EFFECTS OF RACIAL STEREOTYPES ON PERCEPTIONS OF A SPORTS CONCUSSION

By

RACHEL BETH WINER

_____

A Thesis Submitted to The Honors College

In Partial Fulfillment of the Bachelors degree With Honors in

Psychology
THE UNIVERSITY OF ARIZONA

MAY 2018

Approved by:

Dr. Jeff Stone

Department of Psychology

Abstract:

The purpose of this study is to examine if racial bias impacts the perceptions of a concussion in female athletes. There are stereotypes that Black Americans have a higher tolerance to pain than whites, thus causing them to get under treated for pain. Participants read a vignette under a time constraint about a Black or White female soccer player suffering either a mild, moderate, or severe concussion. They then responded to questions asking about the athlete's concussion, pain level and how long they should sit out for. After using a 4 way ANOVA test (target race, type of concussion, time variable, perceiver's gender), the results revealed several marginal interaction effects showing that race and perceiver's sex moderated how the injury was perceived. As predicted, males were less likely to say she was concussed when she was Black compared to White when the injury was mild. However, this is not consistent over all explicit measures; therefore, racial bias when analyzing pain perception may not be a main factor. There were limitations that may have led the study's results such as sample size. There are still future questions about this topic in particular to improve the health disparities amongst blacks and whites.

Introduction:

"Black men can jump higher than white men". This is a stereotype. Stereotyping is different from prejudice. Stereotyping is "the application of an individual's own thoughts, beliefs, and expectations onto other individuals without first obtaining factual knowledge about the individual" (Fiske, 2010). People begin stereotyping other people because of previous experiences or things that other people have said about that individual or the group that individual may be a part of. For example, someone may have an Asian math teacher and know some Asians that are very good at math; therefore, they then think all Asians are good at math. On the other hand, prejudice is when someone behaves a certain way she has an "emotional reaction to another individual or group of individuals based on preconceived ideas about the individual or group" (Fiske, 2010). An example of prejudice is when a person gets uncomfortable and looks at someone as being suspicious because that person may be Middle Eastern.

Both stereotypes and prejudices can cause people to act negatively towards a group of people. Sometimes people claim they are not biased towards others, but subtle biases do exist and so do blatant biases and regardless they can also lead to misconceptions about people (Feene). Self-fulfilling prophecy/ confirmation bias further fuels this. Essentially, if individuals have a stereotype about a group of people and see one of the people from that group demonstrating the stereotypic behavior, it will further reinforce their belief. However, if someone in that group does not do what the stereotype claims they will do, then the individual who believes in the stereotype will ignore that and disregard it and continue to believe in that stereotype even though not everyone in that group does it.

Stereotyping can occur during perceptual bias, especially when individuals need to make judgments under a time constraint and are forced to take a short-cut in their brain, resulting in them relying on stereotypes they believe. Perceptual bias causes people to be objective about situations and can result in people being biased when put under pressure. In a study analyzing perceptual bias, individuals listened to a college basketball game and were presented with a photo of the athlete (either white or black) (Stone et al., 1997). The results showed that participants relied on a stereotype of Black and White athletes when they were rating athletic ability of an individual, the individual's performance and the contribution of the individual to their team's performance. Black athletes were rated as exhibiting more athletic ability and played a better game in comparison to White athletes who were rated as having more basketball intelligence and hustle (Stone et al., 1997).

Racial Stereotypes About Pain Tolerance:

Stereotypes have been created over the years comparing black Americans' pain tolerance relative to white Americans. There has been previous research done on the role of racial bias on perceptions of others' pain. Many people, even medical students, believe blacks to have a higher pain tolerance than whites. This false belief can cause black Americans to receive less pain treatment and cause them to get improper healthcare.

There have been many false beliefs about black Americans biologically in comparison to white Americans. In the 19th century, people viewed black Americans to have thicker skulls, less sensitive nervous systems, etc. (Cartwright, Guillory, 1968). This even carried into the 20th century where America experimented on black soldiers during World War II to test chemicals because of the belief that blacks had a higher pain tolerance (Hoffman et al., 2016). The

Tuskegee Institute studied untreated syphilis in black Americans from 1932 to 1972 because of these false beliefs (Hoffman et al., 2016). Hoffman's participants were all white.

Trawalter and Hoffman did a study to analyze this idea more because black Americans experience "higher rates of diseases, disability and premature death". Previous reports show that injured black athletes are more likely to play in the next game compared to white athletes. It is possible they are more likely to want to play when injured or they are socialized to ignore it and play through the pain. Regardless of the reasons behind it, this increased likelihood to return to the game earlier leads to an increased prevalence of negative consequences for black athletes. Trawalter and Hoffman did 6 experiments analyzing pain perception more deeply. Four of their studies showed Americans, including nurses and nursing students, assume black people feel less pain than white people. Two of the studies have evidence of where this bias comes from. It is rooted in perceptions of status, not necessarily race. The findings of the study are that Black patients are undertreated often for pain and it may be because medical personnel do not think Black patients feel as much pain as White patients. People assume "Blacks feel less pain because they have faced more hardship" (Trawalter et al., 2012). This belief unfortunately leads to under-treatment for Black patients; thus, it may be the reason behind their health disparities.

Hoffman also did another study that looked at a particular factor: people believing the black body to be stronger than the white body. Prior to this study Todd et al. found that while patients had similar self-reports of pain, only 57% of black patients versus 74% of white patients received analgesics for extreme fractures in the emergency room. Further research shows that black patients are less likely to receive medications, regardless of injury, in comparison to white patients. It is possible whites are overprescribed medications, but either way blacks are under-

prescribed. Hoffman looked at why this was happening and if it was because of pain perception. Hoffman's study analyzed medical students holding false beliefs about pain perception and their accuracy of treatment recommendations. It was found that there were racial disparities in pain assessment and treatment recommendations (Hoffman et al., 2016). Study 1 concluded that adults without medical training believed in some false beliefs (example: black people's blood coagulates more quickly than white people's blood). Study 2 concluded that many white medical students and residents believed some of these false beliefs as well which then resulted in less accurate treatment of these patients. The more false beliefs they held, the less accurate the treatment was. "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" (Hoffman et al., 2016). The effect sizes were not large; however, it "seems that racial bias in pain perception has pernicious consequences for accuracy in treatment recommendations for black patients and not for white patients" (Hoffman et al., 2016). Racial bias in pain perception is related to racial bias in pain management and treatment plans of individuals which can lead to them having further health consequences.

Do stereotypes influence perception of a concussion?

After looking at these previous studies done on pain perception, there was not specifically any pain stereotypes that seemed to apply directly to concussions in sports, especially in application to female athletes.

A concussion is a head injury and is defined as "a traumatically induced transient disturbance of brain function and involves a complex pathophysiological process" (Harmon, 2013). The physical symptoms of a concussion are: headache, nausea, vomiting, balance

problems, dizziness, visual problems, fatigue, sensitivity to light and/or noise, numbness, dazed, stunned (Harmon, 2013). The cognitive symptoms are: feeling mentally "foggy", difficulty remembering or concentrating, repeating questions, answering questions slowly, and feeling slowed down (Harmon, 2013). Emotional symptoms can be irritability, sadness, more emotional and nervous (Harmon, 2013). There are also possible sleep symptoms, such as, drowsiness, sleep more or less than usual and difficulty falling asleep (Harmon, 2013). The most common symptoms are a headache or dizziness, while loss of consciousness only occurs in about 10% of concussions and is more rare (Harmon, 2013). These symptoms can overlap with other disorders; therefore, concussions sometimes can be hard to evaluate. However, they are very important to identify.

Concussions occur in all sports, but soccer has some of the highest incidences of them. Also, there is a higher incidence reported by female athletes of concussions compared to male athletes. The risks for athletes coming back too soon to soccer after they have suffered from a concussion also vary but can be severe; therefore, it important to get proper treatment for it. Furthermore, once you have received one concussion, you can become more susceptible to getting another one. When an athlete is experiencing concussion symptoms they should be evaluated and taken off the field right away to be looked at (Harmon, 2013).

Athletes should not return to playing sports until they are symptom-free. The risks of athletes returning to play too early is that they may have decreased reaction time which can lead to another concussion or other injury (Harmon, 2013). If a player returns too early to play they can also receive long-term effects, such as, long-term neurological sequelae and prolonged dysfunction (Harmon, 2013). When these long-term effects occur, people can get

Neuropsychological (NP) testing done to identify the cognitive impairment. Most concussions do not require CT or MRI tests, but in some severe situations, these tests are required to evaluate the brain injury.

Hypotheses:

In conclusion, we have made hypotheses about what we will find in the results of our research. We expect to find no difference in perception of female athletes when they are knocked unconscious during a soccer game. Regardless of her race, in this situation, we hypothesize that racial bias will not play a role and that everyone will mark the athlete as being severely concussed. It is when the symptoms in the vignette are more ambiguous that we will get mixed results in our responses from participants. It is here that participants may be racially biased in their responses and will be likely to say the black female athlete does not have a concussion, should miss fewer games/practices before returning if she does have a concussion, is not in a lot of pain, etc. While participants may say that the white female athlete does have a concussion, is in more pain (compared to the black athlete), should wait longer to return to play, etc. Due to the time constraint (15 seconds or 30 seconds) we expect participants to use shortcuts leading them to be more racially biased because they do not have a long time to read and digest the information and may use perceptual confirmation.

Methods

Participants

The research participants in this study were students from the University of Arizona who were enrolled in the University of Arizona Subject Pool. There were 415 participants that voluntarily signed up for this study with the incentive that they would get 1 credit for their psychology course. 162 participants were excluded from the study for the following reasons: First, if they took longer than 45 minutes on the survey because they took too long and it was not clear if they had let their computer sit with the survey open for a few hours or days; 20 participants were excluded for this. Furthermore, participants were excluded if they got manipulation checks wrong, such as the athlete's gender or ethnicity. Seven participants were excluded for getting the gender incorrect of the target and 135 participants were excluded for getting the ethnicity of the individual incorrect. If they were unaware of the gender or ethnicity of the individual then it is difficult to assess the existence of racial bias that we were analyzing. The final sample contained 92 male participants and 161 female participants. They were students from all different demographics throughout the United States or internationally, but they all are enrolled at the University of Arizona.

Research Design:

The study was a two by three design where the race was varied (white or black) and the concussion symptoms were varied (1 symptom, 3 symptoms, unconscious). Race of the athlete was varied in the vignettes that the participants read about the female athlete soccer player (Ebony or Emma). Ebony was designed to convey a black female and Emma was designed to convey a white female. The five dependent variables were the questions that came after the vignettes that participants responded to. The control variable was the vignette about a female athlete, Sarah, scraping her knee and all the questions associated with that.

<u>Procedure:</u>

The participants were approached alone, online, when they voluntarily chose to complete the survey. Once they signed up for the study they were presented with "The University of Arizona Human Subjects Protection Program Informed Consent Form".

If participants agreed to participate in the study they were then presented with a cover story where they were told they would be participating in a study on perceptions of athletes. The cover story let them know that they would be put under a time constraint when reading the vignette and for answering some of the questions. We let them know the reasoning behind this was because coaches have to work quickly when their athletes get injured. The participants used the red arrows to continue onto the next page at the bottom right part of the screen on every page.

Then all of the participants were presented with the vignette, but half of them were only allotted 15 seconds to read the vignette and the other half were allotted 30 seconds to read the vignette. They were randomly assigned these time constraints. The vignette was "Sarah Smith plays for a Division 1 soccer team at her college. During one of her games, an opposing player and she bump into each other when they go for the ball. Sarah falls to the ground and scrapes her knee. When she stands up she has trouble walking" and this vignette is the control of the study. This vignette is only used so students understand how quickly 15 or 30 seconds go by and their time constraint. Then they had 15 or 30 seconds (the same time that was used for whichever vignette they were presented with) to answer whether or not Sarah had a scraped knee and how severe her scraped knee was. They then got 15 or 30 seconds to answer how much pain she was in. They were not timed for the rest of the questions regarding this vignette about if she should

come out of the game and how long, if she should sit out of any practices/games before returning to soccer, and her gender/age/ethnicity.

Up until this point, all of the participants were presented with the same information. Then subjects were randomly assigned about a second athlete. The second athlete was either a white athlete named Emma or an African American athlete named Ebony. When they read about this second athlete, they were presented with 1 of 3 vignettes, which was randomly assigned to them. The second athlete either had 1 concussion symptom, 3 concussion symptoms or was knocked unconscious. The participants who were presented with the 15-second control vignette also only had 15 seconds to read the second athlete vignette. This was the same for the 30-second vignettes.

After they were randomly assigned with this second athlete vignette, everything they read was the same again. Participants were brought to a question where there was a paragraph they had to read. To make sure individuals are actually engaged and participating, we told them in the paragraph to click "other" on the next question and write, "I read the instructions". The question that they were supposed to respond this way to was a question asking participants to click all the traits that apply when describing their personality (ex. Outgoing, mature, shy, etc.).

Then participants were brought to the demographics section where they would respond to the questions about themselves. They indicated their gender, age, and ethnicity. In order to understand their pain perception further, we had them rate intensity of pain on a scale of 1 (not painful) to 4 (painful) for different situations. They rated hitting their funny bone and pain level of that, pain of walking on burning sand, pain of disinfecting a sore themselves, stubbing their toe, etc. Then they were asked if they had ever coached a sport at any level or if they are

currently a coach. Participants were also asked if they work/have worked in a health related field

and, if so, what field.

After the demographics section they read the debriefing and had to take a debriefing quiz

that consisted of three true/false questions. If they did not get all three of the questions correct,

they were taken back through to re-read the debriefing and re-try the quiz. If they failed a second

time they had to meet with the researcher in person. At the end of the study they were presented

with an goodbye and thank you message.

Materials:

The main materials used in this study were computers (laptop or desktop). The

participants completed a survey that was coded on Qualtrics to complete the study.

Measures:

We analyzed the questionnaire carefully after the 360 participants completed the study.

Some of the questionnaire questions presented after both vignettes were simply yes or no, some

were "fill in the blank", and some made participants pick their answer on a scale of 1 to 9.

The two-option questions, where participants had to choose either "yes" or "no", were

when they were asked to decide whether or not the female athlete they read about had a

concussion. If they chose yes, they thought the athlete had a concussion; if they chose no, then

they did not think the athlete had a concussion. Furthermore, they had to pick "yes" or "no" if

they thought the athlete should come out of the game: "yes" for coming out of the game and "no"

for staying in the game. They had to choose whether or not the athlete should sit out of any

practices or games before returning to practice. They also had to fill in the blank for the age they

thought the athlete was. Another "two-option" question that was presented to the participants was

what gender they thought the athlete was (male or female). In the demographics section, participants had to choose "yes" or "no" to if they currently coach or have ever coached sports and whether or not they work professionally in a health related field.

The fill in the blank questions followed the questions on how many practices and/ or games the athlete should sit out. They could pick any number they wanted; the higher the number they likely thought the athlete's concussion was more severe. They also filled in the blank for their own age in the demographics section. If they had ever been a coach/ currently coach a sport or work in a health related field, they had to fill in the blank of what that sport was and/ or the title of their health related profession.

Participants also were presented with a few questions where they had to pick their answer based off of a scale from 1 to 9. If they thought the athlete had a concussion, they had to state how severe they thought the concussion was on a scale of 1 (very mild) to 9 (very severe). Regardless of whether or not participants thought the athlete had a concussion, they rated how much pain they thought the athlete was in on a scale of 1 (very little) to 9 (a lot). For the demographics section, participants were also asked to rate painful situations on a scale of 1 (not painful) to 4 (extremely painful) to analyze their perception of pain. If they rated disinfecting a sore themselves or slamming their fingers in the car door as a 1 or 2 then they probably have a high pain tolerance and do not perceive something like a concussion to be very painful unless knocked unconscious. However, if a participant thinks hitting their funny bone is extremely painful, then they probably think a mild concussion is very painful.

There were also questions with multiple options to them. For participants who thought that the athlete should sit out of the current game, they were asked to pick one option of how

many minutes they should sit out for (5 minutes, 10, 20, one half of the game or the entire game). They also had multiple options when choosing the race of the athlete. For the manipulation check the participants were presented with several options to choose the personality trait that best fit them or other and fill in the blank saying "I read the instructions". They had multiple options for choosing their own gender and ethnicity (demographics).

Results

The results of the study were analyzed using a 4 way ANOVA (target race, type of concussion, time variable, perceiver gender - male or female). Overall, for moderate to severe symptoms for both targets (black and white), the participants were relatively accurate for if the target was concussed, how severe the concussion was, how long the target should come out for, etc. The ambiguity, which was hypothesized, came with the mild symptoms (see Table 1). The ambiguity within the mild symptoms also depended on the perceiver's sex that was taking the study (see Table 1).

Injury Level	Is she concussed (% Yes) ($p < .0001$)	Should she sit out of practice before returning (% Yes) ($p < .0001$)	Should she sit out of any games before returning (% Yes) ($p < .0001$)	How much pain athlete is in (mean, S.D.) ($p < .0001$)	How severe is her concussion (Mean, S.D.) ($p < .0001$)
Mild	73%	60%	43%	4.73, 1.68	4.65, 1.65
Moderate	96%	95%	71%	6.13, 1.30	6.49, 1.29
Severe	99%	92%	84%	6.44, 1.42	7.00, 1.41

For the explicit measure on whether or not the target was concussed, there was a main effect of injury: $F_{(2, 229)} = 21.19$, $p < .0001$. There was an interaction between target race by injury by perceiver sex, $F_{(2, 229)} - 2.95$, $p = .054$. Overall, participants said the athlete was concussed 73% of the time when the target had mild symptoms. Participants said the athlete was concussed 96% of the time for moderate (3) symptoms and 99% of the time when the athlete had severe concussion symptoms. However, there was ambiguity in the perceiver's sex on whether or not they thought the athlete with mild symptoms was concussed (refer to Figure 1). For mild concussion symptoms, male perceivers were more likely to think the white athlete was concussed than the black athlete, which is consistent with our hypothesis. However, female perceivers were more likely to think the black athlete was concussed than the white athlete.
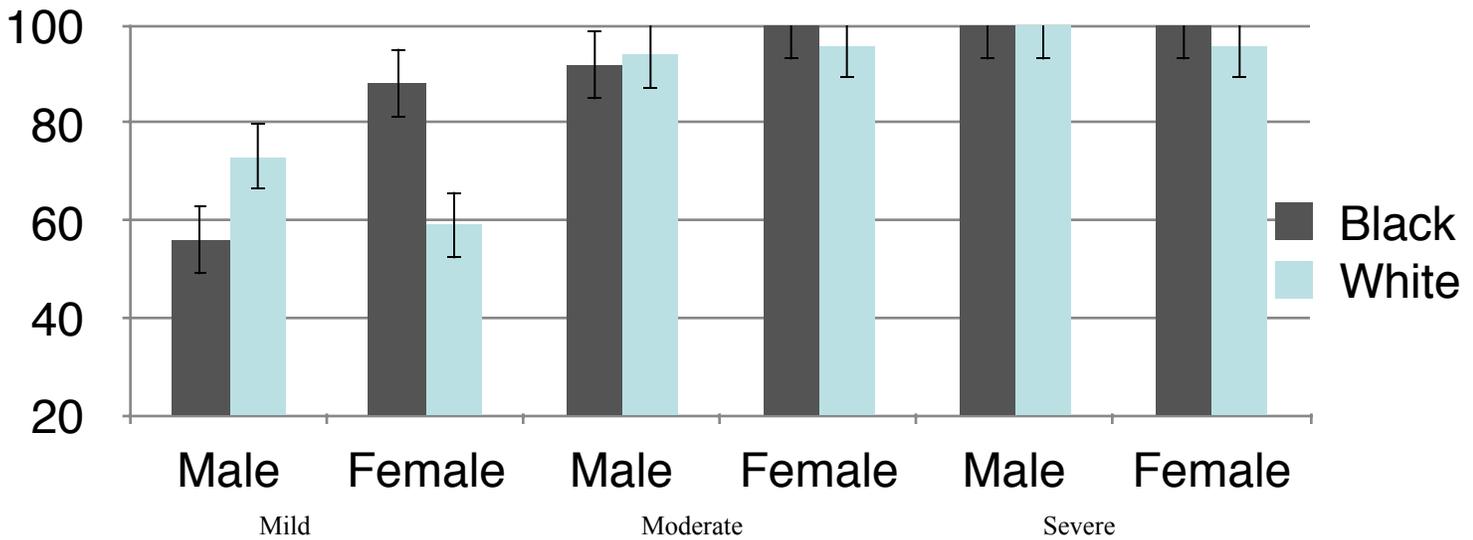

Figure 1: Target race X injury X perceiver sex, $F_{(2, 229)} = 2.95$, $p = .054$. There was a significant effect amongst male perceivers for the mild concussion symptoms. Male perceiver's were more likely to think that white female athletes were concussed than black female athletes for the mild symptom condition. On the other hand, there was some effect amongst female perceivers who thought black athletes were more likely to be concussed than white female athletes for the mild symptom condition.

For the explicit measure on the severity of the concussion, there was a main effect of injury, $F_{(2, 207)} = 45.28$, $p < .0001$. There was an interaction between target race by injury by

perceiver, F (2, 229) = 2.77, p = .065; there was a marginal effect. Participants ranked how severe the concussion was on a scale of 1 (very mild) to 9 (very severe) and as the symptoms increased for the athlete's concussion, the participants ranked the severity of the concussion higher. Overall, for the mild symptoms participants had a mean of 4.65 (SD = 1.65). For the moderate symptoms there was a mean of 6.49 (SD = 1.29) and for severe symptoms a mean of 7.00 (SD = 1.41). Likewise to the previous explicit measure, there was ambiguity amongst perceivers' sex for the mild symptom concussions, not the moderate or severe concussion symptoms (see Figure 2). Male perceivers said the concussion was more severe for black athletes than white athletes while female perceivers showed little bias and said the concussion was almost equally severe for both the white and black athletes (see Figure 2).
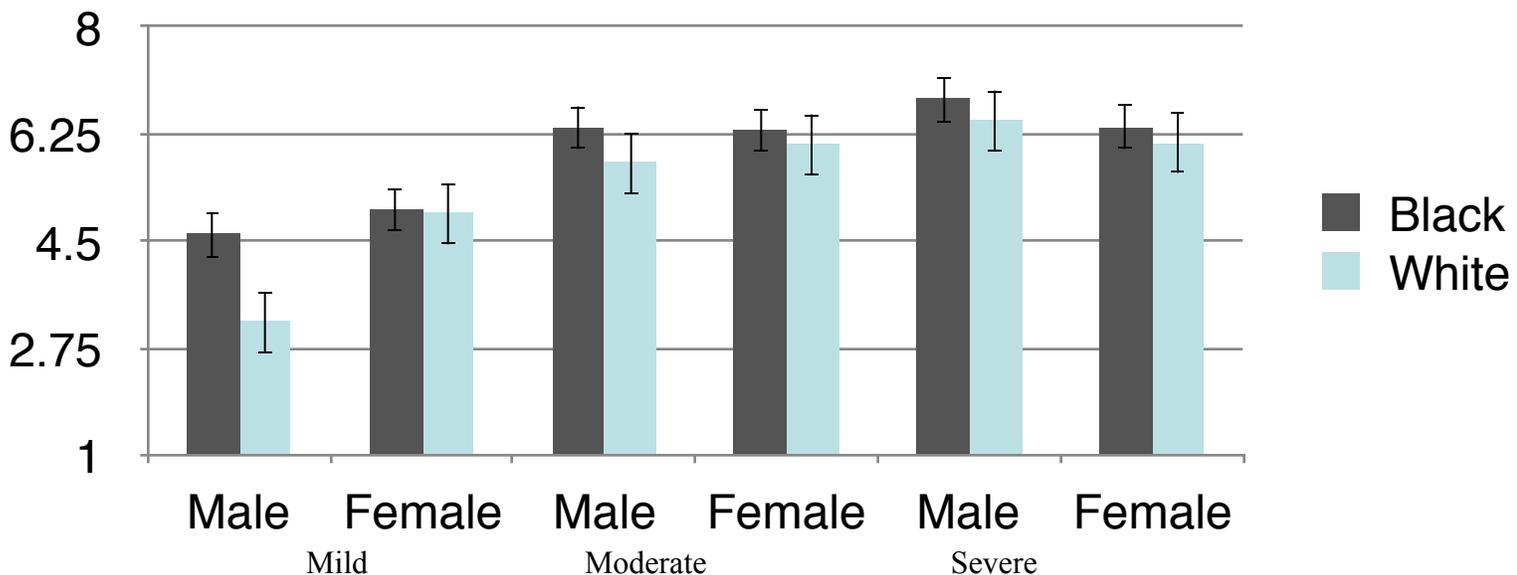

Figure 2: Target race X injury X perceiver sex, F (2, 229) = 2.77, p = .065. There was a significant effect for male perceivers when the athlete had mild concussion symptoms. The male thought the black female athlete had a more severe concussion than the white female athlete for the mild symptom concussion condition.

For the explicit measure, how much pain is the athlete in, there was a main effect for injury: F (2, 229) = 36. 95, p < .0001. There was an interaction between target race by injury by

perceiver sex, F (2, 229) = 2.77, p = .065; there was a marginal effect. Overall, as the number of symptoms the athlete had, the amount of pain they ranked her being in increased. For mild concussion symptoms, there was a mean of 4.73 (SD = 1.68). For moderate concussion symptoms, there was a mean of 6.13 (SD = 1.30). For severe concussion symptoms, there was a mean of 6.44 (SD = 1.42). For this measure as well there was ambiguity for the mild concussion symptoms depending on the perceiver's sex and less ambiguity for moderate and severe concussion symptoms (see Figure 3). For mild concussion symptoms, male perceivers thought the black athlete was in more pain than the white athlete, which was not consistent with our hypothesis (see Figure 3). For mild concussion symptoms, female perceivers had little racial bias in their view of how much pain the athlete was in (see Figure 3).
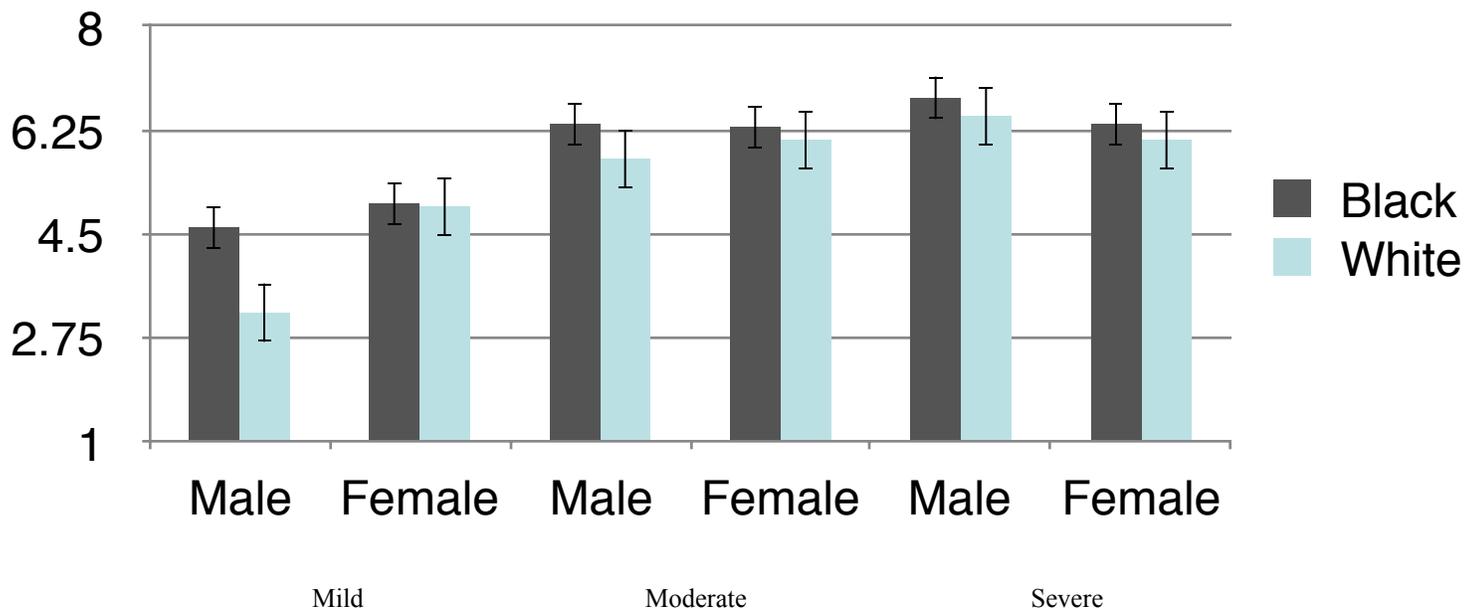

Figure 3: Target race X injury X perceiver sex, F (2, 229) = 2.77, p = .065. There was a significant effect for male perceivers for mild concussion symptoms. This graph looks similar to Figure 2. Male perceivers were more likely to think that the black female athlete was in more pain than the white female athlete.

For the explicit measure, on whether or not the athlete should come out of the game, there was a main effect of target race X perceiver sex, F (1, 229) = 4.28, p = .039. There was a

significant effect for male perceivers who were more likely to think the white female athlete

should be taken out of the game more than the black female athlete (see Figure 4). The male

perceivers were more likely to think the white athlete should be taken out of the game than the

black athlete with the exact same concussion symptoms, which is consistent with our hypothesis.

It was the opposite for female perceivers; although, this effect was not significant for female
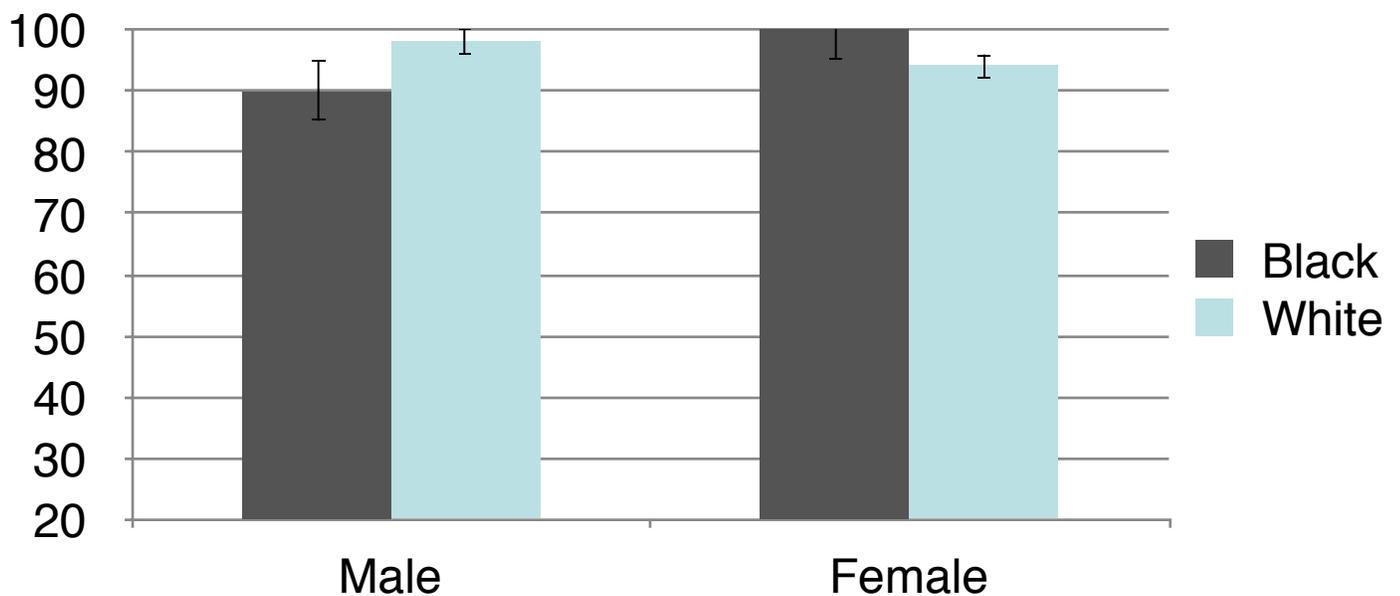
perceivers.

Figure 4: Overall, regardless of number of symptoms the athlete had, male perceivers thought that the while female athlete should be taken out of the game more often than black female athletes. It was slightly the opposite effect for female perceivers, but the effect was not significant.

For the other explicit measures on whether or not the athlete should sit out of any

practices before returning to soccer, there was a main effect for injury, $F_{(2, 229)} = 22.84$,

$p < .0001$. When an athlete had mild concussion symptoms, 60% of the time participants said the

athlete should sit out of practices before returning to soccer. When an athlete had moderate

concussion symptoms, 95% of the time participants said the athlete should sit out of practices

before returning to soccer. For the severe concussion symptoms, 92% of the time participants said the athlete should sit out of practices (see Table 1). These are the results for the athlete regardless of their race.

For the explicit measure on whether or not the athlete should sit out of any games before return to soccer, there was a main effect for injury, $F (2, 229) = 17.14$, $p < .0001$. For the athlete with mild symptoms, 43% of the participants said the athlete should sit out of future games before returning to soccer (see Table 1). For the moderate concussion symptoms, 71% participants said the athlete should sit out of future games and for the severe concussion symptoms, 84% of the participants said the athlete should sit out of future games before returning to soccer (see Table 1). As the number of concussion symptoms increased, the likelihood a participant would say the athlete should sit out of future games increased.

__Discussion and Conclusions__

Overall, there are two ways to look at these results. The first is that as a whole the participants were relatively accurate in their responses to the questions about concussions and racial bias did not play a large role. As the severity of the concussion increased, the more likely the participant was to say the athlete had a concussion, the pain level increased and the likelihood the participant would think the athlete should miss future games or practices. However, when you look deeper at the perceiver's sex, you see the racial bias being a factor in this study.

For the explicit measure on whether or not participants thought the athlete was concussed when they had mild symptoms, male perceivers were more likely to say the athlete was

concussed if she was white rather than black, but this was the opposite for female perceivers. Female perceivers were more likely to say the black athlete was concussed than the white athlete. These results do not necessarily stem from the idea that there is racial bias in pain perception because the results are not consistent though with every other measure.

For female perceivers, this was the only explicit measure where they slightly showed racial bias in their responses. For every other explicit measure about athletes with mild concussion symptoms, female perceivers showed little bias. This is hard to find a connection as to why they thought a black female athlete was more likely to be concussed than a white female athlete. It is possible they were trying to counteract racial bias. Females may be more aware than males of racial bias and tried to counteract it. It is also possible that the reasoning for their lack of racial bias for the responses to the other explicit measures is due to a females nurturing characteristic. Perhaps, female perceivers viewed them as having an injury and felt like they were in the same amount of pain regardless of their race. Females being more nurturing than males could be shown in the fact that female perceivers ranked athletes as being in more pain or the concussion being more severe than what male perceivers ranked the athletes. Another possibility to why female perceivers for the majority of the of the explicit measures showed little to no racial bias is because they saw the individual as an in-group member. They did not see them for their race or an out of group member, but they saw the athlete as a female. According to Tajfel et al. (1971) showed that individuals "favored their in-group and discriminated against the out-group". There in fact is significant in-group favoritism; this could explain the results from the female perceivers in this study.

However, the male perceivers were consistent with this study's hypotheses for some measures, but not all explicit measures. They did rank the white female athlete as more likely to be concussed than black female athlete for the mild concussion symptoms, which is consistent with our hypothesis. However, the reasoning for our hypotheses was because participants would perceive black female athletes as being in less pain than white female athletes. This was not the case though. For male perceivers when athletes had mild concussion symptoms, they believed the black female athlete was actually in more pain than the white female athlete. There must be another possible factor that causes male perceiver's to think a black athlete with mild symptoms is less likely to be concussed than a white athlete with mild symptoms. A possibility of this is the results from Druckman et al. in the discussion that perceptions of socioeconomic status may explain this bias. The male perceivers may not have thought that the black female athlete in particular was not in as much pain as the white female athlete, but that they were less likely to have a concussion because of the hardships they have faced due to the tendency for people to associate African Americans with a lower socioeconomic status. Druckman et al found that "participants assumed that basketball players feel less pain [(during an ACL tear surgery recovery)] than do soccer players because they assumed basketball players have a lower socioeconomic status — presumably, more hardship and less privilege" (2017: 7). In our study, due to some evidence among men perceivers for what we were predicting, but lack of consistency among them, there must be another factor playing a role in the way they perceived these scenarios.

For male perceivers in this study does not fit Trawalter et al. explanation that racial bias plays a role in pain perception and that people think black Americans have a higher pain

tolerance than white Americans (2012). There may be another reason(s) why there are some health disparities amongst blacks and whites in America. Even though there were small effect sizes in this study, as well as Druckman et al, even small effects in the long run can have "large impacts across populations and time" (Druckman et al, 2017: 7). This is an important topic because blacks have a shorter life expectancy than whites and this may be due to the health disparities and treatments they get in the medical field. Regardless, hardships, social class and race do not make someone more or less tolerable to pain.

Limitations:

Likewise to many studies, there were limitations in this study. We tried to exclude participants who spent longer than 45 minutes on the study because it is possible they could have gotten up for hours or days and left the survey open. We also excluded participants who did not get the target's gender or ethnicity correct because we felt as if it would be hard to analyze if racial bias played a role in their pain perception if they could not get the manipulation checks correct. However, these exclusions caused our sample size to shrink by 162 participants. A limitation to this study was the small sample size. For one condition there were only 8 participants to collect and analyze data on, which cannot lead us to make a significant conclusion on this specific condition. Furthermore, the limited number of participants overall for this study as a whole made it hard to prove that there is a large effect size at all. A larger number of participants could have changed the results as well as the effect size.

Although participants were being randomly assigned conditions, there was one condition that was put in the survey twice due to a coding mistake. Therefore, the chances of a participant

getting put in this particular condition were higher than the other conditions, making the sample size for this condition much higher than the other conditions.

Another possible limitation was the time constraint on the study. We only put time constraints on the vignette and first 3 questions that the participants responded to after reading the vignette. The results may have changed if we had put time constraints on every single question that they were asked throughout the study. This could have made perceptual bias have more of an effect than the little to no effect it seemed to have. This time constraint also may have been too short for both the 15 second and 30 second conditions. The results may have been different if one time constraint condition was 10 seconds while the other was 1 minute. There may have been too small of a difference between time constraints (15 versus 30 seconds).

A possible limitation in this study, especially in conditions where participants were reading about the black athlete Ebony, could have been participants counteracting for racial bias. For example, an individual could have responded to the manipulation checks for "other" when asking about Ebony's ethnicity instead of responding "African American" because they do not want to admit that this is an African American name. Individuals getting manipulation checks wrong or putting "other" for a target's ethnicity caused them to be excluded from the data. These individuals could have helped prove or disprove our hypotheses, but we will never know because we could not use their data.

When you use participants who are trying to get course credit for completing a survey or experiment, then you run into limitations with that. Individuals could be disengaged from the survey and just clicking randomly throughout the survey. Manipulation checks are supposed to

exclude these people, but it does not always work so we have to keep this in mind in limitations of the study.

Furthermore, the sample of participants had little healthcare or coaching experience. It is unsure with this study that if people with more experience with sports or the health related field on concussions in general would have the same results as these ordinary student participants. Druckman et al. (2017) suggests that NCAA Division I sports medicine staff has little bias in pain perception; however, these are individuals that work with student-athletes 50+ hours a week on average.

A possible limitation with the time constraint on the vignette is if the participant had dyslexia or another reading disorder they could've possibly not been able to completely read the vignette in time. If they did not have time to read the vignette then the response to the questions posed afterward to analyze racial bias in pain perception would not be completely accurate.

Future Questions and Concerns:

There are many future questions that arose from the results of this study. We were not expecting the perceiver's gender to play a role in the results, but it did. It is possible that the female perceivers saw the female athlete as an in-group female member and out-group member depending on race; more research should be done on this. Furthermore, why did female perceivers say the black female athlete was more likely to be concussed than the white female athlete but showed little to no racial bias for the athletes in many of the other explicit measures? It is possible women try to be or are more aware of racial bias and try to counteract it.

Another variable for future discussion is perceptual bias and how dramatic a timing variable needs to be manipulated in order for perceptual bias to be triggered. This is in response

to the timing variable in this study having little to no effect on the results. It was assumed that participants with less time to take the study would rely on the perceptual bias because their brain would be making short-cuts when reading the vignettes and responding to the survey. When your brain makes short cuts it is likely to turn to these racial biases. However, these were not the results.

Druckman et al. in 2017 began the focus of pain perception amongst individuals in the sports medicine field to see if there was racial bias, but more research on this still needs to be done. Prior research has focused on some medical students and some nursing students, but in order to see if there really is racial bias in pain perception that is leading to these health disparities amongst black and white Americans, there needs to be further research done on individuals in the health-related field with this topic.

References:

Cartwright SA. Report on the diseases and physical peculiarities of the Negro race. New Orleans
Med Surg J. 1851;7:691–715.Fiske, S.T. (2010). *Social beings: Core motives in Social
Psychology* (2nd ed.). Hoboken, NJ: Wiley.

Guillory JD. The pro-slavery arguments of Dr. Samuel A. Cartwright. La Hist. 1968;9:209–227.

Harmon, Kimberly G, et al. "American Medical Society for Sports Medicine Position Statement:
Concussion in Sport." *British Journal of Sports Medicine*, BMJ Publishing Group Ltd
and British Association of Sport and Exercise Medicine, 1 Jan. 2013, bjsm.bmj.com/
content/47/1/15.

Hoffman, Kelly M., et al. "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 of the United States of America*, National Academy
of Sciences, 19 Apr. 2016, www.ncbi.nlm.nih.gov/pmc/articles/PMC4843483/.

Keene, Sabrina. "Social Bias: Prejudice, Stereotyping, and Discrimination." *Journal of Law
Enforcement* , vol. 1, no. 3, pp. 1–5., www.jghcs.info/index.php/l/article/viewFile/62/63.

Stone, J., Perry, Z. W., & Darley, J. M. (1997). "White men can't jump": Evidence for the
perceptual confirmation of racial stereotypes following a basketball game. *Basic and
Applied Social Psychology*, *19*(3), 291-306.

Trawalter, Sophie, et al. "Racial Bias in Perceptions of Others' Pain." *PLOS ONE*, Public Library
of Science, journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0048546.

Tajfel H. *Human groups and social categories*. Cambridge. England: Cambridge University
Press. 1981. 369 p.

Tajfel H. *Social identity and intergroup relations*. Cambridge. England: Cambridge University

Press. 1982. 528 p.