When the Stadium Goes Silent:
How Crowds Affect the Performance of Discriminated Groups

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Abstract

Using a natural experiment induced by COVID-19, we test how the sudden absence of fans at football games impacts player performance in Italy. We find that African players, who are most commonly targeted by racial harassment, play better when fans are no longer at the stadium. A similar, albeit weaker, effect is detected among black players. Using official records of racist behaviour by fans, we show that performance improves the most in teams that were subject to abuse before the lockdown. Our evidence suggests that racist pressure can harm discriminated groups and lower the overall quality of the game.

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1 Introduction

In modern societies, sports events are a unique public display of emotions and frustrations. In football, the noisy support of spectators is an integral part of the 'beautiful game', as each side attempts to intimidate the other and cheer their team to victory.[1] As a mentality of 'us' vs 'them' sets in, however, support for one's team often turns into a language of disparagement and insult against the rival, which can rapidly descend into discriminatory and racist behaviour.[2]

The problem of racism in football is well known, as underscored in a recent report by the United Nations (Sonntag and Ranc, 2015), but it persists largely unabated and episodes of racial harassment during matches occur frequently in many countries. Yet, little is known about the impact of racial harassment on the performance of the athletes who are targeted. One may hypothesise, for instance, that intimidation lowers the quality of athletes' performance and is therefore detrimental to the sport. Uncovering this mechanism would serve the broader purpose of shedding light on the impact of racial harassment on the productivity of economic agents.

This is the first paper, to the best of our knowledge, that attempts to fill this knowledge gap by means of a natural experiment: the sudden absence of football fans in Italian stadiums caused by the COVID-19 pandemic. In early March 2020, the main Italian football championship (Serie A) was interrupted in an effort to prevent the spread of the virus and resumed at the end of June with so-called "ghost games" – matches played without supporters at the stadium. As racist intimidation from fans against players is frequent and widely documented in Italy, this natural experiment allows us to test whether minorities that are most commonly subject to abuse experience a differential change in performance when the stadium goes silent.

Our main result is that players from Africa, who are most heavily targeted by racial harassment during matches, experience a significant improvement in performance when supporters are no longer at the stadium, while the performance of players from other regions does not change. We reach the same conclusion when we focus on players of African origin (who may also have other nationalities) and black players more broadly, but the result is largely

[1] Since the paper focuses on a European football league, we will use the term 'football' as opposed to 'soccer' throughout the draft.

[2] This is further accentuated by the strong link that exists between football and national identity (Depetris-Chauvin et al., 2020).

driven by African players (in line with the hypothesis that players born in Africa are not used to being racially harassed until they arrive in Europe and are thus less prepared to withstand racist pressure). We document this effect using detailed data on players' performance based on a widely-used algorithm that accounts for a wide array of performance metrics. The analysis includes individual, team, and match fixed effects, and controls for a host of time-varying factors, including weather conditions during each game.

Our second key result is that performance improves more substantially among African players whose teams were subject to racist abuse prior to the lockdown and whose performance was plausibly affected negatively by such episodes. We reach this conclusion using data on episodes of racist conduct by fans that were officially recorded by the authorities in the first part of the season (prior to the lockdown). This evidence corroborates the hypothesis that racism plays a role in driving our findings. We also run a battery of robustness checks to test competing mechanisms, including sheer 'choking effects' of large crowds, lack of experience, potential differences in athleticism, and referee bias. None of these explanations finds support in the data. Although the ideal natural experiment to test the mechanism of interest would have entailed shutting down racist behaviour per se, rather than the presence of fans more broadly, our evidence is strongly suggestive that racist pressures affect players and it provides valuable new insights into the impact of crowd pressure on minority groups.

The results fit a broader framework that may stretch beyond the world of sports, whereby individuals who belong to historically discriminated groups perform worse than their peers when the task takes place in an environment where discriminatory behaviour occurs manifestly. This hypothesis requires broader scrutiny beyond the specific context we analyse. Furthermore, since we show that discriminated players do better in the absence of fans while no other groups do worse, our evidence suggests that racial harassment can lead to an overall decrease in productivity and efficiency.

This study contributes to the literature on the economic costs of racial discrimination and on how discrimination negatively affects the labour market outcomes of minority groups. A growing body of work documents the role of racial discrimination in driving labour market disparities (e.g., Lang and Spitzer, 2020), which can take a variety of forms, including wage gaps (Bayer and Charles, 2018; Aizer et al., 2020; Caselli and Falco, 2021). Our work specifically investigates the effect of racial harassment on the labour market outcomes of discriminated

workers. The existing evidence on this important question is still limited. Previous studies have documented negative effects among nurses (Shields and Price, 2002; Shields and Wheatley Price, 2002; Deery et al., 2011) and in the military (Antecol and Cobb-Clark, 2008; 2009), but cannot rely on exogenous sources of variation to identify causal impacts. We overcome this limitation by using a natural experiment to study the problem. Our results are particularly striking because they demonstrate that even elite athletes who are the best in their profession (and can count on significant resources to cope with discrimination) are affected. Though we can only speculate about this, one may predict that larger effects would be detected in lower sports leagues where the victims of discrimination cannot count on the same resources (and skills) as top players.

Finally, we contribute to the specific literature on the impact of supporters on sports results (e.g., Pettersson-Lidbom and Priks, 2010; Ponzo and Scoppa, 2018; Bryson et al., 2021; Colella et al., 2021) and of racial discrimination in sports (e.g., Price and Wolfers, 2010; Parsons et al., 2011; Gallo et al., 2013).

2 The Context of Our Study

The problem of racism in football is well known and it is not new. In a collection of reflections on football, the writer Eduardo Galeano addresses the controversies surrounding the presence of black players in Latin American teams as early as one hundred years ago (Galeano, 1995). A recent UNESCO report takes stock of the problem and underlines an inherent paradox within the sport (Sonntag and Ranc, 2015). On the one hand, football is without doubt the most religiously and ethnically inclusive sport in the world. With over 200 national associations that form part of it, FIFA (the International Federation of Association Football) has more members than the United Nations. Yet, racism is so widespread among football supporters that in a number of countries ad-hoc laws and institutions have been created to monitor episodes of racism in stadiums and apply sanctions to attempt curbing them.

Italy is no exception to the pervasiveness of racism in football. Episodes of racism in Italian stadiums are common (e.g., New York Times, 2019), and have often been very prominent in the public debate, especially when sanctions have been imposed on racist supporters and their teams. A recent report published by the Italian Footballers' Association documents over 600 cases of racist violence, intimidation, and threats against players of all categories over a

period of 6 years (Romani and Poli, 2019). The largest share of episodes (close to one third) took place in the main league (Serie A). This is likely to be a lower-bound on the number of episodes that actually occurred, since much of the phenomenon (e.g., much of the verbal abuse that takes place during a match) goes undetected. The report further indicates that players from African countries are the most heavily abused in Italian stadiums. This is in line with journalistic reporting (Ziegler, 2013), as well as academic literature on the subject (Doidge, 2015). The abuse most commonly takes the form of derogatory chanting and booing, but it can also escalate to most contemptible acts, such as throwing bananas at African players (BBC, 2014).

The COVID-19 pandemic offers a unique opportunity to study the effects of racism on the performance of football players in Italy. The country was the most severely hit in Europe in the early months of the pandemic.[3] As a result, on March 9 the Italian government decided to impose a national lockdown, which ended on May 3. The lockdown entailed a suspension of all sporting events in the country.[4] The main football league (Serie A) was interrupted on March 9 and no games were played for the following three months. It resumed on June 20, but the remaining games of the season (approximately one third of the total) were played in empty stadiums. The season ended on August 2.[5] The new Serie A season (2020-21) began on September 19. Since the number of COVID-19 infections had fallen during the summer, the government decided to allow supporters back in stadiums. The analysis in this paper will focus on matches from the 2019-20 season.

3 Data and Empirical Model

3.1 Data

For the purpose of our analysis, we construct a rich dataset combining several sources of information. First, in order to measure the performance of players, we use the scores assigned

[3] By early March 2020, while other European countries were detecting their first cases, recorded daily infections in Italy were already above 5,000.

[4] A small number of games had already been postponed or were played without fans between late February and early March as the virus started to spread. We account for this in the analysis and treat these games as those that took place after the lockdown.

[5] All the post-lockdown matches took place in the evening to avoid the hottest hours of the day during the summer.

by an algorithm to each football player for every match played during the season. The scores range from 0 to 10, with increments of 0.5, where 6 represents the equivalent of a passing grade. Starting from the rich and comprehensive database of Opta, the algorithm (called 'Alvin482' and developed by Fantacalcio.it, the largest online provider of information for fantasy football leagues in Italy) takes into account individual players' position (e.g., goalkeeper, defender, midfielder, and forward), their plays (e.g., passes, tackles, assists, dribbles, and goals), and other collateral aspects (e.g., level of difficulty of the game) to calculate a performance index.[6] The information is therefore fully based on objectively measured criteria, which is a key strength of our approach (compared, for instance, to using the scores of expert journalists after each game, which may be affected by biases in their judgement). Another strength of the data is that we obtain an assessment of performance that is informative for players in all positions.[7].

The dataset includes all players who made at least one appearance in the 2019-20 Serie A season. We exclude all players who did not play after February or only played from June onward (i.e., only played before or after the lockdown). We also exclude players who made only very sporadic appearances (those who did not play at least one game before and after the lockdown with the same team).[8] The resulting dataset includes 419 players across 20 teams.

We complement this dataset with information on players' nationality and assign each player to one of the following groups: Italy, European Union (including the UK), East Europe (non-EU), Latin America, Africa, Other. Players from Italy and the EU jointly account for 68.5% of all the players. The largest three groups of non-EU players are from Latin America (16.5%), non-EU Eastern European countries (7.2%), and Africa (6.0%).[9] Moreover, we categorise players according to their family origins (e.g., 9.3% of players are categorised as being of African origin as their parents were born in an African nation) and skin colour (16.5% of players are categorised as black) to verify whether the effects are also detected on these broader categories.[10]

Furthermore, to directly test for the effect of racism, we obtain data on past episodes

[6]The data can be downloaded from www.fantacalcio.it and additional information on the algorithm 'Alvin482' can be found in Fantacalcio.it (2017). Such data are rare and typically not publicly available.

[7]If we were to use goals scored, the most obvious measure of performance in football, the metric would not be very informative for the performance of defensive players

[8]Robustness tests show that our conclusions do not hinge on this decision.

[9]See Table A1 in the Online Appendix for further information on players' nationalities.

[10]Our categorisation of black vs non-black players follows the commonly used Fitzpatrick scale (Fitzpatrick, 1975) of skin colour, which defines six physiologically relevant groups. We categorise as black those who are closest to types five and six on the scale ("brown" and "dark brown to black" skin).

of racist behaviour among football fans. The data are based on the official record of the internal justice system of Lega Serie A (the administrative body that oversees the championship), and provide an official account of racist abuse against football players in each game (e.g., racist chants, insults).[11] We use this information to identify teams that were victim of racist abuse by opponent fans prior to the lockdown, and we test whether the performance of African players in those teams changes differentially after the lockdown compared to African players who did not directly experience abuse.[12]

Finally, using information on the time and location of each match, we are able to incorporate in the analysis rich data on weather conditions during the game.[13] These include temperature, rain, fog, humidity, and wind.

Figure 1 plots changes in the average score attained by players from different groups between the pre- and post-lockdown period. In line with our hypothesis, it shows that African players experience a significant increase in performance after the lockdown. Table 1 offers additional details on these statistical differences.[14]

3.2 Empirical Model

Our main results are based on the estimation of the following empirical model:

$$ln(Score)_{itm} = \alpha + \beta No\ Fans_m + \sum_{k=1}^{K} \gamma_k No\ Fans_m \times Group_{ik} + \theta \mathbf{X}_m + \eta_{it} + u_{itm}, \qquad (1)$$

where $ln(Score)$ is the natural logarithm of the score of player i in team t for match m;[15] $No\ Fans_m$ is a dummy equal to 1 if match m takes place without fans in the stadium; $Group_{ik}$ is a dummy equal to 1 if player i belongs to minority k (e.g., Africa, Latin America, East

[11] The data are available at www.legaseriea.it.

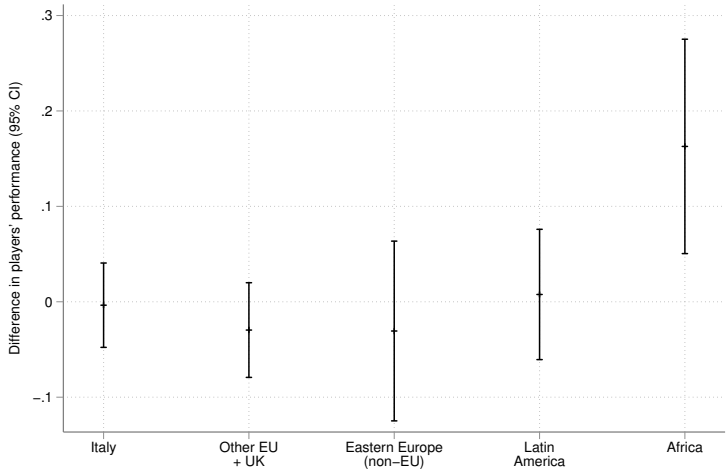
[12] Twelve episodes of abuse were officially recorded in the pre-lockdown part of the 2019-20 season against players of six teams (nearly one third of all teams in the championship): Brescia, Fiorentina, Inter, Juventus, Napoli, and Sampdoria. Since the official statistics typically capture only the most salient episodes, it is reasonable to expect that these had the strongest impact on players, which motivates our approach. The actual number of episodes, however, is likely to be larger.

[13] The data are available at www.ilmeteo.it.

[14] One feature of the dataset to be noted is that the number of observations decreases in the second part of the season due to the lower number of matches. This does not affect our conclusions since our analysis controls for individual player fixed effects and is therefore unaffected by changes in the composition of the sample. Nonetheless, we run a robustness test by confining our sample to players who take part in the vast majority of matches both before and after the lockdown. Our results are unchanged (discussed below).

[15] Conducting the analysis in levels rather than logs does not change the results.

Figure 1: Difference in players' performance pre- vs post-lockdown, by group



Note: The figure reports the mean difference along with 95% confidence intervals in players' performance pre- vs post-lockdown by group. The difference for players from other regions not included in the graph, which jointly account for less than 2% of all players, is not shown for conciseness (and it is not statistically significant).

Europe (non-EU), etc.); $\mathbf{X}_m$ includes variables that capture match-specific characteristics, such as home games, an opponent fixed effect, and weather conditions;[16] η_{it} is a player fixed effect that allows us to control for ability, productivity, and any other individual traits that may play a role in the analysis (e.g., age, salary level). To account for the possibility that such effect may be team-specific (i.e., that a player's productivity changes with the team he plays for), we allow this to be a player-team fixed effect and we discuss this feature in greater detail below. u_{im} is an idiosyncratic error term.

In addition to the baseline model, the following augmented specification tests the mechanism of interest in greater detail:

$$ln(Score)_{itm} = \alpha + \beta No\ Fans_m + \sum_{k=1}^{K} \gamma_k No\ Fans_m \times Group_{ik} + \\ + \sum_{k=1}^{K} \delta_k No\ Fans_m \times Group_{ik} \times Prev.\ Subject\ to\ Racism_{tm} + \theta \mathbf{X}_m + \eta_{it} + u_{itm}, \quad (2)$$

where $Prev.\ Subject\ to\ Racism_{tm}$ is a dummy equal to 1 if match m is an away game played by a team t whose players faced episodes of racial abuse (by fans of opposing teams) prior to the

[16] Our results are robust to the exclusion of all the control variables in $\mathbf{X}_m$, as well as to the inclusion of the number of goals scored by each team as a proxy of competitiveness (though one should be aware that the potential endogeneity of this variable poses some limitations to the value of using such a control). All additional results are available upon request.

Table 1: Descriptive statistics: players' performance by group

	Fans (1)		No Fans (2)		Difference, (2)-(1)
Country group	N	Mean (SE)	N	Mean (SE)	t-test
Italy	2281	5.946	1286	5.942	-0.004
		(0.014)		(0.017)	(0.023)
Other EU + UK	1725	5.994	1083	5.964	-0.030
		(0.016)		(0.019)	(0.025)
East Europe (ex-EU)	523	6.029	258	5.998	-0.031
		(0.027)		(0.040)	(0.048)
Latin America	1070	6.010	572	6.017	0.008
		(0.021)		(0.027)	(0.035)
Africa	357	5.846	228	6.009	0.163***
		(0.036)		(0.044)	(0.057)
Other	76	6.000	53	5.991	-0.009
		(0.072)		(0.096)	(0.117)
Total	6032	5.973	3480	5.971	-0.002
		(0.009)		(0.011)	(0.014)

Note: The table displays mean performance, standard error (in brackets), and the number of observations (player-match) by match type (Fans and No Fans) and players' group. "Fans" refers to all games with fans at the stadium, which implies all games from week 1 to week 26, with the exception of four matches in week 25 that were postponed to June and six matches in week 26 that were played in March but without fans. "No Fans" refers to all games without fans, which implies all matches from week 27 to week 38 plus the four postponed matches of week 25 and the six matches of week 26 played without fans. *** $p < 0.01$.

lockdown.[17] The rationale is that players of those teams were exposed to documented episodes of racist pressure and, therefore, are the ones whose performance should have most plausibly improved in the absence of fans relative to the pre-lockdown period. Hence, the additional triple interaction term $No\ Fans_m \times Group_{ik} \times Prev.\ Subject\ to\ Racism_{tm}$ allows us to test whether the change in performance of players from minority group k is larger if they are in teams that experienced racist episodes prior to the lockdown (compared to players from the same minority group in teams that did not experience such episodes). This will allow us to shed additional light on the role that racism plays in driving our results.

4 Results

Our main result is that the performance of African players improves significantly when supporters are no longer at the stadium (Table 2). Compared to the pre-lockdown period, African players attain scores that are 3% higher in the post-lockdown games. By comparison, players from the other geographic areas do not experience significant changes in performance. The

[17] We focus specifically on away games since players typically experience abuse from supporters of the opposing team.

analysis is based on the estimation of equation (1). It controls for *player* × *team* fixed effects and standard errors are clustered at the *team* × *match day* level.[18] All our specifications also control for time-varying match characteristics, such as home games, an opponent fixed effect, and weather conditions.[19] Including these controls, however, does not affect our conclusions.[20] In the same vein, the last two columns of Table 2 include *match day* fixed effects that allow us to control for any residual conditions that are specific to a particular point in the season, and *team* × *match day* fixed effects that allow us to control for conditions that are specific to an individual team and match, such as team composition (which may give rise to spillovers, for instance, depending on the number of African players in the team), and whether the game is a local derby (which is often associated with fans being more aggressive). The results do not change significantly, although the statistical precision of our estimates decreases. This is to be expected, since identification is attained from comparisons between players who are within the same team in a given match. The fact that such a demanding specification confirms our results, despite the limited amount of variation it can rely on, lends further support to our conclusions.

Our main result does not change qualitatively when we replace $Africa$ with a category that includes both African players and non-African players of African origin (see Table A3 in the Online Appendix). These are (mostly) European players whose parents were born in Africa. The effect we detect is, however, smaller (the coefficient falls from 0.030 to 0.016) and statistically weaker (significant at the 10% level). A potential explanation for this weaker result is that European players of African descent have been exposed to racial harassment for their entire careers, while African players have only been exposed to harassment since they arrived

[18] Since relatively few players change team over the course of the season, including *player* × *team* fixed effects may in fact be of limited value and, in practice, similar to including *player* and *team* fixed effects separately. Indeed, when we do that, the results do not change (the additional estimates are omitted for conciseness but are available upon request).

[19] Player fixed effects also account for potentially time-varying factors, such as earnings, which are however fixed over the course of a season.

[20] Another difference between the pre-lockdown and the post-lockdown part of the season is that the latter included fewer matches. While we have no specific reason to believe this may have led to systematic imbalances in the samples of players who took part in matches before and after the lockdown, we repeat the estimation on the sample of players who played at least 30 matches out of 38 throughout the season, and were therefore present in the majority of matches both before and after the lockdown. Our conclusions are confirmed (Column 1, Table A2 in the Online Appendix) and they do not vary if we focus on players who played an even larger number of matches (35 out of 38, omitted for conciseness).

Table 2: Effect of ghost stadiums (no fans) on players' performance

	Africa (1)	Latin (2)	East (3)	EU (4)	Other (5)	All (6)	All (7)	All (8)
No Fans	-0.002	-0.000	0.000	-0.000	-0.000	-0.004	-0.002	
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.022)	
No Fans ×	0.030***					0.032***	0.032***	0.018*
Africa	(0.010)					(0.010)	(0.010)	(0.009)
No Fans ×		-0.002				0.003	0.003	-0.001
Latin America		(0.007)				(0.007)	(0.008)	(0.007)
No Fans ×			-0.004			0.000	0.000	-0.000
East Europe (non-EU)			(0.008)			(0.008)	(0.008)	(0.008)
No Fans ×				0.000		0.004	0.004	-0.003
Other EU + UK				(0.005)		(0.006)	(0.006)	(0.005)
No Fans ×					0.010	0.014	0.014	0.003
Other					(0.020)	(0.020)	(0.020)	(0.018)
Match controls	yes	yes	yes	yes	yes	yes	yes	no
Player-Team FE	yes	yes	yes	yes	yes	yes	yes	yes
Opponent team FE	yes	yes	yes	yes	yes	yes	yes	yes
Match day FE	no	no	no	no	no	no	yes	no
Team-Match day FE	no	no	no	no	no	no	no	yes
Observations	9,512	9,512	9,512	9,512	9,512	9,512	9,512	9,512
R-squared	0.160	0.159	0.159	0.159	0.159	0.160	0.162	0.394

Note: The dependent variable is the log of players' scores (performance). No Fans is a dummy equal to 1 for all matches played without fans. The baseline group in columns (6)-(8) is Italy. Match controls include: home dummy, home dummy interacted with No Fans, and weather characteristics in each city and day of the match (average, minimum, and maximum temperatures, humidity, wind, and presence of fog, rain and storms). Standard errors are clustered at the team-match day level.
* $p < 0.10$.
*** $p < 0.01$.

in Europe.[21] This might have made the former better prepared to face abusive crowds.[22] It should also be remarked that we mainly focus on origins by nationality, rather than on a looser definition of ethnic background (e.g., black players), in order to avoid ambiguity and potential arbitrariness in the categorisation (e.g., players often have mixed ethnic backgrounds). Yet, when we repeat the analysis using a coarser split of players into black and non-black, our conclusions are similar. The coefficient becomes 0.013 and is significant at the 10% level, as shown in Table A3 in the Online Appendix (consistent with recent work by Colella, 2021). Overall, however, the evidence points to the conclusion that the effect we detect is most relevant

[21] In line with this hypothesis, when we split players into those with more or less than 5 years of experience in the Italian major football league, we find that the positive effect of no longer having fans at the stadium on the performance of African players is larger among the less experienced ones (though the effect is not statistically significant, possibly due to the small sample size). On the other hand, when we test whether less experienced players perform better in the absence of fans *independently of their origins*, we find no effect, confirming that racial pressure is the main channel at play (Column 2, Table A2 in the Online Appendix).

[22] Following this logic, one may also hypothesise that the improved performance of African players without fans could in fact be due to habituation to abusive crowds over the course of the season. If this were the case, we should observe an improvement in performance among African players in the second part of seasons prior to the one we analyse. When we run this additional test on the 2018-19 season (dividing the season in two blocks and experimenting with different block lengths), we find no evidence in support of this hypothesis (Table A4 in the Online Appendix). These results suggest that habituation occurs over longer periods and support the conclusion that the effect we observe is due to the absence of fans.

for African players and players of African origin, which is consistent with the patterns of racial harassment commonly observed in football stadiums, where those groups are most frequently subject to racist pressure.[23]

Our second key result is that the absence of supporters has a stronger positive impact on the performance of African players in teams that were subject to racist abuse prior to the lockdown. The result is obtained from the estimation of equation (2) and it is reported in Table 3. African players from abused teams experience an improvement in performance of about 11% compared to the pre-lockdown period (the sum of the coefficients on $No\ Fans \times Africa$ and $No\ Fans \times Africa \times Prev.\ Subject\ to\ Racism$). African players in other teams experience a smaller (but still statistically significant) improvement in performance of 2% (the coefficient on $No\ Fans \times Africa$).[24] In interpreting this result, one should bear in mind that officially recorded episodes of racial harassment are only a (likely small) subset of all the episodes of verbal abuse and intimidation that commonly occur during matches. Match officials typically record the most manifest forms of abuse (e.g., prolonged booing or racist chanting), but cannot keep track of all the more sporadic episodes that still occur. A smaller but still significant effect is therefore in line with our expectations. One should also bear in mind that abused teams may not be representative of all the teams in the championship (though they do cover both top and bottom performers, as well as a range of regions from both the north and the south of the country), but it is worth remarking that all the specifications we estimate control for individual and team fixed effects. Overall, these findings support the hypothesis that the absence of fans has an impact on the performance of African players by turning off the discriminatory pressure they are subject to.[25]

[23] A potential confounder may be the fact that players from Africa may have been less negatively affected by worries about the spread of COVID-19 since African countries were not the most heavily affected in the first months of the pandemic. To test this hypothesis, we add to our empirical model an interaction term between $No\ Fans$ and the number of deaths due to COVID-19 per million inhabitants in the player's country of origin from the beginning of the pandemic to June 20, 2020 (day of the first match after the lockdown). We find no evidence that players from more heavily affected countries did worse after the lockdown *ceteris paribus* (Column 3, Table A2 in the Online Appendix).

[24] This is consistent with the average effect of approximately 3% since only one sixth of all Serie A games involve a team subject to racism prior to the lockdown and playing away.

[25] A possible concern is that our measure of racial harassment is endogenous, as such abuse may be directed particularly at players performing well or badly. In the first case, our estimated effect would have a downward bias and can be considered a lower bound. To avoid concerns related to the second case, we check the robustness of our results to excluding all players who received a score lower than 6 in games prior to the lockdown during which their team was subject to racist abuse. All the results go through and are available upon request.

Table 3: Effect of ghost stadiums (no fans) on players' performance, previous episodes of racist abuse

	Africa (1)	Latin (2)	East (3)	EU (4)	Other (5)	All (6)	All (7)	All (8)
No Fans	-0.002	-0.001	0.000	-0.001	-0.001	-0.005	-0.003	
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.022)	
Prev. Subject to Racism	-0.004	-0.006	-0.004	-0.002	-0.005	-0.003	-0.005	
	(0.009)	(0.010)	(0.010)	(0.010)	(0.009)	(0.011)	(0.011)	
No Fans ×	-0.002	0.004	-0.000	0.004	0.001	0.006	0.007	
Prev. Subject to Racism	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.014)	(0.015)	
No Fans × Africa	0.022**					0.026**	0.026**	0.011
	(0.010)					(0.011)	(0.011)	(0.010)
No Fans × Africa ×	0.087***					0.078**	0.078**	0.075**
Prev. Subject to Racism	(0.033)					(0.033)	(0.034)	(0.032)
Africa ×	-0.025					-0.026	-0.026	-0.029
Prev. Subject to Racism	(0.032)					(0.032)	(0.032)	(0.031)
No Fans × Latin America		0.001				0.006	0.006	0.002
		(0.007)				(0.008)	(0.008)	(0.007)
No Fans × Latin America ×		-0.018				-0.021	-0.022	-0.015
Prev. Subject to Racism		(0.018)				(0.020)	(0.020)	(0.018)
Latin America ×		0.008				0.005	0.006	0.002
Prev. Subject to Racism		(0.012)				(0.014)	(0.014)	(0.012)
No Fans × East Europe (non-EU)			-0.005			0.000	0.000	-0.001
			(0.008)			(0.009)	(0.009)	(0.008)
No Fans × East Europe (non-EU) ×			0.007			0.001	0.000	0.005
Prev. Subject to Racism			(0.022)			(0.024)	(0.024)	(0.024)
East Europe (non-EU) ×			0.002			0.000	0.000	-0.005
Prev. Subject to Racism			(0.015)			(0.016)	(0.016)	(0.015)
No Fans × Other EU + UK				0.002		0.006	0.006	-0.002
				(0.005)		(0.006)	(0.006)	(0.005)
No Fans × Other EU + UK ×				-0.010		-0.012	-0.012	-0.004
Prev. Subject to Racism				(0.012)		(0.013)	(0.013)	(0.012)
Other EU + UK ×				-0.006		-0.005	-0.005	-0.009
Prev. Subject to Racism				(0.009)		(0.010)	(0.010)	(0.010)
No Fans × Other					0.013	0.018	0.018	0.002
					(0.021)	(0.021)	(0.021)	(0.019)
No Fans × Other ×					-0.065	-0.070	-0.071	-0.017
Prev. Subject to Racism					(0.059)	(0.059)	(0.060)	(0.062)
Other ×					0.054	0.052	0.055	0.042
Prev. Subject to Racism					(0.059)	(0.060)	(0.061)	(0.060)
Match controls	yes	yes	yes	yes	yes	yes	yes	no
Player-Team FE	yes	yes	yes	yes	yes	yes	yes	yes
Opponent team FE	yes	yes	yes	yes	yes	yes	yes	yes
Match day FE	no	no	no	no	no	no	yes	no
Team-Match day FE	no	no	no	no	no	no	no	yes
Observations	9,512	9,512	9,512	9,512	9,512	9,512	9,512	9,512
R-squared	0.160	0.159	0.159	0.159	0.159	0.161	0.163	0.395

Note: The dependent variable is the log of players' scores (performance). No Fans is a dummy equal to 1 for all matches played without fans. Prev. Subject to Racism is a dummy equal to 1 for players in away games and in teams that were subject to racism prior to the lockdown. The baseline group in columns (6)-(8) is Italy. Match controls include: home dummy, home dummy interacted with No Fans, and weather characteristics in each city and day of the match (average, minimum, and maximum temperature, humidity, wind, and presence of fog, rain and storms). Standard errors are clustered at the team-match day level.
** $p < 0.05$.
*** $p < 0.01$.

5 Alternative Mechanisms and Placebo

In this section, we document a battery of robustness checks that aim to test alternative mechanisms to racial harassment as an explanation of our key results. We also document the results of placebo tests that aim to verify whether African players may have been displaying a different performance already prior to the lockdown.

5.1 Choking Under Pressure

One can argue that racist harassment is not the only form of pressure that disappears when fans are no longer at the stadium. Sheer cheering and chanting by supporters is a powerful force that may impact the performance of players without being racist. Indeed, existing work on the psychological effects of crowd pressure indicates that athletes often "choke under pressure" (Baumeister, 1984; Dohmen, 2008; Böheim et al., 2019). In our exploration of the literature, we have found no convincing explanation as to why such a mechanism should operate specifically to the detriment of African players, while not affecting those from other minorities who are equally foreign to the Italian context. Nonetheless, we test for this possibility using two strategies.

First, we introduce a dummy capturing whether each match is played in a 'hot stadium', one where the number of fans before the lockdown was, on average, above the national median. Specifically, we include an interaction between $No\ Fans \times Africa \times High\ Attendance\ Stadium$. The rationale is that high attendance per se causes choking under pressure, while it does not necessarily imply racism. Upon doing that, we find no evidence that the estimated effect on the performance of African players is due to sheer choking under pressure. The coefficient on this new interaction term is small and not statistically significant (Column 1, Table 4). Second, we introduce a dummy to identify players with experience of playing in major international competitions, who are better prepared to play in front of large crowds. If choking under pressure is the main driver of our results, this should allow us to detect it by helping us to control for the degree of mental readiness to face large crowds. In particular, we follow other recent studies in this literature and use participation in the main European championships (Europa League and Champions League) as our indicator of international experience (e.g., Ferraresi and Gucciardi, 2020). With this additional variable at hand, we can introduce another interaction term ($No\ Fans \times Africa \times Team\ International\ Experience$) to test whether the estimated effect on African players differs by their level of experience. We do not find any evidence supporting this conclusion (Column 2, Table 4).

5.2 Style of play and athleticism

The long interruption in the football season due to the lockdown caused major disruption in the training routines of players and may have affected the dynamics of the game. This may

have impacted players with different styles of play and levels of athleticism differently. While we have no strong reason to believe that African players should have been affected by these mechanisms differently from the rest, we test for this possibility by introducing variables that capture players' levels of athleticism before the lockdown (Column 3, Table 4). Specifically, we introduce the average number of kilometres run by each player during the course of a match before the interruption of the season (and create a dummy equal to 1 if a player runs more than the median, *Runner*), as well as players' height (above the median, *Tall*), and their age (below the median, *Young*). We interact these proxies of athleticism with the *No Fans* dummy. We also control for players' position (goalkeeper, defender, midfielder or forward), as that can influence the style of play and the extent to which athleticism matters for performance. We find no evidence that athleticism correlates with improved performance in the post-lockdown period nor that it drives the improved performance of African players, in line with our priors.[26]

5.3 Referee Bias

A growing literature documents that the absence of fans at the stadium affects referees' decisions (Bryson et al., 2021; Cueva, 2020; Endrich and Gesche, 2020; Scoppa, 2021). Another strand of the literature shows that referees' perceived racism can negatively affect black players' performance (e.g., Parsons et al., 2011). One may therefore hypothesise that pressure from racist fans may lead referees to be tougher on African players, who may respond by lowering their performance. To control for this indirect mechanism, we include in our specification whether players receive a yellow or red card, as well as an interaction between cards received and the dummy for no fans. Our results are not affected. We also test whether African or black players are awarded more cards (yellow, red, and the sum of the two) when fans are present but find no supporting evidence for this hypothesis.[27] These results are omitted for conciseness but available upon request.

[26]The specification also controls for the number of days since the last match played by a player and whether a player was frequently substituted in or out during the course of a game prior to the lockdown. None of these variables have an impact. The reason for including them is that, after the lockdown, the frequency of matches was increased and the number of substitutions allowed changed from 3 to 5 (to compensate for lack of training during the lockdown). This second change may have created an advantage for players who, prior to the interruption, were more likely to start from the bench and be substituted in during the course of the match. We also find that African players are no less likely to be substituted out after the lockdown. If their athletic condition was superior to other players, one would expect to find a difference in this respect.

[27]It would have been interesting to include the number of fouls committed by players in the analysis, but the information is unavailable.

Table 4: Effect of ghost stadiums (no fans) on players' performance, alternative mechanisms

	High Att. Away	Team Int. Exp.	Athleticism
	(1)	(2)	(3)
No Fans	-0.000	0.001	-0.009
	(0.010)	(0.008)	(0.011)
No Fans × Africa	0.024**	0.029***	0.032***
	(0.011)	(0.011)	(0.010)
High Attendance Away	-0.003		
	(0.009)		
No Fans ×	-0.004		
High Attendance Away	(0.012)		
Africa ×	0.006		
High Attendance Away	(0.019)		
No Fans × Africa ×	0.031		
High Attendance Away	(0.023)		
No Fans ×		-0.009	
Team International Experience		(0.009)	
No Fans × Africa ×		-0.002	
Team International Experience		(0.028)	
Days since last match			-0.000
			(0.000)
No Fans × Sub In			0.010*
			(0.006)
No Fans × Sub Out			0.003
			(0.005)
No Fans × Midfielder			0.007
			(0.007)
No Fans × Defender			0.004
			(0.007)
No Fans × Goalkeeper			0.005
			(0.010)
No Fans × Young			-0.003
			(0.006)
No Fans × Runner			0.002
			(0.006)
No Fans × Tall			-0.005
			(0.005)
Match controls	yes	yes	yes
Player-Team FE	yes	yes	yes
Opponent team FE	yes	yes	yes
Observations	9,512	9,512	9,092
R-squared	0.160	0.160	0.164

Note: The dependent variable is the log of players' scores (performance). No Fans is a dummy equal to 1 for all matches played without fans. High Attendance Away is a dummy equal to 1 if the match is played away in a stadium with above median attendance prior to the lockdown. Team International Experience is a dummy equal to 1 if the team played in an international competition (UEFA Champions League or UEFA Europa League) during the season 2019-20. Days since last match represents the number of days since the last match played by a given player. Sub In is a dummy equal to 1 if the player was subbing in more than the median player (by position) prior to the lockdown. Sub Out is a dummy equal to 1 if the player was subbed out more than the median player (by position) prior to the lockdown. Young is a dummy equal to 1 if the player was born in or after 1997. Runner is a dummy equal to 1 if the player ran more kilometers per match than the median player (by position) prior to the lockdown. Tall is a dummy equal to 1 if the player is taller than the median (by position) prior to the lockdown. The baseline position is Forward. Match controls include: home dummy, home dummy interacted with No Fans, and weather characteristics in each city and day of the match (average, minimum, and maximum temperature, humidity, wind, and presence of fog, rain and storms). Standard errors are clustered at the team-match day level.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

5.4 Placebo Tests

As a final robustness check, we run a series of placebo tests. First, we divide the matches in the 2019-20 season that took place before the lockdown in blocks of 5 weeks and we run our

main specification classifying each block in turn as "treated".[28] The real treatment (i.e., no fans) only occurred after week 26, but this test can help us detect whether the performance of African players already differed at any point in the pre-treatment period. We find no evidence of pre-treatment differences (Table A5 in the Online Appendix).

This conclusion is further corroborated when we analyse how the coefficient on $No\ Fans \times Africa$ in equation (1) varies over the months. The results, available upon request, show that the performance of African players improved only once fans were no longer at the stadium, and no significant trend in the preceding period can be detected.

6 Conclusions

This is the first paper, to the best of our knowledge, that exploits a natural experiment to explore how harassment affects the performance of agents from minority groups that are commonly subject to racist abuse. Using data from the main Italian football championship (Serie A), we find that African players experience a significant increase in performance when fans are no longer at the stadium due to the COVID-19 lockdown. Coupled with the fact that African players are disproportionately subject to racist discrimination and intimidation by fans in Italy, our findings are consistent with the hypothesis that racist pressure harms performance. To test this mechanism, we investigate whether the improvement in the performance of African players when stadiums are empty is more marked in teams that were subject to racist abuse prior to the lockdown (whose players could plausibly be affected by such racist episodes). We find support for this hypothesis. Though the ideal natural experiment would have entailed shutting down racist behaviour per se, rather than the presence of fans more broadly, our evidence is overall strongly suggestive that racist pressures affect players.

Our findings are particularly striking because they concern elite athletes, who are the best in their profession and typically enjoy sizeable earnings, as well as high social status. Further investigation would be necessary to test the impact of racist pressure on the performance of athletes in lower-ranked leagues, and especially among youth, where one can imagine the impacts of discrimination being even more significant and harmful.

Finally, our findings point to the conclusion that racism can do economic harm to the

[28] We experimented with blocks of different sizes and that made no difference for the conclusions.

football industry. Football, like other sports, thrives on fans from all over the world seeking to watch and emulate extraordinary players who perform beyond normal. When a significant share of players cannot express their full potential, the 'beautiful game' becomes less beautiful.

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When the Stadium Goes Silent:
How Crowds Affect the Performance of Discriminated Groups

Online Appendix

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A Additional Tables

Table A1: Players' nationality

Country	Group	Count	Share (%)
Italy	Italy	163	38.9
EU + UK	Other EU + UK	124	29.6
Brazil	Latin America	26	6.21
Argentina	Latin America	20	4.77
Serbia	East Europe (non-EU)	10	2.39
Uruguay	Latin America	8	1.91
Albania	East Europe (non-EU)	6	1.43
Cote d'Ivoire	Africa	6	1.43
Colombia	Latin America	6	1.43
Turkey	Other	5	1.19
Bosnia and Herzegovina	East Europe (non-EU)	4	0.95
Algeria	Africa	4	0.95
Chile	Latin America	3	0.72
Macedonia	East Europe (non-EU)	3	0.72
Nigeria	Africa	3	0.72
Senegal	Africa	3	0.72
Gambia	Africa	2	0.48
Iceland	Other	2	0.48
Paraguay	Latin America	2	0.48
Ukraine	East Europe (non-EU)	2	0.48
Venezuela	Latin America	2	0.48
Kosovo	East Europe (non-EU)	2	0.48
Angola	Africa	1	0.24
Armenia	East Europe (non-EU)	1	0.24
Burkina Faso	Africa	1	0.24
Cameroon	Africa	1	0.24
Ecuador	Latin America	1	0.24
Ghana	Africa	1	0.24
Guinea	Africa	1	0.24
Equatorial Guinea	Africa	1	0.24
Japan	Other	1	0.24
Morocco	Africa	1	0.24
Moldova	East Europe (non-EU)	1	0.24
Mexico	Latin America	1	0.24
Montenegro	East Europe (non-EU)	1	0.24
Total		419	100

Note: The table presents the number of players by country and group (region), as well as the percentage shares with respect to the total. Players from EU member countries (except Italy) and the UK are grouped together.

Table A2: Effect of ghost stadiums (no fans) on players' performance, additional results

	$\geq$ 30 Matches	Experience	COVID-19 Deaths
	(1)	(2)	(3)
No Fans	-0.004	-0.002	0.001
	(0.009)	(0.008)	(0.008)
No Fans × Africa	0.032**	0.035***	0.028***
	(0.016)	(0.012)	(0.010)
No Fans ×		-0.001	
Serie A experience ($\geq$ 5 years)		(0.005)	
No Fans × Africa ×		-0.018	
Serie A experience ($\geq$ 5 years)		(0.023)	
No Fans × COVID-19 deaths			-0.000
			(0.000)
Match controls	yes	yes	yes
Player-Team FE	yes	yes	yes
Opponent team FE	yes	yes	yes
Observations	4,094	9,512	9,512
R-squared	0.118	0.160	0.160

Note: The dependent variable is the log of players' scores (performance). No Fans is a dummy equal to 1 for all matches played without fans. Serie A experience ($\geq$ 5 years) is a dummy equal to one if the player has five or more years of experience in the Italian major football league. COVID-19 deaths is the number of deaths due to COVID-19 per million inhabitants in the country of origin from the beginning of the pandemic up to June 20, 2020. Match controls include: home dummy, home dummy interacted with No Fans, and weather characteristics in each city and day of the match (average, minimum, and maximum temperature, humidity, wind, and presence of fog, rain and storms). Standard errors are clustered at the team-match day level.
** $p < 0.05$.
*** $p < 0.01$.

Table A3: Effect of ghost stadiums (no fans) on players' performance, African vs black players

	Africa	African origin	Black
	(1)	(2)	(3)
No Fans	-0.002	-0.002	-0.002
	(0.008)	(0.008)	(0.008)
No Fans ×	0.030***		
Africa	(0.010)		
No Fans ×		0.016*	
African origin		(0.009)	
No Fans ×			0.013*
Black			(0.007)
Match controls	yes	yes	yes
Player-Team FE	yes	yes	yes
Opponent team FE	yes	yes	yes
Observations	9,512	9,512	9,512
R-squared	0.160	0.159	0.159

Note: The dependent variable is the log of players' scores (performance). No Fans is a dummy equal to 1 for all matches played without fans. Match controls include: home dummy, home dummy interacted with No Fans, and weather characteristics in each city and day of the match (average, minimum, and maximum temperature, humidity, wind, and presence of fog, rain and storms). Standard errors are clustered at the team-match day level.
* $p < 0.10$.
*** $p < 0.01$.

Table A4: Effect of ghost stadiums (no fans) on players' performance, season 2018-19

	Weeks 20-38 (1)	Weeks 25-38 (2)	Weeks 30-38 (3)	Weeks 35-38 (4)
Weeks 20-38	-0.001			
	(0.006)			
Weeks 20-38 × Africa	-0.004			
	(0.009)			
Weeks 25-38		-0.007		
		(0.006)		
Weeks 25-38 × Africa		-0.005		
		(0.009)		
Weeks 30-38			-0.002	
			(0.007)	
Weeks 30-38 × Africa			0.003	
			(0.010)	
Weeks 35-38				-0.006
				(0.009)
Weeks 35-38 × Africa				0.008
				(0.015)
Match controls	yes	yes	yes	yes
Player-Team FE	yes	yes	yes	yes
Opponent team FE	yes	yes	yes	yes
Observations	8,353	8,353	8,353	8,353
R-squared	0.124	0.125	0.124	0.124

Note: The dependent variable is the log of players' scores (performance). Weeks 20-38, 25-38, 30-38, 35-38 are dummies equal to 1 for each corresponding set of match days. Match controls include: home dummy, home dummy interacted with the set of match days, and weather characteristics in each city and day of the match (average, minimum, and maximum temperature, humidity, wind, and presence of fog, rain and storms). Standard errors are clustered at the team-match day level.

Table A5: Effect of ghost stadiums (no fans) on players' performance, placebo

	Weeks 1-5 (1)	Weeks 6-10 (2)	Weeks 11-15 (3)	Weeks 16-20 (4)	Weeks 21-26 (5)
Weeks 1-5	-0.002				
	(0.010)				
Weeks 1-5 × Africa	-0.005				
	(0.018)				
Weeks 6-10		-0.009			
		(0.009)			
Weeks 6-10 × Africa		-0.007			
		(0.014)			
Weeks 11-15			0.008		
			(0.008)		
Weeks 11-15 × Africa			0.012		
			(0.014)		
Weeks 16-20				-0.002	
				(0.010)	
Weeks 16-20 × Africa				0.016	
				(0.017)	
Weeks 21-26					0.003
					(0.009)
Weeks 21-26 × Africa					-0.023
					(0.017)
Match controls	yes	yes	yes	yes	yes
Player-Team FE	yes	yes	yes	yes	yes
Opponent team FE	yes	yes	yes	yes	yes
Observations	6,014	6,014	6,014	6,014	6,014
R-squared	0.191	0.192	0.192	0.192	0.192

Note: The dependent variable is the log of players' scores (performance). The regressions are restricted to matches played with fans. Weeks 1-5, 6-10, 11-15, 16-20, 21-26 are dummies equal to 1 for each corresponding set of match days. Match controls include: home dummy, home dummy interacted with the set of match days, and weather characteristics in each city and day of the match (average, minimum, and maximum temperature, humidity, wind, and presence of fog, rain and storms). Standard errors are clustered at the team-match day level.