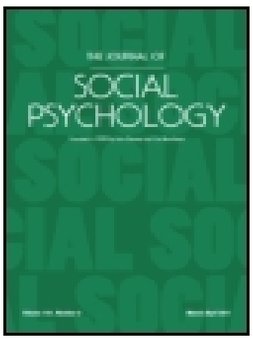

The Journal of Social Psychology

ISSN: 0022-4545 (Print) 1940-1183 (Online) Journal homepage: http://www.tandfonline.com/loi/vsoc20

Racial bias in sport medical staff's perceptions of others' pain

James N Druckman, Sophie Trawalter, Ivonne Montes, Alexandria Fredendall, Noah Kanter & Allison Paige Rubenstein

To cite this article: James N Druckman, Sophie Trawalter, Ivonne Montes, Alexandria Fredendall, Noah Kanter & Allison Paige Rubenstein (2017): Racial bias in sport medical staff's perceptions of others' pain, The Journal of Social Psychology, DOI: 10.1080/00224545.2017.1409188

To link to this article: https://doi.org/10.1080/00224545.2017.1409188

Accepted author version posted online: 27 Nov 2017.
Published online: 11 Dec 2017.

Submit your article to this journal

Article views: 46

View related articles

View Crossmark data

Full Terms & Conditions of access and use can be found at
http://www.tandfonline.com/action/journalInformation?journalCode=vsoc20

THE JOURNAL OF SOCIAL PSYCHOLOGY
https://doi.org/10.1080/00224545.2017.1409188

Routledge
Taylor & Francis Group

Check for updates

Racial bias in sport medical staff's perceptions of others' pain

James N Druckman[a], Sophie Trawalter[b], Ivonne Montes[a], Alexandria Fredendall[a], Noah Kanter[c], and Allison Paige Rubenstein[a]

[a]Northwestern University; [b]University of Virginia; [c]Dartmouth College

ABSTRACT

Unequal treatment based on race is well documented in higher education and healthcare settings. In the present work, we examine racial bias at the intersection of these domains: racial bias in pain-related perceptions among National Collegiate Athletic Association (NCAA) Division 1 sport medical staff. Using experimental vignettes about a student-athlete who injured his/her anterior cruciate ligament (ACL), we find, like prior work, that respondents perceived Black (vs. White) targets as having higher initial pain tolerance. Moreover, this bias was mediated by perceptions of social class. We extend prior work by showing racial bias was *not* evident on other outcome measures, including perception of recovery process pain, likelihood of over-reporting pain, and over-use of drugs to combat pain. This suggests stricter boundary conditions on bias in pain perceptions than had been previously recognized.

ARTICLE HISTORY
Received 6 April 2017
Revised 26 August 2017
Accepted 15 November 2017

KEYWORDS
Pain perceptions; racial bias; social class; sports psychology

Imagine a star athlete, Jordan. Jordan plays NCAA Division 1 basketball and is headed for a professional career in the NBA. Now imagine that, in the middle of a game, Jordan falls and screams in pain. He has torn his anterior cruciate ligament (ACL). The injury ends his season and could put his career in jeopardy. His recovery depends in large part on the care he receives from his team's medical staff. And that care may depend on his race.

Prior work documents glaring racial disparities in healthcare in general and pain management in particular. Relative to White patients, Black patients are less likely to receive pain medications and, when they do receive pain medications, they receive less of them (Anderson, Green, & Payne, 2009; Bonham, 2001; Hampton, Cavalier, & Langford, 2015). For instance, one retrospective study 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 (Todd, Deaton, D'Adamo, & Goe, 2000). In another study, Black children diagnosed with appendicitis were significantly less likely than White children diagnosed with appendicitis to receive any pain medication for moderate pain and were less likely to receive opioids, the appropriate treatment for severe pain (Goyal, Kupperman, Cleary, Teach, & Chamberlain, 2015).

These disparities may be attributable, at least in part, to racial bias. Research suggests that medical staff see Black (vs. White) patients as being more likely to abuse pain medications (Van Ryn & Burke, 2000). This concern could make medical staff reluctant to prescribe pain medications. In addition, research suggests that medical staff view Black (vs. White) people as having greater pain tolerance. In a study by Staton and colleagues (2007), 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 non-Black patients (33.5%). Since this

CONTACT James N Druckman druckman@northwestern.edu Department of Political Science, 601 University PlaceEvanston, IL 60208, USA.

Supplemental data for this article can be accessed on the publisher's Web site.

© 2017 Taylor & Francis

seminal study, social psychologists have replicated this finding using experimental paradigms (Hollingshead, Meints, Miller, Robinson, & Hirsh, 2016; Mathur, Richeson, Paice, Muzyka, & Chiao, 2014; Trawalter, Hoffman, & Waytz, 2012; Wandner, Scipio, Hirsh, Torres, & Robinson, 2012). In one set of studies (Trawalter et al., 2012), participants were randomly assigned to rate the pain of a Black or White target person in various scenarios ("Jordan cuts himself with a sheet of paper"; "Jordan caught his finger in a car door"; "Jordan stapled his finger with an industrial stapler"). These studies have found that participants, including medical staff, perceive a Black (vs. White) target person as experiencing less pain. This experimental work is important because it isolates the target person's race as a causal factor; it shows that participants are using race to make assumptions about someone's pain. (In the work by Staton and colleagues, alternative explanations exist; for example, it could be that more awkward/negative patient-doctor interactions—and not patient race per se—led to distrust between Black patients and White doctors, and the discounting of Black patients' pain.)

Of note, follow-up studies suggest that racial bias in pain perception may not be rooted in racial prejudice. Black participants also exhibit the racial bias; they too assume that Black people feel less pain than do White people (Hollingshead et al., 2016; Trawalter et al., 2012). And, racial prejudice does not seem to predict racial bias in pain perception; Whites who have negative racial attitudes are just as likely as Whites who have positive racial attitudes to assume that a Black target person feels less pain (Mathur et al., 2014; Trawalter et al., 2012). Rather, studies suggest that racial bias in pain perception is partly rooted in perceptions of hardship. In two experiments, adult participants received information about a Black and/or White target person's life hardship. Importantly, hardship information was directly tied to socioeconomic and not physical hardship; that is, hardship was conveyed by social class. Then, participants were asked to rate the pain of the target person. Participants reported that the target individual would feel less pain if s/he had experienced greater hardship. Racial bias emerged, but only when hardship information was consistent with expectations about race and life hardship; that is, participants reported that the Black (vs. White) target individual would feel less pain only if s/he had experienced greater hardship (Hoffman & Trawalter, 2016, Experiments 1 & 2). In another experiment, participants reported that the Black (vs. White) target individual would feel less pain, but only if they endorsed the belief that hardship leads to toughness; in other words, if they endorsed the notion that "that which does not kill us makes us stronger" (Hoffman & Trawalter, 2016, Experiment 3).

The present work

Previous work on racial bias in pain perception has been informative but leaves open a number of questions:

First, previous work has not distinguished between perceptions of pain and perceptions of coping or dealing with that pain. Because participants have never been asked to distinguish between a target person's initial pain experience and a target person's ability to recover or "deal with" the pain subsequently, it is unclear what participants are reporting when asked "how much pain does this person feel?" It is feasible that they are reporting the latter; that is, the extent to which Black vs. White target persons can deal with the pain and recover. This is important for practical reasons, for designing interventions, but also for theoretical reasons. People's beliefs about racial differences in initial pain likely reflect beliefs about racial differences in biology and physiology (see Hoffman, Trawalter, Axt, & Oliver, 2016); beliefs about racial differences in recovery pain may reflect not only beliefs about racial differences in biology and physiology, but also self-regulation and adherence to a treatment regimen.

Second, previous work has not shown whether trained medical staff with extensive experience show this racial bias in pain perception. Trawalter and colleagues documented the bias in a small sample of nurses and nursing students (Trawalter et al., 2012), and in another, larger sample of medical students and residents (Hoffman et al., 2016). Whether medical staff with more extensive

experience with treating patients (e.g., not earlier career medical staff)—and Black patients in particular—show this bias remains unclear.

In the present work, we fill these two gaps. We ask participants about (and therefore distinguish between) a target patient's initial pain and their subsequent pain as they recover, and we recruited a large sample of experienced medical staff; specifically, NCAA Division 1 sport medical staff. The average respondent in our sample had worked in the field of athletic medicine for 11–12 years. Moreover, this is an intriguing population to study because they tend to have relatively high levels of contact with Black patients, and there are well-known ongoing national debates about inequities in college sports (e.g., Harper, Williams, & Blackman, 2013; Simon, 2005).

Third, previous work has not systematically examined how race interacts with gender and context; it has not taken an intersectional approach (e.g., by exploring how gender and race interact or how context may generate differential race effects). In the present work, we manipulate not only target race (Black vs. White) but target gender (male, female) and sport domain (basketball, soccer). We are then able to examine whether racial bias in perceptions of others' pain disproportionately affects men or women, and whether context—in our case, sport domain—influences the bias. We consider gender based on previous work suggesting that gender and race intersect in important ways to produce inequity (e.g., Crenshaw, 1991; Purdie-Vaughns & Eibach, 2008). We also consider sport—basketball and soccer—given the racialized nature of sport domain: basketball is stereotypically Black but soccer is not. This is particularly true when it comes to college sports. Even objectively speaking, Blacks make up a majority of student-athletes in basketball while being a clear minority in soccer. NCAA data from 2014–15 show that 9.8% and 6.4% of Division 1 soccer players are Black males and Black females, respectively. For basketball, the analogous figures are 58.3% and 51.0% (NCAA, 2016). Manipulating the sport domain, in the context of college athletics, thus, allows us then to examine how respondents perceive Black and White athletes in stereotypically Black or non-stereotypically Black domains. If assumptions about Blacks generalize to "Black sports"—in this case, basketball—then it could be that White basketball players will be perceived as feeling less pain than White soccer players. Lastly, we examine two other potential sources of racial bias in pain management: perceptions that the patient (athlete) will abuse pain medications and perceptions that the patient (athlete) is over-reporting pain. By so doing, we are able to compare and contrast potential sources of racial bias in pain assessment and treatment.

Method[1]

Participants

We identified the universe of publically available e-mails of NCAA Division 1 sport medical personnel via university Web sites. We then e-mailed potential respondents an invitation to participate in research in exchange for a $5 Amazon gift card. Of the 2,740 individuals successful contacted, we received 651 valid responses. Further details on our sampling approach, attrition, and random assignment checks appear in Supplementary Appendix A. We collected data in the spring of 2015. The sample we analyzed included 651 individual respondents. This sample (see Appendix C for precise demographic measures) was 48% male, 44% female (8% did not report gender), 80% White, 2% Black, 2% Asian, 3% Hispanic, 2% multiracial, and 2% other (9% did not report race/ethnicity). Seven percent of participants were between 18 and 24 years of age, 47% between 24 and 34, 29% between 35 and 50, 8% between 51 and 65, and less than 1% were over 65 years of age (9% did not report age). Twenty-one percent of participants were the director/head of their department and 14% were still students (76% of them had a Master's degree). On average, participants had held their current position for 6–7 years and had, as mentioned, worked in athletic medicine for 11–12 years. In other words, on average, they were quite experienced. And indeed, they reported working with student-athletes on average over 50 hours a week (although the standard deviation was quite high; $M = 50.41$, $SD = 62.16$). Ideologically, participants ranged from very liberal to very conservative, with a very slight skew in the liberal direction ($M = 3.95$ where 4 = moderate, $SD = 1.37$).

Procedure

Our procedure involved providing each respondent with a vignette that described a student-athlete who just underwent surgery for an ACL injury. We used an ACL injury because it is relatively common in the two sports on which we focus: basketball and soccer (Hootman, Dick, & Agel, 2007). We randomly assigned respondents to one of eight vignette conditions that varied (1) race (Black/White), (2) gender (male/female), and (3) sport (basketball/soccer). We followed prior work by varying race and gender by using demographically diagnostic names (e.g., Pager, 2007). The precise vignette presented to respondents read:

> **NAME** is an NCAA Division 1 **SPORT** player on an athletic scholarship. **He/she** is a sophomore who in a preseason practice, made a sharp cut and ruptured **his/her** anterior cruciate ligament (ACL) (grade 3). **He/she** just received surgery. It was the first serious injury that **NAME** had experienced. Next we will ask you various questions about your thoughts about the injury and recovery process. In answering these questions, try to think about the specific situation just described.

To create the eight possible conditions, **NAME** was a stereotypically Black male name, Black female name, White male name, or White female name, and **SPORT** was either basketball or soccer. For example, then, some respondents read about a Black male soccer player, others about a White female basketball player, and so on. Further details on the vignettes as well as how we determined descriptive names appear in Supplementary Appendix B.

After reading the randomly assigned vignette, we asked respondents to make various judgments; here, we focus on all judgments related to the target student-athlete's pain experience (as well as questions respondents answered about their demographic and background characteristics). There were four main pain outcome variables: perception of initial injury pain, perception of recovery process pain, likelihood of over-reporting pain, and use of drugs to combat pain (asked in a standard order). Specifically, participants were asked, *How painful do you think the initial ACL injury was for* **NAME***?* (1-Not painful, 4-Extremely painful), *How painful do you think the recovery process would be for* **NAME***?* (1-Not painful, 4-Extremely painful), *Overall, how likely is* **NAME** *to over-report (exaggerate) discomfort?* (1-Not at all likely, 5-Extremely likely), *Overall, how likely is* **NAME** *to abuse drugs (e.g., painkillers) including alcohol?* (1-Not at all likely, 5-Extremely likely). Participants also answered one question about their perception of the target's social class so we could explore the aforementioned mediational role of hardship—for us, operationalized as class. Specifically, the question asked was: *If you were asked to use one of five names to describe what you think* ***NAME's*** *social class is, which would you say: the lower class, the working class, the middle class, the upper middle class, or the upper class?* (1-Lower class, 2-Working class, 3-Middle class, 4-Upper middle class, 5-Upper class).

We included items to capture racial attitudes and experiences, since they may moderate race bias in pain perceptions. Respondents answered four questions from the Symbolic Racism Scale (Henry & Sears, 2002); from these items, we created a composite for racial attitudes (prejudice) by averaging the 4 items, reverse-coding when appropriate ($\alpha = .68$). On this 5-point scale; the average respondent scored a 3.14 (where 3 = neither disagree nor agree with statements reflecting symbolic racism, $SD = .72$). Further, respondents reported the percent time working with Black and White male and female athletes (we did not cap the total percentages to 100% and thus many respondents exceed 100%). On average, they spent 36% of their time working with White male athletes, 30% of their time working with Black male athletes, 40% of their time working with White female athletes, and 18% of their time working with Black female athletes. Finally, they answered the previously described demographic and background questions. Wordings for all items appear in Supplementary Appendix C.

Results[2]

Sensitivity analysis

Given our recruiting and sampling approach, we aimed to collect data from as many medical staff as possible. We thus did not compute an *a priori* power analysis. Nonetheless, we present here a

sensitivity analysis; that is, the smallest effect size we can detect given our achieved sample size. For main effects (e.g., racial bias, gender bias), we can detect effects larger than $f = .11$, $\eta^2 = .012$. For the full three-way interaction, we can detect effects larger than $f = .15$, $\eta^2 = .022$. We have the power to detect small main effects and small-to-medium interaction effects, in other words.

Primary analyses

We conducted a 2 (target race: Black vs. White) × 2 (target gender: male vs. female) × 2 (target sport: basketball vs. soccer) general linear model (GLM) on each of our four pain variables: initial pain ratings, recovery pain ratings, over-reporting of pain, and drug abuse. For initial pain ratings and recovery pain ratings, we also controlled for participants' ratings of the pain they would experience if they had been injured, consistent with previous work (see Supplementary Appendix C for question wording) (Hoffman & Trawalter, 2016; Trawalter et al., 2012).[3] Results hold when not controlling for self-ratings. In addition, results hold when controlling for participant demographics (e.g., race/ethnicity, gender, age). Degrees of freedom differ slightly between analyses due to missing data.[4]

Initial pain ratings

Results revealed a main effect of target sport, F (1, 631) = 9.80, $p = .002$, $\eta^2 = .015$, reflecting the fact that participants believed that basketball players would experience less pain than soccer players. There was also a main effect of target race, F (1, 631) = 7.44, $p = .007$, $\eta^2 = .012$, reflecting the fact that participants believed that Black athletes would experience less pain than White athletes. There were no other main effects or interactions, all Fs ≤ 2.52, all ps ≥ .113. See Table 1 Panel A for all raw cell means and standard deviations.

Recovery pain ratings

Results revealed no significant effects of target race, gender, and/or sport, and no interactions, all Fs ≤ 1.74, all ps ≥ .187. See Table 1 Panel B for all raw cell means and standard deviations.

Over-reporting pain

Results revealed no significant effects of target race, gender, and/or sport and no interactions, all Fs ≤ 2.49, all ps ≥ .115. See Table 1 Panel C for all raw cell means and standard deviations.

Drug abuse

Results revealed no significant effects of target race, gender, and/or sport and no interactions, all Fs ≤ .90, all ps ≥ .342. See Table 1 Panel D for all raw cell means and standard deviations.

Secondary analyses: mediation

As mentioned, previous work suggests biased pain assessments are rooted in perceptions of hardship or class (e.g., Hoffman & Trawalter, 2016). Following that work, we tested whether perceived target status (i.e., our measure of the target's social class) mediated the relationship between target race, sport, and initial pain ratings using a bootstrapping analysis using the PROCESS macro (Hayes, 2013). To conduct the bootstrapping analysis, we drew 10,000 random samples with replacement to estimate the size of the indirect effect of target race on initial pain ratings through perceived social class. The bootstrap analysis yielded a 95% confidence interval that did not include 0 (95% CI [.003, .022], $p = .013$), suggesting that perceived social class (i.e., status) mediated the relationship between target race and initial pain ratings.

A similar bootstrap analysis revealed that perceived social class also mediated the effects of target sport on initial pain ratings (95% CI [.006, .035], $p = .005$). In other words, it seems that participants assumed that Black athletes and basketball players (who are disproportionately Black) feel less pain

Table 1. Raw means and standard deviations for ratings of pain variables (panel a = initial pain, panel b = recovery pain, panel c = over-reporting pain, panel d = drub abuse).

	Target Race	Target Gender	Target Sport	*N*	*M*	*SD*
(A)	Black	Female	Basketball	93	3.097	0.723
	Black	Female	Soccer	70	3.386	0.597
	Black	Male	Basketball	54	3.074	0.610
	Black	Male	Soccer	94	3.277	0.594
	White	Female	Basketball	88	3.352	0.662
	White	Female	Soccer	81	3.383	0.538
	White	Male	Basketball	79	3.269	0.674
	White	Male	Soccer	81	3.370	0.641
(B)	Black	Female	Basketball	93	3.075	0.494
	Black	Female	Soccer	70	3.086	0.631
	Black	Male	Basketball	54	3.056	0.452
	Black	Male	Soccer	92	3.011	0.545
	White	Female	Basketball	87	3.011	0.581
	White	Female	Soccer	80	3.088	0.532
	White	Male	Basketball	79	3.038	0.609
	White	Male	Soccer	80	3.100	0.542
(C)	Black	Female	Basketball	94	3.362	0.853
	Black	Female	Soccer	73	3.493	0.801
	Black	Male	Basketball	54	3.500	0.818
	Black	Male	Soccer	93	3.301	0.777
	White	Female	Basketball	90	3.300	0.800
	White	Female	Soccer	82	3.244	0.825
	White	Male	Basketball	81	3.506	0.868
	White	Male	Soccer	82	3.366	0.854
(D)	Black	Female	Basketball	95	3.937	0.649
	Black	Female	Soccer	73	3.904	0.670
	Black	Male	Basketball	54	3.889	0.604
	Black	Male	Soccer	93	3.860	0.636
	White	Female	Basketball	90	3.922	0.674
	White	Female	Soccer	82	3.890	0.685
	White	Male	Basketball	81	3.864	0.628
	White	Male	Soccer	82	3.841	0.693

than do White athletes and soccer players (who are disproportionately White) because they assume that Black athletes and basketball players have lower socioeconomic status.

Secondary analyses: moderation

We tested whether racial attitudes and/or contact moderated the effects of target sport and target race on initial pain ratings. This allows us to see whether racial bias in perception of the target's initial pain is driven primarily by individuals high in prejudice and/or low on contact. For prejudice, we used the aforementioned symbolic racism scale. We operationalized contact using the previously described contact items, focusing on the amount of contact participants had with the relevant target population in their work (e.g., for those in the Black male target condition, we used the % time working with Black male student-athletes as the measure, etc.). Results are similar using a relative contact score (i.e., subtracting amount of contact with Black athletes from the amount of contact with White athletes). We reran the primary analyses with racial attitudes and contact in the model, allowing for main effects and interactions. Of note, racial attitudes and contact were not correlated, $r = .02$, $p = .833$, perhaps because we measured general racial attitudes toward Blacks and contact with Black versus White male and female *athletes*, more specifically.

Racial attitudes

When introducing racial attitudes to the model, results revealed a marginal effect of target race, F (1, 527) = 3.37, $p = .067$, $\eta^2 = .006$, a three-way interaction between target race, target gender, and sport domain, F (1, 527) = 4.22, $p = .041$, $\eta^2 = .008$, qualified by the four-way interaction between target

race, target gender, sport domain, and racial attitudes, F (1, 527) = 3.67, p = .056, η^2= .007. This marginally significant four-way interaction was driven by participants in the Black male soccer condition and White male soccer condition. In the Black male soccer condition, more negative racial attitudes were associated with higher initial pain ratings, F (1, 80) = 4.17, p = .045, η^2 = .050. In the White male soccer condition, more negative racial attitudes were marginally associated with lower initial pain ratings. F (1, 64) = 3.80, p = .056, η^2 = .056. Notably, the direction of these results run counter to the idea that prejudice underlies pain judgments, consistent with previous work. Racial attitudes did not predict pain ratings for any other target group, all Fs ≤ 1.05, all ps ≥ .312. All other main effects and interactions were not significant, all Fs ≤ 1.71, all ps ≥ .191.

Contact

There was no main effect of contact, F (1, 525) = .18, p = .670, and no significant interactions of target race, gender, and/or sport with contact, all Fs ≤ 1.42, all ps ≥ .233.

General discussion

The present study replicates previous work, showing a racial bias in pain perception whereby people—here, college athletic medical staff—assume Blacks feel less pain than do Whites. It also replicates previous work showing that this bias is mediated by socioeconomic status; people seem to assume that Blacks feel less pain but only if and when they assume Blacks have lower socioeconomic status (Hoffman & Trawalter, 2016). In addition, it extends previous work in four important ways:

First, the present work clarifies previous work. Previous work had not distinguished between perceptions of pain and perceptions of coping with or recovering from that pain. In the present work, we asked participants about (and therefore distinguished between) a target patient's initial pain and subsequent pain. Our findings suggest that bias in pain perception is about perceptions of initial pain and not recovery pain; in other words, it appears people assume that Blacks feel less pain, *not* that they cope with their pain and recovery better. This suggests that interventions should challenge people's beliefs that Black people feel less pain per se.

Second, previous work had not shown whether trained medical staff with extensive experience show racial bias in pain perception. Previous work documented the bias in a small sample of nurses and nursing students, and in another, larger sample of medical students and residents (Hoffman et al., 2016; Trawalter et al., 2012). In the present work, we studied a large sample of NCAA Division 1 sport medical staff—medical staff with *extensive* experience and experience with Black patients. Our findings suggest that, at least relative to other populations, this population may be *relatively* unbiased (see also Druckman, Trawalter, & Montes, N.d.). Our results revealed only a small bias in perceptions of initial pain (η^2= .012). On the one hand, these are comforting results in light of research showing widespread racial bias among other medically trained populations (Anderson et al., 2009; Bonham, 2001; Hampton et al., 2015; Williams et al., 2015). On the other hand, even small effects can have a large impact across populations and time.

Third, previous work had not systematically examined how race interacts with gender and context. In the present work, we manipulated not only target race (Black vs. White) but target gender (male, female) and sport domain (basketball, soccer). Interestingly, we did not find evidence of intersectionality. Target race, target gender, and sport domain did not interact. We did find that sport domain mattered, however. Participants assumed that basketball players (who are disproportionately Black) feel less pain than do soccer players (who are disproportionately White). This effect, like the target race effect, was mediated by perceptions of social class. In other words, participants assumed that basketball players feel less pain than do soccer players because they assumed basketball players have lower socioeconomic status—presumably, more hardship and less privilege (see Hoffman & Trawalter, 2016). The implication is that sport may carry the same racial stereotypes

as its most represented players and imputes a class attribution. This has practical implications insofar as practitioners should be conscious of potential sport bias in treatment.[5]

Lastly, we examined two other possible racial biases in pain management: perceptions that the patient (athlete) will abuse pain medications and perceptions that the patient (athlete) is over-reporting pain. We were thus able to examine the extent to which racial bias in pain perception might matter relative to other plausible biases. Again, our findings suggest that this population of medical staff is relatively unbiased. Not only did they show just a small, albeit reliable, racial bias in perceptions of pain, they showed no evidence of bias in perceptions of pain during recovery, probability of drug abuse, or over-reporting pain.

Limitations of this work provide fruitful avenues for future research. The present work used hypothetical vignettes. Future work might corroborate these findings with real-world, non-hypothetical data or archival data, for instance. It would be interesting to see whether Black athletes get shorter recovery times for injuries relative to their White counterparts suffering from similar injuries. That our results reveal differences only on initial injury pain perceptions may mean one would find no differences in documented recovery times, but regardless, real-world data would nicely complement our hypothetical vignettes as well as prior work using such data (e.g., Trawalter et al., 2012). Future work will also need to develop and test interventions. In time, such work could help reduce disparities in college athletics and serve as a model for reducing disparities beyond college athletics. Finally, future work can build on our approach by incorporating other injuries, sports, racial groups and populations.

In sum, the present work suggests that medical staff perceive Black athletes as feeling less pain than do White athletes. They also perceive basketball players as feeling less pain than soccer player. We further found that perceptions of socioeconomic status can explain these biases in perceptions of pain in this population, similar to lay populations (Hoffman & Trawalter, 2016). This finding might serve as a starting place for thinking about interventions—interventions grounded in recognizing that social class and the hardship it conveys do not make one impervious to physical pain.

Notes

1. All materials necessary to reproduce this experiment are provided in the Supplemental Appendices online and at Harvard Dataverse: doi:10.7910/DVN/ETM4LW.
2. All data and codes necessary to reproduce our analyses are available at Harvard Dataverse: doi:10.7910/DVN/ETM4LW.
3. Since we control for how much pain the respondent believes the injury would cause him or her, the model for the two pain perceptions ratings is an ANCOVA. For the other two outcomes, the model is an ANOVA.
4. For clarity, in presenting all the results, we do not report details on every main effect, or 2- and 3-way interactions, but instead we report the significant effects and a summary of the non-significant effects.
5. Data suggest injury rates among soccer and basketball players are similar (although women soccer players are injured more).Generally then, there is no reason to suspect basketball players have lower tolerance due to fewer injury experiences (see Roos et al., 2017; Zuckerman et al., N.d.).

Acknowledgments

We thank David Figlio, Alexander Green, Adam Howat, Kevan Ketterling, and Jennifer Richeson for their helpful advice.

References

Anderson, K. O., Green, C. R., & Payne, R. (2009). Racial and ethnic disparities in pain: Causes and consequences of unequal care. *The Journal of Pain*, *10*(12), 1187–1204. doi:10.1016/j.jpain.2009.10.002

Bonham, V. L. (2001). Race, ethnicity, and pain treatment: Striving to understand the causes and solutions to the disparities in pain treatment. *The Journal of Law, Medicine & Ethics*, *28*(s4), 52–68. doi:10.1111/j.1748-720X.2001.tb00039.x

Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, 1241–1299. doi:10.2307/1229039

Druckman, J. N., Trawalter, S., & Montes, I. (N.d).Unbiased?: Race, gender, and sport effects in university medical staff's perceptions of injured student-athletes. *Journal for the Study of Sports and Athletes in Education*. Forthcoming.

Goyal, M. K., Kupperman, N., Cleary, S. D., Teach, S. J., & Chamberlain, J. M. (2015). Racial disparities in pain management of children with appendicitis in emergency departments. *JAMA Pediatrics*, *169*, 996–1002. doi:10.1001/jamapediatrics.2015.1915

Hampton, S. B., Cavalier, J., & Langford, R. (2015). The influence of race and gender on pain management: A systematic literature review. *Pain Management Nursing*, *16*(6), 968–977. doi:10.1016/j.pmn.2015.06.009

Harper, S. R., Williams J, C. D., & Blackman, H. W. (2013). Black male student-athletes and racial inequities in NCAA Division I college sports. *Center for the Study of Race & Equity in Education*. Retrieved from https://works.bepress.com/cdwilliamsjr/1/

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.

Henry, P. J., & Sears, D. O. (2002). The symbolic racism 2000 scale. *Political Psychology*, *23*(2), 253–283. doi:10.1111/pops.2002.23.issue-2

Hoffman, K. M., & Trawalter, S. (2016). Assumptions about life hardship and pain perception. *Group Processes & Intergroup Relations*, *19*(4), 493–508. doi:10.1177/1368430215625781

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. doi:10.1073/pnas.1516047113

Hollingshead, N. A., Meints, S. M., Miller, M. M., Robinson, M. E., & Hirsh, A. T. (2016). A comparison of race-related pain stereotypes held by White and Black individuals. *Journal of Applied Social Psychology*. https://doi.org/10.1111/jasp.12415

Hootman, J. M., Dick, R., & Agel, J. (2007). Epidemiology of collegiate injuries for 15 sports: Summary and recommendations for injury prevention initiatives. *Journal of Athletic Training*, *42*(2), 311–319.

Mathur, V. A., Richeson, J. A., Paice, J. A., Muzyka, M., & Chiao, J. Y. (2014). Racial bias in pain perception and response: Experimental examination of automatic and deliberate processes. *The Journal of Pain*, *15*(5), 476–484. doi:10.1016/j.jpain.2014.01.488

NCAA. (2016). Sport sponsorship, participation, and demographics search: Student-athlete data. Retrieved from http://web1.ncaa.org/rgdSearch/exec/saSearch.

Pager, D. (2007). The use of field experiments for studies of employment discrimination: Contributions, critiques, and directions for the future. *The ANNALS of the American Academy of Political and Social Science*, *609*(1), 104–133. doi:10.1177/0002716206294796

Purdie-Vaughns, V., & Eibach, R. P. (2008). Intersectional invisibility: The distinctive advantages and disadvantages of multiple subordinate-group identities. *Sex Roles*, *59*(5–6), 377–391. doi:10.1007/s11199-008-9424-4

Roos, K. G., Wasserman, E. B., Dalton, S. L., Gray, A., Djoko, A., Dompier, T. P., & Kerr, Z. Y. (2017). Epidemiology of 3825 injuries sustained in six seasons of national collegiate athletic association men's and women's soccer (2009/2010–2014/2015). *British Journal of Sports Medicine*, *51*, 1029–1034. doi:10.1136/bjsports-2015-095718

Simon, R. J. (Ed.). (2005). *Sporting equality: Title IX thirty years later*. New Brunswick, NJ: Transaction Publishers.

Staton, L. J., Panda, M., Chen, I., Genao, I., Kurz, J., Pasanen, M., … Cykert, S. (2007). When race matters: Disagreement in pain perception between patients and their physicians in primary care. *Journal of the National Medical Association*, *99*(5), 532–538.

Todd, K. H., Deaton, C., D'Adamo, A. P., & Goe, L. (2000). Ethnicity and analgesic practice. *Annals of Emergency Medicine*, *35*, 11–16. doi:10.1016/S0196-0644(00)70099-0

Trawalter, S., Hoffman, K. M., & Waytz, A. (2012). Racial bias in perceptions of others' pain. *PLoS ONE*, *7*(11), 1–8. doi:10.1371/journal.pone.0048546

Van Ryn, M., & Burke, J. (2000). The effect of patient race and socio-economic status on physicians' perceptions of patients. *Social Science & Medicine*, *50*(6), 813–828. doi:10.1016/S0277-9536(99)00338-X

Wandner, L. D., Scipio, C. D., Hirsh, A. T., Torres, C. A., & Robinson, M. E. (2012). The perception of pain in others: How gender, race, and age influence pain expectations. *The Journal of Pain*, *13*(3), 220–227. doi:10.1016/j.jpain.2011.10.014

Williams, R. L., Romney, C., Kano, M., Wright, R., Skipper, B., Getrich, C. M., … Zyzanski, S. J. (2015). Racial, gender, and socioeconomic status bias in senior medical student clinical ecision-making: A national survey. *Journal of General Internal Medicine*, *30*(6), 758–767. doi:10.1007/s11606-014-3168-3

Zuckerman, S. L., Wegner, A. M., Roos, K. G., Djoko, A., Dompier, T. P., & Kerr, Z. Y.(N.d). Injuries sustained in National Collegiate Athletic Association men's and women's basketball, 2009/2010–2014/2015. In: *British journal of sports medicine*. Forthcoming. doi:10.1136/bjsports-2016-096005