

Erasmus University Rotterdam

Erasmus School of  
**Economics**

---

Does the crowd influence individual player performances, especially minority groups?  
Evidence from the English Premier League matches during COVID-19.

---

Bachelor thesis: Economie en Bedrijfseconomie

Student: Xander de Jong

Student number: 530282

Sports Economics & Strategy Economics

Thesis supervisor: S.D.T. Hoey

Second assessor:

August 9, 2022

Keywords: Sports Economics, COVID-19, Racism, Discrimination,  
Social pressure, crowd attendance

## Abstract

This paper investigates the effect of empty stadiums on individual player performances for minority groups in professional football. During the 2019-2020 English Premier League season matches had to be played behind closed doors due to the COVID-19 pandemic. This gave an opportunity for a natural experiment. This paper finds that players belonging to minority groups significantly perform worse when there are no fans in the stadium. Furthermore, this paper investigates the effect of social media pressure on players, and I conclude that more popular players do not perform better than less popular players when playing in empty stadiums.

# Contents

Abstract .....	2
1 Introduction .....	4
2 Empirical Evidence .....	7
3 Data .....	11
3.1 Descriptive variables .....	11
4 Methodology .....	16
4.1 Nationality regression analysis.....	16
4.2 Ethnic Background regression analysis.....	17
4.3 Popularity regression analysis .....	18
5 Results .....	19
5.1 Results regression analysis nationalities on PMR .....	19
5.2 Result regression analysis Black on PMR.....	20
5.3 Results regression analysis popularity on PMR .....	21
6 Discussion .....	24
7 Conclusion.....	25
8 References .....	26
9 Appendix .....	28

# 1 Introduction

Since ancient times sports have been a way of entertainment for people. In ancient Greece, thousands of people would come to watch the Olympics, where the best athletes in Greece would perform all kinds of sports. Now stadiums are still chock-full when the Olympics are being played or when a local derby is to unfold. However, recently things have changed in the world of sports. Due to the COVID-19 pandemic, professional sports had to be played behind closed doors. This meant no more cheering spectators, roaring fanbases and shouting supporters. Professional athletes had to perform in complete silence, while they might have gotten used to the pressure accompanying the full stadiums. This created an interesting phenomenon in the world of sports, where athletes were exposed to completely new circumstances. How will they react? How will it affect their performance? Do crowds optimize the performances of athletes or do athletes perform better without the pressure? This paper was inspired by the change in circumstances for athletes and how athletes respond to them. This research will investigate how empty stadiums affect the performances of minority groups in English football.

Fans of football are known to be fanatic and loud. Some football fans are even so fanatic that they grab every opportunity to either cheer their team to the win or when they do not succeed try to get the opposing team down. In football, this has caused problems as some fans take it so far that they discriminate or racially abuse the opposing player or sometimes even their own players. Lately, racism in football has gotten the attention of the world in an attempt to make football accessible to everyone. Racial harassment of players has been happening for some time, for instance when Antonio Rüdiger player of Chelsea F.C. stood up for being targeted by monkey chants. In this interview (Steinberg, 2020), he addressed the fact that “walking off the pitch does not make any sense if they (racial harassers) still don’t get punished, the consequence may be that I am again the booed man.” The racial harassment clearly seems to affect Rüdiger’s emotions in the post-match interview. However, there is little known about the impact of racial harassment on athletes’ performances. This research will, by using a natural experiment, namely the COVID-19 pandemic where the lockdown caused matches to be played behind closed, test whether players from minority groups experienced a differential change in performance when the stadiums are empty.

Based on the previous discussion, this paper examines the following two hypotheses:

HO1: “Football players belonging to minority groups will perform better in empty stadiums than in full stadiums.”

Due to racial harassment and discrimination in stadiums, players from minority groups will not perform optimally. Epting et al. (2011) found that distinct types of audience behaviour have different effects on the performance of particular sports skills. They found that distinctive audience behaviour left basketball players unaffected for example. On the other hand, football is known to have a large home advantage and therefore the effect of jeering could be negative in football or differently the effect of cheering could be greatly positive. This paper will assess this hypothesis by using nationality as a measure to distinguish minority groups from regular players, also skin-colour will be used as a measure to distinguish Black players, who receive a large amount of racial harassment no matter what country they are from, from white players.

Secondly, the impact of social media on our lives is tremendous. Nowadays almost every professional footballer is active on one of the social media platforms. They share their lives with the common public by posting pictures, stories and they respond to certain things. This way football players seem close to the regular fan and players seem more reachable. However, this also comes with a negative side. Players have come out confessing the hate comments and death threats they receive on a daily basis when active on social media. Arsenal player Bukayo Saka also urged social media platforms to act after the racial abuse he received on social media after missing the deciding penalty for England at the European Cup 2020 (Jackson, 2021). It may trigger a feeling of more pressure for players because if they play bad, they receive a large number of hate comments and threats on social media. This can change current player behaviour overall as players might feel like playing for online fans instead of the presence in the stadiums. Playing in an empty stadium might not release the online pressure as social media pressure remains the main type of pressure for popular players. For that reason, I decided to examine the following hypothesis:

HO2: “Football players who are more popular on social media will not perform better when playing in empty stadiums than less popular players.”

This paper will research this hypothesis by using Instagram followers as a measure of social media popularity. Instagram is a social media app belonging to Meta (Facebook) where people can post pictures on an online timeline where followers can see them and respond to

them. Also, people can send private messages to other people. This way players often get online abuse or racist comments and slurs.

Previous research about differentials in performance during the COVID-19 lockdown has been mainly focused on effects on the collective. How the home advantage changes when teams play without any spectators, or about how the referee's bias changes when there are not 50,000 home fans judging him for any decision, he/she gives against them. This paper will add to this literature by adding individual effects on athletes' performance when playing without any fans. This has only been done once by Caselli et al. (2021) who investigated the differential in performance when playing in empty stadiums for minority groups in the Italian Serie A. They found that African players performed significantly better when playing in empty stadiums. By adding social media popularity, this research gives another dimension to the paper of Caselli et al. (2021) where social pressure was only considered in real-life situations. Whereas nowadays pressure is also created by social media and should also be explored.

In addition, racism and discrimination have been known to cause inequality in either productivity, wage, or opportunities. By exploring the effect of empty stadiums on the performances of minority groups, this paper can expose racism and discrimination in football. minority groups who play better in empty stadiums are not playing optimally in the current system where stadiums are packed, and racial harassment is mostly left unpunished because felons are not caught in the act. This means these players do not have equal circumstances as other players. By doing this research this phenomenon can be proven once again and action can be undertaken to improve the situation for minority groups in football.

This paper will first cover the empirical evidence, then it will discuss the data section, where the sources and descriptive variables of the dataset are being discussed. Next, the methodology and results will be reported. Lastly, the discussion and conclusion will be examined.

## 2 Empirical Evidence

This research contributes to the literature on racial discrimination and its impact on the market outcomes of minority groups. Throughout history, there are many examples of racism and discrimination leading to market deficiencies. Where Adam Smith believed that slavery was not rational and beneficial and was only not abandoned because of man's tyrannical nature (Salter, 1996). Nowadays, on the other hand, racial discrimination is less easily identifiable than slavery and therefore poses problems for social scientific conceptualization and measurement (Pager & Shepherd, 2008). Research has been done about the cost of racial and ethnic discrimination in housing, wherein the mortgage market Quillian et al. (2020) find that the racial gaps in mortgage cost have not declined at all from 1970 to 2016 suggesting persistent racial discrimination. Furthermore, literature has been documented about the role of racial discrimination in influencing the labour market. According to Nunley et al (2015), there is a racial gap in employment opportunities and Borrowczyk-Martins et al. (2017) state that there are Black-white wage and employment gaps in the US and find evidence of employer prejudice and racial skill gaps. This prejudice causes a discrepancy in hiring workers because, for example, white workers who are less productive will be hired over more productive Black workers. My research adds to the prior literature about racial discrimination and its disruption of market mechanisms. I study the problem of the effect of racism and discrimination on the productivity of athletes. The imbalance of productivity among ethnicities could also cause gaps in wages and/or employment. In Italy, cases have been documented where African players were not signed by a club, as a result of racial discrimination expressed by their own fans (Wanneh, 2020).

In addition, this research also contributes to the literature written about racial discrimination in sports. Preston and Szymanski (2000) investigated racial discrimination in English football. The authors examined data on the racial composition and financial and sporting performance of English professional football clubs between 1974 and 1993. Szymanski (extra) found evidence of racial discrimination in English football in a way that Black talent is underpaid. Teams with a higher proportion of Black players performed better than their average wage bill would suggest. Preston and Szymanski (2000) could not find any evidence that the ethnic preferences of the fans caused this discrimination as they did not find significantly lower attendance or revenues for clubs with higher numbers of appearances of Black players compared to other clubs. Additionally, Kahn (1991) reviewed studies of racial discrimination in professional sports. In professional basketball, there is also evidence of wage

discrimination against Black talent as well as customer discrimination. In professional basketball, fans' preference for white players positively affects ticket sales, and consequently, white basketball players may be paid more than Black players with the same performance. This research adds to the literature written about racial discrimination in professional sports as it gives a revolutionary insight into crowd prejudice and discrimination in professional football. The papers mentioned above-used ticket sales, revenues, and attendance as dependent variables. They had difficulties extracting effects as discrimination is not something tangible but, in this research, I use the COVID-19 lockdown as a natural experiment where the effect of discrimination on player performances is more easily extractable. This research will give more insight into the crowd discrimination toward Black/African athletes competing in professional sports.

Following up on crowd discrimination is crowd pressure. Playing in front of sometimes 50,000 fans induces loads of pressure on twenty-two field players and the referees in charge. This pressure is not only felt by minorities every player has a certain mechanism to cope with this pressure. In this study, I will analyse multiple nationalities and how they are affected by the sudden loss of crowd pressure. Savage and Torgler (2011) research the magnitude and direction of stress effects on performance. The authors investigated the relationship between stress and performance in a winner takes all football match. They investigated penalty shootouts for World Cups and UEFA European club competitions where the stakes are high and stress levels as well. Savage and Torgler (2011) concluded that being in a situation of relative advantage increases the probability of performing well (scoring a penalty goal) and being in a situation of relative disadvantage decreases the probability of scoring a goal. They also found that negative stress has a bigger impact than positive stress. The loss of attendance during COVID-19 might suggest a loss of negative stress for opposition teams and therefore a decrease in home advantage. Fischer and Haucap (2021) made use of a "natural experiment" where the COVID-19 pandemic in Germany resulted in "ghost matches" being played in the top three football divisions in Germany. The authors examined the relation between crowd support and home advantage in professional football. Fischer and Haucap (2021) find that the reduction of home advantage is mainly driven by reduced occupancy. Goumas (2012) also found that not smaller crowds, but smaller crowd density negatively affect the home advantage. Goumas (2012) found that the crowd is likely to influence football referees' bias toward the home team when making decisions that may affect the outcome of matches. On the other hand, Sánchez and Lavín (2020) claim there are no significant differences between



playing with or without a crowd, except in German and Spanish top football leagues. Sánchez and Lavín (2020) highlight that the presence and volume of spectators do not significantly affect most competitions and raise the question of why many teams continue to win at home. The identity factor would be worth considering. Foreign players might have a distinct perspective on what it means to play abroad or at home as they do not play on home soil, they might experience home and away games the same. On the contrary, players with roots at their club (e.g., have experienced the whole youth system of a club) might have a different approach to home and away games. Another factor that could influence home advantage is travelling fatigue. This could cause the away team to perform worse at away games even though there are no home fans in the stadium. This paper adds to the literature on crowd discrimination and crowd pressure as the player performance instead of the team performance will be used to see how each player reacts to playing without a crowd. Individual player performance might be a better dependent variable as it truly captures how foreign and local players react to a loss of attendance.

Furthermore, more literature has been dedicated to the effect of social pressure on individual players. Braga and Guillén (2012) study how pressure affects an individual's behaviour. They use attendance as a proxy for pressure to investigate whether the number of fans present in the stadium affects the performance of players. Braga and Guillén (2012) use an instrumental variable: "a promotion in Brazil during which low ticket prices were assigned to random soccer matches" (Braga & Guillén, 2012). The authors conclude that the presence of fans only has a small impact on the outcome of a football match, and they interpret this result as evidence that football players are less influenced by psychological pressure than what is proposed in previous literature. For example, Dohmen (2008) finds that professional football players are more likely to choke on a penalty kick (a measure of performance) when the match is played for a bigger crowd. A more recent study on choking under pressure is done by Ferraresi and Gucciardi (2021). Ferraresi and Gucciardi (2021) also use the COVID-19 pandemic as a natural experiment where they investigate the effect of empty stadiums on player performance by testing the probability of missing a penalty kick for teams playing without any fans. Ferraresi and Gucciardi (2021) find that the social environment affects a player's performance whereas for home teams social support leads to improved performance and for away teams the absence of an audience leads to players being less likely to miss a penalty, especially in stadiums that used to be crowded. This research adds to the literature on player performances under pressure because the use of an algorithm to rate player

performances based on statistics adds a broader measure of performance. A penalty kick only captures one moment, which can be influenced by many factors or even plain bad luck, whereas performance levels vary by match and can be much more consistent than penalty kicks.

Lastly, Caselli et al (2021) investigated how the sudden absence of supporters at football games in Italy, due to COVID lockdowns, would affect the performance of players from minority groups. The authors especially focussed on African players who are most commonly harassed and discriminated against not only by rival fans but also by their own fans. Caselli et al (2021) find that African football players perform better in the absence of fans especially when African players play in a team that has been subject to racist fan behaviour before. They conclude that racism and discrimination decrease the overall quality of football games. The paper by Caselli et al. (2021) has been the main driver for this work. This research tests whether empty stadiums also affect football players from minority groups in the highest-grossing league in the world the English Premier League. Following up on Caselli et al. (2021) I will also assess performance changes for different nationalities in pre-and post-Covid games as well as test the performance changes for players with Black skin colour. In this research, the setting is also different, this makes this paper a great example of whether the external validity of Caselli et al. (2021) holds in the English Premier League. On the other hand, this research will complement Caselli et al (2021) by distinguishing between skin colours within nationalities as well as testing whether popularity has any influence on the performance in pre-and post-COVID games.

### 3 Data

To construct a dataset, I combined several sources of information. First, to collect the performances of players in the English Premier League, I used match ratings on a scale from 0 to 10, with increments of 0.1. These match ratings are awarded to players for every match in the season they have played in and are formed by an algorithm developed by FootballCritic.com and an editorial bonus. FootballCritic.com provides rich statistical data from a database of 50,000 players and teams across two hundred competitions. The FootballCritic match algorithm for players considers fifty data points per player (e.g., goals, assists, passes, tackles etc.) and weights them each differently based on the player's position (e.g., goalkeeper, defender, midfielder, or attacker). Additionally, the editorial bonus is where Football Critic's league editors can reward or punish players for actions, which are difficult to define and reward statistically (e.g., individual skill, season-defining goal, or a big howler). The league editors can reward or punish players by adding or subtracting points ranging from 0.1 to 0.6. However, players will not receive an editorial bonus every match. The bonus is reserved for a few moments that can determine what the match will be remembered for. Using statistical data and the view of experts a performance index is created, which I will use for this research.

The strength of this performance index is that a major part of the match rating is objectively composed of statistics weighted by player position, so for example goals scored cannot be a reliable performance indicator as defenders' and goalkeepers' main task is not to score goals but prevent them and therefore it would not be fair to judge them on goals scored. Furthermore, the editorial bonus is a good addition to the performance index as statistics do not capture the complete performance of a player. For example, a title-winning goal or beautiful dribble can get a player more points. Assuming the league editors are non-biased and experts, their influence will transform the statistical performance positively.

#### 3.1 Descriptive variables

Furthermore, I added Premier League player information on nationality, age and matches played in the 2019-2020 season to the dataset. I obtained this information from FBref.com (*2019-2020 Premier League Player Stats*, 2020). I used information on players' nationality to assign them to the following groups: British (countries belonging to Great Britain), Europe, Latin America (Spanish/Portuguese speaking countries in South- and North America), African and other (countries in Asia, Oceania, and the Caribbean). British players accounted for

approximately 40%, European players for 38%, and African players for 8%, (Latin America for 10%, and other for 3%).

In the data, I exclude players who have not played from June onwards or before June as there is no possibility to test the effect of empty stadiums as they have either played only in full stadiums in season 2019-2020 or only in empty stadiums. Furthermore, the player must have played minimally one match in each period (before- and after-lockdown). Players who have transferred during the January transfer window within the Premier League will also be included in the dataset. The dataset consists of 336 players over 20 Premier League teams.

For the second statistical test, instead of nationalities, I divided players into ethnic groups. Premier League players are considered Black ethnicity when they either have a double nationality where minimal one nationality is African or former slave colony such as the Caribbean (Transfermarkt.com, 2020) or it is mentioned his parents are from Africa or a former slave colony (Lifeblogger.com). This resulted in roughly 33.0% of the Premier League players being of Black descent. I will assess whether players of Black descent will perform better in empty stadiums than white players.

Thirdly, to evaluate the difference in the effect of empty stadiums on the player performance between more popular players and less popular ones, I used Instagram followers as a measure of popularity. The variable Instagram is a running variable and will be used in combination with the ethnicity of a player to distinguish popularity effects between nationalities. It was not possible to gather the number of Instagram followers over time for the period 2019-2020, so I used the most recent number of Instagram followers (this may give way to an unjust portrayal of popularity). More popular players might be an easier victim of directed racism and discrimination in football stadiums because their name is well known or because of their popularity they are more skilled and used to positive and negative attention than less popular players. Only 296 players are included in the Instagram variable because some players do not have an Instagram account, or some players have a private Instagram account which does not represent their popularity as only people of the player's choice are allowed to follow them. See table 3.1 for all player-specific descriptive variables.

In addition, FootballCritic also provides a team performance algorithm for teams that assigns teams with a score from 0 to 10. The Team Match Rating (TMR) is either rewarded or punished depending on the outcome of their fixture based on match score (e.g. narrow win or comprehensive loss), expected goals (the number of goals that could have been scored by a

team based on “the probability that a shot will result in a goal based on the characteristics of that shot and the events leading up to it” (FBref.com, 2020)), team weighting and the dominance of offensive and defensive match statistics (e.g. shots on target, passes, interceptions, offsides etc.). It is important to control for the TMR as it influences player performances if their team either under or overperforms. If after the lockdown the team underperforms compared to pre-lockdown it is more likely that individual players also perform worse while, they have been performing relatively better than in pre-lockdown.

Table 3.1: Player-specific descriptive variables

Variables	Descriptive variables			
	Observations	Mean	Min.	Max.
Age	336	25.91 (3.90)	17	37
Matches played	336	22.10 (10.00)	2	38
Instagram	296	2,090,719 (5,355,985)	1,674	54,100,000
Goalkeeper	336	0.068 (0.25)	0	1
Defender	336	0.36 (0.48)	0	1
Midfielder	336	0.42 (0.49)	0	1
Forward	336	0.16 (0.37)	0	1
British	336	0.41 (0.49)	0	1
Europe	336	0.38 (0.49)	0	1
Latin America	336	0.10 (0.29)	0	1
Africa	336	0.08 (0.27)	0	1
Other	336	0.03 (0.18)	0	1
Black	336	0.33 (0.47)	0	1

Note: standard errors are in parentheses.

Table 3.2 shows the performance variables for players and teams pre- and post-COVID. Furthermore, the goals scored by home teams and away teams pre- and post-COVID are also considered in the table. The PMR including all players from different nationalities significantly decreases from 6.65 to 6.55 when matches are played without fans. Also, the TMR decreases significantly by 0.05 points. Suggesting that the performance of players and teams decreased overall in the absence of fans.

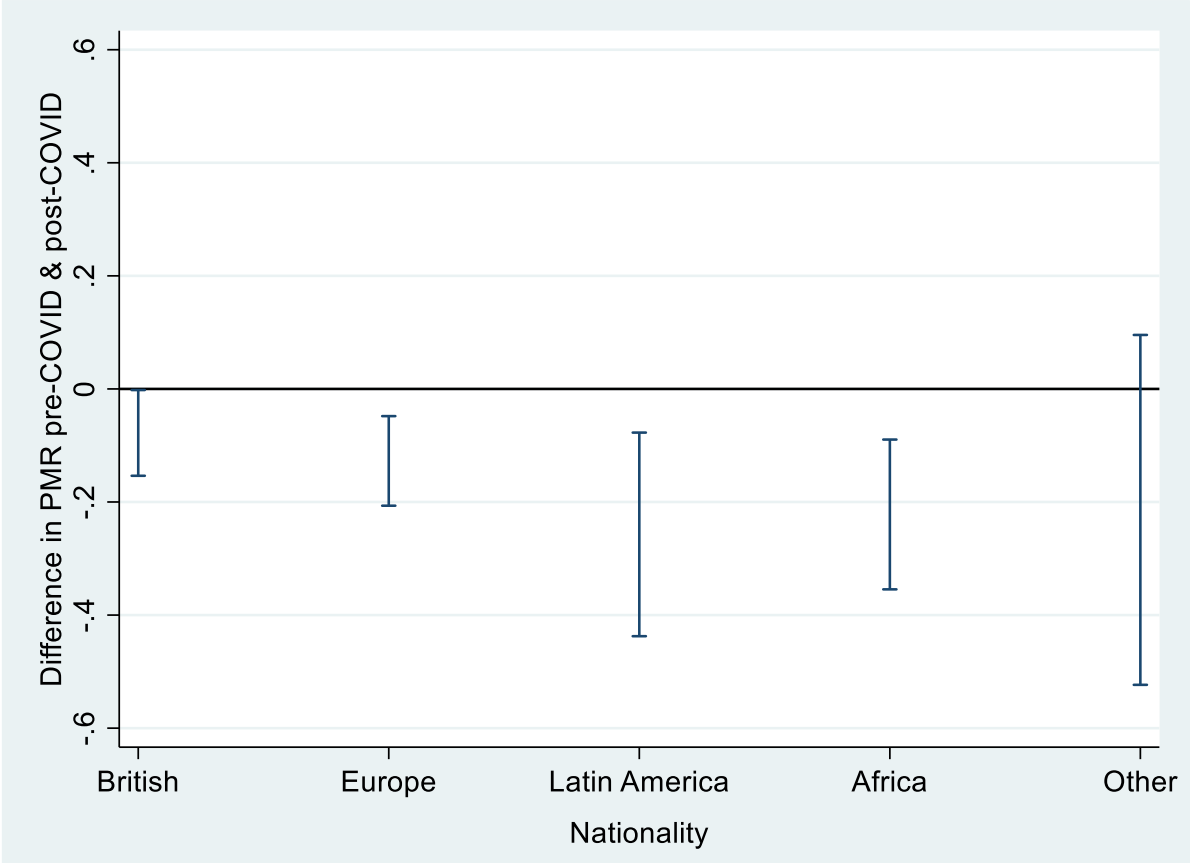
Table 3.2: Pre-COVID and Post-COVID descriptive variables

Descriptive variables					
Variables	Pre-COVID		Post-COVID		Difference
	Observations	Mean (Standard Error)	Observations	Mean (Standard Error)	Mean (Standard Error)
Player Match Rating	5,509	6.65 (0.01)	1,915	6.55 (0.02)	-0.10*** (0.02)
Team Match Rating	5,509	6.43 (0.13)	1,915	6.38 (0.03)	-0.05* (0.03)
Home Goals	288	1.51 (0.07)	92	1.54 (0.15)	0.04 (0.16)
Away Goals	288	1.22 (0.07)	92	1.17 (0.12)	-0.04 (0.14)

Note: standard errors are in parentheses. Significance is categorized as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

In addition, figure 3.1 depicts an informal test where the 95% confidence interval of the difference in match rating for players from different nationalities before and after the lockdown is shown. It is visible that the figure suggests that almost all nationalities perform worse (with a 95% confidence interval) in empty stadiums than they previously did in full stadiums except Other which has the largest interval and British interval which is almost significant on the 95% confidence interval.

Figure 3.1: Difference in PMR pre-COVID & post-COVID



## 4 Methodology

### 4.1 Nationality regression analysis

To research the effect of empty stadiums on player performance we will make use of a regression analysis. The matches we will use for this regression will solely come from the 2019/2020 English Premier League season.

The main results will be based on the estimation of the following regression

$$\ln (PMR)_{ptm} = \alpha + \beta_1 NoFans_m + \beta_2 NoFans_m * Nationality_p + \beta_3 X_m + \eta_{pt} + \varepsilon, \quad (1)$$

where the  $\ln (PlayerMatchRating(PMR))_{ptm}$  is the natural logarithm of the player match rating acquired by a player (p) in team (t) during match (m).  $NoFans_m$  is a dummy variable that takes the value of one when fans are absent in the stadium and zero when fans are present in the stadium during a match.  $NoFans_m * Nationality_p$  is the interaction term covering the effect of no fans on certain nationalities such as African, Latin American, and European. This way we can separate the effects of different nationalities when no fans are present in stadiums. Furthermore,  $X_m$  includes variables such as Team Match Rating (TMR), home games, team goals and opposing team goals which are match-specific characteristics and need to be controlled for.  $\eta_{pt}$  is a player-fixed effect which controls for time-invariant characteristics of players such as ability, skills, and game intelligence.  $\varepsilon$  is the error term.

In addition, we will perform a quite similar regression analysis only we will add team-fixed effects next to the already existing player-fixed effect. The regression will look as follows:

$$\ln (PMR)_{ptm} = \alpha + \beta_1 NoFans_m + \beta_2 NoFans_m * Nationality_p + \beta_3 X_m + \eta_{pt} + \theta_{tm} + \varepsilon, \quad (2)$$

$\ln (PMR)_{ptm}$  is the natural logarithm of the player match rating acquired by a player (p) in team (t) during match (m).  $NoFans_m$  is a dummy variable that takes the value of one when there are no fans in the stadium and zero when fans are present in the stadium during a match.



$NoFans_m * Nationality_{pk}$  is the interaction term covering the effect of no fans on certain nationalities.  $X_m$  includes match-specific characteristics  $\eta_{pt}$  and  $\theta_{tm}$  are respectively player and team fixed effects.

#### 4.2 Ethnic Background regression analysis

In this regression analysis, we will examine the effect of empty stadiums on Black players. To gather information about the skin colour of players. Using their ethnic background to see if players have any African heritage or are related to former colonial dependencies having a major Black population. The regression analysis is as follows:

$$\ln (PMR)_{ptm} = \alpha + \beta_1 NoFans_m + \beta_2 NoFans_m * Black_p + \beta_3 X_m + \eta_{pt} + \varepsilon, \quad (3)$$

The dependent variable is the natural logarithm of the PMR. Instead of the  $Nationality_p$  interacted with dummy variable  $NoFans_m$ , dummy variable  $Black_p$  will interact with  $NoFans_m$  to distinguish the effect of empty stadiums between Black and white players.  $X_m$  includes match-specific controls and  $\eta_{pt}$  is a player-fixed effect.  $\varepsilon$  is the error term.

The appendix shows a more detailed table including the difference in performance between Black and white football players within nationalities, where the following regression function is used:

$$\begin{aligned} \ln (PMR)_{ptm} = & \alpha + \beta_1 NoFans_m + \beta_2 Black_p + \beta_3 Nationality_p + \beta_4 NoFans_m * \\ & Black_p + \beta_5 NoFans_m * Nationality_p + \beta_6 Black_p * Nationality_p + \beta_7 NoFans_m * \\ & Black_p * Nationality_p + \beta_8 X_m + \theta_{pt} + \varepsilon, \end{aligned} \quad (4)$$

Again, the dependent variable is the natural logarithm of the PMR. In this equation, a three-way interaction term is used as in  $NoFans_m * Black_p * Nationality_p$ . This interaction term makes sure we can separate the effect of empty stadiums on Black and white professional football players within different nationalities. In Great Britain, 31.4% of the players are of African/colonial descent. There might be a positive influence of empty stadiums on Black players between different nationalities.  $Black_p$  is a dummy variable when the player is

considered of African/Colonial descent.  $X_m$  are match control variables as well as player-specific control variables such as age.  $\theta_{pt}$  is team fixed effects which keep the team-specific time-invariant characteristics constant such as team value, squad composition and manager. In this regression team fixed effects will be used over player fixed effects as player fixed effects account for nationality as well as skin colour in this way player fixed effects exclude interesting coefficients.  $\varepsilon$  is the error term.

### 4.3 Popularity regression analysis

In this regression analysis, we seek to investigate the effect of empty stadiums on more popular players on social media. Instagram followers will be used as a continuous variable to get a more accurate understanding of the effect. The regression looks as follows:

$$\ln (PMR)_{ptm} = \alpha + \beta_1 NoFans_m + \beta_2 NoFans_m * Instagram_p + \beta_3 X_m + \eta_{pt} + \varepsilon, \quad (5)$$

The new interaction term  $NoFans_m * Instagram_p$  captures the effect of an empty stadium when a football player has more followers with increments of one million followers at the time. Again, the regression makes use of  $X_m$  match specific controls and  $\eta_{pt}$  player fixed effects.

Lastly, this regression analysis will test the player performance without fans by Instagram popularity for both Black and white footballers and how the lockdown might have affected more popular Black footballers differently from more popular white footballers

$$\begin{aligned} \ln (PMR)_{ptm} = & \alpha + \beta_1 NoFans_m + \beta_2 Instagram_p + \beta_3 Black_p + \beta_4 NoFans_m * \\ & Instagram_p + \beta_5 NoFans_p * Black_p + \beta_6 Instagram_p * Black_p + \beta_7 NoFans_m * \\ & Instagram_p * Black_p + \beta_8 X_m + \theta_{tm} + \varepsilon, \end{aligned} \quad (6)$$

In equation 6, the interaction term  $NoFans_m * Instagram_p * Black_p$  captures the effect of playing in empty stadiums for Black players with continuous variable  $Instagram_p$  to investigate the effect on player performance for more popular football players.  $X_m$  are match-specific and player-specific controls and  $\theta_{pt}$  team fixed effects.

## 5 Results

### 5.1 Results regression analysis nationalities on PMR

Table 5.1 shows the regression analysis of the No Fans dummy on PMR with an interaction term between the No Fans dummy and the Nationality dummies based on formulas 1 and 2. The regression has been performed over the 2019/2020 English Premier League season. Columns 1-4 show the regression being performed on separate Nationality dummies (being Africa, Europe, Latin America and other) making use of player-fixed effects. Column 5 shows the regression on PMR with all interaction terms being used in the formula. Column 6 shows the regression on PMR including all interaction terms and also including player fixed effects in combination with team fixed effects.

The results in column 1 show a non-significant coefficient for the interaction term between Africa and No Fans. This suggests there is no significantly different effect on player performance with fans if the player is from Africa. In column 2 there also does not seem to be a significant effect for European players as well as for column 4 for players from other countries. However, column 3 states that the player performance of Latin American players significantly decreases in post-COVID matches by 3.1%. Column 1-4 also shows all players' performances significantly decrease by 1%-1.2% without any fans. Column 5 shows the results of the regression analysis where all interaction terms are included. In this column, some significant results emerge. Firstly, the interaction term including Africa shows a significant value meaning African players' performance significantly decreases by 2% in empty stadiums. This is also visible for European players whose performance significantly declines by 1% during lockdown matches and the performance of Latin American players also significantly reduces by 2.7%. In the last column, we added team fixed effect to the regression analysis this allows us to control for any residual team-specific conditions such as team composition, team value and ranking. In this column we see the same results and significance as in column 5 only the r-squared is lower and this is because of the multiple fixed effects. The multiple fixed effects make that the independent variables explain a smaller proportion of the remaining variance of the dependent variable.

Table 5.1: Playing without fans for different nationalities on player performance

Variables	Player Match Rating					
	(1)	(2)	(3)	(4)	(5)	(6)
No Fans	-0.011*** (0.003)	-0.011*** (0.003)	-0.010*** (0.003)	-0.012*** (0.003)	-0.004 (0.004)	-0.004 (0.004)
No Fans X Africa	-0.013 (0.009)				-0.020** (0.010)	-0.020** (0.010)
No Fans X Europe		-0.003 (0.005)			-0.010* (0.006)	-0.010* (0.006)
No Fans X Latin America			-0.021** (0.008)		-0.027*** (0.009)	-0.027*** (0.009)
No Fans X Other				0.001 (0.015)	-0.007 (0.015)	-0.007 (0.015)
TMR	0.032*** (0.003)	0.032*** (0.003)	0.032*** (0.003)	0.032*** (0.003)	0.032*** (0.003)	0.032*** (0.003)
Home	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)
Team Goals	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)
Opposing team goals	-0.017*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Player FE	Yes	Yes	Yes	Yes	Yes	Yes
Team FE	No	No	No	No	No	Yes
R-squared	0.276	0.276	0.276	0.276	0.275	0.198
Observations	7,424	7,424	7,424	7,424	7,424	7,424

Note: Table 5.1 shows the regression analysis of the No Fans dummy and interaction terms between No Fans and Nationality on the PMR. The baseline group is British. Control variables are added such as TMR, home game, team goals and opposition team goals. Player fixed effects and team fixed effects are added as well. Standard errors are given in parentheses. Significance is categorized as follows: \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01.

## 5.2 Result regression analysis Black on PMR

Table 5.2 shows the regression analysis of dummy No Fans interacted with Black (whether the player is of African descent). Column 1 shows the effect on player performance for Black players when there are no fans present in the stadium including player-fixed effects. In the appendix tables A1 and A2, the regression analysis of the interaction term combining No Fans, Black and Nationality is shown to investigate the difference within nationalities between Black and white players.

Column 1 shows again a significant coefficient for the No Fans dummy, again suggesting there is a significant decrease of 1.2% for all performances after COVID-19. However, the interaction term between No Fans and Black does not give a significant result and therefore indicating there is no significant difference in underperforming in empty stadiums for Black and white athletes.

### 5.3 Results regression analysis popularity on PMR

Table 5.3 shows the effect on player performance for increments of one million Instagram followers for different skin-colour. Column 1 shows the regression analysis on the player performance of No Fans and the interaction term No Fans and Instagram with player fixed effects. Column 2 shows the effect on player performances of having more Instagram followers between Black and white players with team fixed effects.

From column 1 we can conclude that again the No Fans dummy gives a significant negative relation. However, the interaction term between No Fans and Instagram does not show a significant effect suggesting that a greater number of followers on Instagram does not influence the player performance without fans. Column 2 shows a significant coefficient for the interaction term between No Fans, Instagram and Black. This means that more popular Black players significantly improve their performance in lockdown matches compared to more popular white players. Lastly, this column shows that players who have more followers on Instagram significantly decrease their performance in empty stadiums. Every million followers the performance decreases by roughly 0.2% during lockdown.

Table 5.2: Playing without fans for different skin-color on player performance

Variables	Player Match Rating
	(1)
No Fans	-0.012*** (0.003)
No Fans X Black	-0.001 (0.006)
TMR	0.032*** (0.003)
Home	0.008*** (0.002)
Team goals	0.008*** (0.002)
Opposing team goals	-0.017*** (0.002)
Controls	Yes
Player FE	Yes
Team FE	No
R-squared	0.276
Observations	7,424

Note: Table 5.2 shows the regression analysis of the No Fans dummy and interaction terms between No Fans and Black on the PMR. Control variables are added such as TMR, home games, team goals and opposition team goals. Player fixed effects were added as well. Standard errors are given in parentheses. Significance is categorized as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

Table 5.3: Playing without fans for different numbers of Instagram followers on player performance

Variables	Player Match Rating	
	(1)	(2)
No Fans	-0.011*** (0.003)	-0.010*** (0.004)
Instagram		0.001 (0.001)
Black		-0.006* (0.004)
No Fans X Instagram	-0.000 (0.000)	-0.002** (0.001)
No Fans X Black		-0.003 (0.007)
No Fans X Instagram X Black		0.002* (0.001)
Instagram X Black		-0.000 (0.001)
Controls	Yes	Yes
Player FE	Yes	No
Team FE	No	Yes
R-squared	0.274	0.279
Observations	6,596	6,596

Note: Table 5.3 shows the regression analysis of the No Fans dummy and interaction terms between No Fans and Instagram, and the interaction term No Fans and Instagram for different skin colours on the PMR and the interaction term No Fans, Instagram and Black. Control variables are added such as TMR, home games, team goals and opposition team goals. Player fixed effects and team fixed effects are added as well. Standard errors are given in parentheses. Significance is categorized as follows: \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01.

## 6 Discussion

First, the answer to hypothesis 1 (“Football players belonging to minority groups will perform better in empty stadiums than in full stadiums”) is that football players belonging to minority groups do not perform better in empty stadiums than in full stadiums. We actually see a significant decrease in player performance for Latin American players and African players. Furthermore, British players significantly improved their performance playing empty stadiums and Black British players had a significantly worse performance over the complete 2019-2020 season. These were not the results the previous literature predicted and came to me as a surprise as well. Racism still plays an influential role in football stadiums, and players are bothered by discrimination and racism by fans. However, this paper does not provide proof for this. Reasons for this could be the strict lockdown professional footballers had to face. Professional football players had to live in a bubble and especially foreign players (Latin America and Africa) who due to travel restrictions could not have relatives or friends over. This can cause loneliness and mental health issues possibly influencing their performance and that could explain the results in this paper. In addition, a more practical reason could be. This research only uses the 2019-2020 season where only 92 out of 380 matches were played behind closed doors. In this way, it could be a coincidence.

Secondly, the answer to hypothesis 2 (“Football players who are more popular on social media will not perform better when playing in empty stadiums than less popular players”) is that more popular football players indeed do not perform better than less popular players in empty stadiums. However, we see when we split the sample by skin colour that more popular white players are more negatively affected when playing in empty stadiums than Black players. There has not been conducted much research about the impact of social media pressure on athletes yet and this result could spark a debate about whether players indeed feel more pressured when receiving online hate comments or threats.



## 7 Conclusion

In conclusion, this research has not delivered proof of racism in the English Premier League. Minority groups significantly decreased their performance when playing in empty stadiums and there was no difference in the performance during lockdown for Black and white players. Although, more popular players do not perform better than less popular players in empty stadiums, when differentiated by skin-colour we see some different effects. This research finds that more popular white players perform worse than the more popular Black players. Which is interesting, because earlier we did not find a difference in performance between Black and white players. This paper can be the start of broader research on this topic. Firstly, it would be good for further research to take multiple leagues and multiple seasons into consideration. English is the most professionalized league where players can be so professional and have so many skills, they have become immune to discrimination and maybe even get a certain motivation from it. Second, I would suggest for further research to include more controls such as fitness levels or player value. Additionally, more popular football players did not perform better in empty stadiums than less popular players. Social media has become an enormous component in everyone's life including professional athletes the effect of online abuse have not been researched much yet, although in future research scientist could focus on the impact of social media pressures on athletes by tracking their followers or the amount of abuse they receive and conduct test whether this has an impact on their performances.

## 8 References

- Borrowczyk-Martins, D., Bradley, J., & Tarasonis, L. (2017). Racial discrimination in the U.S. labor market: Employment and wage differentials by skill. *Labour Economics*, 49, 106–127. <https://doi.org/10.1016/j.labeco.2017.09.007>
- Braga, B., & Guillén, D. (2012). Working under pressure: Evidence from the impacts of soccer fans on players' performance. *Economics Letters*, 114(2), 212–215. <https://doi.org/10.1016/j.econlet.2011.10.017>
- Caselli, M., Falco, P., & Mattera, G. (2021). When the Stadium Goes Silent: How Crowds Affect the Performance of Discriminated Groups. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3943174>
- Dohmen, T. J. (2008). Do professionals choke under pressure? *Journal of Economic Behavior & Organization*, 65(3–4), 636–653. <https://doi.org/10.1016/j.jebo.2005.12.004>
- Epting, L. K., Riggs, K. N., Knowles, J. D., & Hanky, J. J. (2011). Cheers vs. Jeers: Effects of Audience Feedback on Individual Athletic Performance. *North American Journal of Psychology*, 13(2).
- FBref. (n.d.). FBref. Retrieved May 9, 2022, from <https://www.fbref.com/en/>
- Ferraresi, M., & Gucciardi, G. (2021). Who chokes on a penalty kick? Social environment and individual performance during Covid-19 times. *Economics Letters*, 203, 109868. <https://doi.org/10.1016/j.econlet.2021.109868>
- Fischer, K., & Haucap, J. (2021). Does Crowd Support Drive the Home Advantage in Professional Football? Evidence from German Ghost Games during the COVID-19 Pandemic. *Journal of Sports Economics*, 22(8), 982–1008. <https://doi.org/10.1177/15270025211026552>
- FootballCritic - Football. Rated. (n.d.). FootballCritic. Retrieved May 9, 2022, from <https://www.footballcritic.com/>
- Goumas, C. (2012). Home advantage and referee bias in European football. *European Journal of Sport Science*, 14(sup1), S243–S249. <https://doi.org/10.1080/17461391.2012.686062>
- Jackson, J. (2021, July 15). *England's Bukayo Saka urges social media platforms to act after racial abuse*. The Guardian. <https://www.theguardian.com/football/2021/jul/15/englands-bukayo-saka-urges-social-media-platforms-to-act-after-racial-abuse>

- Kahn, L. M. (1991). Discrimination in Professional Sports: A Survey of the Literature. *ILR Review*, 44(3), 395–418. <https://doi.org/10.1177/001979399104400301>
- Nunley, J. M., Pugh, A., Romero, N., & Seals, R. A. (2015). Racial Discrimination in the Labor Market for Recent College Graduates: Evidence from a Field Experiment. *The B.E. Journal of Economic Analysis & Policy*, 15(3), 1093–1125. <https://doi.org/10.1515/bejeap-2014-0082>
- Pager, D., & Shepherd, H. (2008). The Sociology of Discrimination: Racial Discrimination in Employment, Housing, Credit, and Consumer Markets. *Annual Review of Sociology*, 34(1), 181–209. <https://doi.org/10.1146/annurev.soc.33.040406.131740>
- Preston, I., & Szymanski, S. (2000). Racial Discrimination in English football. *Scottish Journal of Political Economy*, 47(4), 342–363. <https://doi.org/10.1111/1467-9485.00168>
- Salter, J. (1996). ADAM SMITH ON SLAVERY. *History of Economic Ideas*, 4(1/2), 225–251. <http://www.jstor.org/stable/23722188>
- Savage, D. A., & Torgler, B. (2011). Nerves of steel? Stress, work performance and elite athletes. *Applied Economics*, 44(19), 2423–2435. <https://doi.org/10.1080/00036846.2011.564150>
- Steinberg, J. (2020, February 24). *Chelsea's Antonio Rüdiger says racism won after abuse goes unpunished*. The Guardian. <https://www.theguardian.com/football/2020/feb/23/chelseas-antonio-rudiger-says-racism-won-after-abuse-goes-unpunished>
- Transfermarkt. (n.d.). *Football transfers, rumours, market values and news*. Retrieved May 9, 2022, from <https://www.transfermarkt.com/>
- Wanneh, G. (2020, January 4). *Andre Onana recounts disturbing racism encounter with Italian club*. KICK442. <https://www.kick442.com/andre-onana-recounts-disturbing-racism-encounter-with-italian-club/>

## 9 Appendix

Table A1: Playing without fans for different skin-color on player performance

Variables	Player Match Rating	
	(1)	(2)
No Fans	-0.019*** (0.004)	-0.012*** (0.004)
Black	0.010** (0.004)	-0.007* (0.004)
No Fans X Black	0.000 (0.007)	0.002 (0.007)
British	0.002 (0.003)	
No Fans X British	0.013** (0.006)	
No Fans X Black X British	0.002 (0.011)	
Black X British	-0.035*** (0.006)	
Europe		-0.002 (0.003)
No Fans X Europe		-0.002 (0.006)
No Fans X Black X Europe		-0.007 (0.012)
Black X Europe		0.011* (0.006)
Controls	Yes	Yes
Player FE	No	No
Team FE	Yes	Yes
R-squared	0.280	0.277
Observations	7,424	7,424

Note: Table A1 shows the regression analysis of the No Fans dummy and interaction terms between No Fans and Black, and the interaction term No Fans and Black for dummies British and Europe on the PMR. Control variables are added such as TMR, home games, team goals and opposition team goals. Team fixed effects are added as well. Standard errors are given in parentheses. Significance is categorized as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

Table A2: Playing without fans for different skin-color on player performance

Variables	Player Match Rating	
	(1)	(2)
No Fans	-0.010*** (0.003)	-0.013*** (0.003)
Black	-0.005 (0.003)	-0.002 (0.003)
No Fans X Black	-0.004 (0.006)	-0.002 (0.006)
Latin America	-0.003 (0.005)	
No Fans X Latin America	-0.027*** (0.010)	
No Fans X Black X Latin America	0.047 (0.030)	
Black X Latin America	0.020 (0.014)	
Other		0.007 (0.009)
No Fans X Other		0.002 (0.018)
No Fans X Black X Other		0.052 (0.032)
Black X Other		-0.032* (0.019)
Controls	Yes	Yes
Player FE	No	No
Team FE	Yes	Yes
R-squared	0.276	0.277
Observations	7,424	7,424

Note: Table A2 shows the regression analysis of the No Fans dummy and interaction terms between No Fans and Black, and the interaction term No Fans and Black for dummies British and Europe on the PMR. Control variables are added such as TMR, team goals and opposition team goals. Player fixed effects and team fixed effects are added as well. Standard errors are given in parentheses. Significance is categorized as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .