



Ethnic identity predicts experimental pain sensitivity in African Americans and Hispanics

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Abstract

The aim of this study was to examine experimental pain sensitivity in three ethnic groups, African Americans, Hispanic Americans and non-Hispanic White Americans, and to determine whether ethnic identity is differentially associated with pain sensitivity across ethnic groups. Participants included sixty-three African American, sixty-one Hispanic and eighty-two non-Hispanic white participants who were assessed using three experimental pain measures: thermal, cold-pressor and ischemic. Participants' ethnic identity was assessed using the Multi-group Ethnic Identity Measure (MEIM). Ethnic group differences in pain responses were observed, with African American and Hispanic subjects showing lower cold and heat pain tolerances than non-Hispanic White Americans. In addition, pain range (i.e. tolerance-threshold) was computed for heat, cold and ischemic pain, and the two minority groups again had lower values compared to non-Hispanic White Americans. Ethnic identity was associated with pain range only for African American and Hispanic groups. Statistically controlling for ethnic identity rendered some of the group differences in pain range non-significant. These findings indicate that ethnic identity is associated with pain sensitivity in ethnic minority groups, and may partially mediate group differences in pain perception. The results of the present investigation provide evidence of ethnic group differences in responses to experimental pain across multiple noxious stimuli, with both minority groups exhibiting greater sensitivity to laboratory evoked pain compared to non-Hispanic White Americans.

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1. Introduction

Ethnic disparities in pain have recently gained increasing attention (Edwards et al., 2005; Hastie et al., 2005). Several investigators have reported ethnic differences in clinical pain. For example, Riley et al. (2002) reported that African Americans studied in a chronic pain center reported higher levels of pain unpleasantness, emotional response to pain, and increased pain behaviors relative to non-Hispanic White Americans. Several other studies

in treatment-seeking, chronic pain populations have reported a similar pattern of results (Greenwald, 1991; Edwards et al., 1999, 2005; McCracken et al., 2001; Green et al., 2003). Additional evidence indicates ethnic differences in the severity of pain associated with several medical conditions, including AIDS (Breitbart et al., 1996), glaucoma (Sherwood et al., 1998), and arthritis (Creamer et al., 1999).

In addition to these clinical findings, several studies have examined ethnic differences in responses to experimental pain. Zatzick and Dimsdale (1990) reviewed the literature regarding ethnic differences in responses to controlled laboratory stimuli. They concluded that there was evidence for ethnic differences in pain perception,

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although the actual mechanisms underlying ethnic differences in pain perception were not known. Since that review, additional evidence of greater sensitivity to experimentally induced pain among African Americans compared to non-Hispanic White Americans has emerged (Edwards et al., 2001a,b,c; Green et al., 2003). In general, these differences appear more robust for suprathreshold versus threshold stimuli (Edwards et al., 1999; Campbell et al., 2005), and these differences emerged across multiple experimental stimuli (Campbell et al., 2005). Interestingly, one study reported that ethnic differences in pain perception were present when using standardized pain scales, but not with individually tailored scales (Campbell et al., 2004).

1.1. Ethnic identity

Ethnicity refers to a social group of people who share a common ancestral origin, language, physiology and culture or social background that provide a sense of identity (Smith et al., 1999; Edwards et al., 2001a,b,c; Lasch, 2002). Ethnicity is a powerful predictor of health-related outcomes (Lasch, 2002) beliefs and behaviors (Lipton and Marbach, 1984). Ethnic identity, distinguished from one's ethnicity (Phinney, 1992), is part of a person's self-concept that is derived from one's knowledge or membership in a social group (Phinney, 1992; Smith et al., 1999).

There is an interface between pain and ethnicity. Both are shaped by culture; behavioral and attitudinal norms and systems of meaning (Lasch, 2002). While several studies provide evidence for an association between ethnicity and pain, most comparisons are between African Americans and non-Hispanic White Americans, and few investigations have examined ethnic differences in response to experimental pain stimuli among healthy young adults of three major ethnic groups: African American, Hispanic American, and non-Hispanic White Americans. Moreover, while ethnic differences in pain sensitivity associated with psychological factors, such as catastrophizing and hypervigilance, have been reported (Edwards et al., 1999; Campbell et al., 2005), the contribution of sociocultural constructs, such as ethnic identity, has not been determined. Therefore, we examined sensitivity to multiple experimental pain stimuli among African Americans, Hispanic Americans, and non-Hispanic White Americans, and we determined whether ethnic identity was associated with pain responses across all three groups.

2. Methods

2.1. Participants

The study included a total of 206 participants representing three major ethnic groups that included 63 African Americans (30.6%), 61 Hispanic Americans (29.6%) and 82 non-Hispanic

White Americans (39.8%). These three groups were the focus of the research as they represent the three largest ethnic groups in the US as well as in our local area. Moreover, current clinical data suggest that African Americans and Hispanics may experience increased clinical pain and may be at risk for undertreatment of pain (Green et al., 2003). While the study was open to individuals from other ethnic groups, the small number of individuals from these other groups precludes their inclusion in the hypothesis-driven analyses at this time. Therefore, the analyses included only participants from the African American, Hispanic and non-Hispanic white groups who were healthy adults between the ages of 18 and 53. Investigators recruited participants through multiple mechanisms, including a local telephone survey, local print media and posted advertisements. Individuals were also included who were referred to the study by participants previously completing the protocol. Some subjects inevitably knew each other; however, in order to reduce these effects investigators requested that participants not discuss the nature of the study with prospective enrollees. Self-identification of ethnicity revealed that 29.5% of the participants were Hispanic. By race, 32.9% of participants self-identified as African American/Black and 57% (including Hispanics) self-selected as white/Caucasian, or European. The distribution of sex across race/ethnicity was sixty-six percent African American females, 56% Hispanic females, and 43% non-Hispanic white females. The percent of males was significantly higher for non-Hispanic white males than for African American and Hispanic males. Education for all participants ranged from high school to graduate level of college education. The mean age was 24.5 for African Americans, 22.1 for Hispanics, and 25.0 for non-Hispanic White Americans. Demographic data by ethnicity are in presented in Table 2. No ethnic group differences were found among participants in income. However, because a significant proportion of our population was comprised of students, individual income may not be a good indicator of SES. Therefore, we also examined family income. Even though we found that family income differed across ethnic group, this variable was not related to MEIM scores or pain sensitivity among ethnic groups. Therefore, family income was not used as a control variable. Income data are presented in Table 2.

Prior to participating in the study, researchers obtained both verbal and written informed consent from each participant. All procedures were approved by the University of Florida's Institutional Review Board.

2.2. General experimental procedures

Each subject participated in three experimental sessions over a 1–2 week period. First, an introductory session was conducted, which included completion of questionnaires, a brief interview, and taste testing (data to be reported elsewhere). Then, two experimental pain testing sessions were conducted, with two of the following four experimental pain induction procedures conducted during each session: thermal pain, pressure pain, ischemic pain, and cold-pressor pain (described below). The order of presentation was such that cold-pressor and ischemic pain procedures were always conducted last and in separate sessions, to avoid carryover effects. Thermal and pressure pain were always conducted first, followed by a 10-min rest period. Thus, subjects were randomly assigned to one of four possible testing

orders. For females, experimental testing sessions were always conducted during the follicular phase of the menstrual cycle (days 4–10) following menses.

To control for observer bias, we recruited experimenters of diverse ethnic backgrounds and used two experimenters for all testing procedures. Experimenters included African American, Hispanic, Asian and non-Hispanic white individuals. When possible, we matched participant-experimenter ethnicity/race with one experimenter of the participant's ethnicity. When not possible, the vast majority of sessions were conducted with at least one minority experimenter. In order to further reduce experimenter bias, all participants listened to digitally recorded instructions, and experimenters were trained to provide procedural information only when requested by subjects. Thus, experimenter encouragement was kept to a minimum.

2.3. Measures

2.3.1. MEIM questionnaire

Participants completed the Multi-group Ethnic Identity Measure (MEIM) Questionnaire (Table 1), a twenty-item questionnaire assessing ethnic identity common across groups (Phinney, 1992). The MEIM has shown adequate reliability and validity and has been used to assess ethnic identity across multiple ethnic groups (Phinney, 1992). In addition to a total Ethnic Identity score, the MEIM yields three subscale scores: Affirmation and Belonging, Ethnic Identity Achievement, and Ethnic Behaviors. The subscale for Affirmation and Belonging includes items 6, 11, 14, 18 and 20; Ethnic Identity Achievement 1, 3, 5, 8R (reverse-scored), 10R (reverse-scored) and 12; Ethnic Behavior, 2 and 16.

2.4. Pain induction procedures

Participants underwent three experimental laboratory pain induction procedures: thermal pain, ischemic pain, and cold-pressor pain. Procedures were conducted as previously reported (Campbell et al., 2005).

2.4.1. Ischemic pain procedure

The left arm was exsanguinated by elevating it above heart level for 30 s, and then the arm was occluded with a standard pressure cuff inflated to 240 mmHg. Participants performed 20 handgrip exercises of 2-s duration at 4-s intervals at 50% of their maximum grip strength. Participants continued until the perceived pain became intolerable or for 15 min. Every 30 s, subjects were prompted to rate the unpleasantness or intensity of their arm pain using the 0–100 scale.

2.4.2. Pressure pain threshold

Pressure pain threshold was assessed with a handheld pressure algometer (Pain Diagnostics, Great Neck, NY) with 1 cm diameter tip. Pressure was applied at 1 kg/s to the left upper trapezius and the left masseter, with the order of site presentation randomized. The experimenter recorded the pressure at which pain was first reported. Pressure pain thresholds were assessed 3 times at each site, and the average of the three trials was used in data analysis.

2.4.3. Thermal pain procedure

Contact heat stimuli were delivered using a computer-controlled Medoc Thermal Sensory Analyzer (TSA-2001, Ramat Yishai, Israel), which is a peltier-element-based stimulator. Detection of warmth (warmth threshold), first pain sensation (heat pain threshold) and pain limit (heat pain tolerance) was assessed on the ventral forearm using an ascending method of limits with a 0.5 °C/s rate of rise.

2.4.4. Cold pressor pain

The participant immersed his/her left hand up to the wrist in 5 °C water. The water temperature was maintained (± 0.1 °C) by a refrigeration unit (Neslab, Portsmouth, NH), and the water was constantly re-circulated to prevent local warming around the submerged hand. Participants continued for 5 min or until they reported intolerable pain. Participants being prompted to rate the unpleasantness or intensity of the cold-pressor pain using the 0–100 scale at 15-s intervals.

Table 1
MEIM Questionnaire

1	I have spent time trying to find out more about my own ethnic group, such as its history, traditions, and customs
2	I am active in organizations or social groups that include mostly members of my own ethnic group
3	I have a clear sense of my ethnic background and what it means for me
4	I like meeting and getting to know people from ethnic groups other than my own
5	I think a lot about how my life will be affected by my ethnic group membership
6	I am happy that I am a member of the group I belong to
7	I sometimes feel it would be better if different ethnic groups didn't try to mix together
8	I am not very clear about the role of my ethnicity in my life
9	I often spend time with people from ethnic groups other than my own
10	I really have not spent much time trying to learn more about the culture and history of my ethnic group
11	I have a strong sense of belonging to my own ethnic group
12	I understand pretty well what my ethnic group membership means to me, in terms of how to relate to my own group and other groups
13	In order to learn more about my ethnic background, I have often talked to other people about my ethnic group
14	I have a lot of pride in my ethnic group and its accomplishments
15	I don't try to become friends with people from other ethnic groups
16	I participate in cultural practices of my own group, such as special food, music, or customs
17	I am involved in activities with people from other ethnic groups
18	I feel a strong attachment toward my own ethnic group
19	I enjoy being around people from ethnic groups other than my own
20	I feel good about my cultural or ethnic background

2.5. Statistical methods

Data were analyzed using SAS. The means, standard deviation, and pain range were computed for continuous variables, while frequency distributions were generated on categorical variables such as age and sex. Statistical significance was set at $p < 0.05$. A series of Pearson-product moment correlation analyses were used to examine associations between Ethnic Identity and pain variables among the groups. The means and standard deviation of MEIM scores were calculated for all three groups. In addition to threshold and tolerance measures, pain sensitivity range (PSR) scores were generated for each subject. PSR values were computed by subtracting pain threshold from pain tolerance for each of the three pain modalities, as in previous studies (Gelfand, 1964; Rollman and Harris, 1987). These values are thought to more accurately reflect “true pain tolerance” by determining the amount of stimulation a participant is able to withstand after it becomes painful. To prevent distortion of the pain range value due to ceiling effects, pain range was not calculated for subjects who reached the cutoff for any tolerance measure if the threshold measure was more than 2 standard deviations higher than the mean pain threshold for that stimulus modality.

3. Results

Demographic and income data for the three ethnic groups are shown in Table 2. Hispanic subjects were sig-

Table 2
Means (SD) of demographic and income data scores for African Americans, Hispanics and non-Hispanic White Americans

Measures	African American	Hispanic	Non-Hispanic White Americans
Age	24.5 (7.4)	22.1 (4.8)	25.0 (8.4)
Sex (% female)	66%	56%	43%
Personal annual income			
\$0–19,000	49 (77.78%)	49 (80.33%)	59 (72.84%)
\$20,000–49,999	12 (19.05%)	8 (13.11%)	14 (17.28)
\$50,000–79,999	2 (3.17%)	3 (4.92%)	7 (8.64%)
\$80,000–100,000	0	1 (1.64%)	1 (1.23%)
Family income ^a			
\$0–19,000	13 (20.63%)	9 (14.75)	11 (13.58)
\$20,000–49,999	26 (41.27%)	20 (32.79)	11 (13.58)
\$50,000–79,999	11 (17.46)	13 (21.31)	22 (27.16%)
\$80,000–100,000	13 (20.63)	19 (31.15)	37 (45.68%)

^a Ethnic group difference, $p < .05$.

Table 3
Means (SD) of MEIM scores for African Americans, Hispanics and Non-Hispanic White Americans

MEIM total	48.1 (5.1)	43.9 (6.9)	36.1 (8.2)	$F(2,203) = 51.58, p < .0001$
MEIM sub-scales				
Affirmation and belonging	18.8 (1.4)	17.5 (2.7)	14.9 (3.3)	$F(2,203) = 36.39, p < .0001$
Identity achievement	23.1 (3.4)	20.7 (3.9)	16.5 (4.6)	$F(2,203) = 48.77, p < .0001$
Ethnic behaviors	6.2 (1.3)	5.6 (1.6)	4.7 (1.6)	$F(2,203) = 14.68, p < .0001$

nificantly younger than African Americans and non-Hispanic White Americans, though this age difference is considered to be of little practical significance. Given a greater proportion of females were African American participants compared to Hispanics and non-Hispanic White Americans, sex was entered as a covariate in all analyses.

3.1. MEIM scores

Ethnic Identity scores differed significantly for minority groups compared to non-Hispanic White Americans. The means and standard deviation of MEIM scores for African Americans, Hispanics and non-Hispanic White Americans are shown in Table 3. For the total MEIM score and all subscale scores, African Americans scored higher than Hispanics, who had scores higher than non-Hispanic White Americans ($F(2,203) = 51.58, p < .0001$).

3.2. Pain measures

Table 4 shows the means of threshold, tolerance and pain sensitivity range (PSR) scores across African Americans, Hispanics and non-Hispanic White Americans. No group differences emerged for any of the pain threshold measures (all p 's $> .10$). However, significant ethnic group differences were found for heat and cold pain tolerance with tolerance being lower in African Americans and Hispanics (who did not differ from each other) compared to non-Hispanic White Americans. No differences emerged for ischemic pain tolerance. African Americans and Hispanics had marginally lower ischemic PSR and significantly lower heat and cold PSR values than non-Hispanic White Americans. The two minority groups did not differ on any pain range measure.

3.3. Associations between MEIM and PSR

Correlation analyses were conducted separately for each ethnic group to examine associations between MEIM scores and PSR values. For both minority groups, stronger Ethnic Identity predicted lower PSR values across thermal, cold and ischemic pain measures (See Table 5). Among African Americans, total MEIM, Affirmation, and Ethnic Behavior scores were negatively

Table 4
Means (SD) of pain measures for African American, Hispanic and non-Hispanic White American females and males

Measure	African American			Hispanic			Non-Hispanic White Americans		
	Female	Male	Group	Female	Male	Group	Female	Male	Group
Threshold									
IPTH (s)	191.1 (167.6)	248.8 (217.5)	208.3 (186.2)	166.0 (169.5)	187.5 (145.8)	175.5 (158.5)	141.0 (131.2)	214.5 (177.8)	185.3 (162.9)
CPTH (s)	12.0 (10.3)	16.6 (12.3)	13.6 (11.0)	13.5 (17.7)	29.2 (55.2)	20.5 (36.5)	16.6 (13.4)	21.5 (15.6)	19.8 (15.1)
HPTH (°C)	42.0 (3.02)	42.3 (3.5)	42.1 (3.2)	40.1 (3.4)	42.9 (3.0)	41.4 (3.5)	40.7 (3.2)	42.2 (2.9)	41.7 (3.2)
PPTHM (kg)	2.6 (0.8)	3.3 (1.4)	2.89 (1.1)	2.4 (0.7)	4.2 (1.6)	3.2 (1.5)	2.4 (0.8)	3.6 (1.3)	3.2 (1.4)
PPHT (kg)	5.4 (1.9)	6.7 (2.4)	5.9 (2.2)	4.9 (1.6)	7.2 (2.2)	6.0 (2.2)	5.2 (2.4)	7.7 (2.0)	6.7 (2.5)
Tolerance									
IPTO (s)	355.3 (252.5)	630.2 (235.5)	446.4 (275.5)	439.8 (297.1)	492.9 (251.9)	463.4 (277.1)	445.7 (243.3)	625.8 (265.2)	550. (268.3)
CPTO* (s)	31.7 (25.3)	66.1 (83.5)	42.6 (54.0)	50.5 (79.6)	101.8 (110.4)	73.3 (97.1)	88.3 (99.3)	162.4 (124.8)	133.1 (120.3)
HPTO* (°C)	45.4 (2.3)	47.5 (2.4)	46.2 (2.5)	44.9 (2.9)	47.5 (2.5)	46.1 (3.0)	46.3 (2.2)	48.6 (2.2)	47.6 (2.5)
Pain range									
ISPR (s)	175.8 (204.8)	415.8 (264.2)	257.7 (249.5)	280.7 (241.1)	307.5 (234.0)	292.5 (236.3)	304.6 (199.3)	416.8 (229.3)	365.8 (222.0)
CPR* (s)	19.6 (19.3)	49.5 (80.0)	29.7 (50.2)	36.9 (70.1)	75.3 (102.4)	53.6 (87.0)	71.7 (90.3)	140.8 (117.8)	113.3 (112.0)
HPR* (°C)	3.4 (1.4)	5.1 (2.7)	4.1 (2.3)	4.8 (2.3)	4.5 (2.7)	4.7 (2.5)	5.5 (2.7)	6.3 (3.0)	6.0 (3.0)

IPTH, ischemic pain threshold; PPHTM, pressure pain threshold masseter; IPTO, ischemic pain tolerance; CPR, cold pain range.

CPTH, cold pain threshold; PPHT, pressure pain threshold trapezius; CPTO, cold pain tolerance; HPR, heat pain range.

HPTH, heat pain threshold; HPTO, heat pain tolerance; ISPR, ischemic pain range.

* $p < .05$ (African Americans = Hispanics < non-Hispanic White Americans).

correlated with both ischemic and cold PSR. Among Hispanics, all MEIM scores were inversely associated with cold PSR, and total MEIM as well as Ethnic Achievement scores were negatively associated with heat PSR. Affirmation scores were negatively correlated with ischemic PSR. In order to determine whether MEIM scores predicted ethnic group differences in PSR values, ANCOVAs were conducted for each PSR measure, using the total MEIM score as a covariate. When controlling for MEIM total, ethnic group differences in ischemic ($F(2,189) = 0.07, p = 0.93$) and heat ($F(2,202) = 1.487, p = 0.23$) pain range became frankly non-significant, while group differences in cold pain range remained significant ($F(2,200) = 3.59, p = 0.03$).

4. Discussion

Research using controlled laboratory stimuli has documented ethnic differences in pain perception. Most studies have investigated pain perception in African Americans compared to non-Hispanic White Americans. Results from such studies have reported lower pain thresholds and tolerances among African American subjects compared to non-Hispanic white subjects across multiple experimental pain modalities. Findings from this study support and extend similar pain investigations (Zatzick and Dimsdale, 1990; Edwards and Fillingim, 1999; Edwards et al., 2001a,b,c, 2003; Campbell et al., 2004, 2005; Fillingim, 2005). Although several studies have addressed ethnic differences and pain response in clinical studies (Greenwald, 1991; Edwards et al. 2001, 2005; Riley et al., 2002; Green et al., 2003, 2005; Campbell et al., 2004), and some have included multiple ethnic groups (Lawlis et al., 1984; Lipton and Marbach, 1984; Faucett et al., 1994; Edwards et al., 2005; Hastie et al., 2005; Watson et al., 2005; Woodrow et al., 1972), a unique contribution of this study is the inclusion of both Hispanics and African Americans in a comparative study of experimental pain and ethnic identity.

Consistent with previous investigators (Wolff and Jarvik, 1963; Gelfand, 1964; Wolff, 1971; Rollman and Harris, 1987; Edwards and Fillingim, 1999; Edwards et al., 2001a,b,c, 2003; Campbell et al., 2005), the most robust ethnic group differences in this study emerged for measures of pain tolerance compared to pain threshold. Threshold is the stimulus intensity at which pain is first perceived (Wolff, 1971; Woodrow et al., 1972), while tolerance reflects the highest level of stimulation to which a participant is willing to be exposed (Gelfand, 1964). Pain threshold and tolerance represent distinct constructs and are likely influenced by different factors (Wolff, 1971). For example, it has been suggested that pain tolerance may have greater clinical relevance than threshold, and may also be more affected by psycholog-

Table 5

Correlation matrix of MEIM scores and pain measures for African Americans, Hispanic Americans, and non-Hispanic White Americans

Ethnicity		Cold pain range	Heat pain range	Ischemic pain range
African American	MEIM total	-.29*	-.19	-.31**
	Affirmation and belonging	-.29*	-.13	-.26*
	Identity achievement	-.20	-.13	-.22
	Ethnic behaviors	-.30*	-.24	-.34**
Hispanic American	MEIM total	-.37*	-.30*	-.23
	Affirmation and belonging	-.36**	-.22	-.29*
	Identity achievement	-.26*	-.34**	-.16
	Ethnic behaviors	-.33**	-.10	-.10
Non-Hispanic White Americans	MEIM total	-.13	-.16	-.10
	Affirmation and belonging	-.04	-.20	-.15
	Identity achievement	-.20	-.12	-.09
	Ethnic behaviors	.03	-.03	.08

* $p < .05$.** $p \leq .01$.

ical and motivational processes (Gelfand, 1964; Wolff, 1971; Woodrow et al., 1972).

In an effort to produce a purer measure of ability to withstand pain, previous investigators have derived a measure known as pain sensitivity range (PSR), which is computed as the interval between tolerance and threshold (Gelfand, 1964; Rollman et al., 1987). Therefore, we utilized this PSR variable when examining associations with ethnic identity.

A primary goal of this study was to investigate the association between measures of ethnic identity and responses to noxious stimuli. We hypothesized that if ethnic group membership is related to pain sensitivity, then stronger identification with one's ethnic group (i.e. higher scores on the MEIM) should predict greater pain sensitivity. Indeed, consistent with our expectations, among African Americans and Hispanics, significant negative correlations emerged between cold, thermal and ischemic pain range measures and MEIM total and subscale scores. MEIM scores were not associated with pain range among non-Hispanic White Americans. Also, when statistically controlling for MEIM scores, the ethnic group difference in heat pain range became non-significant, and the ischemic pain range difference went from marginally significant ($p = .10$) to non-significant ($p = .90$), suggesting that ethnic identity accounted for some of the ethnic group differences in pain range. Ethnic identity is a specific, multidimensional form of social or collective identity (Liebkind, 1992; Valk, 2001). We used the Multi-Ethnic Identity Measure (MEIM) to assess ethnic identity across domains of ethnic belonging, identity achievement and ethnic behaviors. The Multi-group Ethnic Identity Measure (MEIM) is a widely used scale that has been applied to research on diverse groups (Valk, 2001). Such a measure is important in a study of ethnic identity and pain, because ethnicity suggests that groups of people are distinct based on behavior, culture, ancestry, beliefs, history, biology and physical characteristics (Edwards et al.,

2001a,b,c), and a combination of these factors is likely responsible for racial and ethnic differences in pain sensitivity (Edwards et al., 2005). Cultural affiliation, a related construct, has been associated with clinical pain (Bates et al., 1993), and the present findings revealed that stronger ethnic identity was associated with greater experimental pain sensitivity, but only among African Americans and Hispanics. One reason for the lack of association in non-Hispanic White Americans might be restriction of range, because non-Hispanic White Americans had significantly lower MEIM scores than African Americans and Hispanics. Phinney (1990, 1992) characterizes Affirmation and Belonging as the sense of ethnic pride, feeling good about one's background, being happy with one's group membership and feelings of belonging and attachment to the group. Identity Achievement is the secure sense of self that is the ideal outcome of identity formation, and Ethnic Behaviors, is involvement in social activities with members of one's group and participation in cultural traditions.

Despite consistent evidence of ethnic group differences in response to noxious stimuli, the mechanisms underlying differences in pain sensitivity remain unclear (Edwards and Fillingim, 1999). However, evidence suggests several plausible explanations. For example, psychosocial or developmental hypotheses generally posit that a combination of psychological and socio-cultural factors such as attitudes, gender, language, acculturation, learning and cultural conditioning, degree of expressiveness, chronic stress, education, religion, and socialization of pain expression, heightened attention to painful stimuli, pain coping styles represents factors contributing to ethnic group differences in pain response (Wolff and Langley, 1968; Zborowski, 1969; Melzack and Wall, 1982; Lipton and Marbach, 1984; Lasch, 2000; Bonham, 2001; Edwards et al., 2001a,b,c; Green et al., 2003; Campbell et al., 2005).

Ethnic identity could be conceptualized as an index of the degree to which these cultural factors have been inculcated in a given individual; therefore, higher ethnic identity scores would be consistent with increased developmental/cultural influences on pain. Implicit in many considerations of sociocultural influences on pain is the presupposition that sociocultural factors primarily alter pain expression rather than the underlying experience of pain. However, two decades ago, Bates (1987, 1993) proposed a “biocultural” model of pain, which recognizes that developmentally conferred cultural processes (e.g. language, pain-related attitudes and beliefs, social learning) influence not only verbal and nonverbal pain expressions but also affect pain processing at the neurobiological level. As a model, we believe that the shared cultural learning of beliefs and behavior, associated with ethnic identity of African Americans and Hispanics, predict pain responses. Importantly, these shared experiences can affect not only beliefs and practices related to pain but also underlying neurobiological processes involved in sculpting the pain experience. Clearly, additional research is needed to further delineate the mechanisms whereby ethnic identity and other cultural factors contribute to ethnic group differences in pain responses.

Several limitations of this study deserve mention. The majority of participants were highly educated, healthy young adults, and our results may not generalize to samples that differ in education, geographic region or age. While our sample may have the disadvantage of suboptimal generalizability, observing ethnic differences even in a healthy, well-educated sample suggests that these differences are unlikely the result of confounding factors such as differences in SES or disparities in health care, which may well characterize more representative samples. Therefore, the investigation of this type of sample does offer some benefit to help offset the lower generalizability. Proportionately more of the African American group was comprised of women compared to Hispanic and non-Hispanic white groups. Inspection of these data reveals that for pain measures on which ethnic differences emerged (heat pain, cold pain), the magnitude of the ethnic difference appears comparable for females and males of each ethnic group. For ischemic pain, where ethnic differences did not emerge, it appears that African American females were the most sensitive group. While we statistically controlled for sex in all analyses, equal sex distributions across ethnic groups would have been ideal. Future studies on pain and ethnicity should investigate differences in participants older than those included in this study. We acknowledge that our findings may not be applicable to other samples that differ in age, education, geographic region, etc.

This study examined experimental pain responses, and the results may not provide clinically relevant information. While a growing body of evidence supports the clinical relevance of experimental pain responses (Edwards et al., 2005), additional research is needed to determine the extent to which ethnic group differences in experimental pain sensitivity are relevant to ethnic differences in clinical pain. Also, given the large number of correlations conducted, interpretive caution is warranted regarding the association between MEIM scores and pain measures.

These limitations notwithstanding, this study replicates and extends previous findings regarding ethnic group differences in pain sensitivity. Specifically, African Americans and Hispanics showed greater sensitivity to experimental pain compared to non-Hispanic White Americans, especially for measure of pain tolerance. Moreover, higher scores on measures of ethnic identification predicted greater pain sensitivity in the two minority groups, and ethnic identity partially accounted for group differences in pain range values. These findings suggest that ethnic identity may be an important variable to consider in future research exploring ethnic group differences in pain.

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