

In Vivo Praying and Catastrophizing Mediate the Race Differences in Experimental Pain Sensitivity

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Abstract: Black individuals have a lower tolerance for experimental pain than white individuals. Black and white individuals also differ in their use of pain coping strategies, which may explain the race differences in pain sensitivity. We examined the extent to which situation-specific pain coping mediated black-white differences in pain sensitivity. We hypothesized that 1) black participants would demonstrate lower pain tolerance than white participants, 2) black participants would use different pain coping strategies than white participants, and 3) the differential use of these strategies would mediate the relationship between race and pain tolerance. Healthy college undergraduates (N = 190) participated in a cold pressor task and then completed the Coping Strategies Questionnaire–Revised to assess their situation-specific pain coping. Compared with white participants, black participants demonstrated lower pain tolerance, engaged in more situation-specific catastrophizing and praying, and ignored pain less frequently. Catastrophizing and praying were inversely related to pain tolerance and were significant mediators of the relationship between race and pain tolerance. The indirect effect of praying was stronger than that of catastrophizing. Race differences in pain sensitivity may be due, in part, to differences in the use of catastrophizing and praying as coping strategies. These results may help guide treatments addressing maladaptive pain coping.

Perspective: This study suggests that race differences in pain sensitivity may be due, in part, to the differential use of catastrophizing and praying strategies. Psychosocial treatments for pain should encourage patients to take an active role in their pain management.

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Key words: Race, catastrophizing, praying, experimental pain, coping.

Chronic pain affects approximately 100 million Americans and is associated with \$635 billion in annual medical treatment and lost productivity.²⁵ Although ubiquitous, the experience of pain differs based on race and ethnicity. Compared to non-Hispanic whites, black individuals have a heightened sensitivity to both clinical and experimental pain.^{6,10,14,34,39,45} Not only are black individuals more sensitive to pain but they report more pain-related interference and disability than non-Hispanic whites.^{8,14} Given the personal and public health burden of chronic pain, it is important to better understand these racial differences in order to optimize pain care for all patients.

Coping is one of the most widely studied psychosocial constructs in pain and may help explain race differences in pain sensitivity. Racial groups differ in their use of pain coping strategies. Black individuals engage in pain-related praying and catastrophizing more than non-Hispanic whites, whereas non-Hispanic whites more often use ignoring strategies.^{8,22,26} These differences may be particularly important to understanding racial differences in pain sensitivity, as previous studies have found that catastrophizing and praying are associated with increased pain sensitivity, whereas ignoring strategies are associated with less pain.^{15,26,37}

Most of the coping literature has focused on the strategies individuals use when they experience pain (ie, general pain coping). More recently, several studies have examined situation-specific (ie, in vivo) pain coping. Unlike general pain coping, situation-specific pain coping refers to the techniques used to manage pain during a specific task, such as an experimental cold pressor task (CPT). For example, several studies found the association between situation-specific catastrophizing, a cognitive-affective response to pain, and experimental pain sensitivity to be stronger than that between general

Received October 10, 2014; Revised January 22, 2015; Accepted February 14, 2015.

Supported by a grant from the Department of Psychology at Indiana University–Purdue University Indianapolis.

There are no conflicts of interest that might be seen as influencing or prejudicing the research.

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<http://dx.doi.org/10.1016/j.jpain.2015.02.005>

coping strategies and pain sensitivity.^{11,12} Moreover, Fabian and colleagues found that blacks reported greater situation-specific catastrophizing, but not general catastrophizing, than whites and that situation-specific catastrophizing mediated the relationship between race and tolerance for experimental cold pain.¹⁶ Although the relationships among pain, race, and situation-specific catastrophizing have been examined, to our knowledge, no studies have examined other situation-specific coping strategies in the context of race differences in pain sensitivity. Such studies will enhance understanding of racial differences in pain and may eventually lead to individualized clinical approaches targeting these strategies.

The goal of the current study was to examine situation-specific coping strategies as potential mediators of the relationship between race and experimental pain sensitivity. We hypothesized that 1) black participants would engage in praying and catastrophizing strategies more and ignoring strategies less than white participants, and 2) the differential use of situation-specific coping strategies would mediate the relationship between race and pain sensitivity.

Methods

Participants

Participants were 190 healthy undergraduates from Indiana University–Purdue University Indianapolis. Potential participants were excluded if they met any of the following exclusion criteria: chronic pain, circulatory problems, hypertension, diabetes, heart or vascular disease, a history of fainting spells, a seizure disorder, Raynaud's disease, sickle cell anemia, a recently sprained or fractured wrist or hand, pregnancy, or previous participation in a CPT.

Procedures

All procedures were approved by the University's institutional review board. Students interested in participating in the study were contacted via telephone to answer a number of health-related questions and determine study eligibility. Eligible participants scheduled a time to complete the study individually in a laboratory at Indiana University–Purdue University Indianapolis.

On arrival, all participants provided informed consent to participate. Next, they completed a questionnaire to rule out use of analgesic medications within the past 24 hours and consumption of caffeine and alcohol within the last 2 hours. Participants who had used analgesic medications or consumed caffeine or alcohol were rescheduled. Prior to the CPT, participants completed a computerized demographic questionnaire. During the CPT, participants were asked to submerge their nondominant hand up to their wrist in a circulating bath of 2° C water (Thermo Scientific Arctic Series Refrigerated Bath Circulator; Thermo Scientific, Waltham, MA). They were instructed to leave their hand in the water until they could no longer tolerate the sensation. Participants were asked to say "pain" as soon as they experienced

any painful sensations. While their hand was submerged in the water, participants rated the intensity of their pain every 10 seconds using written visual analog scales (VASs). When the participants were no longer able to tolerate the sensation, they were asked to say "pain limit" and complete 1 last VAS rating upon removing their hand from the water. Participants who had not reached pain tolerance after 3 minutes were asked to remove their hand from the water and make a final VAS rating. After completing the CPT, participants completed a modified version of the Coping Strategies Questionnaire–Revised (CSQ-R) measuring situation-specific ("in vivo") coping strategy use during the CPT. They were then debriefed and compensated with either class credit or a \$10 Amazon gift card.

Cold Pain Threshold and Tolerance

Pain threshold was determined by measuring the amount of time in seconds each participant's hand remained in the water before saying "pain." Pain tolerance was the total number of seconds elapsed at the time of withdrawal from the cold pressor.

Pain Intensity

During the CPT, participants were prompted every 10 seconds to rate their pain intensity on a VAS (0–100) with anchors of "no pain" and "worst pain imaginable."

Pain Coping

The CSQ-R is a 27-item self-report measure of pain-related coping.³⁵ The CSQ-R consists of 6 cognitive strategies (diverting attention, reinterpreting pain sensations, coping self-statements, ignoring pain sensations, praying/hoping, and catastrophizing) that were retained from the original CSQ. Participants rated how often they use each strategy to cope with pain from 0 (never do that) to 6 (always do that). Consistent with previous studies, the instructions for the CSQ-R were revised to measure situation-specific coping, such that participants were asked to rate how often they used each strategy to cope with the pain they experienced during the CPT.^{7,12,20,24} The CSQ-R has a more refined factor structure than the original CSQ, with subscale reliability ranging from .72 to .86.^{35,36} The 6-factor structure reported by Hastie et al²² was retained in this sample with good overall ($\alpha = .85$) and subscale (range of $\alpha = .83$ –.91) reliability.

Data Analysis

Independent samples t-tests were used to identify race differences in pain sensitivity and coping variables. Pearson's correlations were used to evaluate the bivariate associations among coping variables and measures of pain sensitivity.

A multiple mediation analysis was conducted to test our hypotheses that coping strategy use would mediate the association between race and pain tolerance. In a multiple mediation model, one can test both the overall mediation effect for all mediators included in the model

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