# Racial Bias in Football Subreddit

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## ABSTRACT

Reddit, one of the most popular social media these days, can provide people with a platform to share and discuss their ideas with others anonymously and freely without any examination, in which it is relatively easy to trackle people's bias and stereotypes. We investigated if racial bias exists in the Football Subreddit and tested whether the skin colors of football players correlated with the sentiment of comments in Football Subreddit. The key point of our approach is to extract name entities from comments, match the name entities with the names in the player data to get the corresponding player's skin tone and apply sentiment analysis to get the sentiment of each comment. Based on these two points, we can investigate if the comments are rated positively or negatively with the players. Finally, racial bias was demonstrated to exist in Football Subreddit and the skin tone of players was proved to correlated with sentiment of comments in Football Subreddit.

## CCS CONCEPTS

• **Information systems → Web mining**.

## KEYWORDS

Racial bias, Football, Reddit, Text Mining, Natural Language Processing

## 1 INTRODUCTION

Racial bias can be defined as "a negative evaluation of one group and its members relative to another" [1]. It exists in a lot of areas, for example in hiring [3], education [23], and sports [19]. In sports area, racial bias has been found in television coverage [16], commentary [19], and announcers' speech [20]. Racial bias can be explicit and implicit, both can not only affect people's attitudes and behaviors, but can even have a negative impact on the society and individuals [9]. Social media, as one of the invaluable tool for people to share information and communicate with others, provides a platform for people to post any content without anyone checking [10]. Reddit is the sixth most popular social website for information aggregation with 430 million users every month[1], which is a good data source with big amount of information.

**Research Goal.** Skin color has been read to mean race [8], meanwhile football as one of the most popular sports in the world, where there are a lot of players with different skin colors. In this regard, we want to investigate if there is any racial bias in the comments of Football Subreddit.

**Approach.** We scraped the comments from Football Subreddit from the year 2011 to 2021[2]. We also collected the player data from SoccerWiki[3], where there are players' data including skin color of players. We focused on the comments which the players' names were mentioned and, extracted name entities from these comments, matched name entities in comments with names in the player data and finally got the skincolor label for each comment. After using sentiment analysis on these comments, we then used descriptive statistics and empirical strategies for our analysis goals.

**Contributions and Findings.** Applying the approach including natural languaga processing technology, we used a non-manual way to more objectively find the existence of racial bias in Football Subreddit. People in the Football Subreddit commented players with different skin colors differently. The results also show that the sentiment of comments in Football Subreddit is correlated to players' skin colors.

## 2 RELATED WORK

This section first summarizes the existing literatures related to racial bias in football, then gives an overview of racial bias in social media. It illustrates the importance to identify racial bias in Football Subreddit and attempt to reduce people's racial bias to dwindle its impact on individuals and society.

### 2.1 Racial Bias in Football

After finding the media still portrayed African Americans stereotypically and inaccurately, Rada trackled if there was racial bias in the football television coverage [16]. They taped the football games aired on the television during the 1992 season and analyzed the video of football games manually according to the Biased Coverage Index (BCI), which is used to characterize descriptive comments of players by announcers. They found that in these coverages African American players were described with more positive physical attributes, while commenting White players with more positive cognitive attributes.

Rainville et al. investigated the existence of racial bias in football announcers' speech [17]. They made audio tape recording from National Football League games and wrote transcription of the announcers' speech. They analyzed the content of speech about different players in three main categories: description, attribution of players and announcers related traits. Using Chi Square test, they demonstrated the relationship between these three categories and the skin colors of players. They further found that players with lighter skin tone got more praises, less criticisms than comparable players with darker skin tone.

Principe and van Ours got the similar results: there is racial bias in ratings of professional football players in Italian newspaper [15]. They applied descriptive statistics and inferential statistics to analyzed the ratings of football players given from the three most sold Italian sports newspapers. They found that the low ratings of black players are at the lower end of these three newspapers' rating distribution, which reveals the racial bias in these three Italian newspapers.

[1] https://thesmallbusinessblog.net/reddit-statistics/
[2] https://www.reddit.com/r/football/
[3] https://en.soccerwiki.org/

The evidence that the positions of football players with darker skin tone were assigned by managers with lighter skin tone based on the racial stereotypes of abilities was given by Maguire [13]. Maguire did the studies respectively in North American and Britain and combined them: he analyzed the position of each player in the football matches and got the evidence to support the relationship between race and occupancy of central positions that black players seldom played central position and finally, which demonstrated another form of racial bias in football.

## 2.2 Racial Bias in Social Media

Social Media, as the most used tool for communication in this age, greatly accelerates the production and flow of information with shorter and simpler narrative [11]. Based on this, social media has already been regarded as one user-generated aggregation of internet information source to providing a lot of data for analysis.

As mentioned before, racial bias has been demonstrated be present in football television coverage. Dobson et al. found that through social media, memes with racial stereotypes are mimicked and appropriated online [4]. Meme are some of the most popular user-created content on the internet [10], but in such context memes become a comic stereotype, which to some extent may deepen the racial stereotypes of people and lead to more serious racial bias.

Tynes et al. used hierarchical regression to analyze the survey data containing a sample of 217 African American and European American college students and found one model explaining perceptions of campus racial climate that included race, individual online racial bias, and online stress. The results showed that African American students suffered more online racial bias and stress [21].

Chaudhry pointed out that since Twitter promotes "free speech", it was necessary to investigate the racism in Twitter [2]. He applied content analysis to analyze the tweets and comments collected from Twitter and achieved to trackle the racism in Twitter. He also mentioned that the time-continuous tweets are well worth considering because they reveal the thoughts and opinions of most people who want to remain private and expose a degree of racial intolerance.

Reddit, same as Twitter, with a lot of user-generated information, is a good data source for researchers to examine racial bias. Thus, based on these studies, we propose our research questions and hypotheses:

*RQ: Does racial bias exist in Football Subreddit comments?*

*H1: There is a difference in sentiment scores of Football Subreddit comments about players with different skin colors.*

*H2: There is a difference in sentiment scores of Football Subreddit comments about players with lighter skin tone and darker skin tone.*

*H3: There is a relationship between player skin tone and the sentiment of comments.*

# 3 APPROACH

In this section, we describe the whole solution workflow for this study, including data collection, data processing, name entity recognition and data labeling.

## 3.1 Data Collection

In data collection, we collected comments from Football Subreddit and the player data from SoccerWiki.

**Comments Dataset.** As Chaudhry mentioned, time-continuous tweets can better reveal the thoughts of opinions of most people who want to hide, here we decided to collect the time-continuous comments in Football Subreddit. To get more comments, we chose to collect all the comments during the period where the most famous soccer league were held from 2011/2011 season to 2020/2021 season, like English Premier League, German Bundesliga, Spanish La Liga, France Ligue 1 and Italian Serie A. Football Subreddit was first build up in 2008, which had few users in the first several years. Therefore, in this study we mainly collected the comments from 2011 to 2021. In comments collection, Reddit Pushshift API[4] was applied, with it, we could set some parameters like date, name of subreddit to help us to implement the collection of comments by time period. The number of collected comments from Football Subreddit of each season is shown in Table 1. Thus, in this step we got a dataset with the data volume of over 150,000 comments.

**Table 1: Number of Collected Comments**

| Season | Comments | Season | Comments |
|---|---|---|---|
| 2011/2012 | 1387 | 2016/2017 | 7773 |
| 2012/2013 | 7599 | 2017/2018 | 7482 |
| 2013/2014 | 11565 | 2018/2019 | 19364 |
| 2014/2015 | 8401 | 2019/2020 | 44575 |
| 2015/2016 | 5739 | 2020/2021 | 40721 |

**Player Dataset.** Since there is no free football player dataset, we collected player data ourselves from SoccerWiki. SoccerWiki is a website containing most of the football players' data, including name, skin color, nation and some traits of player. To extract more names in comments, we collected the data of players from popular leagues, such as English Premier League, Spanish La Liga, Italian Serie A, German Bundesliga, France Ligue 1 etc. In this step, Selenium[5] was applied, using webdriver to obtain the content of parsed HTML pages. Finally, we got a player dataset with 7591 players. The number and percentage of the players with different skin colors are shown in Table 2.

**Table 2: Statistics of Player Data**

| Skin Color | Number | Percentage |
|---|---|---|
| Black | 382 | 5.06% |
| Dark Brown | 877 | 11.61% |
| Brown | 976 | 12.93% |
| Olive | 1940 | 25.69% |
| White | 3322 | 43.99% |
| Pale | 94 | 0.72% |

[4]https://github.com/pushshift/api
[5]https://selenium-python.readthedocs.io/

## 3.2 Data Processing

In this part, we deleted all the invalid comments, like Bots' comments. To make further steps more easier, we removed the urls, excess whitespaces, and emojis from comments. Additionally, in the subsequent processing of the data, we found that the phrase abbreviation would have an impact on the subsequent steps. Thus, in this step we also expanded contractions, for example, we transferred "don't" to "do not".

After observation, we found that in time-continuous comments, people often use pronouns to represent the person name mentioned in previous comments, which would caused a lot data loss in the name entity recognition part. One possible processing method was investigated: coreference resolution.

**Coreference Resolution.** Coreference Resolution is used to identify linguistic expressions in natural language that refer to the same real-world entity [24]. Like in the sentence "Mary likes her cat", "Mary" and "her" are regarded as the same real-world entity. With coreference resolution, "Mary" and "her" will be clustered into one group, and "her" can be changed with "Mary". However, the effects of coreference resolution are hard to evaluate, we could only know it resolved some coreferences in comments, but without manual check we didn't know if it added or reduced the noise in the data. Therefore, in this study we didn't adopt it. But, notably, as long as the evaluation method is found, coreference resolution could reduce invalid data in the study. Moreover, in future studies, context-specific coreference resolution model is also worth to be explored.

**Name Entity Recognition.** After getting relatively clear comments dataset, we applied Spacy Name Entity Recognizer model[6] to extract name entities from each comment. The pipeline of Spacy Name Entity Recognizer model mainly includes tokenizer, tagger and parser, which can help us get the tag of each word in comments, and we saved the words with tag "PERSON" as the name entities. After extracting all the words with "PERSON" tag, we removed not only the data without any name entities but also the data with more than one name entities. Since without manual processing, it is difficult to determine who the subject is in this kind of data with multiple name entities. In such an example "Mary is not so smart like Lucy", it can be explained as criticism to Mary that "Mary is not so smart" or praise to Lucy that "Lucy is so smart". Therefore, these data can cause confusion for further steps, especially in sentiment analysis part.

## 3.3 Data Labeling

In data labeling, first of all, to get the skin color label for each comment, we matched the name entities extracted from last step with the names in player dataset. Then, we applied sentiment analysis to get the sentiment of each comment.

**Player Name Matching.** To make the matching process quicker, we applied database fuzzy query to match name entities in comments with names in player dataset. Since in the comments, people seldom write the full name of players, we used four different fuzzy query methods: regarding name entities as first name, middle name, last name and full name to match the names of players. After that, we found that some name entities were matched with different player names. Moreover, there are some players with the same first, last or middle name but different skin colors. One example is that Aaron Joseph Herrera (White) and Aaron Justin Lennon (Brown) have the same first name but totally different skin colors. To prevent adding noise to the data, we deleted those comments with same name entity but different player names. After getting the skin color labels, to investigate H2, we categorized the skin colors into two categories: lighter skin tone and darker skin tone. According to different UV phenotype, olive skin color covers Type I, Type II and Type III on the Fitzpatrick Scale. Meanwhile, Fitzpatrick skin type has been demonstrated to correlated poorly with constitutive skin color [5]. Therefore, it is hard to accurately determine which groups olive skin color should belong to. To prevent more noise in our data, we excluded the olive skin color. As a result, pale and white were categorized into lighter skin tone group, while brown, dark brown and black belong to darker skin tone group.

**Sentiment Analysis.** For sentiment analysis, applying VADER[7], we got three scores: pos, neg and compound, where compound is the most useful metric. Compound is calculated by adding up the value scores of each word in the lexicon, and then normalized to between -1 (most extreme negative) and +1 (most extreme positive). Shown in Table 3, we categorized comments into three groups: positive, neutral and negative.

**Table 3: Sentiment Categories**

| Compound | Sentiment |
|---|---|
| [0.05, 1] | positive |
| (-0.05, 0.05) | neutral |
| [-0.05, -1] | negative |

# 4 RESULTS

This section presents the main results of our analysis: descriptive analysis and empirical analysis. In the descriptive analysis, basic statistical results were shown. In empirical analysis, we applied different statistical methods to investigate our research question and hypotheses.

## 4.1 Descriptive analysis

Completing the steps above, we got a valid dataset of 3631 comments containing players' names. After excluding the comments with olive skin color label, the final sample size is 3030.

Fig. 1 shows that there are more positive comments than negative comments in the sample. After calculating the mean and variance of sentiment for each group, we also got the results shown in Table 4 that the means of sentiment in five group are all in the positive range.

[6]https://spacy.io/usage/linguistic-featuresnamed-entities

[7]https://github.com/cjhutto/vaderSentiment

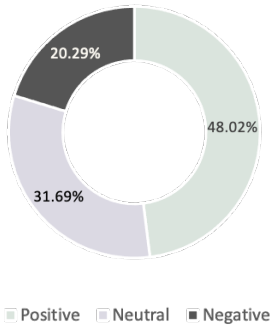


**Figure 1: Percentage of Comments**

**Table 4: Sentiment of Comments in five Groups**

| Group | Count | Mean | Variance |
|---|---|---|---|
| Black | 75 | 0.14 | 0.16 |
| Dark Brown | 402 | 0.11 | 0.18 |
| Brown | 341 | 0.19 | 0.16 |
| White | 2203 | 0.19 | 0.17 |
| Pale | 9 | 0.22 | 0.11 |

358 unique players were mentioned in the comments, in which most of them are white players. The main reason for this result is that we focused on the European Football Leagues. However, it also demonstrated that this sample was unbalanced, which could influence the assumption of equal sample size in tests like ANOVA [18]. Meanwhile, according to the rule of thumb [12], as long as the largest variance is no more than 4 times the smallest variance, ANOVA is robust to heterogeneity of variance. Shown in Table 4, the smallest variance is in Pale group (0.11), the biggest variance is in Dark Brown group (0.18), the difference between them is smaller than 4 times. Therefore, ANOVA is still applicable for this study.

**Table 5: Statistics of Unique Players in Comments**

| Skin Color | Number | Percentage |
|---|---|---|
| Black | 29 | 8.10% |
| Dark Brown | 54 | 15.08% |
| Brown | 71 | 19.83% |
| White | 201 | 56.15% |
| Pale | 3 | 0.84% |

Fig. 2 shows that except brown group, the percentage of positive comments in white (72%) and pale (75%) group are bigger than the percentage of positive comments in black (71%) and dark brown (61%) group, meanwhile the percentage of negatives comments in white and pale group are smaller than the ones in black and dark brown group. Uzogara et al. mentioned that for the most part, from psychological perspective, African Americans who physically appear to be close to average skin color, like brown, appear to be protected racially and are the least stigmatized among African Americans [22]. This can explain why the ratio of positive comments in brown group is higher than black and dark brown group.

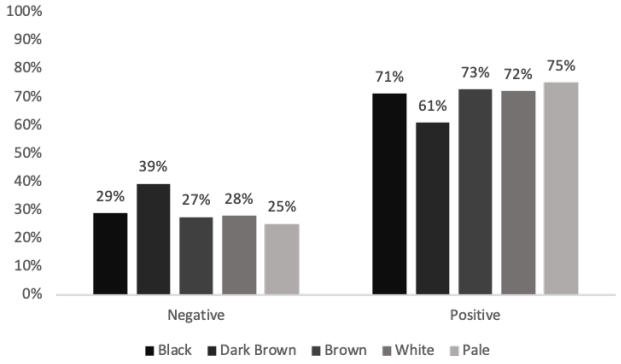


**Figure 2: Split Positive and Negative Comments in 5 Groups**

Fig. 3 illustrates that the percentage of positive comments in lighter skin tone group is higher than the darker skin tone group, while the percentage of negative comments in lighter skin tone group is lower than the darker skin tone group, which shows people in Football Subreddit rated players with lighter skin tone more positively than players with darker skin tone.

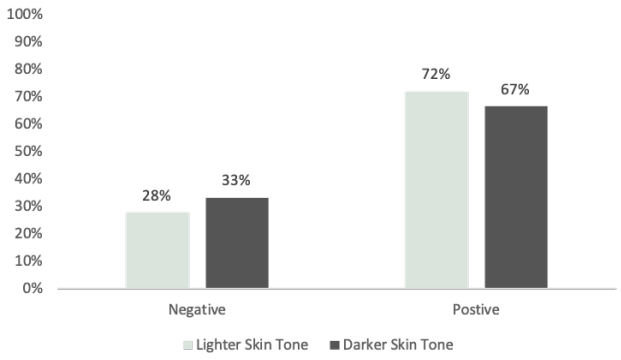


**Figure 3: Split Positive and Negative Comments in 2 Groups**

Fig. 4 and Fig. 5 respectively shows the language differences in Darker group and Lighter group. These graphs were made using Shifterator[8], which is used to quantify which words cause pairwise differences between two texts [6]. Based on these two graphs, we found that there was no much differences in the words which mainly contributed to divide comments into positive and negative group between Darker and Lighter skin tone groups.

[8]https://github.com/ryanjgallagher/shifterator

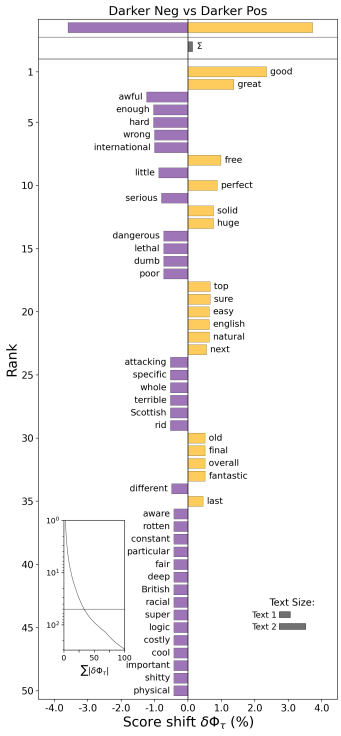


**Figure 4: Language differences in Darker Group**

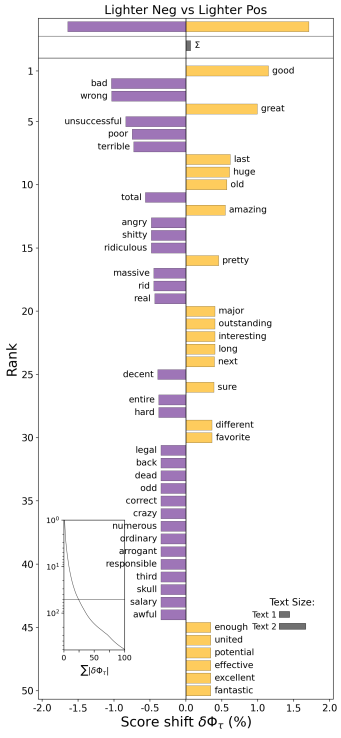


**Figure 5: Language differences in Lighter Group**

## 4.2 Empirical Strategy

Before doing empirical analysis, we computed the value of skewness and kurtosis for sentiment scores to see if it was normally distributed and we got results shown in the Table 6, with kurtosis equaling to -0.56 and skewness equaling to -0.14. According to George and Mallery, as long as the values for skewness and kurtosis of one variable are between -2 and +2, this variable is considered as normally distributed [7].

**Table 6: Kurtosis and Skewness of Sentiment Score**

| | Kurtosis | Skewness |
|---|---|---|
| Sentiment Score | -0.56 | -0.14 |

Based on this, we gave the concrete empirical strategies. For H1, to compare the difference in sentiment scores between five groups: black, dark brown, brown, white and pale, ANOVA was applied. For H2, T-test was used to investigate the difference between two groups: lighter skin tone and darker skin tone. For H3, to examine the relationship between two categorical variables: skin color (lighter skin tone vs. darker skin tone) and sentiment of comment (positive, negative and neutral), Chi-Square Test was adopted. Moreover, for the first two hypotheses, we mainly focused on the positive and negative comments and didn't make neutral comments into consideration. To get more precise results, we applied the statistical methods on the comments with and without neutral group.

**Hypothesis 1.** Applying one-way analysis of variance, the results showed that there was significant difference in the sentiment scores of Football Subreddit comments about players with different skin colors, *F(4, 2085)=2.85, p<.05*. See Table 7, significant differences were shown in the comments both with and without neutral scores, so hypothesis 1 was supported.

**Table 7: ANOVA Results of H1**

| | $df_{between}$ | $df_{within}$ | *F-value* | *p-value* |
|---|---|---|---|---|
| Without neutral | 4 | 2085 | 2.85 | <.05 |
| With neutral | 4 | 3020 | 3.26 | <.05 |

**Hypothesis 2.** The results of T-test showed that the difference in the sentiment scores of comments about players with lighter skin tone and darker skin tone was significant, *T(2088)=-3.10, p<.05*. See Table 8, there was significant difference in the comments both with and without neutral scores. Therefore, hypothesis 2 was supported.

**Table 8: T-test Results of H2**

| | *df* | *T-value* | *p-value* |
|---|---|---|---|
| Without neutral | 2088 | -2.30 | <.05 |
| With neutral | 3028 | -2.27 | <.05 |

**Hypothesis 3.** Applying Chi-Square Test, the results demonstrated that there was significant correlation between player skin tone (Lighter and Darker) and the sentiment of comments (Positive, Neutral and Negative), $\chi^2(2, N=3030)=36717540$, p<.001. Therefore, hypothesis 3 was supported.

## 5 DISCUSSION

Social media, as the most used communication tool, provides a platform for people to share their ideas and some information, including comments on football players. Reddit, one of the most heated social media in recent years, contains a lot of user-generated information, in which some opinions are anonymously shared and transmitted. Focusing on Football, which is one of the most popular sports with different skintone players, we demonstrated the existence of racial bias in Football Subreddit comments by finding people rated players with different skin colors differently. The results were consistent with the findings from Principe and van Ours [15], Rada [16] and Rainville et al. [17].

Additionally, similar to the study of Maguire [13], in our study the relationship between sentiment of comments and player skin colors in Football Subreddit was also proved. Racial bias can be shown in different forms: football match position assignment, football commentaries, football coverage and comments in football community. Obviously, the result of this study is not the final word on biased comments in Football or in any other fields. Rather, it should be part of an ongoing effort to define racial bias and determine whether it exists in the mass range of social media.

**Limitations.** In this work, we chose Football Subreddit as the data source, disregarding its number of members and the level of activity of members. Although we already collected most of comments on Football Subreddit, after some data processing steps, we got limited valid sample. Considering this, longitudinal study can be applied in this kind of social community in future study. As time passes and the number of users increases, so does the data, and the conclusions from study can become more convincing. Also, there are more lighter skin tone players than darker skin tone players in the player dataset, causing the sample unbalanced. In the future study, to expand the range of comments and player data collection is necessary. Additionally, in the process of name entity recognition, a lot of obvious names were not identified, leading to huge data loss. Therefore, how to improve Name Entity Recognizer model to be context-specific applicable is also one point worthy to investigate. Moreover, the context coreferences in comments also caused mass of invalid data. Coreference is very normal no matter in our daily talk or comments on the social media. Regarding this, applying coreference resolution properly in natural language understanding is very necessary. Besides, finding one effective way to evaluate the effects of coreference resolution is also important. Furthermore, in name entity recognition phase, we removed the data with more than one name entities, which also brought about data loss. As it is hard to do sentiment analysis on multiple entities, sentiment analysis on entity level should be payed attention to in the future studies. Further, we only focused on the skin color of the players and not on factors such as their ability and performance. These factors were mostly investigated by manual content analysis, which not only cost a lot of time and energy but also the results could be subjective to the researcher's emotions. Thus, application of natural language processing in content analysis of these factors would be useful in future researches.

## 6 CONCLUSION

This study gave an illustration of the analysis of comments on Football Subreddit. In examining the comments posted by community members, we found that people have different opinions about players of different skin color, and these differences are mainly reflected in the proportion of positive and negative comments about players with different skin colors. In addition, we also found that the emotional color of Football Subreddit members' comments was closely related to the skin tone of the players. By testing the three hypotheses, we have obtained the answer to the research question that racial bias is present in the comments of the Football Subreddit.

According to Pope et al.[14], the perception of racial bias can somehow reduce people's racial bias, so we hope that the study can somehow mitigate people's racial bias or prejudice against players with different skin color. It is also hoped that future research will further identify the specific sources of people's racial bias.

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## REFERENCES

[1] Alaa Abou-Arab and Rochelle Mendonca. 2021. Exploring implicit and explicit racial bias in OT professionals. *The American Journal of Occupational Therapy* 75, Supplement_2 (2021), 7512500020p1–7512500020p1.
[2] Irfan Chaudhry. 2015. # Hashtagging hate: Using Twitter to track racism online. *First Monday* (2015).
[3] Shelley J Correll and Stephen Benard. 2006. Gender and racial bias in hiring. *Memorandum report for University of Pennsylvania* (2006).
[4] Kathy Dobson and Irena Knezevic. 2018. " Ain't nobody got time for that!": Framing and stereotyping in legacy and social media. *Canadian journal of communication* 43, 3 (2018), 381–397.
[5] Thomas B Fitzpatrick. 1988. The validity and practicality of sun-reactive skin types I through VI. *Archives of dermatology* 124, 6 (1988), 869–871.
[6] Ryan J Gallagher, Morgan R Frank, Lewis Mitchell, Aaron J Schwartz, Andrew J Reagan, Christopher M Danforth, and Peter Sheridan Dodds. 2021. Generalized word shift graphs: a method for visualizing and explaining pairwise comparisons between texts. *EPJ Data Science* 10, 1 (2021), 4.
[7] Darren George and Paul Mallery. 2019. *IBM SPSS statistics 26 step by step: A simple guide and reference.* Routledge.
[8] Evelyn Nakano Glenn. 2009. *Shades of difference: Why skin color matters.* Stanford University Press.
[9] Victoria Groom, Jeremy N Bailenson, and Clifford Nass. 2009. The influence of racial embodiment on racial bias in immersive virtual environments. *Social Influence* 4, 3 (2009), 231–248.
[10] Daniel Herborn. 2013. Racial vilification and social media. *Indigenous Law Bulletin* 8, 4 (2013), 16–19.
[11] Merlyna Lim. 2013. Many clicks but little sticks: Social media activism in Indonesia. *DIGITAL* (2013), 127.
[12] John A List, Sally Sadoff, and Mathis Wagner. 2011. So you want to run an experiment, now what? Some simple rules of thumb for optimal experimental design. *Experimental Economics* 14, 4 (2011), 439–457.
[13] Joe A Maguire. 1988. Race and position assignment in English soccer: A preliminary analysis of ethnicity and sport in Britain. *Sociology of Sport Journal* 5, 3 (1988), 257–269.
[14] Devin G Pope, Joseph Price, and Justin Wolfers. 2013. *Awareness reduces racial bias.* Technical Report. National Bureau of Economic Research.
[15] Francesco Principe and Jan C van Ours. 2022. Racial bias in newspaper ratings of professional football players. *European Economic Review* 141 (2022), 103980.
[16] James A Rada. 1996. Color blind-sided: Racial bias in network television's coverage of professional football games. *Howard Journal of Communications* 7, 3 (1996), 231–239.
[17] Raymond E Rainville and Edward McCormick. 1977. Extent of covert racial prejudice in pro football announcers' speech. *Journalism Quarterly* 54, 1 (1977), 20–26.

[18] Shayna A Rusticus and Chris Y Lovato. 2014. Impact of sample size and variability on the power and type I error rates of equivalence tests: A simulation study. *Practical Assessment, Research, and Evaluation* 19, 1 (2014), 11.

[19] Anthony Schmidt and Kevin Coe. 2014. Old and new forms of racial bias in mediated sports commentary: The case of the National Football League draft. *Journal of Broadcasting & Electronic Media* 58, 4 (2014), 655–670.

[20] Susan Tyler Eastman, Andrew C. Billings. 2001. Biased voices of sports: Racial and gender stereotyping in college basketball announcing. *Howard Journal of Communications* 12, 4 (2001), 183–201.

[21] Brendesha M Tynes, Chad A Rose, and Suzanne L Markoe. 2013. Extending campus life to the Internet: Social media, discrimination, and perceptions of racial climate. *Journal of Diversity in Higher Education* 6, 2 (2013), 102.

[22] Ekeoma E Uzogara, Hedwig Lee, Cleopatra M Abdou, and James S Jackson. 2014. A comparison of skin tone discrimination among African American men: 1995 and 2003. *Psychology of men & masculinity* 15, 2 (2014), 201.

[23] Natasha Warikoo, Stacey Sinclair, Jessica Fei, and Drew Jacoby-Senghor. 2016. Examining racial bias in education: A new approach. *Educational Researcher* 45, 9 (2016), 508–514.

[24] Jiaping Zheng, Wendy W Chapman, Rebecca S Crowley, and Guergana K Savova. 2011. Coreference resolution: A review of general methodologies and applications in the clinical domain. *Journal of biomedical informatics* 44, 6 (2011), 1113–1122.