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INVESTIGATING THE HOME ADVANTAGE IN THE WORLD'S PRESTIGIOUS FOOTBALL LEAGUES BEFORE AND AFTER THE OUTBREAK OF COVID-19

Ebrahim Alidoust Ghahfarokhi[1], Sajad Soroush[2], Hosein Hasanbeigi[3]

ABSTRACT

The aim of this study was to evaluate the effects of the COVID-19 (absence of spectators) on the results of football teams in 5 popular leagues in the world (English Premier League, Italian Serie A, Spanish LaLiga, German Bundesliga and French Ligue 1). This research was descriptive-comparative. Therefore, the results of football teams were analyzed from the 2015/16 season to the middle of the 2019/20 season (before COVID) and the continuation of the 2019/20 season to the 2020/21 season (after COVID). The number of matches analyzed was 10,853, including 2,546 after COVID matches. The variables that were analyzed were: home Advantage, ratio of goals scored (HGSR) and ratio of goals conceded (HGCR) in home games. The results of t-test showed a significant decrease in home advantage (p=0.044) only in the German Bundesliga. In addition, in the EPL, none of the variables showed a significant difference. In the Italian, German and French leagues, HGCR increased significantly after COVID pandemic (p<0.04). In the Spanish league, HGSR showed a significant decrease (p<0.04). In this study, only the absence of spectators over home advantage was examined. Although spectators may influence the results, teams still perform better at home in the COVID pandemic duration. So, we can conclude the location of the events can be important. Also, the referees can be unfairly biased in favor of one side or another by the presence of crowds. Hence, future research may examine other factors.

Key words: Covid-19. Football Leagues. Home Advantage. Spectators.

1 - Associate Professor, Sport Management Department, Faculty of Physical Education and Sport Sciences, University of Tehran, Tehran, Iran.
2 - Assistant Professor, Department of Physical Education and Sport Sciences, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.

RESUMO

Investigando a vantagem de jogar em casa nas ligas mundiais de futebol antes e depois do surto de covid-19

O objetivo deste estudo foi avaliar os efeitos do COVID-19 (ausência de espectadores) nos resultados dos times de futebol em 5 ligas populares do mundo (Premier League inglesa, Série A italiana, LaLiga espanhola, Bundesliga alemã e Ligue francesa 1). Esta pesquisa foi descritiva-comparativa. Assim, foram analisados os resultados das equipas de futebol desde a época 2015/16 até meados da época 2019/20 (antes da COVID) e a continuação da época 2019/20 até à época 2020/21 (depois da COVID). O número de partidas analisadas foi de 10.853, incluindo 2.546 após partidas do COVID. As variáveis analisadas foram: vantagem em casa, proporção de gols marcados (HGSR) e proporção de gols sofridos (HGCR) em jogos em casa. Os resultados do teste t mostraram uma diminuição significativa da vantagem em casa (p=0,044) apenas na Bundesliga alemã. Além disso, no EPL, nenhuma das variáveis apresentou diferença significativa. Nas ligas italiana, alemã e francesa, o HGCR aumentou significativamente após a pandemia de COVID (p<0,04). Na liga espanhola, o HGSR apresentou um decréscimo significativo (p<0,04). Neste estudo, foi examinada apenas a ausência de espectadores sobre a vantagem de jogar em casa. Embora os espectadores possam influenciar os resultados, as equipes ainda apresentam melhor desempenho em casa durante a pandemia de COVID. Assim, podemos concluir que a localização dos eventos pode ser importante. Além disso, os árbitros podem ser injustamente tendenciosos a favor de um lado ou de outro pela presença de multidões. Assim, pesquisas futuras podem examinar outros fatores.

Palavras-chave: Covid-19. Ligas de Futebol. Vantagem Casa. Espectadores.

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INTRODUCTION

Home advantage is a well-known fact that has been studied many times in various team sports as well as individuais sports. Home advantage can be considered as the percentage of total points earned from home games (as the host team) for the whole season (Pollard, 2006).

Leite (2017) described the concept of home advantage as the consistency of winning more than 50% of home matches. Home advantage in football has long been established as an important factor in determining the outcome of a game.

The first quantitative report of home advantage in football was by which was followed Pollard (1986) who quantitatively analyzed the home advantage in football (Inan, 2018).

Various studies have examined the factors affecting home advantage.

Courneya and Carron (1992) pointed out these factors: spectator support, journeys made, rules of the game, familiarity with the stadium, and referee's bias.

Other factors mentioned in the home advantage are as follows: the number of spectators, crowd density, impact of the crowd (proximity to the playing field or the intensity of support (Pollard, 2006; Pollard, and Pollard, 2005), more knowledge of the home stadium, such as special characteristics or abnormal dimensions (Clarke and Norman, 1995; Pollard, 1986), characteristic climatic conditions (Seckin and Pollard, 2007).

The results of various studies show that the presence of spectators in stadiums and the benefit of teams from them as well as the use of hosting advantage has always played an important role in the success of teams (Marek, and Vávra, 2020).

Therefore, the presence of spectators in stadiums not only helps athletes and sports teams to present attractive and exciting games, but also can play an effective role in generating revenue for clubs, attracting sponsors, media attention and the right to broadcast games, and finally creatingthe quality of sports competitions (Herold, Boronczyk, and Breuer, 2021; Dantes, Borges, and Silva, 2020).

Pollard (2008) introduced eight key factors in the home advantage, one of the most important of which was the effect of population. In fact, the presence of spectators in stadiums has a positive effect on the performance of football teams.

Ponzo and Scoppa (2018) reviewed the Italian Serie A and concluded that the home stadium and the presence of spectators have a positive effect on the results of the teams.

Allen and Jones (2014) reviewed the English Premier League matches from the 1992/93 season to the 2011/12 season and postulatedthat the average home advantage did not show an upward or downward trend. In addition, they reported that the home advantage was greater in the teams at the bottom of the league table.

Krumer and Lechner (2018), by examining the German Bundesliga football matches, showed that the home advantage in the matches held during the weekend is much greater than the matches held at the midweek.

This is attributed to a smaller stadium crowd and the psychological effect that players consider midweek matches less relevant.

Also, Goller and Krumer (2020) concluded that in the top leagues of France, Germany, Spain and England, home advantage is affected by the day of the game. Unusual days also have fewer attendances than days that are repeated frequently.

Furthermore, Krumer (2020) revealed that kick-off times matter for home advantage in the group stage matches of the UEFA Europa League because they affected the size of the stadium crowd.

The first time ever, in 2020, the COVID pandemic is giving sports a timeout. In December 2019, at the same time as the outbreak of the COVID in the world, the most important sport events at the international, regional and national levels were canceled or postponed in order to maintain the athletes and people's health involved in sports (Parnell et al., 2020).

The International Olympic Committee announced that the Tokyo 2020 Olympic Games will be postponed until 2021.

Furthermore, this rare and unknown situation has evoked drastic changes and disruptions in the professional team sports landscape around the world, including the suspension or even cancellation of the 2019-2020 season.

The COVID pandemic has caused severe changes for the whole society, including

the sports industry. Since early March 2020, all across Europe, spectators have been banned from attending games of professional football leagues.

Various leagues were completely suspended or finished the 2019-2020 season without any in-stadium spectators (Evans et al., 2020; Bass et al., 2020).

It is clear that football loses its spirit and mission without the presence of spectators and the absence of spectators in the stadiums has reduced the attractiveness and excitement of the matches. This claim can be seen in past research and studies.

The past research showed the importance of spectator presence in stadiums and the positive productivity of teams from the hosting conditions and the presence of home spectators in the stadium (Eshghi, et al., 2013).

In order to answer the question of why the home advantage and the presence of the host spectators affect their performance, it can be said that playing at home makes the weaker football team have a higher chance of winning against the stronger team, but despite the COVID pandemic and the absence of spectators in the stadiums, this chance has been taken away from weak teams, and in fact, the competitive balance of football leagues has been disturbed.

In other words, not only teams deprived of the support of their fans in the stadiums to achieve the desired result, but also the absence of spectators in the stadiums reduces the attractiveness of the matches and even the motivation of the fans to watch the matches on TV (Forrest, et al., 2005).

For example, Konaka (2021) explored the benefits of home advantage and the presence of spectators in stadiums before COVID and afterwards among the major European leagues.

Their findings showed that in four major European leagues, despite the COVID conditions and the absence of spectators, the advantage of hosting teams over home games (in the presence of spectators) has diminished.

The rate of reduction varies between different leagues. In the German Bundesliga, the absence of spectators in the stadiums has a negative effect on the results of the host teams, but in the English Premier League, there is no significant difference between the results of the teams before and after COVID pandemic.

The fans always make a big difference to the success of the host teams.

The presence of spectators in home games and their support of the host team not only helps the optimal performance of the players but it can also be a lever of pressure on the rival team and the referees.

Therefore, due to the absence of spectators in the stadiums during COVID-19 pandemic, we are now examining the extent to which the presence of spectators in the stadium affects the football results and also what are the home advantages for the teams without spectators?

MATERIALS AND METHODS

This research was descriptive-comparative. The population and statistical sample of the research were football matches in five famous world leagues, including the English Premier League, Italian Serie A, Spanish LaLiga, German Bundesliga and French Ligue 1.

All five leagues have been suspended since mid-March due to the COVID-19 pandemic. The four leagues, except for France, resumed by late June, and finished by early August.

But French Ligue 1 made a quick decision and announced its cancellation at the end of April (Konaka, 2021).

Therefore, the results of football teams were analyzed from the 2015/16 season to the middle of the 2019/20 season (before COVID and with the presence of spectators) and the continuation of the 2019/20 season to the 2020/21 season (after COVID pandemic and without spectators). The results of the season matches were collected from worldfootball.net (https://www.worldfootball.net/).

The number of matches analyzed was 10,853, including 2,546 after COVID matches. Table 1, outlines the leagues and the numbers of matches analyzed in this study.

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Table 1 - Numbers of matches analyzed in this study.

Country	Number of teams	All Matches	Before COVID Matches (2015 – 2019)	After COVID Matches (2019-2020)
England Premier League	20	2281	1760	521
Italy Serie A	20	2276	1716	560
Spain LaLiga	20	2280	1722	558
Germany Bundesliga	18	1836	1387	449
France Ligue 1	20	2179	1721	458
Total	686	10853	8307	2546

The variables that were analyzed in this study were: home Advantage, ratio of goals scored (HGSR) and ratio of goals conceded (HGCR) in home games.

Finally, to compare the variables in two cases without the presence of spectators in the stadium (After COVID) and with the presence of spectators in the stadiums (Before COVID), independent t-test was used due to the normality of data.

Finding

The formula of Pollard (2006) has been used to calculate Home advantage. We divide team points in home games by the maximum possible points (number of home games multiplied by 3).

Figure 1 shows the mean of home advantages in the world's top five leagues by season.

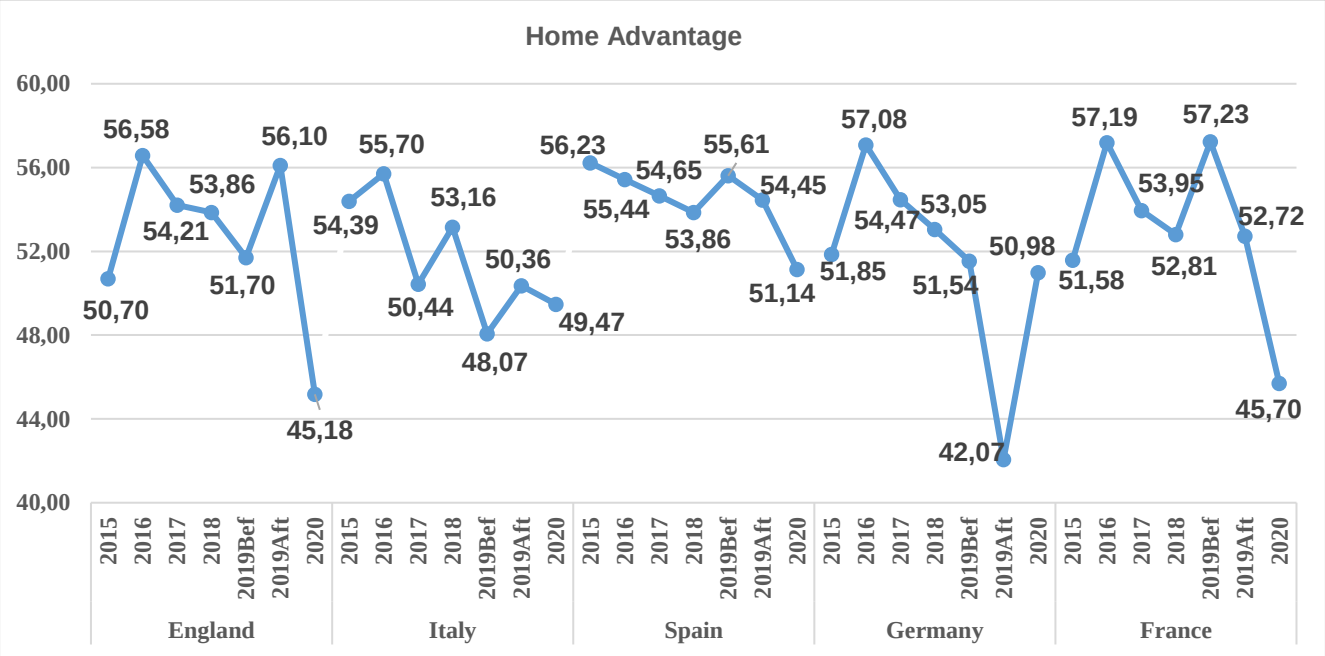

Figure 1 - Home advantages in the world's top five leagues by season.

As shown in Figure 1, the changes in the home advantage in the world's major football leagues, have not been the same since the outbreak of the COVID-19 pandemic.

The biggest decrease in the average of home advantage is related to the German league, which has returned to the previous level in the next season. In the French and Spanish leagues, in the continuation of the 2019 season, first there is a slight decrease in the average of home advantage, and then in the 2020 season, this decrease has continued.

Interestingly, in the English and Italian leagues, this average has increased in the continuation of the 2019 season, but in the 2020 season, it shows a significant decrease.

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In addition, two other indicators are checked in home games. These indicators are the ratio of goals scored (HGSR) and the ratio of goals conceded in home games (HGCR). Mean of these three indexes in the 5 major leagues, before and after COVID pandemic, was shown in Table 2.

Table 2 - Mean of Home advantage, Goal scored and Goal conceded before and after COVID pandemic.

Country	COVID		n	Min	Max	Mean	Std. Dev
England Premier League	Before COVID	Home Advantage	100	15.79	100.00	53.41	17.352
		HGSR	100	.53	3.21	1.53	0.549
		HGCR	100	.47	2.33	1.21	0.385
	After COVID	Home Advantage	40	14.29	100.00	50.64	20.202
		HGSR	40	.14	3.71	1.45	0.670
		HGCR	40	.14	2.05	1.20	0.442
Italy Serie A	Before COVID	Home Advantage	100	15.15	96.49	52.35	17.929
		HGSR	100	.20	3.00	1.50	0.536
		HGCR	100	.32	2.11	1.23	0.361
	After COVID	Home Advantage	40	6.67	91.23	49.92	20.519
		HGSR	40	.74	2.79	1.68	0.570
		HGCR	40	.78	2.70	1.46	0.447
Spain LaLiga	Before COVID	Home Advantage	100	13.33	93.33	55.16	16.286
		HGSR	100	.70	3.68	1.56	0.584
		HGCR	100	.37	2.30	1.15	0.386
	After COVID	Home Advantage	40	22.81	92.59	52.80	16.129
		HGSR	40	.63	2.32	1.35	0.431
		HGCR	40	.11	2.00	1.07	0.379
Germany Bundesliga	Before COVID	Home Advantage	90	20.83	90.20	53.60	16.653
		HGSR	90	.88	3.44	1.67	0.618
		HGCR	90	.47	2.38	1.31	0.381
	After COVID	Home Advantage	36	4.76	84.31	46.53	19.830
		HGSR	36	.57	3.76	1.65	0.717
		HGCR	36	.50	3.86	1.50	0.564
France Ligue 1	Before COVID	Home Advantage	100	17.54	92.98	54.55	15.444
		HGSR	100	.68	3.68	1.50	0.563
		HGCR	100	.37	1.95	1.09	0.346
	After COVID	Home Advantage	40	.00	100.00	49.21	20.929
		HGSR	40	.00	3.50	1.38	0.638
		HGCR	40	.25	2.05	1.23	0.417

The results of Table 2 show that home advantage, as well as the goal scored ratio, has decreased in all leagues after COVID pandemic.

The goal conceded ratio has increased in three leagues (France, Germany and Italy) and has remained almost constant in two leagues. In fact, based on these results, it can be claimed that the host teams have not been able to take advantage of hosting as in the past.

To analyze the data, first the normality of data distribution was evaluated using Kolmogorov-Smirnov test (K-S).

Then, all indexes presented in Tables 2 before and after COVID were compared using independent t-test.

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Table 3 - Comparison of results using independent t-test.

Country		Mean Dif	t	df	Sig. (2-tailed)
England Premier League	Home Advantage	2.773	.814	138	.417
	HGSR	0.088	.804	138	.423
	HGCR	0.010	.138	138	.890
Italy Serie A	Home Advantage	2.436	.697	138	.487
	HGSR	-0.173	-1.691	138	.093
	HGCR	-0.230	-3.175	138	.002
Spain LaLiga	Home Advantage	2.359	.776	138	.439
	HGSR	0.218	2.134	138	.035
	HGCR	0.080	1.114	138	.267
Germany Bundesliga	Home Advantage	7.071	2.036	124	.044
	HGSR	0.023	.179	124	.858
	HGCR	-0.184	-2.119	124	.036
France Ligue 1	Home Advantage	5.341	1.662	138	.099
	HGSR	0.119	1.083	138	.281
	HGCR	-0.149	-2.165	138	.032

The results of t-test in Table 3 showed despite the changes (decrease or increase) in the mean of the research variables, their comparison in the period before and after COVID pandemic was not significant in most Cases.

The home advantage shows a significant decrease (p=0.044) only in the German league. In addition, in the English league, none of the variables showed a significant difference. In the Italian league (p<0.01), and in the German and French leagues (p<0.04), HGCR increased significantly after COVID pandemic. In the Spanish league, HGSR showed a significant decrease (p<0.04).

DISCUSSION

With the expansion of COVID-19 worldwide, sporting events that could have been postponed were delayed, and many sporting events were postponed to the following year or another time.

The most important postponed events are the 2020 Tokyo Summer Olympics and the European Football Championship.

Postponement or cancellation of sports events and competitions in the world and the resumption of competitions without the presence of spectators in stadiums has caused great financial losses to sponsors, governments, and football clubs (Reade, and Singleton, 2020; Szymanski, 2020).

In addition, it should be noted that football without the presence of spectators in stadiums, football matches have lost some of their necessary charms. The outbreak of the Coronavirus has also deprived football teams of leverage and their twelfth teammates (who are the spectators).

The aim of this study was to evaluate the effects of the COVID-19 and the absence of spectators on the results of football teams in 5 popular leagues in the world. In this study, the results of football teams was analyzed from the 2015/16 season to the middle of the 2019/20 season (before COVID19 and with the presence of spectators) and the continuation of the 2019/20 season along with the 2020/21 season (after COVID-19 pandemic and without spectators).

The results showed that the home advantage changes at the COVID pandemic have not been the same in the world's popular football leagues. In the German league, there was a sharp decline in the home advantage at first, but it returned to normal the following season.

In the Spanish and French leagues, the home advantage first decreased and continued to decline in the following season, but in the English and Italian leagues, the home advantage first increased and decreased the following season.

The European leagues fan attendance report (EPFL, 2018) shows that the English Premier League (94%) and the German Bundesliga (91%) have the highest level of stadium utilization respectively.

Also, among the 20 most popular teams in the world of football (by highest average

attendances), there are 9 German teams (Poli et al., 2019).

The possibility of a significant reduction in home advantage in the Bundesliga has been due to the impact and impressive presence of fans in the stadiums. Of course, the findings regarding the English Premiere League are contradictory. In the EPL, some rich and famous teams (such as Manchester City, Liverpool, Chelsea, Manchester United, Tottenham, etc.) have higher technical power, and other teams usually try to get the next rankings or remain in the Premiere League.

The reason for the contradictory findings in the EPL could be the imbalance in the competitive power of the teams which in a way prevents weaker teams from utilizing the home advantage.

At the time of the COVID pandemic, there are also three studies of the so-called 'Ghost Games' conducted in Germany (Fischer and Haucap, 2020; Endrich and Gesche, 2020; Dilger and Vischer, 2020).

They showed that playing in the stadium without spectators had a great impact on the results of games in the German league.

These findings are probably due to the social pressure created by the crowd at home games. The results of McCarrick et al., (2020), Ferraresi and Gucciardi (2020), and Scoppa (2020) are generally consistent with our own. We find that the absence of home crowd has no effect on the final match score, but it does result in a reduction of home goal conceded for home teams.

The results of t-test showed a significant decrease in home advantage ($p=0.044$) only in the German Bundesliga. In addition, in the EPL, none of the variables showed a significant difference. In the Italian, German and French leagues, HGCR increased significantly after COVID pandemic ($p<0.04$). In the Spanish league, HGSR showed a significant decrease ($p<0.04$).

Numerous studies have explicitly mentioned the effective role of spectators on the success of host teams. However, in this study, it was found that except for Germany, where the home advantage decreased, in general, the results of the home teams without the presence of spectators were not significantly different from their results in the presence of spectators.

This finding is consistent with the results of research by Peeters and Van Ours (2020), Konaka (2021), Goller and Krumer (2020) and Koyama and Reade (2009).

In fact, they believe that in the last decade, the crowd effect and the effect of home advantage on the results of the teams has decreased. In other words, in team sports such as football, home advantage has little effect on the success and superiority of the host teams.

Perhaps, one of the reasons for this is Strengthening and controlling the psychological factors (stress, competitive anxiety, excitement) of the players and coaches that has reduced the impact of the absence of spectators in stadiums. In addition, players may be accustomed to competing in an empty stadium. Increasing the experience of the game in this situation has caused players to focus more on competing

with opponents. Also, the increase in the number of substitutions for football teams from three to five could be another reason. However, this change in football rules has had its pros and cons but research shows that increasing the number of substitutions has had a positive effect on the performance of football players (Mota et al., 2021).

Although, Pollard (2008), Ponzo and Scoppa (2018), Boudreaux et al., (2017) concluded that spectator presence and hosting advantage have a significant impact on the success of football teams and spectator absence has a negative effect on host team results. but the findings of this study showed a significant decrease in home advantage only in the German Bundesliga.

Also, our results was not support the conclusions from Pettersson-Lidbom and Priks (2010) and Reade et al., (2020).

In this regard, Koyama and Reade (2009), Peeters and Van Ours (2020), Goller and Krumer (2020) believe that the impact of home advantage on team results has decreased, but familiarity with home stadium can have a positive effect on team performance and results.

Also, Van Ours (2016) reported that teams playing on artificial turf have an additional home advantage, scoring 0.33 points and 0.42 more goals per game.

Van Damme and Baert (2019) examined the effect of distance on home advantage in European international football and concluded that altitude is important as well as crowd sizes.

Finally, it can be said that although the Coronavirus has disrupted regular football competitions around the world and restricted the attendance of spectators in stadiums, it has helped teams with fewer fans to enjoy a level playing field against popular teams.

In the current situation, the absence of spectators in the stadiums has put less psychological pressure on the referees, players and coaches.

Although Neville et al., (2002) and Boyko et al., (2007) concluded that spectator attendance in stadiums and home teams' superiority was largely due to spectator pressure on the referee, but this finding was contradict the results of a similar study by Johnson (2008).

The results of the studies implemented by Rocha et al., (2013), Scoppa (2008), and Dawson et al., (2007) showed that football referees at the highest levels of football in Brazil, Italy, Spain and Germany are systematically prejudiced against the host teams. In particular, In particular, when the host teams lose the match, the referees get more extra time, but whenever the host team wins the match, the referee tries to finish the match faster.

On the other hand, according to the studies, the absence of spectators in the stadiums has reduced the referees' prejudices against the host team. This factor can also affect the performance of football teams in home games.

However, due to the presence of a video assistant referee (VAR) in football matches, refereeing errors have been greatly reduced or it has been possible to correct refereeing errors.

Therefore, in addition to examining the role of referees in obtaining the results of teams, it is necessary to address the factors affecting the performance of players and football teams.

Hence, football clubs should be further investigated.

CONCLUSION

This paper examines the absence of spectators for professional soccer teams in affecting the home advantage, using the situation induced by Corona pandemic. Interestingly enough, this effect is only observed in Bundesliga, Germany.

Some of our findings could be important for researchers in the field of sports economics.

According to the experimental evidence, although spectators or crowds may influence the results, teams still perform better at home.

So, the location of the events can be important. This is probably why neutral venues are often chosen for the finals of key competitions, or an equal percentage is set for fans of participating individuals or teams (such as the sports cup final).

There are also some evidence shows that the referees can be unfairly biased in favor of one side or another by the presence of external crowds.

Of course, in this study, we only investigate the effect of attendance or absence of spectators on changes in home advantage. Hence, future research may examine other factors.

Does the players' confidence in empty stadiums decrease? Does playing in stadiums without spectators reduce the familiarity with the stadium? Or is reducing the referee bias the main reason? Future research may specifically discuss within-match data on tactics, strategy and referee performance.

For a more detailed examination, it is necessary to examine this issue in other countries as well: Because the results of games without spectators are different among different countries.

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3 - MSc, Sport Management Department, Faculty of Physical Education and Sport Sciences, University of Shahid Rajayi, Tehran, Iran.

E-mail dos autores:
e.alidoust@ut.ac.ir
s.soroush2016@gmail.com
kalhora239@gmail.com

Corresponding Author:
Ebrahim Alidoust Ghahfarokhi.
e.alidoust@ut.ac.ir
Faculty of Physical Education and Sport Sciences.
University of Tehran.
Between 15th and 16th St., North Kargar st., Tehran, Iran.
Postal code: 14398-13117.
Tel.: 00989126057876.
Fax: 00982188351742.

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