

**Unbiased?: Race, Gender, and Sport Effects in  
University Medical Staff's Perceptions of Injured  
Student-Athletes**

**James Druckman**

Payson S. Wild Professor of Political Science  
IPR Fellow  
Northwestern University

**Sophie Trawalter**

Associate Professor of Public Policy and Psychology  
University of Virginia

**Ivonne Montes**

PhD Student  
Northwestern University

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**DRAFT**

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## ABSTRACT

Injured student-athletes rely on university medical staff personnel for care. Do these practitioners exhibit race and/or gender biases in their perceptions of injured student-athletes? While such biases have been widely documented in other medical practitioner populations, they have not been studied in the domain of college athletics. The researchers use a survey experiment conducted on National Collegiate Athletic Association Division 1 medical staff to explore perceptions of an injured student-athlete (e.g., the likelihood of the student-athlete complying with treatment). They find little evidence of bias. They discuss why this population of medical practitioners may differ from others, and they offer suggestions for future work on medical treatment of student-athletes.

Injuries are an inherent part of sports. The central governing body for college athletics – the National Collegiate Athletic Association (NCAA) – tracks student-athlete injuries in an effort to minimize health risks (<http://www.ncaa.org/health-and-safety/medical-conditions/sports-injuries>). The primary caretakers for student-athletes are university athletic department medical staff. The welfare of injured student-athletes thus depends, in part, on the perceptions and decisions of these medical personnel. Do these caretakers exhibit race or gender bias in their treatment perceptions? For example, do they perceive an injured Black student-athlete as less likely to comply with medical advice than an injured White student athlete? Are they less comfortable treating female student-athletes than male student-athletes?

Addressing these questions is critically important since biased perceptions can affect treatment decisions. For example, if medical personnel view Black student-athletes as less compliant or are less comfortable treating women student-athletes, they may not perform a needed procedure (in anticipation of non-compliance or due to discomfort). Certain student-athletes, due to their race or gender, then may not receive the highest quality care. For college stakeholders, this would suggest the need for interventions aimed at vitiating race and gender bias in perceptions of injured student-athletes (e.g., programs that increase inter-racial personalized interactions; see Burgess, van Ryn, Dovidio, & Saha, 2007; Burgess, Warren, Phelan, Dovidio, & van Ryn, 2010; Zestcott, Blair & Stone, 2016).

In what follows, we first review the literature that displays notable biases, particularly racial bias, in medical care. While such work is voluminous, NCAA sport medical personnel have not been studied (at least not so far as we are aware). We thus have little or no idea if biases persist in this domain. Moreover, as we discuss, there are plausible reasons why these caretakers may display less bias. We then present a large-scale vignette experiment conducted with NCAA

Division 1 medical personnel. The experiment allows us to test for the presence of race and/or gender biases on various treatment perceptions, when it comes to treating an anterior cruciate ligament (ACL) injury (see, e.g., van Ryn, & Burke, 2000). Put another way, the purpose of our paper is to explore whether the types of race and gender biases found in other medical practitioner populations appear among college medical personnel. It turns out that we find little evidence of bias. We conclude with a discussion of why college sports medical personnel may display scant bias (i.e., what lessons can be learned from this population), and directions for future research.

### **Evidence of Bias**

Ideally, medical practitioners engage in uniform (quality) medical care such that expectations and subsequent treatment hinge on the condition, and not the patient's socio-demographic status. Yet, as one group of authors summarize, "thousands of studies have demonstrated that Black adults and children are less likely to receive appropriate, guideline-concordant, and cutting-edge medical care than their White counterparts, independent of disease status and other clinically relevant factors" (van Ryn, et al., 2011, p. 200). There is also "extensive evidence" of disparity in care based on gender (Williams et al., 2015, p. 758).

One study conducted a survey of physicians concerning treatment of coronary artery disease, focusing on physician reactions to treating particular patients of different races and income (Ryn & Burke, 2000). They find significantly different patient expectations based on race: Blacks are seen as more likely to "fail to comply with medical advice" (42% of Blacks said to have no risk of non-compliance versus 57% of Whites), are seen as less likely to "participate in rehabilitation as proscribed" (34% of Blacks said to be very likely to participate in rehabilitation versus 47% of Whites), and are seen as having a higher risk of lacking social

support (45% of Blacks as seen as not at all likely to lack social support versus 63% of Whites) (also see Steele 2010: 26). Another study explored the reactions of emergency medicine residents to hypothetical clinical vignettes about a male patient with chest pain (Green et al., 2007). The respondents were randomly assigned to conditions that showed a picture of the patient as being either Black or White. They found no explicit statement of racial prejudice; however, implicit (e.g., unconscious) measures revealed a preference for favoring White patients. There also was evidence of implicit stereotypes of Blacks as less cooperative with medical procedures and less cooperative in general. As those biases increased, there was an increased desire to want to treat White patients. These are just a few examples from the enormous literature on racial bias in healthcare settings (also see, e.g., Hall et al., 2015).

There also is evidence of gender bias. One study showed that “after accounting for illness behavior differences and all other factors, the odds of prescribed activity restrictions among female patients of male physicians is four times that of equivalent male patients of those physicians” (Safran, Rogers, Tarlov, McHorney, & Ware, 1997, p. 711). Another study by Schulman and colleagues (1999) explored the reactions of clinical physicians to randomly assigned videos of a patient with cardiac symptoms – where the patient’s gender, race, and age were randomly varied (as were aspects of the medical condition). They report that men and White patients were significantly more likely to be referred for cardiac catheterization (a procedure used to diagnose and treat cardiovascular condition). Further, they find Black women, in particular, were significantly less likely to be referred for cardiac catheterization than white men. This latter finding suggests possible intersectional (i.e., gender X race) bias. The authors conclude (p. 618), “Our findings suggest that the race and sex of a patient independently influence how physicians manage chest pain.” As with race, there are many other studies that

demonstrate gender bias: “Implicit gender bias among physicians may also unknowingly sway treatment decisions... assumptions based on stereotypes that men are more stoic than women or more likely to engage in rigorous activities... [may] adversely influence the care of individual patients” (Chapman, Kaatz, & Carnes, 2013, p. 1507). Yet, no work of which we know has explored whether college sports medical staff display race and/or gender biases.

### **Present Study**

In light of all this evidence, one might assume biases exist in the domain of college athletic medicine. If so, this would be particularly problematic given many student-athletes are entirely dependent (i.e., have scant choice) on the medical staffs available to them at their schools. Indeed, student-athletes sit in an ambiguous position; Staurowsky (2014, pp. 23-24) explains: “In the netherworld that has existed for college athletes between bona fide workers and students, their ability to access their rights becomes more difficult... The lives of college athletes are routinely regulated in ways that distinguish them from their colleagues in the general student population...” If there are biases, then, it would be particularly important – for the well-being of student-athletes – to proceed with interventions to minimize them.

Yet, we know of no evidence of persistent biases among college sports medical staff. Moreover, there are some reasons that such biases may be less present. Sports medical staff work in relatively diverse environments and in settings where discussions about race and gender (e.g., Title IX) are frequent. They also have frequent contact with men and women from varied ethnic and racial backgrounds. These factors can often minimize implicit biases (e.g., Burgess et al., 2007). We put this possibility to the test by implementing a vignette experiment with college medical sports personnel. In so doing, we follow some studies from the aforementioned literature (Bachmann et al., 2008; Green et al., 2007; Haider, et al., 2011; Hébert, Meslin, & Dunn, 1992)

by randomly exposing respondents to a hypothetical scenario that, in our case, involved a student athlete who had injured his or her ACL. We then asked the practitioner respondents for their perceptions of the injured student-athlete (e.g., how he/she would do with regard to aspects of treatment). Each respondent received one of eight possible scenarios that randomly varied the race (Black/White), gender (male/female), and sport (basketball/soccer) of the injured student-athlete. Since respondents are *randomly* assigned to a single vignette, we can compare whether the race and/or gender (or sport) of the student-athlete affects the practitioner's response – that is, evidence of a race/gender/sport bias.

We included the sport treatment (i.e., the student-athlete plays basketball or soccer) due to the racialized nature of sport domain. Basketball is stereotypically Black but soccer is not, and this is particularly true when it comes to college sports. Even objectively speaking, Blacks making 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 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 are perceived more favorably than White soccer players.

### **Vignette Survey Experiment**

Our population is individuals on sports medical staffs of NCAA Division 1 schools. Details on how we obtained our sample are in the appendix; we ended up with 717 respondents. We focus on an ACL injury as it is relatively common in college athletics (Agel, Rockwood, &

Klossner, 2016). Our treatment involved a vignette, which we introduced by telling respondents that "... [w]hile the vignette is hypothetical, it reflects a common scenario that occurs with student-athletes such as the person described. When reading and thinking about it, try to imagine the specific case described..." The vignette read as follows<sup>1</sup>:

**NAME** is an NCAA Division 1 **SPORT** player on an athletic scholarship. **He/she** is a sophomore who in a pre-season 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.

We created eight possible conditions that varied race (Black/White), gender (male/female), and sport (basketball/soccer). We varied race and gender by male or female names (i.e., the "NAME" in the vignette) that are stereotypically Black or White (see Butler & Homola, 2017; Pager, 2007). The names used respectively for White male, White female, Black male, and Black female are: Dalton Wood, Shelbi Wood, Jabari Washington, and Eboni Washington (see the appendix for justification and validity evidence on these name choices). We varied sport by inserting soccer or basketball in the vignette (where "SPORT" appears in the text above); ACL injuries are relatively common in both sports (e.g., Hootman et al., 2007).

To be clear, each respondent read one of the eight possible vignettes (via *random* assignment).<sup>2</sup> After reading the assigned vignette, respondents answered questions about themselves (e.g., demographics, backgrounds) and their perceptions/expectations about the student-athlete. In another paper (Druckman et al., 2017), we explore outcome variables related to pain perceptions. In that paper, we looked at four pain related outcome variables, finding a

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<sup>1</sup> See the appendix for a detailed rationale of design specifics as well as some pre-test results regarding the vignette.

<sup>2</sup> Due to random assignment, we are in a strong position to make causal inferences about the impact of race, gender, and sport since, on average, the groups assigned to different vignettes should differ only in terms of variations in what their vignette describes.

significant effect for one such that Black athletes and basketball players were perceived to feel less initial injury pain than White athletes and soccer players, respectively. This finding is in line with a sizeable literature on racial bias in pain perception (e.g., Hoffman & Trawalter, 2016; Trawalter, Hoffman, & Waytz, 2012). Our question here is whether this racial bias occurs in *treatment*-relevant perceptions (as opposed to perceptions of pain).

We list the treatment outcomes and measures on which we focus in the first two columns of Table 1. Four categories have been studied in prior work (e.g., van Ryn & Burke, 2000): (1) compliance (e.g., will the student-athlete comply with the treatment regime?); (2) oversight (e.g., will oversight be needed to ensure compliance?); (3) comfort (e.g., how comfortable is the provider in treating the student-athlete?); and (4) social support (e.g., will the student-athlete have adequate social support in recovery?) (see the appendix for precise questions).

**[Insert Table 1 About Here]**

The final column of Table 1 displays the ANOVA results, which entailed 2 (target race: Black vs. White) X 2 (target gender: male vs. female) X 2 (target sport: basketball vs. soccer) ANOVAs on each outcome. Degrees of freedom differ slightly between analyses due to missing data; we report specific results only when they reached conventional statistical significance. We find only one significant effect across all variables: women soccer student-athletes are seen as needing greater activity restrictions.<sup>3</sup> This is sensible (and non-stereotypic) given “soccer is one of the sports that have the highest risk of anterior cruciate ligament (ACL) injury [and] [f]emale soccer players are 2–3 times more likely to suffer ACL injuries compared to male soccer players” (Dai, Mao, Garrett, & Yu, 2014, p. 299). Thus, the greater concern of (re-)injury leads

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<sup>3</sup> The mean score, on a 4-point scale (with higher scores indicating the need for more restrictions), for women soccer players is 3.23 (std. dev. = .69; N = 155). The mean score for all others is 3.07 (.70; 494) ( $t_{647} = 2.58$ ;  $p \leq .01$  for a two-tailed test).

to precautions. Otherwise, the picture is one of little bias: we find no other significant results on any other variable for race, gender, or sport.

The overall null results regarding race starkly contrast with the previously discussed work that shows medical personnel view Black patients as being less likely to comply with medical advice, requiring greater oversight, lacking social support, and being less preferable when it comes to treatment (e.g., Green et al., 2007; van Ryn & Burke, 2000). The lack of gender results also differs from prior work, which suggests female student-athletes will be less motivated to partake in a recovery routine and therefore exhibit lower levels of compliance, require more oversight, and thus less desirable to treat (e.g., Green & Pope, 1999; Safran et al., 1997; Torres et al., 2013; also see Stålnacke, Lehti, Wiklund, Wiklund, & Hammarström, 2015). The lack of a sport by race interaction also suggests that even basketball, where stereotypes about Black athletes are common, does not prime racial biases (Stone, Peny, & Darley, 1997).

## **Discussion**

Our results paint a picture of university athletic personnel as being unbiased when it comes to treatment perceptions of injured student-athletes. Why do our results differ from so much other evidence of race and/or gender bias in medical treatment? It could be that our name manipulation failed – although the pain perception result from the other noted paper and our activity restriction result (and pre-testing; see the appendix) suggest that is not the case. Another possibility is that the results reflect a slow evolution towards lessening racial biases: a recent study looking at cardiac decision-making by medical students reported “no evidence in the overall sample of racial bias in clinical decision-making... [and] no evidence in our overall sample of clinical decision-making bias related to patient gender” (Williams et al., 2015, p. 763). The authors (2015, p. 765) suggest their results give “reason for cautious optimism that racial

bias in clinical decision-making may be less common in the future [but] [m]uch work still needs to be done...”

It could be that there has been a slow evolution towards less bias, although we also suspect our results reflect the unique population under study. Indeed, we earlier posited that sports medical staff work in unique settings. First, the training and experiences of many NCAA medical personnel differs from that of other medical populations insofar as it focuses squarely on athletes. It may be that this facilitates perspective taking such that medical personnel more ably envision the viewpoint of their patients. This has been shown to mitigate bias (Chapman et al., 2013, p. 1508). Second, relatedly, NCAA medical staff have considerable contact with Black student-athletes and women student-athletes; we queried this in our survey, and the average percentage of time spent with Black student-athletes was 48% and with women student-athletes was 59%. Favorable contact at this level decreases bias (e.g. Burgess et al. 2007, p. 883; van Ryn et al., 2015, p. 1754).<sup>4</sup>

Third, our sample was fairly experienced in the field, having worked in athletic medicine for an average of 11 to 12 years (see the appendix). Some work suggests that experience in the medical field can work to decrease implicit racial bias (van Ryn et al., 2015). Fourth, on an institutional level, race is a widely discussed issue in college sports (e.g., Harper, 2016; <http://www.tidesport.org/college-sport.html>). While much of this discussion points to vast inequities (e.g., in graduation rates, hiring), it is possible that the attention prompts practitioners to be aware of potential racial biases and actively aim to correct them (e.g., Chapman et al., 2013; Green et al., 2007; Pope, Price, & Wolfers, 2014).

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<sup>4</sup> The average combined percentages exceed 100% since we did not confine respondents to come to a 100% total.

Which, if any, of these processes are at work is a topic for further investigation. One should be cautious in interpreting our results, but at the same time, understanding what may make this population relatively unbiased could be a pathway to implementing programs to reduce bias in other populations (i.e., other medical practitioners such as those studied in the previously discussed research). Future work might seek to exploit variations in the aforementioned possible causes of “de-biasing,” including perspective taking, contact, experience, and race/gender discussion. We additionally encourage scholars to study sports medical personnel by exploring different injuries, sports, and outcome variables including actual treatment decisions. It may be that biases emerge in distinct scenarios, or perhaps there are other types of biases based on factors such as socioeconomic status (Williams et al. 2015). Such further study is critical for college stakeholders who want to ensure the well-being of student-athletes.

## References

- Agel, J., Rockwood, T., & Klossner, D. (2016). Collegiate ACL injury rates across 15 sports: National Collegiate Athletic Association injury surveillance system data update (2004-2005 through 2012-2013). *Clinical Journal of Sport Medicine*, 26, 518-523.
- Bachmann, L.M., Mühleisen, A., Bock, A., ter Riet, G., Held, U., & Kessels, A.G.H.. (2008). Vignette studies of medical choice and judgement to study caregivers' medical decision behavior: systematic review. *BMC Medical Research Methodology*, 8, 50-58.
- Burgess, D.J., van Ryn, M., Dovidio, J., & Saha, S. (2007). Reducing racial bias among health care providers: Lessons from social-cognitive psychology. *Journal of General Internal Medicine*, 22, 882–887
- Burgess, D.J., Warren, J., Phelan, S., Dovidio, J., van Ryn, Michelle. (2010). Stereotype threat and health disparities: What medical educators and future physicians need to know. *Journal of General Internal Medicine*, 25, 169-177.
- Butler, D.M., & Homola J. (2017). An empirical justification for the use of racially distinctive names to signal race in experiments. *Political Analysis*, 25, 122-130.
- Chapman, E.N., Kaatz, A., & Carnes, M. (2013). Physicians and Implicit Bias: How Doctors May Unwittingly Perpetuate Health Care Disparities. *Journal of General Internal Medicine*, 28, 1504–1510
- Dai, B., Mao, D., Garrett, W.E., & Yu, B. (2014). Anterior cruciate ligament injuries in soccer: Loading mechanisms, risk factors, and prevention programs. *Journal of Sport and Health Science*, 3, 299-306.

- Druckman, J.N., Trawalter, S., Montes, I., Fredendall, A., Kanter, N., & Rubenstein, A.P. (2017). Racial bias in sport medical staff's perceptions of others' pain. Unpublished paper, Northwestern University.
- Green A.R., Carney D.R., Pallin D.J., Ngo, L.H., Raymond, K.L., Iezzoni, L.I., & Banaji, M.R. (2007). Implicit bias among physicians and its prediction of thrombolysis decisions for black and white patients. *Journal of General Internal Medicine*, 22, 1231-1238.
- Green, C.A., & Pope, C.R. (1999). Gender, psychosocial factors and the use of medical services: a longitudinal analysis. *Social Science & Medicine*, 48, 1363-1372
- Haider, A. H., Sexton, J., Sriram, N., Cooper, L. A., Efron, D. T., Swoboda, S., Villegas, C. V, Haut, E. R., Bonds, M., Pronovost, P. J., Lipsett, P. A., Freischlag, J. A., & Cornwell, E.E. (2011). Association of unconscious race and social class bias with vignette-based clinical assessments by medical students. *JAMA: The Journal of the American Medical Association*, 306, 942-951.
- Hall, W.J., Chapman, M.V., Lee, K.M., Merino, Y.M., Thomas, T.W., Payne, B.K., Eng, E., Day, S.H., & Coyne-Beasley, T. (2015). Implicit Racial/Ethnic Bias Among Health Care Professionals and Its Influence on Health Care Outcomes: A Systematic Review. *American Journal of Public Health*, 105, e60-76.
- Harper, S.R. (2016). Black male student-athletes and racial inequities in NCAA Division I college sports: 2016 edition. Philadelphia: University of Pennsylvania, Center for the Study of Race & Equity in Education.
- Hébert P.C., Meslin E.M., & Dunn E.V. (1992). Measuring the ethical sensitivity of medical students: a study at the University of Toronto. *Journal of Medical Ethics*, 18, 142–147.

- Hoffman, K. M., & Trawalter, S. (2016). Assumptions about life hardship and pain perception. *Group Processes & Intergroup Relations*, 19, 493-508.
- 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, 311-319.
- 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, 104–133.
- Pope, D.G., Price, J., & Wolfers, J. (2014). Awareness reduces racial bias. CESifo Working Paper, No. 4675.
- Safran, D.G., Rogers, W.H., Tarlov, A.R., McHorney, C.A., & Ware Jr., J.E. (1997). Gender differences in medical treatment: The case of physician-proscribed activity restrictions. *Social Science & Medicine*, 45, 711-722.
- Schulman, K.A., Berlin, J.A., Harless, W., Kerner, J.F., Sistrunk, S., Gersh, B.J., Dubé, R., Taleghani, C.K., Burke, J.E., Williams, S., Eisenberg, J.M., & Escarce, J.J. (1999). The Effect of Race and Sex on Physician's Recommendations for Cardiac Catheterization. *The New England Journal of Medicine*, 340, 618-626.
- Stålnacke, I.H., Lehti, A., Wiklund, A.F., Wiklund, M. & Hammarström, A. (2015). Is there a gender bias in recommendations for further rehabilitation in primary care of patients with chronic pain after interdisciplinary team assessment? *Journal of Rehabilitation Medicine*, 47, 365-371.

- Staurowsky, E. (2014). College athletes' rights in the age of the super conference: The case of the all players united campaign. *Journal of Intercollegiate Sport*, 7(1), 11-34.
- Steele, Claude. (2010). *Whistling vivaldi: How stereotypes affect us and what we can do*. New York : W.W. Norton & Company,
- Stone, J. Peny, Z.W., & Darley, J.M. (1997). White men can't jump: Evidence of the perceptual confirmation of racial stereotypes following a basketball game. *Basic and Applied Social Psychology*, 79, 291-306.
- Torres, C.A., Bartley, E.A., Wandner, L.D., Alqudah, A.F., Hirsh, A.T., & Robinson, M.E.. (2013). The influence of sex, race, and age on pain assessment and treatment decisions using virtual human technology: a cross-national comparison. *Journal of Pain Research*, 6, 577-588.
- Trawalter, S., Hoffman, K. M., & Waytz, A. (2012). Racial bias in perceptions of others' pain. *PLoS ONE*, 7, 1-8.
- van Ryn, M, Burgess, D.J., Dovidio, J.F., Phelan, S.M., Saha, S., Malat, J., Griffin, J.M., Fu, S.S., & Perry, S. (2011). The impact of racism on clinician cognition, behavior, and clinical decision making. *Du Bois Review*, 8, 199–218.
- van Ryn, M., & Burke, J. (2000). The effect of patient race and socio-economic status on physicians' perceptions of patients. *Social Science & Medicine*, 50, 813–828.
- van Ryn, M., Hardeman, R., Phelan, S.M., Burgess, D.J., Dovidio, J.F., Herrin, J., Burke, S.E., Nelson, D.B., Perry, S., Yeazel, M., & Przedworski, J.M.. (2015). Medical school experiences associated with change in implicit racial bias among 3547 students: A medical student CHANGES study report. *Journal of General Internal Medicine*, 30, 1748-1756.

Williams, R. L., Romney, C., Kano, M., Wright, R., Skipper, B., Getrich, C. M., Sussman, A.L., & Zyzanski, S. J. (2015). Racial, gender, and socioeconomic status bias in senior medical student clinical decision-making: A national survey. *Journal of General Internal Medicine*, 30, 758-767.

Zestcott, C.A., Blair, I.V., & Stone, J. (2016). Examining the presence, consequences, and reduction of implicit bias in health care: A narrative review. *Group Processes & Intergroup Relations*, 19, 528-542.

**Table 1: Measures and Results**

| <b>Outcome Perception</b>         | <b>Measure</b>   | <b>ANOVA Result</b>   |
|-----------------------------------|--|---|
| Treatment Compliance Expectations | <ul style="list-style-type: none"> <li>• Scale created from 7 items (<math>\alpha = .77</math>). These include:               <ul style="list-style-type: none"> <li>○ Likelihood of the student-athlete following medical advice at 5 distinct phases of recovery.</li> <li>○ Likelihood of the student-athlete participating in all prescribed activities.</li> <li>○ Likelihood of the student-athlete failing to comply with medical advice at any stage.</li> </ul> </li> </ul> | all $F_s \leq 1.33$ , all $p_s \geq .249$ .   |
| Oversight Expectations            | <ul style="list-style-type: none"> <li>• Amount of oversight the student-athlete will need.</li> <li>• Likelihood of the student-athlete needing activity restrictions.</li> </ul>   | <ul style="list-style-type: none"> <li>• all <math>F_s \leq 2.21</math>, all <math>p_s \geq .138</math>.</li> <li>• for gender X sport, <math>F(1, 641) = 6.34</math>, <math>p = .012</math></li> </ul> <p style="text-align: center;">all other <math>F_s \leq 1.99</math>,<br/>all other <math>p_s \geq .159</math></p> |
| Treatment Comfort                 | <ul style="list-style-type: none"> <li>• Comfort of respondent in treating the student-athlete.</li> </ul>   | all $F_s \leq 3.20$ , all other $p_s \geq .074$   |
| Social Support                    | <ul style="list-style-type: none"> <li>• Likelihood of the student-athlete lacking social support (e.g., care in recovery).</li> </ul>   | all $F_s \leq 2.53$ , all $p_s \geq .112$ .   |

## **Appendix A: Sample**

To obtain our sample, we first used a Wikipedia list of all National Collegiate Athletic Association (NCAA) Division 1 schools. For each school, we went to the athletic department website to obtain the names of all the sport medical staff (thus, we identified multiple people from each school). We obtained their e-mails either on the site or, if not, we searched for e-mails in the given university directory. We identified 3,303 potential respondents; however, we were unable to locate e-mails for 486 individuals because they were not listed either on the site or in the directory, or the school in question did not have a publically accessible directory. For the remaining 2,817 individuals, we sent a personalized e-mail invitation, with the subject line “Survey of NCAA Athletic Departments,” to participate in our survey. We described the survey as studying “the opinions and perceptions of medical staffs [so as]... to understand how those involved in care for student-athletes view and care for student-athletes who have ACL injuries.” Potential respondents were provided with a secure and encrypted link on which to take the survey. We additionally offered a \$5 Amazon gift card for those who completed the survey. We sent two reminder e-mails. Data were collected from March 13, 2015, to April 3, 2015. Roughly, 77 e-mails bounced back which means, to the best of our knowledge, 2,740 individuals received an invitation. A total of 752 responded (at least in part), leading to a response rate (based on those who received the invite) of 27.5%. This is higher than most web-based survey response rates (Couper, 2008). As noted below, our sample also was relatively heterogeneous (on sampling and experiments, see Druckman & Kam, 2011).

### **Sample Profile**

A total of 752 participants accessed the survey. Of those, 35 participants asked to have their data excluded for a sample of 717 participants. That is, at the end of the survey, we

provided the following information about the study, after which we asked if the respondent would like to have his or her responses excluded: “Thank you for your participation. As was mentioned in the consent information, you received one out of several possible vignettes about an ACL injury. The purpose of our study was to assess how varying characteristics of a student-athlete affects perceptions and treatment expectations. Thank you very much your participation. At this point, if you would prefer that your answers be excluded from our study, please click yes below. Otherwise you are free to close out the survey.” A total of 35 responded affirmatively.

Of the 717 remaining participants, the sample was 44% male, and 40% female (16% did not report gender). It was 72% White, 2% Black, 2% Asian, 3% Hispanic, 2% multiracial, and 2% other (17% did not report race/ethnicity). Six percent of participants were between 18 and 24 years of age, 43% between 24 and 34, 27% between 35 and 50, 7% between 51 and 65, and 1% were over 65 years of age (17% did not report age). Twenty-one percent of participants were the director/head of their department, and 14% were still students (69% of them had a Master’s degree). On average, participants had held their current position for 6-7 years and had 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; mean of 50.34, std. dev. of 62.08). Ideologically, participants ranged from very liberal to very conservative (mean of 3.94 where 4 = moderate, std. dev. of 1.36). The Ns in our results vary due to item non-response.

## Appendix B: Vignette Details

As partially mentioned in the text, we began the study with the following statement: “The purpose of this study is to explore how individuals make decisions about a sport injury. You will first read a vignette about a student-athlete who experienced an injury. We are providing you with one vignette from several we created. While the vignette is hypothetical, it reflects a common scenario that occurs with student-athletes such as the person described. When reading and thinking about it, try to imagine the specific case described. You then will be asked a set of standard survey questions about the case, as well as some more general questions.”

As stated in the paper, the vignette read:

**NAME** is an NCAA Division 1 **SPORT** player on an athletic scholarship. **He/she** is a sophomore who in a pre-season 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.

We referred to the student-athlete as being on athletic scholarship to accentuate the importance of sport, and as a sophomore to ensure there is a potential career (but he/she has proven him/herself a bit by playing a season). We minimized complications that arise with prior injuries (and the nature of such injuries) by mentioning it is the student-athlete’s first serious injury. We also portrayed the injury as occurring during a pre-season practice given higher injury rates than during other practice times (Hootman, Dick, & Agel, 2007). Finally, we described the injury as an extreme tear in need of surgery so that we could ask about various steps in a longer rehabilitation process.

### Details on Vignette Choices

As stated in the paper, we created 8 possible conditions that varied race (Black/White), gender (male/female), and sport (basketball/soccer). We varied sport by inserting soccer or

basketball in the vignette (where “SPORT” appears in the text above). We varied race and gender by male or female names (i.e., the “NAME” in the vignette) that are stereotypically Black or White (see also Azmat & Petrongolo, 2014; Bertrand & Mullainathan, 2004; Ewens, Tomlin, & Wang, 2014; Pager, 2007; Riach & Rich, 2002). The names used respectively for White male, White female, Black male, and Black female are: Dalton Wood, Shelbi Wood, Jabari Washington, and Eboni Washington. In the next section, we describe how we tested for the suitability of our names.

### *Choosing Names*

Birth records from the state of Florida, from 1994 to 2002, suggest that the first names we employed were given, on average, at least 150 times/year, were at least 95% male or 95% female for the given usage, were at least 90% White or 90% Black for the given usage, and squarely middle class where the typical parent is a high school graduate with some postsecondary education but typically not a 2-year or 4-year degree. Specifically, respectively Eboni: average 12.54 years of maternal education; Jabari: average 12.56 years of maternal education; Shelbi: average 12.52 years of maternal education; Dalton: average 12.53 years of maternal education. The last name Wood is virtually all White, while 88% of those with the last name Washington were Black. (David Figlio, Ph.D., e-mail communication, November 2014).

We also conducted a pre-test (from 11/20/14-11/22/14) on Amazon’s Mechanical Turk where we paid respondents \$1.00 (N = 204). We randomly assigned respondents to one of four conditions where each condition used one of our four names. We asked them speculate on the person with the given name’s gender (male or female), and race (White, African American, Asian American, Hispanic, Native American or other). As the below table shows, the perceived race/gender are both fairly close to the objective data.

|                               | % White (for Dalton/Shelbi)/<br>% African American (for Jabari/Eboni) | % Male |
|-------------------------------|---|--------|
| Dalton Wood<br>(N = 51)       | 92%   | 96%    |
| Jabari Washington<br>(N = 52) | 92%   | 92%    |
| Shelbi Wood<br>(N = 50)       | 88%   | 6%     |
| Eboni Washington<br>(N = 51)  | 94%   | 8%     |

## Appendix C: Question Wording

For the following questions, the “NAME” provided was whichever name was used in the given condition (see Supplementary Appendix B).

### Treatment Compliance Questions (as noted in Table 1, all items merged to form one scale)

Next we will ask you some questions about future, uncertain outcomes, regarding **NAME**. The questions ask you to think about the percent chance that something will happen. The percent chance can be thought of as the number of chances out of 100. You can use any number between 0 and 100. For example, numbers like 2 and 5 percent may be “almost no chance,” 20 percent or so may mean “not much chance,” a 45- or 55-percent chance may be a “pretty even chance,” 80 percent or so may mean a “very good chance,” and a 95- or 98-percent chance may be “almost certain.” Please answer by listing the percent you believe to be most appropriate.

**[Not Used in Analyses]** Let’s start with the weather where you live. What do you think is the percent chance (what are the chances out of 100) that it will rain tomorrow? \_\_\_\_\_

Let’s move to questions about the ACL surgery now. Early rehabilitation, after ACL surgery, often involves management of pain and swelling as well as controlled ambulation and range of motion exercises. What is the percent chance that **NAME** will follow medical advice during this phase of recovery? \_\_\_\_\_

The next stage of rehabilitation often involves full range of motion and strengthening exercises along with light activities such as stationary cycling progressing to jogging. What is the percent chance that **NAME** will follow medical advice during this phase of recovery? \_\_\_\_\_

The next stage of rehabilitation often involves full straight ahead activities (e.g., running with no cutting or pivoting) and controlled, supervised, agility drills. What is the percent chance that **NAME** will follow medical advice during this phase of recovery? \_\_\_\_\_

The next stage of rehabilitation often involves a return to full activity with running and intense agility drills. What is the percent chance that **NAME** will follow medical advice during this phase of recovery? \_\_\_\_\_

As you may know, perturbation training (PERT) is a recovery program that involves specialized neuromuscular training and progressive perturbations on unstable surfaces in both bilateral and unilateral stance. This is done along with aggressive agility and sport specific training. If offered, what is the percent chance that **NAME** would participate in PERT training? \_\_\_\_\_

Overall, how likely is **NAME** to participate in rehabilitation as proscribed?

\_\_\_\_\_  
*Not at all  
likely*

\_\_\_\_\_  
*A little  
likely*

\_\_\_\_\_  
*Somewhat  
likely*

\_\_\_\_\_  
*Very  
likely*

\_\_\_\_\_  
*Extremey  
likely*

Overall, how likely is **NAME** to fail to comply with medical advice?

Not at all  
likely      A little  
likely      Somewhat  
likely      Very  
likely      Extremey  
likely

**Oversight Expectations Questions**

Overall, how much oversight will **NAME** need during the rehabilitation?

none at all      a little      a moderate  
amount      a good  
amount      a great deal

To what extent do you think **NAME** will need to have **his/her** activities restricted to ensure proper healing?

No  
restrictions      some  
restriction      a fair amount  
restrictions      a lot of  
restrictions

**Treatment Comfort Question**

Do you think you would be very uncomfortable or very comfortable treating **NAME**

Very  
uncomfortable      Somewhat  
uncomfortable      Neither  
uncomfortable nor      Somewhat  
comfortable      Very  
comfortable

**Social Support Question**

Overall, how likely is **NAME** to lack social support, that is someone to care for **him or her**?

Not at all  
likely      A little  
likely      Somewhat  
likely      Very  
likely      Extremey  
likely

**Sample Profile Questions**

Are you male or female?

\_\_\_\_\_ *male*                  \_\_\_\_\_ *female*

What is your age?

\_\_\_\_\_ *under 18*          \_\_\_\_\_ *18-24*          \_\_\_\_\_ *25-34*          \_\_\_\_\_ *35-50*          \_\_\_\_\_ *51-65*          \_\_\_\_\_ *over 65*

Which of the following do you consider to be your primary racial or ethnic group (*you may check more than one*)?

\_\_\_\_\_ *white*                  \_\_\_\_\_ *african american*          \_\_\_\_\_ *asian american*          \_\_\_\_\_ *hispanic*                  \_\_\_\_\_ *native american*          \_\_\_\_\_ *other*

Are you the director/head of your department?

\_\_\_\_\_ *No*                          \_\_\_\_\_ *Yes*

Are you currently a student (e.g., a graduate or undergraduate)?

\_\_\_\_\_ *No*                          \_\_\_\_\_ *Yes*

What is your highest level of education?

\_\_\_\_\_ *Less than high school*          \_\_\_\_\_ *High school*          \_\_\_\_\_ *Some college*                  \_\_\_\_\_ *4 year college degree*          \_\_\_\_\_ *Master's degree*          \_\_\_\_\_ *PhD*                  \_\_\_\_\_ *MD*                  \_\_\_\_\_ *PhD and MD*

For how long have you held your current position (in years and months)?

\_\_\_\_\_ Years                  \_\_\_\_\_ Months

For how long have you worked in the field (i.e., athletic medicine)? (This includes your time in your current position; in years and months)?

\_\_\_\_\_ Years                  \_\_\_\_\_ Months

In a typical week during the academic year, how many hours a week do you spend working with student-athletes? \_\_\_\_\_

Which point on this scale best describes your political views?

\_\_\_\_\_ *very liberal*                  \_\_\_\_\_ *moderately liberal*                  \_\_\_\_\_ *somewhat liberal*                  \_\_\_\_\_ *moderate somewhat conservative*                  \_\_\_\_\_ *moderately conservative*                  \_\_\_\_\_ *very conservative*                  \_\_\_\_\_ *conservative*

We interested in the frequency with which student-athletes of different demographic backgrounds work with athletic medical staffs. Of the total time you spend working with student-athletes, what percentage involves working with individuals from each of the below demographic groups. This likely will not sum to 100% since we do not list an exhaustive set of demographic descriptions.

White men \_\_\_\_\_

Black men \_\_\_\_\_

White women \_\_\_\_\_

Black women \_\_\_\_\_

### **Debrief**

#### ***Information about the Study***

Thank you for your participation. As was mentioned in the consent information, you received one out of several possible vignettes about an ACL injury. The purpose of our study was to assess how varying characteristics of a student-athlete affects perceptions and treatment expectations. Thank you very much your participation. At this point, if you would prefer that your answers be excluded from our study, please click yes below. Otherwise you are free to close out the survey.

Do you want to **exclude** your responses?

\_\_\_\_\_   
 *No*

\_\_\_\_\_   
 *Yes*

## Appendices References

- Azmat, G., & Petrongolo, B. (2014). Gender and the labor market: What have we learned from field and lab experiments? *Labour Economics*, 30, 32–40.
- Bertrand, M., & Mullainathan, S. (2004). Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. *The American Economic Review*, 94, 991–1013.
- Couper, M. P. (2008). *Designing effective web surveys*. New York, NY: Cambridge University Press.
- Druckman, J. N., & Kam, C. D. (2011). Students as experimental participants: A defense of the 'narrow data base.' In J. N. Druckman, D. P. Green, J. H. Kuklinski, & A. Lupia (Eds.), *Cambridge Handbook of Experimental Political Science* (pp. 41–57). New York, NY: Cambridge University Press.
- Ewens, M., Tomlin, B., & Wang, L. C. (2014). Statistical discrimination or prejudice? A large sample field experiment. *The Review of Economics and Statistics*, 96, 119–134.
- 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, 311–319.
- 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, 104–133.
- Riach, P. A., & Rich, J. (2002). Field experiments of discrimination in the market place. *The Economic Journal*, 112, F480–F518.