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Section IV – Behavioural Sciences in Sport & Sports of the Disabled

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Did the Absence of Crowd Support During the Covid-19 Pandemic Affect the Home Advantage in Brazilian Elite Soccer?

by

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This study aimed to investigate the impact of crowd absence due to the COVID-19 pandemic on home advantage in Series A and B of professional Brazilian male soccer. Moreover, we sought to compare the home advantage between different competitive levels. Data from 2018 to 2020 Brazilian professional soccer championships (Series A and B) were analyzed, consisting of 2280 matches. The effect of home advantage was calculated in relation to the number of points won, the number of wins, goals scored and goals conceded. Our results indicated that home advantage was reduced in Serie A. Specifically, the 2020 (absence of the crowd) and 2019 seasons showed smaller home advantage compared to the 2018 season. On the other hand, Serie B analyses indicated no changes in home advantage over the seasons analyzed. The comparison of home advantage between competitive levels indicated higher home advantage in Serie A, exclusively in the 2018 season. In addition to the absence of fans, other changes occurred in elite sports due to the pandemic, such as changes in rules and the calendar. Considering that home advantage is affected by multiple interacting factors, it is important to investigate specific sports leagues across the world to determine which factors had the greatest impact on the advantage of playing home matches.

Key words: *team performance, crowd support, match location, coronavirus.*

Introduction

Home advantage (HA) is a well-documented topic in the sports literature, since this phenomenon is prevalent in many team sports (Courneya and Carron, 1992; Nevill and Holder, 1999). Among these modalities, soccer stands out, since this modality presents the greatest advantage of playing at home (Pollard and Pollard, 2005). Previous studies have shown that this advantage is persistent, regardless of competitive levels in soccer, since the home teams consistently win more points than the visiting teams all around the world (Leite and Pollard, 2018; Pollard, 2006). Such effects have also been corroborated in professional Brazilian male soccer in a study carried out in the 2003 to 2009 seasons, both in Series A and B (Almeida et al., 2011).

The advantage of playing at home seems determined by the interaction of multiple factors (Pollard and Armatas, 2017). The distance traveled by visiting teams (Pollard and Medeiros, 2008), familiarity with the field and playing conditions (McSharry, 2007), territoriality (Neave and Wolfson, 2003), as well as the density and the size of the crowd (Inan, 2020) are the main factors associated with the advantage to play at home

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(Goumas, 2014; Ponzo and Scoppa, 2018; Staufenbiel et al., 2018). Specifically, the presence of the crowd support has received special attention from researchers, since it is believed to impact other determinant factors, such as referees decisions and the psychological state of players (Pollard and Armatas, 2017; Ponzo and Scoppa, 2018). Indeed, studies have shown that the presence of the crowd not only creates a social atmosphere which affects the psychological state of players (Greer, 1983), but also impacts the decisions of referees in relation to the awarding of fouls and penalty kicks, as well as cards distributed, all favoring the home team (Pollard and Armatas, 2017). Despite this, evidence is controversial, since previous studies reported a positive association between crowd density and HA (Goumas, 2014; Inan, 2020; Ponzo and Scoppa, 2018), while other studies found no association between these factors (Staufenbiel et al., 2018) or even verified the occurrence of HA even in the absence of the crowd (Van De Ven, 2011).

The influence of the crowd support in HA is still a controversial topic, which indicates that more evidence is necessary to understand whether and how this phenomenon influences the result of matches. The investigation of different competitive levels can contribute to the understanding of the role of the crowd in HA, since higher competitive levels are usually associated with greater attendance of soccer fans (Inan, 2020). Generally speaking, if larger and denser crowds are associated with higher HA, then the advantage of playing at home would be greater at higher competitive levels (Serie A) over lower competitive levels (Serie B). However, Leite and Pollard (2018) reported that HA was predominantly higher in Serie B compared to Serie A, in a data analysis of 47 leagues around the world in the seasons of 2010 to 2016. The authors suggested some causes for this result, such as smaller referee bias in Serie A due to better referee preparation, greater travel effects due to less comfort in Serie B teams, and more intimidating atmosphere in Series B stadiums despite the lower average crowd, among other factors (Leite and Pollard, 2018). This topic had already been investigated in Brazilian soccer by Almeida et al. (2011), and higher HA was reported in Serie B compared to Serie A, in seasons from 2003 to 2009.

The Covid-19 pandemic provided researchers with an ecological opportunity to investigate the role of the crowd support in HA, since sports leagues from various countries were forced to organize competitions without crowd presence, for health security reasons. These competitions played without the crowd represent a natural experiment, which favors the investigation of the effects of the absence of crowd support on HA in several soccer leagues. In this regard, previous research has compared HA between games played without crowd presence and games from previous seasons, in which crowd support was still present, in leagues around the world. Tilp and Thaller (2020) reported that the traditional advantage of playing at home in previous Bundesliga seasons turned into a disadvantage of playing at home, due the absence of crowds at the stadiums. These results were corroborated by Fischer and Haucap (2020), who took a step further by identifying that this reduction in HA occurred exclusively in Serie A, but not in Series B and C of German professional soccer. Sors et al. (2020) investigated Series A and B of four European leagues, and also found a reduction in the advantage of playing at home as well as in the referee bias. Those authors attributed both factors to the absence of social pressure and noise produced by the crowd. Conversely, Matos et al. (2021) examined HA in the Portuguese major soccer league and did not find changes due to the absence of the crowd, either in the comparison with games from the 2019/2020 season or in the comparison with previous seasons. Almeida and Leite (2021) also reported divergent results for several European leagues due to the absence of crowds in the stadiums. While HA was reduced in some leagues, the absence of the crowd support did not seem to affect HA in others. These contradictory results indicate that the absence of crowd support may affect HA in different ways, according to the contexts investigated. This indicates the need for further investigations accounting for the specificity of the leagues. To the best of the authors' knowledge, such an investigation has not been conducted in Brazilian soccer due the restrictions imposed by the COVID-19 pandemic context.

Therefore, the “Brasileirão” soccer league,

the main soccer championship in Brazil, was analyzed in this study. Our aim was to investigate HA in different seasons with and without crowd support in Series A and B of Brazilian professional male soccer. In addition, we aimed to compare HA between different levels of competition (Series A and B) in the analyzed seasons. We expected to identify a reduction in HA over time in both series, due to the absence of crowd support. Additionally, we hypothesized the existence of greater HA in Serie B compared to Serie A, according to the trend reported worldwide.

Methods

Measures

This study used data referring to Series A and B, from three editions of the Brazilian men's professional soccer championship, carried out in the period from 2018 to 2020. In the seasons of 2018 and 2019, crowds were present at the stadiums, while in the 2020 season no crowds were allowed in the stadiums, due to the sanitary restrictions imposed by the COVID-19 pandemic. Data from each season were retrieved from the website of the Brazilian Football Confederation https://www.cbf.com.br/. Twenty teams participated in all editions analyzed and played 19 home matches and 19 away matches in each season. Thus, the sample consisted of 2280 games (all games of the seasons). Data analyzed in this work comprised the effect of HA in relation to the number of points won, the number of wins, goals scored and goals conceded in matches played at home and away from home. In this study, HA calculated from the number of points won in games played at home and away from home is the primary dependent variable. The other variables served as complementary measures.

Design and Procedures

After data collection and organization, the home advantage effect was calculated using the following equation for each variable: HA = ((H – A)/A)*100%, in which H refers to the number of points (or wins or goals) obtained in home games and A refers to the number of points (or wins or goals) obtained in games played away (Matos et al., 2020). Values obtained from the HA calculations are shown in Table 1. The results of this equation can present positive and negative percentage values, and the higher the value, the greater the effect of HA. To illustrate, Serie A teams showed a 128.02% HA value on the variable points in the 2018 season. This means that teams won 128.02% more points in games played at home than they did in games played away from home, which corroborates the advantage of playing at home for Serie A teams in this season.

Statistical Analysis

To compare HA across seasons and series, nonparametric statistics were used, since the data showed deviations from normality and homoscedasticity. The Kruskal Wallis test was used to verify differences in HA across seasons for all variables analyzed. The level of significance adopted was 5%. Whenever the Kruskal Wallis test indicated differences in HA between seasons, paired comparisons were performed, with the level of significance adjusted by the Bonferroni correction. In these cases, the significance adopted was 1.6%. Thus, the comparison of HA between Series A and B in each of the seasons was performed for all variables using the Mann-Whitney U test, with a significance level of 5%. The effect size was reported in all analyses using Pearson's r, classified as small (r = 0.1), medium (r = 0.3) and large (r = 0.5), according to Cohen (1992). Statistical analyses were performed using SPSS 25 software.

Results

The HA analysis in Serie A indicated differences between the seasons for points [$H(2) = 14.797$; $p = 0.001$], wins [$H(2) = 17.631$; $p < 0.001$] and goals conceded [$H(2) = 6.714$; $p = 0.035$]. On the other hand, no differences were found between the seasons for goals scored [$H(2) = 4.940$; $p = 0.085$].

Table 2 presents the results of pairwise comparisons carried out between seasons for variables, in which significant differences were reported. The analysis regarding the number of points won at home versus away games indicated greater HA for Serie A teams in the 2018 season compared to 2019 and 2020 seasons. The same results were verified regarding the proportion of games won at home versus away games, with higher HA in the 2018 season compared to 2019 and 2020 seasons. Finally, the analysis of goals conceded indicated greater HA in the 2018 season compared to the 2020 season.

Serie B analyses did not indicate differences in HA across seasons for goals scored

[$H(2) = 2.315$; $p = 0.314$], goals conceded [$H(2) = 2.726$; $p = 0.256$], wins [$H(2) = 1.641$; $p = 0.440$] and points [$H(2) = 2.560$; $p = 0.278$].

Table 3 presents the results of the Mann-Whitney U test used to compare the effect of HA between Series A and B for points, wins, goals scored and goals conceded. Greater HA effects were found for Serie A in the 2018 season for all variables analyzed. Additionally, greater HA effects were found for Serie A in the 2019 season in the goals conceded variable. No differences were reported for other variables in the 2019 season or in any of the variables in the 2020 season.

Table 1

HA values in Brazilian soccer championships

Series	Season	Points	Wins	Goals scored	Goals conceded
A	2018 (crowd)	128.02%	197.06%	73.84%	-42.48%
	2019 (crowd)	65.82%	87.76%	49.57%	-33.14%
	2020 (no crowd)	51.1%	69.31%	31.37%	-23.88%
B	2018 (crowd)	40.24%	55.88%	22.05%	-18.06%
	2019 (crowd)	38.92%	55.56%	26%	-20.35%
	2020 (no crowd)	58.48%	78.57%	43.07%	-30.1%

Table 2

Pairwise comparisons between seasons for Serie A significant variables.

Variable	Seasons	*H*	*p*	*r*
Points	2018 x 2019	17.500	0.002*	2.767
	2018 x 2020	19.175	0.001*	3.032
	2019 x 2020	1.675	0.762	0.264
Wins	2018 x 2019	18.100	<0.001*	2.862
	2018 x 2020	21.575	0.001*	3.411
	2019 x 2020	3.475	0.529	0.549
Goals scored	2018 x 2019	-8.000	0.147	1.265
	2018 x 2020	-14.275	0.010*	2.257
	2019 x 2020	-6.275	0.256	0.992

*Note: H = Kruskal Wallis value; p = significance level; r = effect size; * = p < 0.016*

Table 3

Comparisons between HA in Series A and B.

Variable	AxB	U	Z	*p*	*r*
Points	2018	65.000	-3.652	<0.001*	0.577
	2019	139.000	-1.651	0.099	0.261
	2020	189.000	-0.298	0.766	0.047
Wins	2018	80.500	-3.234	0.001*	0.511
	2019	162.000	-1.028	0.304	0.162
	2020	145.000	-1.490	0.136	0.235
Goals scored	2018	103.500	-2.611	0.009*	0.412
	2019	155.000	-1.217	0.224	0.192
	2020	175.500	-0.663	0.507	0.104
Goals conceded	2018	88.500	-3.016	0.003*	0.476
	2019	127.000	-1.975	0.048*	0.312
	2020	160.000	-1.083	0.279	0.171

*Note: U = Mann Whitney test value; Z = z score; p = significance level; r = effect size; * = p < 0.05*

Discussion

This study investigated whether the presence of crowd support affected HA in Series A and B of the Brazilian soccer leagues from 2018 to 2020. Additionally, we sought to compare HA between different competitive levels throughout the analyzed seasons. Our results showed a reduction in HA in Serie A. The seasons of 2020 (without the presence of fans) and 2019 showed smaller HA compared to the 2018 season, but there were no differences between the 2019 and 2020 seasons. In Serie B, no changes in HA were identified across the seasons analyzed. These findings partially corroborate our hypotheses, given the reduction in HA was identified in the 2020 season, but this reduction only occurred in Serie A. When Series A and B were compared, higher HA was found in Serie A in the 2018 season. These findings diverge from those previously reported in the Brazilian championship (Almeida et al., 2011), thus reinforcing the need for future studies in the Brazilian context.

Data from Serie A indicated that HA was reduced in the 2019 and 2020 seasons compared to the 2018 season. These results indicate a reduction in the advantage of playing at home not only in the 2020 season, when there was no crowd support in the stadiums, but also in the 2019 season, when fans were present in the stadiums. The lowest HA of the 2019 season compared to the 2018 season was associated with a lower proportion of victories won at home compared to away games. Similarly, the reduction in HA between the 2018 and 2020 seasons was associated with a lower proportion of victories conquered and goals scored in 2020 home games compared to away games. In general, our findings differ from those found by Tilp and Thaller (2020) who reported an inversion of home advantage due to the absence of fans in the Bundesliga in the 2019/20 season. On the other hand, our findings are in agreement with Matos et al. (2021) who also did not report reductions in HA in the Portuguese soccer league due to the lack of crowd support associated with the Covid-19 pandemic. Overall, our results contradict the logic that the absence of support from the fans would act by reducing HA (Inan, 2020). The rationale behind this is that visiting teams would participate more motivated in crowdless matches, due to the awareness of the absence of social pressure generated by the opposing fans (Tilp and Thaller, 2020). This would facilitate greater psychological stability during the game and the perception of an advantage for not having to deal with the pressure from fans, further motivating these players, which would collaborate to reduce HA. Additionally, evidence indicates that referees make more favorable decisions for the home teams (more fouls in favor and fewer cards compared to the visiting team) when fans are present at the stadium, compared to games without fans (Endrich and Gesche, 2020), which would also contribute to the HA reduction. This argument, however, is speculative, and applies to the 2020 season, in which fans were not present at the stadiums, but not to the 2019 season, in which fans were still present. This indicates the existence of other modulating factors of the HA effect.

One factor that may have influenced the reduction in HA in Serie A from the 2019 season onwards is the implementation of the Video Assistant Referee (VAR), a technology that has been used in all games as of this season. The use of VAR provides referees with a new opportunity to evaluate crucial situations of the game with more time available and in a collective way. Moreover, it provides the visualization from different angles, which favors the reduction of errors in some decisions, in addition to reducing the impact of social pressure caused by the crowd (Unkelbach and Memmert, 2010). Indeed, recent evidence has indicated that the use of the VAR has changed the dynamics of games in several leagues (Han et al., 2020; Lago-Peñas et al., 2019) and has even resulted in the reduction in HA in some cases (Han et al., 2020). Despite the recent nature of this technology and the scarcity of studies on the subject, findings regarding the VAR seem to converge with the logic of our results. Thus, the use of the VAR contributed to the understanding of the HA reduction in the 2019 season compared to the 2018 season of Serie A in our study. Additionally, it is reasonable to speculate that the use of the VAR associated with the absence of the crowd may have reduced social pressure on the referees during matches in Serie A in the 2020 season, leading to a lower referee bias in favor of home teams (Han et al., 2020). As a result, lower HA was observed in 2019 and 2020 seasons compared to the 2018 season, in which

there was no use of the VAR and crowds were present in the stadiums. It is noteworthy, however, that we did not assess specific data regarding referees decisions to confirm this hypotheses in this study. Thus, the impact of using the VAR on HA in Brazilian soccer remains an issue to be investigated in future studies.

Data from Serie B indicated that there was no reduction in HA over the three seasons analyzed. This result contradicted initial expectations that the absence of the crowd would reduce the advantage of playing at home (Inan, 2020). However, it is noteworthy that in the 2018 and 2019 seasons, small HA values were reported in Serie B compared to Serie A. Since the advantage of playing at home in Serie B was already small, one could argue that reducing this advantage may be harder, which would explain part of the results found in our study. Additionally, it is important to emphasize that the VAR is not available in Serie B games, which could also contribute to the stability of HA in games played at this competitive level. Finally, factors associated with the level of competitiveness may be associated with the results found. The smaller presence of fans, their less supportive behavior and a higher amount of games with a lower performance level of rivalry in Serie B may affect, to a lesser extent, the behavior of the coaching staff and players, as well as their strategies drawn and decisions made. Thus, it is possible that the presence of fans is less decisive in Serie B than in Serie A of Brazilian soccer. A similar logic was proposed by Fischer and Haucap (2020) that may support the explanation of the stability of HA in Serie B in the absence of the crowd. Those authors showed that German teams that were more used to densely crowded stadiums showed a more drastic reduction in HA than teams used to fewer fans in the stadiums. Therefore, it is possible that the maintenance of HA in Serie B of the Brazilian championship has occurred precisely because of the lower average attendance of this championship (2018 = 5,218; 2019 = 5,089) in comparison to Serie A (2018 = 18,821; 2019 = 21,237).

The comparison between HA in Series A and B indicated greater HA in Serie A for the 2018 season, but not for the seasons of 2019 and 2020. This finding was also verified in complementary measures, since Serie A teams had more victories, scored more goals and conceded less goals at home matches proportionally to away matches. Serie A teams also conceded less goals at home matches proportionally to away matches in the 2019 season. Although the teams from Serie A suffered proportionally fewer goals at home than away compared to teams from Serie B in 2019, this factor did not imply a greater amount of points won, indicating that there was no difference in HA between Series A and B in this season. In general, the findings of the present study differ from the findings of Almeida et al. (2011), who indicated higher HA in Brazilian soccer Serie B compared to Serie A in the 2003 to 2009 seasons, and also from the findings of Leite and Pollard (2018) who reported no differences in HA between Series A and B in the 2010 to 2016 seasons in Brazilian professional soccer. Prudence is necessary when interpreting these results, since the number of seasons analyzed in our study was lower than in previous studies. Therefore, it is not possible to rule out that this effect actually results from the natural variation between seasons. Nevertheless, the seeming variation in the dynamics of HA between the competitive levels in our study highlights the relevance of investigating the HA prevalence in Brazilian professional soccer in order to further comprehend the factors that underlies this modification.

The present study has some limitations, such as the analysis of a small number of seasons, and the fact that fans were absent in stadiums in only one of these seasons. Specifically with regard to the season without fans in the stadiums (2020), it is important to emphasize that this season was atypical in more aspects than simply the absence of fans in the stadiums, which calls for caution in the interpretation of HA results. COVID-19 outbreaks that affected participating teams, long periods without field training, the use of a game schedule with less spacing between games and even the change in the rules of the game (increasing the number of substitutions from three to five), are other factors that may also have affected HA in the 2020 season. Thus, it is suggested that future HA investigations include an even greater amount of games without the presence of fans in their analysis, and in competitions with game schedules closer to what was practiced before the pandemic, in order to

minimize the effects of adverse factors.

In short, playing at home continues to be advantageous in both Series of Brazilian professional soccer. However, the COVID-19 pandemic had different effects on HA for each of the Series investigated. While there was a reduction in HA for Serie A, no change in HA for Serie B was reported. Regarding the comparison between Series A and B, greater HA was prevalent in Serie A, specifically in the 2018 season, which was not maintained in the 2019 (with the use of the VAR in Serie A and presence of fans), and 2020 (with the use of the VAR in the Serie A and without the presence of fans) seasons. It is also important to highlight that the sound of stadiums in 2020 simulating fans seems to have no influence on the results, demonstrating that it does not replace the fans in person. Due to the numerous changes made in elite sports in response to the pandemic in the 2020 season, and the implementation of the VAR in Serie A in 2019, it is not possible to attribute the results found only to the absence of crowds in the stadiums. Alternately, our results seem to be a consequence of multiple interacting factors, which reinforces the multifactorial nature of the HA phenomenon. Given the results found and the persistence of the COVID-19 pandemic, further investigation is recommended to determine which factors have the greatest impact on the changes observed in HA in sports leagues across the world.

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