternating, Bilateral</td>
<td>15</td>
<td>5</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>-Always Bilateral</td>
<td>15</td>
<td>12</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>-Varies a Lot</td>
<td>4</td>
<td>7</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Values represent frequencies. **p < .01. ***p < .001.**
Table 11

Means and Univariate MANOVA Results for Cultural Groups on All Pain Measures

<table>
<thead>
<tr>
<th>Cultural Groups</th>
<th>Mexican</th>
<th>Mexican</th>
<th>Anglo</th>
<th>F</th>
<th>American</th>
<th>American</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n = 43)</td>
<td>(n = 36)</td>
<td>(n = 50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pain Experience**

<table>
<thead>
<tr>
<th></th>
<th>Mexican</th>
<th>Mexican</th>
<th>Anglo</th>
<th>F</th>
<th>American</th>
<th>American</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPQaffective</td>
<td>7.3</td>
<td>5.4</td>
<td>5.2</td>
<td>5.62**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPQsensory</td>
<td>19.8</td>
<td>18.3</td>
<td>20.3</td>
<td>.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPQevaluative</td>
<td>3.3</td>
<td>2.9</td>
<td>3.2</td>
<td>.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPQmiscellany</td>
<td>7.4</td>
<td>6.5</td>
<td>6.4</td>
<td>1.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPQ-NWC</td>
<td>17.7</td>
<td>14.2</td>
<td>12.9</td>
<td>13.48***</td>
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<td></td>
</tr>
<tr>
<td>BOX Scale</td>
<td>8.5</td>
<td>7.1</td>
<td>7.4</td>
<td>4.67**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPDareas</td>
<td>6.7</td>
<td>6.7</td>
<td>8.9</td>
<td>4.81**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPDmarks</td>
<td>4.6</td>
<td>3.6</td>
<td>4.4</td>
<td>1.58</td>
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</tr>
</tbody>
</table>

**Pain Behavior**

<table>
<thead>
<tr>
<th></th>
<th>Mexican</th>
<th>Mexican</th>
<th>Anglo</th>
<th>F</th>
<th>American</th>
<th>American</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTmeds</td>
<td>1.5</td>
<td>.69</td>
<td>.78</td>
<td>9.18***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTdosage</td>
<td>845</td>
<td>560</td>
<td>810</td>
<td>1.20</td>
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<td></td>
</tr>
</tbody>
</table>

* p < .05; ** p < .01; *** p < .001.
Table 12

Means and Univariate MANOVA Results for Acculturation Level on All Pain Measures

<table>
<thead>
<tr>
<th>Acculturation Groups</th>
<th>Very Mexican/ Spanish (n = 62)</th>
<th>Equal, True, Anglo (n = 17)</th>
<th>Very Syntonic (n = 50)</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPQaffective</td>
<td>7.0</td>
<td>4.3</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>MPQsensory</td>
<td>18.2</td>
<td>22.5</td>
<td>20.3</td>
<td>2.31</td>
</tr>
<tr>
<td>MPQevaluative</td>
<td>3.1</td>
<td>3.1</td>
<td>3.2</td>
<td>.06</td>
</tr>
<tr>
<td>MPQmiscellany</td>
<td>7.2</td>
<td>6.5</td>
<td>6.4</td>
<td>.63</td>
</tr>
<tr>
<td>MPQ-NWC</td>
<td>16.8</td>
<td>13.8</td>
<td>12.9</td>
<td>10.03***</td>
</tr>
<tr>
<td>Box Scale</td>
<td>8.1</td>
<td>6.9</td>
<td>7.4</td>
<td>2.75</td>
</tr>
<tr>
<td>HPDareas</td>
<td>6.5</td>
<td>7.4</td>
<td>8.9</td>
<td>5.16**</td>
</tr>
<tr>
<td>HPDmarks</td>
<td>4.2</td>
<td>3.8</td>
<td>4.4</td>
<td>.37</td>
</tr>
</tbody>
</table>
Acculturation Groups

<table>
<thead>
<tr>
<th></th>
<th>Very Equal, Very Mexican/ Spanish Syntonic Bicultural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
</tr>
<tr>
<td>n = 62</td>
<td></td>
</tr>
<tr>
<td>n = 17</td>
<td></td>
</tr>
<tr>
<td>n = 50</td>
<td></td>
</tr>
</tbody>
</table>

Pain Behavior

<table>
<thead>
<tr>
<th></th>
<th>TOTmeds</th>
<th>TOTdosage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.2</td>
<td>709</td>
</tr>
<tr>
<td></td>
<td>.77</td>
<td>739</td>
</tr>
<tr>
<td></td>
<td>.78</td>
<td>810</td>
</tr>
<tr>
<td></td>
<td>3.47*</td>
<td>.18</td>
</tr>
</tbody>
</table>

* p < .05; ** p < .01; *** p < .001.
Table 13

Correlations of Acculturation and All Pain Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTmeds</td>
<td>-.2270**</td>
</tr>
<tr>
<td>TOTdosage</td>
<td>.0581</td>
</tr>
<tr>
<td>HPDmarks</td>
<td>.0237</td>
</tr>
<tr>
<td>HPDareas</td>
<td>.2841**</td>
</tr>
<tr>
<td>Box Scale</td>
<td>-.1845*</td>
</tr>
<tr>
<td>MPQsensory</td>
<td>.1325</td>
</tr>
<tr>
<td>MPQaffective</td>
<td>-.3000**</td>
</tr>
<tr>
<td>MPQmiscellany</td>
<td>-.0988</td>
</tr>
<tr>
<td>MPQevaluative</td>
<td>.0167</td>
</tr>
<tr>
<td>MPQ-NWC</td>
<td>-.3790**</td>
</tr>
</tbody>
</table>

* p < .05.  ** p < .01
Table 14

Mean Scores for Cultural Groups on Dimensions of the Acculturation Scale

<table>
<thead>
<tr>
<th></th>
<th>Mexican</th>
<th>Mexican</th>
<th>Anglo American</th>
<th>American</th>
<th>American</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Language Familiarity and Usage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intra-family</td>
<td>11.1</td>
<td>.61</td>
<td>17.6</td>
<td>6.3</td>
<td>30.4</td>
</tr>
<tr>
<td>Extra-family</td>
<td>5.8</td>
<td>2.2</td>
<td>8.8</td>
<td>3.8</td>
<td>14.6</td>
</tr>
<tr>
<td>Ethnic Pride and Identity</td>
<td>14.3</td>
<td>1.1</td>
<td>20.2</td>
<td>8.1</td>
<td>40.5</td>
</tr>
<tr>
<td>Cultural Heritage and Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5 .70</td>
<td>7.8</td>
<td>3.8</td>
<td>12.6</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Ethnic Social Interactions</td>
<td>3.0 .15</td>
<td></td>
<td>6.3</td>
<td>3.3</td>
<td>12.6</td>
</tr>
</tbody>
</table>
Table 15

Group Differences on the Headache Pain Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Mexican</th>
<th>Mexican</th>
<th>Anglo</th>
<th>American</th>
<th>American</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>American</td>
<td>American</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( %)</td>
<td>( n)</td>
<td>( %)</td>
<td>( n)</td>
<td>( %)</td>
<td>( n)</td>
</tr>
<tr>
<td>Headaches</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.64**</td>
</tr>
<tr>
<td>Mild</td>
<td>35</td>
<td>15</td>
<td>56</td>
<td>20</td>
<td>58</td>
<td>29</td>
</tr>
<tr>
<td>Severe</td>
<td>65</td>
<td>28</td>
<td>44</td>
<td>16</td>
<td>42</td>
<td>21</td>
</tr>
<tr>
<td>Cause</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.16</td>
</tr>
<tr>
<td>Stress</td>
<td>58</td>
<td>25</td>
<td>59</td>
<td>20</td>
<td>50</td>
<td>26</td>
</tr>
<tr>
<td>Biologic</td>
<td>16</td>
<td>7</td>
<td>12</td>
<td>6</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Both</td>
<td>26</td>
<td>11</td>
<td>29</td>
<td>10</td>
<td>36</td>
<td>18</td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26.50***</td>
</tr>
<tr>
<td>Pulsating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressing/</td>
<td>81</td>
<td>35</td>
<td>47</td>
<td>17</td>
<td>32</td>
<td>16</td>
</tr>
<tr>
<td>Tight</td>
<td>17</td>
<td>6</td>
<td>28</td>
<td>10</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Stabbing</td>
<td>2</td>
<td>2</td>
<td>25</td>
<td>9</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.89*</td>
</tr>
<tr>
<td>Yes</td>
<td>79</td>
<td>34</td>
<td>50</td>
<td>18</td>
<td>58</td>
<td>29</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>9</td>
<td>50</td>
<td>18</td>
<td>42</td>
<td>21</td>
</tr>
</tbody>
</table>

(Table Continues)
|
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Type of Medication | Mexican\textsuperscript{a} | Mexican\textsuperscript{b} | Anglo\textsuperscript{c} | \( \chi^2 \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| None | 42 | 16 | 50 | 17 | 47 | 23 | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) |
| Analgesic | 58 | 22 | 50 | 17 | 53 | 26 | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) | \( \% \) |

\textbf{Note.} The values represent percentages out of group sample size totals. \textsuperscript{a}Group sample size = 43. \textsuperscript{b}Group sample size = 36. \textsuperscript{c}Group sample size = 50.
Table 16

Differences on Pain Measures Among Mexican Americans Who Chose the Spanish Version or the English Version of the Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Spanish Forms</th>
<th>English Forms</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Ratio</td>
</tr>
<tr>
<td>(n = 19)</td>
<td>(n = 17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPDmarks</td>
<td>3.6±1.9</td>
<td>3.5±1.3</td>
<td>.18</td>
</tr>
<tr>
<td>HPDareas</td>
<td>6.4±3.3</td>
<td>7.0±2.4</td>
<td>-.59</td>
</tr>
<tr>
<td>Boxscale</td>
<td>7.4±2.9</td>
<td>6.9±2.4</td>
<td>.55</td>
</tr>
<tr>
<td>MPQsensory</td>
<td>5.1±7.0</td>
<td>22.0±7.1</td>
<td>-3.0***</td>
</tr>
<tr>
<td>MPQaffective</td>
<td>6.7±3.8</td>
<td>3.9±3.0</td>
<td>2.5</td>
</tr>
<tr>
<td>MPQevaluative</td>
<td>2.6±1.7</td>
<td>3.2±1.6</td>
<td>-.97</td>
</tr>
<tr>
<td>MPQmiscellany</td>
<td>6.8±3.8</td>
<td>6.2±3.4</td>
<td>.51</td>
</tr>
<tr>
<td>MPQ-NWC</td>
<td>15.2±4.4</td>
<td>13.1±5.0</td>
<td>1.3</td>
</tr>
<tr>
<td>TOTmeds</td>
<td>.63±.83</td>
<td>.76±.83</td>
<td>-.48</td>
</tr>
<tr>
<td>TOTdosage</td>
<td>401±602</td>
<td>739±832</td>
<td>-1.41</td>
</tr>
<tr>
<td>Acculturation</td>
<td>1.1±.22</td>
<td>3.3±.99</td>
<td>-9.2***</td>
</tr>
</tbody>
</table>

**p < .01. ***p < .001.
Table 17

Mean Values and T Tests of Demographic Variables for Mexican Americans Who Chose either the Spanish or English Version of the Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Spanish Forms Mean±SD</th>
<th>English Forms Mean±SD</th>
<th>T Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 19)</td>
<td>(n = 17)</td>
<td></td>
</tr>
<tr>
<td>Age (in years)</td>
<td>32±8</td>
<td>28±11</td>
<td>1.3</td>
</tr>
<tr>
<td>Income(^a)</td>
<td>6±5</td>
<td>13±16</td>
<td>-1.94</td>
</tr>
<tr>
<td>Acculturation Total</td>
<td>28±6.9</td>
<td>66±12</td>
<td>-11.4***</td>
</tr>
</tbody>
</table>

\(^a\)Values represent yearly income in U.S. dollars (in thousands). ***p < .001.
Table 18

Percentages and Chi-Square Tests of Demographic Variables for Mexican Americans Who Chose either the Spanish or English Version of Questionnaire

<table>
<thead>
<tr>
<th>Education (in years)</th>
<th>Spanish Forms (n = 19)</th>
<th>English Forms (n = 17)</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6</td>
<td>68</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>7-9</td>
<td>16</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>10-12</td>
<td>11</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>university</td>
<td></td>
<td></td>
<td>21.3***</td>
</tr>
<tr>
<td>1-2</td>
<td>5</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>$\geq$ 2</td>
<td>0</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Generation Level</th>
<th>Spanish Forms (n = 19)</th>
<th>English Forms (n = 17)</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-First</td>
<td>100</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>-Second</td>
<td>0</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>-Third</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-Fourth</td>
<td>0</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>-Fifth</td>
<td>0</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

(Table Continues)
<table>
<thead>
<tr>
<th>Ethnic Identity</th>
<th>Spanish Forms</th>
<th>English Forms</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td></td>
</tr>
<tr>
<td>(n = 19)</td>
<td></td>
<td>(n = 17)</td>
<td></td>
</tr>
<tr>
<td>-Mexican</td>
<td>95</td>
<td>17</td>
<td>22.0***</td>
</tr>
<tr>
<td>-Chicano</td>
<td>0</td>
<td>6</td>
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</tr>
<tr>
<td>-Mexican American</td>
<td>5</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>-Spanish, Latin, Hispanic American</td>
<td>0</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>-Anglo</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td></td>
<td></td>
<td>.39</td>
</tr>
<tr>
<td>-Healthy</td>
<td>69</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>-Unhealthy/Disabled</td>
<td>26</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>-Other</td>
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<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Values represent percentages. ***$p < .001$.**
Figure 1. Mean scores on pain experience and pain behavior measures for cultural groups.
Figure 2. Mean scores on pain experience and pain behavior measures for acculturation levels.
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