



Beliefs about race differences in pain vs. actual race differences in pain: An experimental investigation.

## Journal of Health Disparities Research and Practice

Volume 16 | Issue 1

Article 1

© Center for Health Disparities Research, School of Public Health, University of Nevada, Las Vegas

2023

### Beliefs about race differences in pain vs. actual race differences in pain: An experimental investigation.

Lauren E. Mehok , *Indiana University - Purdue University Indianapolis*, [lmehok@iupui.edu](mailto:lmehok@iupui.edu)

Samantha M. Meints , *Brigham and Women's Hospital*, [smeints@bwh.harvard.edu](mailto:smeints@bwh.harvard.edu)

Megan M. Miller , *Indiana University - Purdue University Indianapolis; Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH; Division of Behavioral Medicine & Clinical Psychology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH*, [meg.marie.miller@gmail.com](mailto:meg.marie.miller@gmail.com)

*See next page for additional authors*

Follow this and additional works at: <https://digitalscholarship.unlv.edu/jhdrp>



Part of the [Clinical Psychology Commons](#)

#### Recommended Citation

Mehok, Lauren E.; Meints, Samantha M.; Miller, Megan M.; Ashburn-Nardo, Leslie; and Hirsh, ADAM (2023) "Beliefs about race differences in pain vs. actual race differences in pain: An experimental investigation.," *Journal of Health Disparities Research and Practice*: Vol. 16: Iss. 1, Article 1. Available at: <https://digitalscholarship.unlv.edu/jhdrp/vol16/iss1/1>

This Article is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Article in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Article has been accepted for inclusion in Journal of Health Disparities Research and Practice by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact [digitalscholarship@unlv.edu](mailto:digitalscholarship@unlv.edu).

---

## Beliefs about race differences in pain vs. actual race differences in pain: An experimental investigation.

### Abstract

**Objective:** Race differences in pain are consistently reported, but the underlying mechanisms are not well understood. This study examined how beliefs about race differences in pain are related to actual differences in experimentally induced pain between Black and White individuals.

**Methods:** Black and White participants completed questionnaires (demographics, pain-related beliefs, pain coping, and mood) and a cold pressor task (CPT) in the laboratory. Beliefs about race differences in pain were tested as potential moderators of the relationship between race and pain tolerance on a CPT.

**Results:** Participants reported beliefs that White people are more pain sensitive (i.e., less pain tolerant) than Black people ( $t(131)=-6.83, p<.01$ ). White participants had a higher pain tolerance on the CPT than Black participants ( $U=1165.50, p(b=-0.37, p=.71)$ ). Follow-up analyses indicated that self-comparisons of participants' own pain sensitivity to that of their same-race group significantly moderated the relationship between race and pain tolerance ( $\omega=4.40, p=.04$ ).

**Conclusion:** These results suggest that beliefs about race differences in pain do not contribute to actual race differences in pain. Rather, how individuals compare themselves to their same-race peers may be more relevant in this context.

### Keywords

pain, race, beliefs, cold pressor, disparities

### Cover Page Footnote

None to declare

### Authors

Lauren E. Mehok, Samantha M. Meints, Megan M. Miller, Leslie Ashburn-Nardo, and ADAM Hirsh



**Journal of Health Disparities Research and Practice**  
**Volume 16, Issue 1, Spring 2023, pp. 1-17**  
© School of Public Health  
University of Nevada, Las Vegas

## **Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain: An Experimental Investigation**

Lauren E. Mehok, Indiana University - Purdue University Indianapolis

Samantha M. Meints, Brigham and Women's Hospital

Megan M. Miller, Indiana University – Purdue University Indianapolis; University of Cincinnati  
College of Medicine; Cincinnati Children’s Hospital Medical Center

Leslie Ashburn-Nardo, Indiana University - Purdue University Indianapolis

Adam Hirsh, Indiana University - Purdue University Indianapolis

*Corresponding Author:* Adam Hirsh, athirsh@iupui.edu

### **ABSTRACT**

**Objective:** Race differences in pain are consistently reported, but the underlying mechanisms are not well understood. This study examined how beliefs about race differences in pain are related to actual differences in experimentally induced pain between Black and White individuals.

**Methods:** Black and White participants completed questionnaires (demographics, pain-related beliefs, pain coping, and mood) and a cold pressor task (CPT) in the laboratory. Beliefs about race differences in pain were tested as potential moderators of the relationship between race and pain tolerance on a CPT.

**Results:** Participants reported beliefs that White people are more pain sensitive (i.e., less pain tolerant) than Black people ( $t(131)=-6.83, p<.01$ ). White participants had a higher pain tolerance on the CPT than Black participants ( $U=1165.50, p<.01$ ), but beliefs about race differences in pain did not significantly moderate this difference ( $b=-0.37, p=.71$ ). Follow-up analyses indicated that self-comparisons of participants’ own pain sensitivity to that of their same-race group significantly moderated the relationship between race and pain tolerance ( $\omega=4.40, p=.04$ ).

**Conclusion:** These results suggest that beliefs about race differences in pain do not contribute to actual race differences in pain. Rather, how individuals compare themselves to their same-race peers may be more relevant in this context.

**Keywords:** pain, race, beliefs, cold pressor, disparities

## INTRODUCTION

Race differences in pain severity and pain tolerance have been identified between Black and White individuals. Black patients report higher pain severity than White patients across different types of chronic pain (Edwards, Fillingim, & Keefe, 2001; Green et al., 2003; Selim et al., 2001; White, Asher, Lai, & Burton, 1999). Furthermore, Black participants have lower pain thresholds and tolerance and higher pain ratings across many quantitative sensory testing modalities (Campbell, Edwards, & Fillingim, 2005; Edwards et al., 2001; Edwards & Fillingim, 1999; Kim et al., 2017; Rahim-Williams et al., 2007; Sheffield, Biles, Orom, Maixner, & Sheps, 2000; Woodrow, Friedman, Siegelau, & Collen, 1972). Self-report measures of psychosocial constructs are related to actual race differences in pain as well. For example, previous studies in experimental settings have identified race differences in coping styles such as prayer (Meints & Hirsh, 2015; Meints, Mosher, Rand, Ashburn-Nardo, & Hirsh, 2018), rumination (Meints, Stout, Abplanalp, & Hirsh, 2017), and catastrophizing (Meints & Hirsh, 2015; Meints, Miller, & Hirsh, 2016) as a contributor to race differences in pain tolerance. Beliefs about race differences in pain are another psychosocial construct that may play a role in this context.

Beliefs are the view that something has or will occur or that knowledge about a referent is true or correct (Wyer & Albarracín, 2005). Previous research has found that pain-specific beliefs – i.e., conceptualizations of what pain means – influence pain outcomes (Jensen & Karoly, 1992; Jensen, Turner, & Romano, 2001; Williams & Thorn, 1989). For example, Jensen and Karoly (1992) found that, among patients with chronic pain, the belief that they were disabled by their pain was correlated with higher medical service utilization, lower activity levels, and poorer psychological functioning (Jensen & Karoly, 1992).

In addition to beliefs about one's own pain, beliefs about group differences in pain have more recently been examined. One study found that laypeople and providers who endorsed the belief that there are biological differences between Black and White people were more likely to rate Black patients as having less pain than White patients (Hoffman, Trawalter, Axt, & Oliver, 2016). Further, Hollingshead and colleagues (2016) found that laypeople, regardless of their own race, believed that the typical White person is more pain-sensitive (i.e., less tolerant of pain) than the typical Black person (Hollingshead, Meints, Miller, Robinson, & Hirsh, 2016b). Interestingly, participants' belief that White people have a lower tolerance to pain than Black people is the opposite of experimental findings of actual race differences in pain (Campbell et al., 2005; Edwards et al., 2001; Edwards & Fillingim, 1999).

The extent to which beliefs about race differences in pain are related to race differences in experimental pain tolerance has yet to be determined. However, there is evidence to suggest that such beliefs can influence participants' own pain tolerance (Robinson, Gagnon, Riley, & Price, 2003). Specifically, Robinson and colleagues found that, absent any manipulation of participants' beliefs, healthy women demonstrated lower pain tolerance on a CPT than did healthy men (Robinson et al., 2003). Interestingly, this difference was not observed among women and men who were given gender-specific pain tolerance expectations. In other words, manipulating participants' beliefs about gender group differences in pain tolerance altered participants' responses to laboratory-induced pain. Research is needed to determine whether similar associations between beliefs and pain apply to other social group identities such as race.

### 3 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain

Mehok et al.

The purpose of this study was to better understand the relationship between beliefs about race differences in pain and actual race differences in pain. Specifically, we aimed to examine the relationship between self-reported beliefs about race differences in pain and race differences in pain tolerance on the CPT. We were particularly interested in understanding these pain-related beliefs as they exist in society at large. In the narrower scientific community, researchers distinguish between pain sensitivity and pain tolerance – pain sensitivity is synonymous with pain threshold, or the lowest intensity at which a given stimulus is perceived as painful (e.g., the temperature at which a contact heat probe first becomes painful), whereas pain tolerance is the maximum level of pain that can be endured (e.g., the amount of time that a person is able to keep their hand in a 2°C water bath before it becomes unbearable) (Merskey & Bogduk, 1994). Despite these scientific distinctions, the terms pain sensitivity and pain tolerance are colloquially used interchangeably. As such, because the current study aimed to examine “lay” beliefs about pain, we operationalized pain sensitivity and tolerance as polar ends of a single continuum, such that pain sensitivity refers to a low ability to withstand or endure pain, and pain tolerance refers to a high ability to withstand or endure pain. This approach is also consistent with the terminology used in other experimental pain studies (Chen, Dworkin, Haug, & Gehrig, 1989; Geisser, Robinson, & Pickren, 1992). We hypothesized that: 1) Black participants would have a lower pain tolerance on the CPT than White participants; 2) regardless of race, participants would demonstrate a belief that the typical Black person is less pain-sensitive (i.e., more pain tolerant) than the typical White person; and 3) the relationship between participant race and CPT pain tolerance would be moderated by participants’ beliefs about race differences in pain.

## **METHODS**

### Participants

Participants who were enrolled in PSY-B110 (Introduction to Psychology) were recruited through an online recruitment system (SONA). Participants were compensated with one class credit for their participation. Given the study purpose, only individuals who self-identified as Black or White were enrolled. Otherwise, the exclusion criteria consisted of the following: history of fainting spells, circulatory problems, hypertension, diabetes, heart or vascular disease, Raynaud’s Disease, Sickle Cell Anemia, pregnancy, seizure disorder, being under psychiatric care, history of allergic skin reactions or excessive bruising, previous frostbite on non-dominant hand, recent arm fracture or wrist sprain, chronic pain, or previous participation in a cold pressor pain experiment. Of the 146 healthy, pain-free, young adults recruited for the study, 13 were excluded because they did not identify as Black or White, and 1 withdrew. The final sample consisted of 132 participants (48.5% female; 48.5% Black), seven of whom self-identified as Hispanic, Latino/a/x, or Spanish ethnicity (2 Black and 5 White). Given previous research on the link between ethnicity and pain (Hollingshead, Ashburn-Nardo, Stewart, & Hirsh, 2016a), we conducted a sensitivity analysis comparing the results that included vs. excluded these 7 participants. The overall pattern of results, as well as the study conclusions, were the same. As such, in order to be maximally inclusive, we present the results of the full sample (N = 132) below. There were approximately equal numbers of men and women represented in each race group (Black sample: 33 women & 31 men; White

4 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain  
Mehok et al.

sample: 31 women & 37 men). The sample had a mean age of 20.5 years (SD=5.4). Full demographic characteristics of the study sample are presented in Table 1.

**Table 1. Descriptive Sample Statistics**

		<b>All Participants (N=132)</b>	<b>Black Participants (n=64)</b>	<b>White Participants (n=68)</b>
Sex	Female	64	33	31
	Male	68	31	37
Ethnicity	Hispanic/Latino/Spanish	7	2	5
	Not Hispanic/Latino/Spanish	125	62	63
Age	18-19	89	44	45
	20+	43	20	23
Work Status	Not working	60	27	33
	Part-time	63	31	32
	Full-time	8	5	3
	Disabled	1	1	0
Income	<\$25,000	124	60	64
	>\$25,000	8	4	4
Marital Status	Single	125	63	62
	Married	6	0	6
	Divorced	1	1	0
Personal Experience with Chronic Pain	None	81	39	42
	Minimal	36	19	17
	Some	11	4	7
	Much	4	2	2

Measures

Eligible participants completed the following questionnaire battery by computer in the laboratory: demographics questionnaire, the Race/Ethnicity Expectations of Pain Questionnaire (REPQ), Coping Strategies Questionnaire-Revised (CSQ-R), and Profile of Mood States-Short Form (POMS-SF).

*Demographic Questionnaire.* Participants responded to questions about their age, sex, race, ethnicity, marital status, education, income, work status, and personal experience with chronic pain.

*Race/Ethnicity Expectations of Pain Questionnaire (REPQ).* Beliefs about race differences in pain were measured using the 10-item Race/Ethnicity Expectations of Pain Questionnaire (REPQ) (Hollingshead et al., 2016b). The REPQ assesses participants' beliefs about their own pain sensitivity and willingness to report pain and their beliefs about the pain sensitivity and willingness to report pain of "the typical" Asian, Black, Hispanic, and White person (Hollingshead

et al., 2016b). Given the focus of the current paper, only the Black, White, and self-referential items were included in the analyses. The REPQ uses 2 Visual Analogue Scales (VASs) ranging from 0 (not at all sensitive/not at all willing) to 100 (most sensitive imaginable/most willing imaginable). The measure has demonstrated good validity and reliability in previous work (Hollingshead et al., 2016b). Correlations were used in place of Cronbach's alpha to assess the internal consistency in the current sample. The sensitivity and willingness items were compared separately for the self, Black, and White questions. The REPQ demonstrated good internal consistency, as indicated by the medium to large correlations for the items pertaining to the typical Black person ( $r = .53, p < .01$ ), the typical White person ( $r = .47, p < .01$ ), and the self ( $r = .48, p < .01$ ). Responses to the pain sensitivity items were used for the moderation analyses.

*Coping Strategies Questionnaire-revised (CSQ-R)*. The Coping Strategies Questionnaire-revised (CSQ-R) was used to measure participants' pain coping strategies (Riley III & Robinson, 1997). The CSQ-R consists of 27 items assessing the frequency and effectiveness of different coping strategies on a 7-point Likert scale ranging from never (0) to always (6). The CSQ-R assesses six coping strategies: ignoring the pain sensations, coping self-statements, reinterpreting pain sensations, diverting attention, praying/hope, and catastrophizing. This six-factor model has been found to be reliable and valid (Riley III & Robinson, 1997). For the current study, Cronbach's alphas for the six factors indicated acceptable internal consistency ( $\alpha = .80 - .92$ ).

*Profile of Mood States-short forms (POMS-SF)*. The Profile of Mood States-short forms (POMS-SF) was used to assess participants' mood (Curran, Andrykowski, & Studts, 1995; Shacham, 1983). The POMS-SF consists of 37 items to which participants indicated how they had been feeling during the past week on a 5-point Likert scale (0=not at all, 1=a little, 2=moderately, 3=quite a bit, and 4=extremely). The POMS-SF produces an overall distress scale and six subscales (Depression-Dejection, Tension-Anxiety, Anger-Hostility, Fatigue-Inertia, Vigor-Activity, and Confusion-Bewilderment) (Curran et al., 1995; Shacham, 1983). The POMS-SF subscales have been found to be reliable and valid (Curran et al., 1995; Shacham, 1983). Cronbach's alphas for the current study were acceptable, ranging from  $\alpha = .79$  to  $\alpha = .93$ .

#### Cold Pressor Task

Pain was induced by a NESLAB RTE Series Refrigerated Bath/Circulator. The water was maintained between 2 and 5 degrees Celsius. The cold pressor task (CPT) has been found to be a reliable and valid measure of pain tolerance (Chapman et al., 1985; Edens & Gil, 1995; Rainville, Feine, Bushnell, & Duncan, 1992).

#### Procedure

Participants arrived at the laboratory, completed the informed consent process, and confirmed that they had adhered to pre-session instructions not to take analgesic medication within the past 24 hours or consume caffeine, alcohol, or nicotine within the past 2 hours. Participants then completed the self-report measures (all of them in a single batch) and the CPT in random order to control for potential order effects. Order of the individual measures was also randomized within the single batch. Before completing the CPT, participants identified their non-dominant hand and placed it into a bucket of room temperature water (20-22 degrees Celsius) for 2 minutes in order to standardize the skin temperature. Participants were then given the following instructions: "In a moment, I will ask you to place your non-dominant hand, palm facing down, in

## 6 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain

Mehok et al.

the water until the water reaches one inch above your wrist. Please keep your hand in the water as long as you can. Withdraw your hand only when you can no longer tolerate the sensation. At that time, withdraw your hand from the water and say ‘pain limit’.” There was a maximum time of 5 minutes on the CPT, although participants were not informed of this limit. Due to researcher error, two participants exceeded the pre-determined maximum time limit; there were no associated adverse effects. Sensitivity analyses indicated that the pattern of findings did not change when these two participants were included vs. excluded from the dataset; thus, we retained them in all analyses reported below. After completing the study, participants were debriefed and given course credit. All of the experimenters were White. This study was approved by the Indiana University Institutional Review Board (IRB#1611140508).

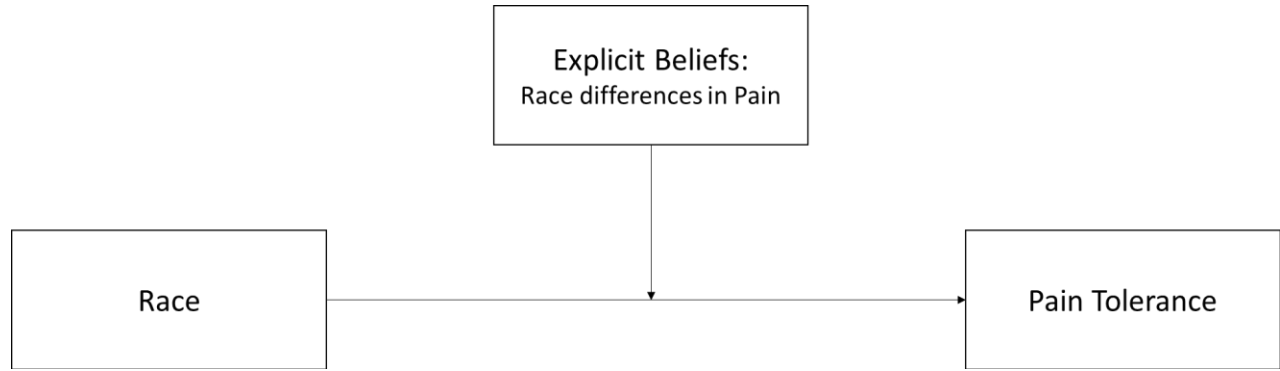
### Data Analysis

We conducted an a priori power analysis to determine an adequate sample size for hypothesis testing. Effect sizes were estimated from a study examining beliefs about gender and pain (Robinson et al., 2003). The average of the effect sizes from all three conditions in that study was 0.36 – this average effect size was used to power the current study. Using G\*Power (Faul et al., 2007) and setting the effect size to 0.36, the power to 0.80, and probability of making a type I error to 5%, it was determined that 105 participants were needed for the current study (actual sample size = 132).

To test hypothesis one, a Mann-Whitney U test was conducted to examine race differences in pain tolerance on the CPT. A Mann-Whitney U test was used to account for a non-normal distribution for pain tolerance (cold-pressor time). For hypothesis two, we used a paired samples t-test to compare participants’ REPQ ratings of pain sensitivity for the typical Black person vs. the typical White person. To test hypothesis three, we conducted a robust moderation analysis to account for the non-normal distribution of data for pain tolerance. An interaction term was created between pain beliefs and participant race, and this term was included in the model to test for statistically significant moderation. Select subscale scores from the POMS-SF (anxiety and depression) and CSQ-R (distraction, catastrophizing, and prayer) were included as a priori covariates based on previous research implicating their contribution to race differences in pain tolerance (Forsythe, Thorn, Day, & Shelby, 2011; Riley, Robinson, Wade, Myers, & Price, 2001). The model for hypothesis three is presented in figure 1. Because Black and White participants did not significantly differ on any of the assessed demographic variables, none of these variables were included in the analyses.

### **Figure 1. Hypothesis 3: Basic Moderation Model for Explicit Beliefs**





Finally, we conducted post-hoc exploratory analyses of the relationship between pain beliefs and pain tolerance across race groups. We compared participants’ beliefs about their own pain sensitivity to their beliefs about the pain sensitivity of members of their own race group. To do this, we first created a continuous variable by subtracting participants’ pain sensitivity ratings for the “typical” member of their race group from participants’ pain sensitivity ratings for themselves. This process yielded a single self-other comparison score for each participant. Next, in order to better understand and interpret the self-other comparison data, we also created a three-level categorical variable. Participants who rated themselves as more pain sensitive than the “typical” member of their own race group (n=62) were categorized as “more pain sensitive.” For example, if a White participant rated their own pain sensitivity as 60/100 on the REPQ and rated the pain sensitivity of a “typical” White person as 40/100, that participant would be assigned to the “more pain sensitive” group. Participants who rated themselves as less pain sensitive than the “typical” member of their own race group (n=64) were categorized as “less pain sensitive.” Participants who rated themselves as equally pain sensitive as the “typical” member of their own race group (n=6) were categorized as “equally pain sensitive.” Given the small sample size, the equally pain sensitive group was removed from analyses due to lack of power. This resulted in a dichotomous self-other comparison variable consisting of the less pain sensitive group and the more pain sensitive group. A robust multiple group moderation analysis was then conducted using the two-level self-other comparison variable as a moderator for the relationship between participant race and CPT pain tolerance. The racial breakdown of participants by self-other comparison category is presented in table 2.

**Table 2. Race Differences in Self-Other Comparison Groups.**

<b>Compared to Own Race</b>	<b>All Participants</b>	<b>Black Participants</b>	<b>White Participants</b>
Less Sensitive	64	19	45
Equally Sensitive	6	3	3
More Sensitive	62	42	20

*Note. Less Sensitive means that participants rated themselves as less pain sensitive compared to their own race group. More sensitive means that participants rated themselves as more pain*

*sensitive than their own race group. Equally Sensitive means that participants rated themselves the same as their race group.*

**RESULTS**

Hypothesis 1 was supported. White participants (Mdn=53.94 seconds) had a significantly higher pain tolerance than Black participants (Mdn=23.34 seconds) on the CPT (U=1165.50,  $p<.01$ ,  $r=0.40$ ). Hypothesis 2 was supported. Participants rated the typical Black person (M=44.56, SD=15.71) as less pain sensitive (i.e., more pain tolerant) than the typical White person (M=56.74, SD=14.67) on the REPQ ( $t(131)=-6.83$ ,  $p<.01$ ,  $d=0.80$ ). The pattern was the same for Black (rated Black sensitivity M=40.95; rated White sensitivity M=60.61) and White (rated Black sensitivity M=47.96; rated White sensitivity M=53.10) participants. Hypothesis 3 was not supported. Beliefs about race differences in pain (REPQ difference score) did not significantly moderate the relationship between participant race and CPT pain tolerance ( $b=-0.37$ ,  $p=.71$ ; table 3).

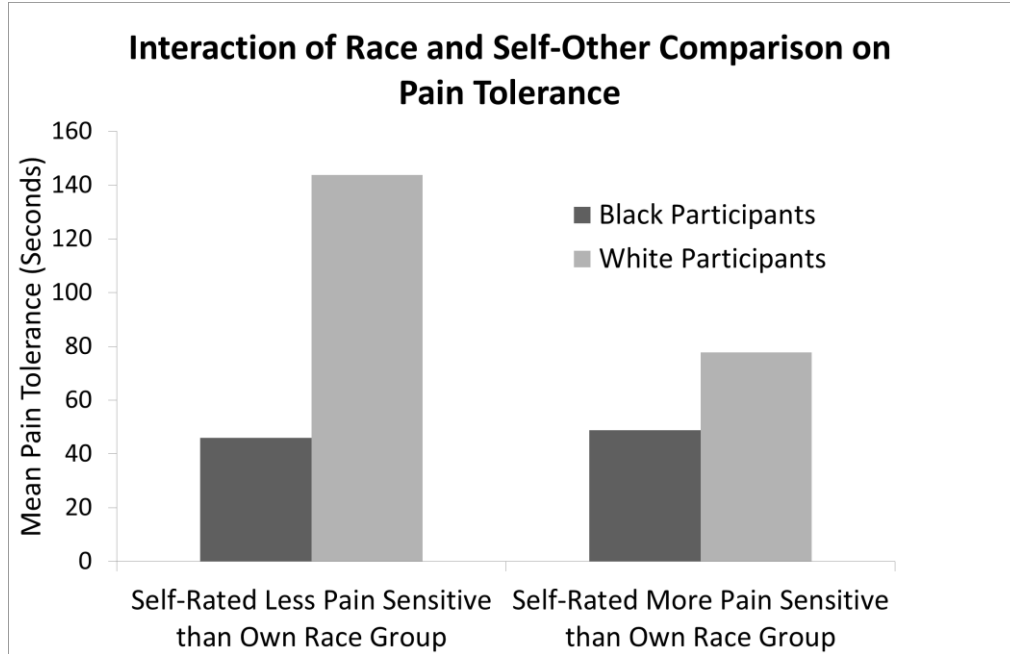
**Table 3. Relationship between Explicit Beliefs about Race Differences in Pain and Actual Pain Tolerance**

Regressed on Pain Tolerance	B	S.E.
Race	-81.51*	19.77
Explicit Belief	1.40	1.90
Interaction	-0.37	1.01
<i>Anxiety</i>	-0.35	2.03
<i>Depression</i>	2.41	1.83
<i>Distraction</i>	-9.01	6.50
<i>Catastrophizing</i>	-16.91	9.42
<i>Prayer</i>	2.66	5.03

*\*p<.01. Model Covariates are italicized.*

Results of the post-hoc analysis on the continuous self-other comparison variable were significant ( $b=-51.99$ ,  $p<.01$ ), as were the results for the categorical variable ( $\omega=4.40$ ,  $p=.04$ ). For ease of interpretation, we present further analyses for the categorical results. Black and White participants in the “less pain sensitive” group had a significantly different CPT pain tolerance ( $b=-97.74$ ,  $p<.01$ ), whereas Black and White participants in the “more pain sensitive” group did not differ in CPT pain tolerance ( $b=-28.91$ ,  $p=.25$ ). Specifically, White participants in the “less pain sensitive” group had a higher CPT pain tolerance than Black participants in the same group (figure 2). To examine the reliability of these results, we re-ran the analysis with the self-other comparison variable included as a continuous moderator. The results were significant and converged with those presented above for the categorical variable.

**Figure 2: Interaction of Race and Self-Other Comparison on Pain Tolerance. \* p<05**



## DISCUSSION

The purpose of this study was to increase understanding of the relationship between beliefs about race differences in pain and actual race differences in pain. We found participants believed that White individuals are more pain sensitive and Black individuals are more pain tolerant.<sup>1</sup> Contrary to these beliefs about race differences in pain, Black participants were less pain tolerant on the CPT than their White counterparts. Although beliefs about race differences in pain did not moderate the observed race differences in actual pain tolerance, post-hoc analyses found that participants' comparison of their own pain tolerance to that of their same-race peers did significantly moderate the relationship between race and pain tolerance.

White participants demonstrated a higher pain tolerance than Black participants on the CPT, which is consistent with previous findings (Campbell et al., 2005; Edwards et al., 2001; Edwards & Fillingim, 1999; Meints et al., 2016; Rahim-Williams et al., 2007; Sheffield et al., 2000; Woodrow et al., 1972). Additionally, participants tended to hold the belief that the typical Black person has a higher pain tolerance than the typical White person, which is also consistent with two previous studies on beliefs about race differences in pain (Hoffman et al., 2016;

<sup>1</sup> As noted in the introduction, for the purposes of this paper on lay beliefs about pain, pain sensitivity and pain tolerance were considered to be opposite ends of the same continuum.

## 10 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain

Mehok et al.

Hollingshead et al., 2016b). Of note, participants' beliefs were contrary to actual race differences in pain tolerance as observed in both the current and previous studies (Campbell et al., 2005; Edwards et al., 2001; Edwards & Fillingim, 1999; Rahim-Williams et al., 2007; Woodrow et al., 1972). Dehumanization, the process of viewing a person or group of people (often from a minority group) as lacking fundamental qualities of humanness, may impact beliefs about race differences in pain (Aguillon et al., 2006; Haslam, 2006; Haslam, Kashima, Loughnan, Shi, & Suitner, 2008).

Dehumanization occurs when individuals liken a group of people to nonhuman things, such as animals or robots (Haslam, 2006; Haslam & Loughnan, 2014; Waytz, Hoffman, & Trawalter, 2014). Black people are frequently dehumanized (Haslam, 2006; Haslam & Loughnan, 2014; Waytz et al., 2014), leading to the perception that they are less capable of experiencing rich human emotions, as well as pain (Haslam et al., 2008). This belief can be traced to times of slavery, during which many medical professionals promoted the idea that enslaved people did not feel pain, a notion that has persisted and influenced medical care even after the abolition of slavery (Cartwright, 2004; Guillory, 1968; Trawalter & Hoffman, 2015). On the other end of the spectrum, supernatural abilities or physical traits may be attributed to a group of people, a type of dehumanization known as superhumanization (Trawalter & Hoffman, 2015; Waytz et al., 2014). Black people are also more likely to be the targets of this characterization, which can also lead to the perception by others that they feel less pain (Trawalter & Hoffman, 2015; Waytz et al., 2014). In addition to being the targets of others' dehumanizing beliefs, Black people may also internalize racial oppression and the associated stereotypes (David, Schroeder, & Fernandez, 2019; Pyke, 2010) and, thus, adopt the same beliefs as White people about race difference in pain.

Views on life hardship may also impact participants' beliefs about race and pain (Trawalter & Hoffman, 2015). One study found that Black people are assumed to have experienced more suffering and hardship, thereby increasing their ability to endure pain relative to other race groups (Hoffman & Trawalter, 2016). Although Black people in the US and many other countries do experience more social hardships than the majority race group (Crosby, Bromley, & Saxe, 1980; Department of Global Communications; Feagin & Bennefield, 2014; Schiele, 2005), research suggests that increased life hardship (e.g., stress from discrimination) actually leads to worse health outcomes such as reduced immune response (Major, Dovidio, Link, & Calabrese, 2018; Morey, Boggero, Scott, & Segerstrom, 2015; Morey & Segerstrom, 2015) and increased report of pain (Edwards, 2008).

Hypothesis three was not supported, as beliefs did not significantly moderate the relationship between race and actual pain tolerance. Previous studies on gender differences in pain found that participants believed men have a higher pain tolerance than women, and these beliefs influenced actual gender difference in pain tolerance (Robinson et al., 2003; Wise, Price, Myers, Heft, & Robinson, 2002). In contrast to the findings for gender, we found that beliefs about race differences in pain did not align with actual race differences in pain. That is, whereas participants believed that Black people are more pain tolerant, our results and others' results indicated that Black people are less pain tolerant. This lack of alignment may explain why beliefs failed to moderate the relationship between race and pain tolerance. Alternately, the topic of the beliefs assessed herein may not be specific or personal enough to influence one's own pain tolerance, and thus race differences in pain tolerance. This explanation seems likely, as few participants rated

## 11 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain

Mehok et al.

their own pain tolerance as equal to that of the “typical member” of their same race group. Moreover, previous studies on pain beliefs that have focused on the self, such as one’s own disability due to pain, have found that these beliefs influence pain outcomes and behaviors, such as activity levels (Dambrun, Villate, & Richetin, 2008; Jensen & Karoly, 1992; Jensen et al., 2001; Williams & Thorn, 1989). Given the prior work on gender that informed the current study (Robinson et al., 2003; Wise et al., 2002), as well as the increasing appreciation of intersectionality in pain (Newman, 2020; Quiton et al., 2020), future research should explore how race and gender interact in the context of pain-related beliefs and experience.

Using items from the REPQ to explore more specific and personal beliefs, we examined participants’ self-other comparisons; i.e., how their perceptions of their own pain tolerance compare to their perceptions of the pain tolerance of a “typical” member of their race group. Consistent with previous findings (Hollingshead et al., 2016b), Black participants were more likely to rate themselves as less pain tolerant than the “typical” Black person, whereas White participants were more likely to rate themselves as more pain tolerant than the “typical” White person. The same dehumanization processes discussed above may also offer an explanation for these findings regarding self-other comparisons. Black participants may have internalized the “dehumanization” or “superhumanization” stereotype (Haslam, 2006; Haslam et al., 2008; Haslam & Loughnan, 2014; Trawalter & Hoffman, 2015; Waytz et al., 2014), believing that Black people in general have a relatively high tolerance to pain. Indeed, research has found that Black people – just like their White counterparts – believe that other Black people are more pain tolerant, suggesting that these beliefs go beyond intergroup dynamics and have become internalized (Pyke, 2010; Trawalter & Hoffman, 2015). However, owing to first-hand knowledge of their own human limitations and experience of pain, Black participants may distance themselves from the stereotype by rating their pain tolerance as relatively lower. So too might Black participants believe that life hardship increases one’s ability to tolerate pain (Hoffman & Trawalter, 2016). However, given that study participants were healthy young college students, they may feel that they have experienced less life hardship than most Black people and, thus, rated their own pain tolerance as comparatively lower.

Examining the self-other comparison findings in the context of social comparison theory may offer another explanation. Social comparison theory holds that people identify similarities or differences between oneself and similar others (Buunk, Gibbons, & Buunk, 2013; Festinger, 1954; Hakmiller, 1966; Tesser, Millar, & Moore, 1988; Wills, 1981; Wood, 1996). In the current study, the “similar other” would be the typical person of participants’ own race group. Social comparisons can be upward or downward (Buunk et al., 2013). Participants who compared themselves to others with a higher pain tolerance would be making an upward social comparison, whereas participants who compared themselves to others with a lower pain tolerance would be making a downward comparison (Festinger, 1954; Tesser et al., 1988; Wills, 1981). Because both Black and White participants tended to believe that the typical Black person has a higher pain tolerance than the typical White person, Black and White participants had different reference points for comparing themselves to same-race others. Black participants were more likely to be making an upward pain-related comparison to a typical Black person (same-race referent) who his assumed to have high pain tolerance. By contrast, White participants were more likely to be making a downward pain-

related comparison to a typical White person (same-race referent) who is assumed to have low pain tolerance. Previous research suggests that upward and downward comparisons lead to different health outcomes. For example, upward comparisons may be threatening, leading to worse affect and subjective well-being, whereas downward comparisons are associated with positive affect and lower rates of depression (Rancourt, Schaefer, Bosson, & Thompson, 2016; Wood, 1996).

In the current post-hoc analyses, the self-other comparisons significantly moderated the relationship between participant race and pain tolerance on the CPT. White participants in the “less pain sensitive” group had a significantly higher pain tolerance than Black participants in the “less pain sensitive” group. In contrast, Black and White participants in the “more pain sensitive” group did not have significantly different pain tolerances. These findings suggest that Black and White individuals may respond differently to downward social comparisons about pain – i.e., rating themselves as less pain sensitive than “typical” members of their race group. It appears that White participants benefit from (i.e., have a higher pain tolerance) making downward comparisons but Black participants do not (i.e., do not have a higher pain tolerance). This effect is clearly seen in figure 2 where the bar representing “less sensitive” White participants is considerably higher (indicating higher pain tolerance) than any of the other groups. One previous study has also found race differences in the impact of downward social comparisons on beliefs and behaviors related to disordered eating, such that downward appearance-related comparisons were detrimental for Hispanic/Latina women but were protective for Asian and White women (Rancourt et al., 2016). Given our initial results, future research should explore race differences in the impact of downward social comparisons in the context of pain.

There were limitations to the current investigation. The sample consisted of participants from a single Midwest university, which may limit the generalizability of the results. Further, healthy young college students may hold different beliefs than individuals from other age or education groups. Future research in this area should include more demographically and clinically (patients and providers) diverse samples. Additionally, all of the experimenters were White. As such, White participants had race-concordant interactions, whereas Black participants had race-discordant interactions. This is a common issue in experimental research, with unknown ramifications for the current results. Indeed, some findings suggest a complex interaction between the gender and racialized identities of both participants and experimenters (Vigil et al., 2017; Weisse, Foster, & Fisher, 2005). Lastly, for the post-hoc analysis, we divided the self-other comparisons based off of a cut point of 1 or negative 1. It is possible that different cut points may yield different findings. However, when this moderation analysis was also run as a continuous variable, the pattern of findings was consistent with those using the categorical variable, suggesting that the underlying directionality of the findings is meaningful.

In summary, the current study provides important new information about the role of beliefs in the context of race differences in pain. It also sets the stage for future work that seeks to explain how social processes affect and are affected by the experience of pain. Of particular importance is research examining the link between patients’ and providers’ beliefs – self-referential and comparative – about pain; not only might the specific beliefs themselves impact patient experience and care, but the degree of (mis)alignment may also be a contributing factor to pain-related

disparities. Ultimately, this line of work may inform patient-, provider-, and contextual- focused interventions to reduce disparities and improve pain care.

## REFERENCES

- Aguillon, J. C., Cruzat, A., Aravena, O., Salazar, L., Llanos, C., & Cuchacovich, M. (2006). Could single-nucleotide polymorphisms (SNPs) affecting the tumour necrosis factor promoter be considered as part of rheumatoid arthritis evolution? *Immunobiology*, *211*(1-2), 75-84. doi:10.1016/j.imbio.2005.09.005
- Buunk, B. P., Gibbons, F. X., & Buunk, A. (2013). *Health, coping, and well-being: Perspectives from social comparison theory*: Psychology Press.
- Campbell, C. M., Edwards, R. R., & Fillingim, R. B. (2005). Ethnic differences in responses to multiple experimental pain stimuli. *Pain*, *113*(1-2), 20-26.
- Cartwright, S. A. (2004). 'Report on the Diseases and Physical Peculiarities of the Negro Race'.
- Chapman, C. R., Casey, K., Dubner, R., Foley, K., Gracely, R., & Reading, A. (1985). Pain measurement: an overview. *Pain*, *22*(1), 1-31.
- Chen, A. C., Dworkin, S. F., Haug, J., & Gehrig, J. (1989). Human pain responsivity in a tonic pain model: psychological determinants. *Pain*, *37*(2), 143-160.
- Crosby, F., Bromley, S., & Saxe, L. (1980). Recent unobtrusive studies of Black and White discrimination and prejudice: A literature review. *Psychological bulletin*, *87*(3), 546.
- Curran, S. L., Andrykowski, M. A., & Studts, J. L. (1995). Short form of the Profile of Mood States (POMS-SF): Psychometric information. *Psychological assessment*, *7*(1), 80.
- Dambrun, M., Villate, M., & Richetin, J. (2008). Implicit racial attitudes and their relationships with explicit personal and cultural beliefs: What personalized and traditional IATs measure. *Current research in social psychology*, *13*(16), 185-198.
- David, E., Schroeder, T. M., & Fernandez, J. (2019). Internalized racism: A systematic review of the psychological literature on racism's most insidious consequence. *Journal of Social Issues*, *75*(4), 1057-1086.
- Department of Global Communications, U. N. More than meets the eye. Let's fight racism!: Vulnerable people. Retrieved from <https://www.un.org/en/letsfightracism/africandescent.shtml>
- Edens, J. L., & Gil, K. M. (1995). Experimental induction of pain: Utility in the study of clinical pain. *Behavior Therapy*, *26*(2), 197-216.
- Edwards, C. L., Fillingim, R. B., & Keefe, F. (2001). Race, ethnicity and pain. *Pain*, *94*(2), 133-137.
- Edwards, R. R. (2008). The association of perceived discrimination with low back pain. *Journal of behavioral medicine*, *31*(5), 379.
- Edwards, R. R., & Fillingim, R. B. (1999). Ethnic differences in thermal pain responses. *Psychosomatic medicine*, *61*(3), 346-354.
- Feagin, J., & Bennefield, Z. (2014). Systemic racism and US health care. *Social science & medicine*, *103*, 7-14.

## 14 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain

Mehok et al.

- Festinger, L. (1954). A theory of social comparison processes. *Human relations*, 7(2), 117-140.
- Forsythe, L. P., Thorn, B., Day, M., & Shelby, G. (2011). Race and sex differences in primary appraisals, catastrophizing, and experimental pain outcomes. *The journal of pain*, 12(5), 563-572.
- Geisser, M. E., Robinson, M. E., & Pickren, W. E. (1992). Differences in cognitive coping strategies among pain-sensitive and pain-tolerant individuals on the cold-pressor test. *Behavior Therapy*, 23(1), 31-41.
- Green, C. R., Anderson, K. O., Baker, T. A., Campbell, L. C., Decker, S., Fillingim, R. B., . . . Vallerand, A. H. (2003). The unequal burden of pain: confronting racial and ethnic disparities in pain. *Pain medicine*, 4(3), 277-294. doi:10.1046/j.1526-4637.2003.03034.x
- Guillory, J. D. (1968). The pro-slavery arguments of Dr. Samuel A. Cartwright. *Louisiana history*, 209-227.
- Hakmiller, K. L. (1966). Need for self-evaluation, perceived similarity and comparison choice. *Journal of experimental social psychology*, 1, 49-54.
- Haslam, N. (2006). Dehumanization: An integrative review. *Personality and social psychology review*, 10(3), 252-264.
- Haslam, N., Kashima, Y., Loughnan, S., Shi, J., & Suitner, C. (2008). Subhuman, inhuman, and superhuman: Contrasting humans with nonhumans in three cultures. *Social cognition*, 26(2), 248-258. doi:10.1521/soco.2008.26.2.248
- Haslam, N., & Loughnan, S. (2014). Dehumanization and infrahumanization. *Annual review of psychology*, 65, 399-423.
- Hoffman, K. M., & Trawalter, S. (2016). Assumptions about life hardship and pain perception. *Group processes & intergroup relations*, 19(4), 493-508.
- Hoffman, K. M., Trawalter, S., Axt, J. R., & Oliver, M. N. (2016). Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites. *Proceedings of the national academy of sciences*, 113(16), 4296-4301.
- Hollingshead, N. A., Ashburn-Nardo, L., Stewart, J. C., & Hirsh, A. T. (2016a). The pain experience of Hispanic Americans: A critical literature review and conceptual model. *The journal of pain*, 17(5), 513-528.
- Hollingshead, N. A., Meints, S. M., Miller, M. M., Robinson, M. E., & Hirsh, A. T. (2016b). A comparison of race-related pain stereotypes held by White and Black individuals. *Journal of applied social psychology*, 46(12), 718-723.
- Jensen, M. P., & Karoly, P. (1992). Pain-specific beliefs, perceived symptom severity, and adjustment to chronic pain. *The clinical journal of pain*, 8(2), 123-130.
- Jensen, M. P., Turner, J. A., & Romano, J. M. (2001). Changes in beliefs, catastrophizing, and coping are associated with improvement in multidisciplinary pain treatment. *Journal of consulting and clinical psychology*, 69(4), 655.
- Kim, H. J., Yang, G. S., Greenspan, J. D., Downton, K. D., Griffith, K. A., Renn, C. L., . . . Dorsey, S. G. (2017). Racial and ethnic differences in experimental pain sensitivity: systematic review and meta-analysis. *Pain*, 158(2), 194-211.

Journal of Health Disparities Research and Practice Volume 16, Issue 1, Spring 2023

<http://digitalscholarship.unlv.edu/jhdrp/>

Follow on Facebook: Health.Disparities.Journal

Follow on Twitter: @jhdrp



## 15 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain

Mehok et al.

- Major, B., Dovidio, J. F., Link, B. G., & Calabrese, S. K. (2018). Stigma and its implications for health: Introduction and overview. In B. Major, J. F. Dovidio, B. G. Link, B. Major, J. F. Dovidio, & B. G. Link (Eds.), *The Oxford handbook of stigma, discrimination, and health*. (pp. 3-28). New York, NY, US: Oxford University Press.
- Meints, S. M., & Hirsh, A. T. (2015). In vivo praying and catastrophizing mediate the race differences in experimental pain sensitivity. *The journal of pain, 16*(5), 491-497.
- Meints, S. M., Miller, M. M., & Hirsh, A. T. (2016). Differences in pain coping between Black and White Americans: A meta-analysis. *The journal of pain, 17*(6), 642-653.
- Meints, S. M., Mosher, C., Rand, K. L., Ashburn-Nardo, L., & Hirsh, A. T. (2018). An experimental investigation of the relationships among race, prayer, and pain. *Scandinavian journal of pain, 18*(3), 545-553.
- Meints, S. M., Stout, M., Abplanalp, S., & Hirsh, A. T. (2017). Pain-related rumination, but not magnification or helplessness, mediates race and sex differences in experimental pain. *Journal of pain, 18*(3), 332-339. doi:10.1016/j.jpain.2016.11.005
- Merskey, H., & Bogduk, N. (1994). Classification of chronic pain, IASP Task Force on Taxonomy. Seattle, WA: International Association for the Study of Pain Press (Also available online at [www.iasp-pain.org](http://www.iasp-pain.org)).
- Morey, J. N., Boggero, I. A., Scott, A. B., & Segerstrom, S. C. (2015). Current directions in stress and human immune function. *Current opinion in psychology, 5*, 13-17. doi:10.1016/j.copsyc.2015.03.007
- Morey, J. N., & Segersfrom, S. C. (2015). Physiological consequences: Early hardship and health across the life span. In K. E. Cherry & K. E. Cherry (Eds.), *Traumatic stress and long-term recovery: Coping with disasters and other negative life events*. (pp. 151-176). Cham, Switzerland: Springer International Publishing.
- Newman, A. K. (2020). *An intersectional identity approach to chronic pain disparities using latent class analysis*. The University of Alabama.
- Pyke, K. D. (2010). What is internalized racial oppression and why don't we study it? Acknowledging racism's hidden injuries. *Sociological perspectives, 53*(4), 551-572.
- Quiton, R. L., Leibel, D. K., Boyd, E. L., Waldstein, S. R., Evans, M. K., & Zonderman, A. B. (2020). Sociodemographic patterns of pain in an urban community sample: an examination of intersectional effects of sex, race, age, and poverty status. *Pain, 161*(5), 1044-1051.
- Rahim-Williams, F. B., Riley III, J. L., Herrera, D., Campbell, C. M., Hastie, B. A., & Fillingim, R. B. (2007). Ethnic identity predicts experimental pain sensitivity in African Americans and Hispanics. *Pain, 129*(1-2), 177-184.
- Rainville, P., Feine, J. S., Bushnell, M. C., & Duncan, G. H. (1992). A psychophysical comparison of sensory and affective responses to four modalities of experimental pain. *Somatosensory & motor research, 9*(4), 265-277.
- Rancourt, D., Schaefer, L. M., Bosson, J. K., & Thompson, J. K. (2016). Differential impact of upward and downward comparisons on diverse women's disordered eating behaviors and body image. *International Journal of Eating Disorders, 49*(5), 519-523.

Journal of Health Disparities Research and Practice Volume 16, Issue 1, Spring 2023

<http://digitalscholarship.unlv.edu/jhdrp/>

Follow on Facebook: Health.Disparities.Journal

Follow on Twitter: @jhdrp

## 16 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain

Mehok et al.

- Riley III, J. L., & Robinson, M. E. (1997). CSQ: Five factors or fiction? *The clinical journal of pain, 13*(2), 156-162.
- Riley, J. L., Robinson, M. E., Wade, J. B., Myers, C. D., & Price, D. D. (2001). Sex differences in negative emotional responses to chronic pain. *The journal of pain, 2*(6), 354-359.
- Robinson, M. E., Gagnon, C. M., Riley, J. L., & Price, D. D. (2003). Altering gender role expectations: effects on pain tolerance, pain threshold, and pain ratings. *The journal of pain, 4*(5), 284-288.
- Schiele, J. H. (2005). Cultural oppression and the high-risk status of African Americans. *Journal of black studies, 35*(6), 802-826.
- Selim, A. J., Fincke, G., Ren, X. S., Deyo, R. A., Lee, A., Skinner, K., & Kazis, L. (2001). Racial differences in the use of lumbar spine radiographs: results from the Veterans Health Study. *Spine, 26*(12), 1364-1369.
- Shacham, S. (1983). A shortened version of the Profile of Mood States. *Journal of personality assessment, 47*(3), 305-306.
- Sheffield, D., Biles, P. L., Orom, H., Maixner, W., & Sheps, D. S. (2000). Race and sex differences in cutaneous pain perception. *Psychosomatic medicine, 62*(4), 517-523.
- Tesser, A., Millar, M., & Moore, J. (1988). Some affective consequences of social comparison and reflection processes: The pain and pleasure of being close. *Journal of personality and social psychology, 54*(1), 49.
- Trawalter, S., & Hoffman, K. M. (2015). Got pain? Racial bias in perceptions of pain. *Social and Personality Psychology Compass, 9*(3), 146-157.
- Vigil, J. M., Coulombe, P., Rowell, L. N., Strenth, C., Kruger, E., Alcock, J., . . . LaMendola, J. (2017). The Confounding Effect of Assessor Ethnicity on Subjective Pain Reporting in Women. *The Open Anesthesia Journal, 11*(1).
- Waytz, A., Hoffman, K. M., & Trawalter, S. (2014). A superhumanization bias in Whites' perceptions of Blacks. *Social psychological and personality science, 6*(3), 352-359. doi:10.1177/1948550614553642
- Weisse, C. S., Foster, K. K., & Fisher, E. A. (2005). The influence of experimenter gender and race on pain reporting: does racial or gender concordance matter? *Pain medicine, 6*(1), 80-87.
- White, S. F., Asher, M. A., Lai, S.-M., & Burton, D. C. (1999). Patients' perceptions of overall function, pain, and appearance after primary posterior instrumentation and fusion for idiopathic scoliosis. *Spine, 24*(16), 1693.
- Williams, D. A., & Thorn, B. E. (1989). An empirical assessment of pain beliefs. *Pain, 36*(3), 351-358.
- Wills, T. A. (1981). Downward comparison principles in social psychology. *Psychological bulletin, 90*(2), 245.
- Wise, E. A., Price, D. D., Myers, C. D., Heft, M. W., & Robinson, M. E. (2002). Gender role expectations of pain: relationship to experimental pain perception. *Pain, 96*(3), 335-342.

17 Beliefs about Race Differences in Pain vs. Actual Race Differences in Pain

Mehok et al.

Wood, J. V. (1996). What is social comparison and how should we study it? *Personality and Social Psychology Bulletin*, 22(5), 520-537.

Woodrow, K. M., Friedman, G. D., Siegelau, A., & Collen, M. F. (1972). Pain tolerance: differences according to age, sex and race. *Psychosomatic medicine*, 34(6), 548-556.

Wyer, R. S., & Albarracín, D. (2005). Belief formation, organization, and change: Cognitive and motivational influences. *The handbook of attitudes*, 273, 322.