

Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites

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Black Americans are systematically undertreated for pain relative to white Americans. We examine whether this racial bias is related to false beliefs about biological differences between blacks and whites (e.g., “black people’s skin is thicker than white people’s skin”). Study 1 documented these beliefs among white laypersons and revealed that participants who more strongly endorsed false beliefs about biological differences reported lower pain ratings for a black (vs. white) target. Study 2 extended these findings to the medical context and found that half of a sample of white medical students and residents endorsed these beliefs. Moreover, participants who endorsed these beliefs rated the black (vs. white) patient’s pain as lower and made less accurate treatment recommendations. Participants who did not endorse these beliefs rated the black (vs. white) patient’s pain as higher, but showed no bias in treatment recommendations. These findings suggest that individuals with at least some medical training hold and may use false beliefs about biological differences between blacks and whites to inform medical judgments, which may contribute to racial disparities in pain assessment and treatment.

racial bias | pain perception | health care disparities | pain treatment

A young man goes to the doctor complaining of severe pain in his back. He expects and trusts that a medical expert, his physician, will assess his pain and prescribe the appropriate treatment to reduce his suffering. After all, a primary goal of health care is to reduce pain and suffering. Whether he receives the standard of care that he expects, however, is likely contingent on his race/ethnicity. Prior research suggests that if he is black, then his pain will likely be underestimated and undertreated compared with if he is white (1–10). The present work investigates one potential factor associated with this racial bias. Specifically, in the present research, we provide evidence that white laypeople and medical students and residents believe that the black body is biologically different—and in many cases, stronger—than the white body. Moreover, we provide evidence that these beliefs are associated with racial bias in perceptions of others’ pain, which in turn predict accuracy in pain treatment recommendations. The current work, then, addresses an important social factor that may contribute to racial bias in health and health care.

Extant research has shown that, relative to white patients, black patients are less likely to be given pain medications and, if given pain medications, they receive lower quantities (1–10). For example, in a retrospective study, Todd et al. (10) found that black patients were significantly less likely than white patients to receive analgesics for extremity fractures in the emergency room (57% vs. 74%), despite having similar self-reports of pain. This disparity in pain treatment is true even among young children. For instance, a study of nearly one million children diagnosed with appendicitis revealed that, relative to white patients, black patients were less likely to receive any pain medication for moderate pain and were less likely to receive opioids—the appropriate treatment—for severe pain (6).

These disparities in pain treatment could reflect an overprescription of medications for white patients, underprescription of medications for black patients, or, more likely, both. Indeed, there is evidence that overprescription is an issue, but there is also clear evidence that the underprescription of pain medications for black patients is a real, documented phenomenon (1, 4). For example, a study examining pain management among patients with metastatic or recurrent cancer found that only 35% of racial minority patients received the appropriate prescriptions—as established by the World Health Organization guidelines—compared with 50% of nonminority patients (4).

Broadly speaking, there are two potential ways by which racial disparities in pain management could arise. The first possibility is that physicians recognize black patients’ pain, but do not to treat it, perhaps due to concerns about noncompliance or access to health care (7, 8). The second possibility is that physicians do not recognize black patients’ pain in the first place, and thus cannot treat it. In fact, recent work suggests that racial bias in pain treatment may stem, in part, from racial bias in perceptions of others’ pain. This research has shown that people assume a priori that blacks feel less pain than do whites (11–17). In a study by Staton et al. (14), for instance, patients were asked to report how much pain they were experiencing, and physicians were asked to rate how much pain they thought the patients were experiencing. Physicians were more likely to underestimate the pain of black patients (47%) relative to nonblack patients (33.5%). Of note,

Significance

The present work examines beliefs associated with racial bias in pain management, a critical health care domain with well-documented racial disparities. Specifically, this work reveals that a substantial number of white laypeople and medical students and residents hold false beliefs about biological differences between blacks and whites and demonstrates that these beliefs predict racial bias in pain perception and treatment recommendation accuracy. It also provides the first evidence that racial bias in pain perception is associated with racial bias in pain treatment recommendations. Taken together, this work provides evidence that false beliefs about biological differences between blacks and whites continue to shape the way we perceive and treat black people—they are associated with racial disparities in pain assessment and treatment recommendations.

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Table 1. Percentage of white participants endorsing beliefs about biological differences between blacks and whites

Item	Study 1: Online sample (<i>n</i> = 92)	Study 2			
		First years (<i>n</i> = 63)	Second years (<i>n</i> = 72)	Third years (<i>n</i> = 59)	Residents (<i>n</i> = 28)
Blacks age more slowly than whites	23	21	28	12	14
Blacks' nerve endings are less sensitive than whites'	20	8	14	0	4
Black people's blood coagulates more quickly than whites'	39	29	17	3	4
Whites have larger brains than blacks	12	2	1	0	0
Whites are less susceptible to heart disease than blacks*	43	63	83	66	50
Blacks are less likely to contract spinal cord diseases*	42	46	67	56	57
Whites have a better sense of hearing compared with blacks	10	3	7	0	0
Blacks' skin is thicker than whites'	58	40	42	22	25
Blacks have denser, stronger bones than whites*	39	25	78	41	29
Blacks have a more sensitive sense of smell than whites	20	10	18	3	7
Whites have a more efficient respiratory system than blacks	16	8	3	2	4
Black couples are significantly more fertile than white couples	17	10	15	2	7
Whites are less likely to have a stroke than blacks*	29	49	63	44	46
Blacks are better at detecting movement than whites	18	14	15	5	11
Blacks have stronger immune systems than whites	14	21	15	3	4
False beliefs composite (11 items), mean (SD)	22.43 (22.93)	14.86 (19.48)	15.91 (19.34)	4.78 (9.89)	7.14 (14.50)
Range	0–100	0–81.82	0–90.91	0–54.55	0–63.64
Combined mean (SD) (medical sample only)			11.55 (17.38)		

For ease of presentation, we shortened the items; see [SI Text](#) for full items and additional information. For ease of interpretation and ease of presentation, we collapsed the scale and coded responses marked as possibly, probably, or definitely untrue as 0 and possibly, probably, or definitely true, as 1, resulting in percentages of individuals who endorsed each item. Bold entries represent the items included in the false beliefs about biological differences between blacks and whites composite.

*Items that are factual or true.

rated the pain of the black target lower and the pain of the white target higher than did participants low in false beliefs. In other words, relative to participants low in false beliefs, they seemed to assume that the black body is stronger and that the white body is weaker.

Study 1 thus demonstrates that white adults without medical training endorse at least some beliefs about biological differences between blacks and whites, many of which are false and fantastical in nature (e.g., black people's blood coagulates more quickly than white people's blood). Study 1 also demonstrates that these beliefs are related to racial bias in pain perception among a sample of white adults without medical training. Given the well-documented, pervasive racial disparities in pain management, understanding who might contribute to this racial bias and why is of paramount importance. Thus, we next examined whether people with some degree of medical training also endorse these beliefs, and if so, whether these beliefs are associated

with racial bias in pain perception and pain treatment recommendations. Study 2 extends the findings of study 1 in at least three important ways: (i) it examines racial bias in a relevant context—medicine—using medical cases similar to those used in medical training; (ii) it extends our investigation to a sample with at least some medical training—medical students and residents; and (iii) it considers a critical downstream outcome—racial bias in pain treatment recommendations.

Study 2

We collected data from a total of 418 medical students and residents. Two hundred twenty-two met the same a priori criteria as in study 1 and completed the study (first years, *n* = 63; second years, *n* = 72; third years, *n* = 59; residents, *n* = 28). Participants gave informed consent in accordance with policies of the IRB of the University of Virginia. After consenting, participants read two mock medical cases about a black and a white patient and made pain ratings (scale: 0 = no pain to 10 = worst possible pain) and medication recommendations (dummy coded for accuracy: 1 = accurate, 0 = inaccurate) for each.[†] They also completed the same measure of beliefs about biological differences between blacks and whites as in study 1. We again averaged the 11 items that captured our variable of interest ($\alpha = 0.92$) (see Table 1 and [Table S1](#) for descriptive information; analyses for the composite with all items can be found in [Table S4](#)). On average, participants endorsed 11.55% (SD = 17.38) of the false beliefs. About 50% reported that at least one of the false belief items was possibly, probably, or definitely true (Table 1). These percentages are noticeably lower compared with those in study 1 (50% vs. 73%); however, given this sample (medical students and residents), the percentages for false beliefs are surprisingly high.

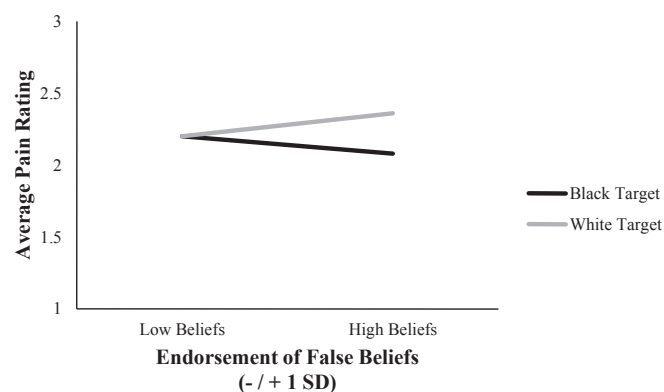


Fig. 1. Nonmedical sample estimated mean pain ratings for black and white targets as a function of false belief endorsement (scale: 1–6; plotted 1 SD below and above the mean). Pain rating scale: 1 = not painful, 2 = somewhat painful, 3 = moderately painful, 4 = extremely painful.

[†]We counterbalanced the order of target race (black, white) and medical case (kidney stone, ankle fracture) across participants. Preliminary analyses revealed that the order of target race and medical case did not moderate the effects, and we thus excluded them from our models for parsimony. Including them does not change the pattern of results.

endorsed more of these beliefs reported that a black (vs. white) target patient would feel less pain and they were less accurate in their treatment recommendations for the black (vs. white) patient. Although the effect sizes for these findings were not large ($\eta_p^2 = 0.03$ and 0.04), the practical importance is significant: those endorsing more false beliefs rated the pain of a black (vs. white) patient half a scale point lower and were less accurate in their treatment recommendations 15% of the time.

In contrast to white medical students and residents who endorsed false beliefs, those who did not endorse (or endorsed fewer) false beliefs reported that a white (vs. black) target patient would feel less pain. This opposite bias perhaps reflects real-world differences, as previous work has shown that black patients tend to report greater pain than do white patients (7, 24, 42). This opposite bias could also reflect participants' attempt to compensate for known racial disparities (see ref. 13 for a similar explanation). Of note, these medical students and residents did not exhibit a racial bias in treatment recommendations. In other words, endorsing fewer false beliefs was associated with the perception that whites feel less pain but not with insufficient treatment recommendations for white patients. In contrast, endorsing more false beliefs was associated with perceptions that blacks feel less pain and a "commensurate" insufficient treatment recommendation for black patients. It thus seems that racial bias in pain perception has pernicious consequences for accuracy in treatment recommendations for black patients and not for white patients.

Unexpectedly, shifts in racial bias as a function of false beliefs stemmed from shifts in perceptions of the white target and not the black target in study 2 (it stemmed from both shifts in perceptions of the white target and black target in study 1). Although perhaps counterintuitive, this pattern of results is consistent with research on intergroup bias demonstrating that discrimination often occurs due to ingroup favoritism rather than outgroup hostility (43). In the present case, it is possible that shifts in perceptions of the white target (and not the black target) reflect this kind of bias; it is possible that these shifts reflect positive (empathic) cognitions about white ingroup members rather than negative (callous) cognitions about black outgroup members.

Limitations of the present work offer avenues for future research. For practical reasons, we used survey methods to document medical students' and residents' beliefs and racial bias. Future work will need to test whether white and nonwhite medical personnel in more advanced stages of their career also hold beliefs about biological differences between blacks and whites, and if so, whether these beliefs have consequences for pain assessment and treatment in real medical contexts. Future work may also delve into the nature of the racial bias: whether it reflects ingroup favoritism rather than outgroup derogation. This distinction may be useful for the development of interventions. These limitations aside, studies 1 and 2 make at least three important contributions. First, they provide the first evidence that racial bias in pain assessment is associated with racial bias in the accuracy of pain treatment recommendations. Second, they reveal that a substantial number of white people—laypersons with no medical training and medical students and residents—hold beliefs about biological differences between blacks and whites, many of which are false and even fantastical in nature. To our knowledge, this is the first demonstration of medical personnel (students and residents with at least some medical training) endorsing such beliefs in modern times. Third, the current studies demonstrate that these beliefs are associated with racial bias in perceptions of others' pain. Interestingly, in study 2, that bias seemed to result from shifts in perceptions of the white target's pain more so than perceptions of the black target's pain, suggesting that perceptions of whites' frailty may shape racial bias in pain perception as much, if not more, than perceptions of blacks' strength.

Concluding Remarks

This last year marks the 30th anniversary of the landmark 1985 *Report of the Secretary's Task Force on Black and Minority Health*—more commonly known as the *Heckler Report*—the first comprehensive documentation of racial disparities in health by medical experts. This report put a national spotlight on the pervasive racial inequities in health and issued a resounding call to eliminate health disparities. Although this call was met with a surge in research efforts and substantial changes in medical programs, policy, and legislation, the ultimate goal of eliminating racial disparities remains elusive. Racial disparities in health and health care continue to be a problem in the United States, a point underscored by the US Department of Health and Human Services' "clarion call to continue to take action toward ending health disparities" (minorityhealth.hhs.gov/Blog/BlogPost.aspx?BlogID=68). The present work sheds light on a heretofore unexplored source of racial bias in pain assessment and treatment recommendations within a relevant population (i.e., medical students and residents), in a context where racial disparities are well documented (i.e., pain management). It demonstrates that beliefs about biological differences between blacks and whites—beliefs dating back to slavery—are associated with the perception that black people feel less pain than do white people and with inadequate treatment recommendations for black patients' pain.

Materials and Methods

Study 1.

Participants. We recruited a sample of 121 adults on Amazon's Mechanical Turk in exchange for a small amount of money. As in previous work (15), we excluded participants who were not born in the United States or native English speakers, as well as participants who did not complete all of the relevant measures. We also excluded all nonwhite participants, given the historical context of black-white relations, particularly in the medical context (20–25). Our final sample consisted of 92 participants (28% female; $M_{\text{age}} = 26.70$, $SD = 8.76$).

Procedure and materials. Participants gave informed consent in accordance with policies of the IRB of the University of Virginia. After consenting, participants were asked to provide their age and gender so the survey program could route the participant to a gender-matched target. They then rated the amount of physical pain they would feel across 18 scenarios and were randomly assigned to rate the pain of a gender-matched black or white target across the same 18 scenarios (*SI Text*). Next, participants completed a 15-item measure of beliefs about biological differences between blacks and whites that are true or untrue (see Table 1 and *SI Text* for a list of items and descriptive information). To compose our conceptual variable of interest—false beliefs about biological differences between blacks and whites—we created an average rating of 11 of the items ($\alpha = 0.92$; see bold items in Table 1 and see *SI Text* for additional information on the measure). All analyses were conducted using continuous measures of beliefs and pain ratings. After this measure, participants provided demographic information, including their race/ethnicity, nationality, and primary language. *SI Text* provides additional information on materials, methods, and results. Data and study materials are also available at <https://osf.io/crxwa/>.

Study 2.

Participants. We recruited cohorts of first-, second-, and third-year medical students from a large public university, who completed the study online during class sessions. We also recruited medical residents from multiple sites, who completed the study online at their convenience. The sample included 418 participants (first years, $n = 134$; second years, $n = 133$; third years, $n = 117$; residents, $n = 34$); we had no set sample size, but rather collected data from as many participants as we were able to obtain. As in previous work (15), we excluded participants who were not native English speakers and/or American because racial bias in pain perception is likely a cultural phenomenon. Including these participants in our analyses does not change the pattern of results. We again excluded nonwhite participants given the historical context of black-white relations, particularly in the medical context (20–25). The final sample consisted of 222 participants (first years, $n = 63$; second years, $n = 72$; third years, $n = 59$; residents, $n = 28$; 48% female; $M_{\text{age}} = 25.18$, $SD = 2.66$). Some participants did not report age, gender, and/or race/ethnicity and thus degrees of freedom vary across analyses.

Procedure and materials. Participants gave informed consent in accordance with policies of the IRB of the University of Virginia. After consenting, participants were asked to provide their age and gender so the survey program

could route the participant to gender-matched targets. Participants then read two mock medical cases about a black and a white patient. They were asked to estimate the pain of each patient and to make a recommendation to treat the patient's pain. Next, participants were asked to provide demographic information and to complete the same measure of beliefs about biological differences between blacks and whites as in study 1, averaging the 11 false items to create a measure of false beliefs ($\alpha = 0.92$). Last, participants responded to debriefing questions about the study and then were debriefed in person

(medical students) or read an electronic debriefing (medical residents). *SI Text* provides additional information on materials, methods, and results. Data and study materials are also available at <https://osf.io/crxwa/>.

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- Anderson KO, Green CR, Payne R (2009) Racial and ethnic disparities in pain: Causes and consequences of unequal care. *J Pain* 10(12):1187–1204.
- Bonham VL (2001) Race, ethnicity, and pain treatment: Striving to understand the causes and solutions to the disparities in pain treatment. *J Law Med Ethics* 29(1): 52–68.
- Cintron A, Morrison RS (2006) Pain and ethnicity in the United States: A systematic review. *J Palliat Med* 9(6):1454–1473.
- Cleeland CS, Gonin R, Baez L, Loehrer P, Pandya KJ (1997) Pain and treatment of pain in minority patients with cancer. The Eastern Cooperative Oncology Group Minority Outpatient Pain Study. *Ann Intern Med* 127(9):813–816.
- Freeman HP, Payne R (2000) Racial injustice in health care. *N Engl J Med* 342(14): 1045–1047.
- Goyal MK, Kuppermann N, Cleary SD, Teach SJ, Chamberlain JM (2015) Racial disparities in pain management of children with appendicitis in emergency departments. *JAMA Pediatr* 169(11):996–1002.
- Green CR, et al. (2003) The unequal burden of pain: Confronting racial and ethnic disparities in pain. *Pain Med* 4(3):277–294.
- Shavers VL, Bakos A, Sheppard VB (2010) Race, ethnicity, and pain among the U.S. adult population. *J Health Care Poor Underserved* 21(1):177–220.
- Smedley BD, Stith AY, Nelson AR (2013) *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* (National Academies Press, Washington, DC).
- Todd KH, Deaton C, D'Adamo AP, Goe L (2000) Ethnicity and analgesic practice. *Ann Emerg Med* 35(1):11–16.
- Dore RA, Hoffman KM, Lillard AS, Trawalter S (2014) Children's racial bias in perceptions of others' pain. *Br J Dev Psychol* 32(2):218–231.
- Hoffman KH, Trawalter S (2016) Assumptions about life hardship and pain perception. *Group Process Intergroup Relat*, 10.1177/1368430215625781.
- Mathur VA, Richeson JA, Paice JA, Muzyka M, Chiao JY (2014) Racial bias in pain perception and response: Experimental examination of automatic and deliberate processes. *J Pain* 15(5):476–484.
- Staton LJ, et al. (2007) When race matters: Disagreement in pain perception between patients and their physicians in primary care. *J Natl Med Assoc* 99(5):532–538.
- Trawalter S, Hoffman KM, Waytz A (2012) Racial bias in perceptions of others' pain. *PLoS One* 7(11):e48546.
- Wandner LD, Scipio CD, Hirsh AT, Torres CA, Robinson ME (2012) The perception of pain in others: How gender, race, and age influence pain expectations. *J Pain* 13(3): 220–227.
- Waytz A, Hoffman KM, Trawalter S (2014) A superhumanization bias in Whites' perceptions of Blacks. *Soc Psychol Personal Sci* 6(3):352–359.
- Haider AH, et al. (2011) Association of unconscious race and social class bias with vignette-based clinical assessments by medical students. *JAMA* 306(9):942–951.
- Green AR, et al. (2007) Implicit bias among physicians and its prediction of thrombolysis decisions for black and white patients. *J Gen Intern Med* 22(9):1231–1238.
- Cartwright SA (1851) Report on the diseases and physical peculiarities of the Negro race. *New Orleans Med Surg J* 7:691–715.
- Guillory JD (1968) The pro-slavery arguments of Dr. Samuel A. Cartwright. *La Hist* 9:209–227.
- Pernick MS (1985) *A Calculus of Suffering: Pain, Professionalism, and Anesthesia in Nineteenth-Century America* (Columbia Univ Press, New York).
- Tidyman P (1826) A sketch of the most remarkable disease of the negroes of the southern states. *Phila J Med Phys Sci* 12:306–338.
- Trawalter S, Hoffman KM (2015) Got pain? Racial bias in perceptions of pain. *Soc Personal Psychol Compass* 9(3):146–157.
- Washington HA (2006) *Medical Apartheid: The Dark History of Medical Experimentation on Black Americans from Colonial Times to the Present* (Doubleday, New York).
- Prentice DA, Miller DT (2007) Psychological essentialism of human categories. *Curr Dir Psychol Sci* 16(4):202–206.
- Williams MJ, Eberhardt JL (2008) Biological conceptions of race and the motivation to cross racial boundaries. *J Pers Soc Psychol* 94(6):1033–1047.
- Morning A (2011) *The Nature of Race: How Scientists Think and Teach About Human Difference* (Univ of California Press, Berkeley, CA).
- Hoberman JM (1997) *Darwin's Athletes: How Sport Has Damaged Black America and Preserved the Myth of Race* (Houghton Mifflin Company, New York).
- Hughey M, Goss DR (2015) A level playing field? Media constructions of athletics, genetics, and race. *Ann Am Acad Pol Soc Sci* 661(1):182–211.
- Sailes GA (1998) *The African American Athlete: Social Myths and Stereotypes. African Americans in Sports: Contemporary Themes*, ed Sailes GA (Transaction Publishers, New Brunswick, NJ), pp 183–198.
- Hall RE (2001) The ball curve: Calculated racism and the stereotype of African American men. *J Black Stud* 32(1):104–119.
- Price S (1997) Whatever happened to the White athlete? *Sports Illustrated* 87(23): 30–55.
- Jayarante TE, et al. (2006) White Americans' genetic lay theories of race differences and sexual orientation: Their relationship with prejudice toward Blacks, and gay men and lesbians. *Group Process Intergroup Relat* 9(1):77–94.
- Angrist JD, Pischke J-S (2009) *Mostly Harmless Econometrics: An Empiricist's Companion* (Princeton Univ Press, Princeton, NJ).
- Allison PD (1999) Comparing logit and probit coefficients across groups. *Sociol Methods Res* 28(2):186–208.
- Baetschmann G, Staub KE, Winkelmann R (2015) Consistent estimation of the fixed effects ordered logit model. *J R Stat Soc [Ser A]* 178(3):685–703.
- Greene WH (2002) The bias of the fixed effects estimator in nonlinear models. Working paper EC-02-05 (New York University, New York) Available at people.stern.nyu.edu/wgreene/nonlinearfixedeffects.pdf. Accessed October 17, 2015.
- Hellevik O (2009) Linear versus logistic regression when the dependent variable is a dichotomy. *Qual Quant* 43(1):59–74.
- Mood C (2010) Logistic regression: Why we cannot do what we think we can do, and what we can do about it. *Eur Sociol Rev* 26(1):67–82.
- Neumann M, et al. (2011) Empathy decline and its reasons: A systematic review of studies with medical students and residents. *Acad Med* 86(8):996–1009.
- Klonoff EA (2009) Disparities in the provision of medical care: An outcome in search of an explanation. *J Behav Med* 32(1):48–63.
- Greenwald AG, Pettigrew TF (2014) With malice toward none and charity for some: Ingroup favoritism enables discrimination. *Am Psychol* 69(7):669–684.
- Zengin A, Prentice A, Ward KA (2015) Ethnic differences in bone health. *Front Endocrinol (Lausanne)* 6(24):24.
- Medecins Sans Frontieres (2013) Clinical guidelines: Diagnosis and treatment manual for curative programmes in hospitals and dispensaries: Guidance for prescribing. Available at apps.who.int/medicinedocs/documents/s17078e/s17078e.pdf. Accessed February 23, 2016.