

Study of playing styles in the spanish first division of football before, during and after covid-19 Estudio de estilos de juego en la primera división de fútbol española antes, durante y después del Covid-19

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Abstract. Due to the worldwide negative impact on sports caused by the COVID-19. The aim was to analyze the influence of the pandemic on playing styles, measured through the interaction of game indicators, to verify the existence of the home advantage effect at three different time points in the Spanish top professional league. To achieve this, 5320 cases (2660 matches) from the 2014/2015 season to 2020/2021 of LaLiga were analyzed. All seasons unfolded normally except for the 2019/2020 season, which experienced a three-month hiatus of inactivity due to the pandemic. During the 2020/2021 season, matches began without spectators or with a limited number of fans to maintain the allowed social distance. A descriptive analysis and classification trees using the CRT technique were performed to identify playing styles. The results showed a simplification of the game throughout the seasons. Visiting teams adapted better to more effective playing styles to achieve better results. These differences may be attributed to rule changes, the total/partial absence of spectators, a three-month inactivity period, and the accumulation of matches in a short period of time. Teams should take into account the different situations analyzed in order to display an effective playing style to achieve their different objectives.

Keywords: Notational Analysis; Playing style; Classification tree; Performance indicators.

Resumen. Debido al impacto negativo a nivel mundial en el deporte provocado por el COVID-19. El objetivo fue analizar la influencia de la pandemia en los estilos de juego, medida a través de la interacción de indicadores de juego, para comprobar la existencia del efecto local en tres momentos diferentes en la primera liga profesional española. Para ello se analizaron 5.320 casos (2.660 partidos) desde la temporada 2014/2015 a la 2020/2021 de LaLiga. Todas las temporadas se desarrollaron con normalidad excepto la temporada 2019/2020, que experimentó una pausa de tres meses de inactividad debido a la pandemia. Durante la temporada 2020/2021 los partidos comenzaron sin espectadores o con un número limitado de aficionados para mantener la distancia social permitida. Se realizó un análisis descriptivo y árboles de clasificación mediante la técnica CRT para identificar estilos de juego. Los resultados mostraron una simplificación del juego a lo largo de las temporadas. Los equipos visitantes se adaptaron mejor a estilos de juego más efectivos para lograr mejores resultados. Estas diferencias pueden atribuirse a cambios de reglas, la ausencia total/parcial de espectadores, un período de inactividad de tres meses y la acumulación de partidos en un corto período de tiempo. Los equipos deben tener en cuenta las diferentes situaciones analizadas para mostrar un estilo de juego eficaz para lograr sus diferentes objetivos.

Palabras Claves: Análisis Notacional, Estilos de Juego, Árbol de Clasificación, Indicadores de Rendimiento.

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Introduction

The impact of fans in various sports events has always been a subject of research in order to understand the home advantage in the final outcome. This effect has been studied in different sports, contexts, and types of competitions (Pollard & Pollard, 2005; Fernández-Cortés et al., 2022; García-Rubio et al., 2009). In the last decade, one event has conditioned the lives of people worldwide: COVID-19, which has also affected the sports context. This infectious disease caused by a coronavirus forced the implementation of a series of prophylactic measures to minimize its impact on people's health. During the COVID-19 pandemic, Spanish professional football took several measures to ensure the safety of players, staff, and the public. Some of the actions taken were: i) Partial suspension of the competition in March 2020; ii) Establishment of a health protocol to guarantee the safety of players and staff during matches; iii) Holding matches behind closed doors, without the presence of fans in stadiums, during part of the 2019-2020 and 2020-2021 seasons; iv) Mandatory regular PCR tests for all individuals associated with teams to detect COVID-19 cases; v) Establishment of isolation bubbles to minimize the risk

of contagion among players and coaching staff. All of these measures resulted in modifications to the sports calendar and the way the competition was conducted. The resumption of the competition after the temporary closure caused by COVID-19 was carried out progressively, with the initial matches being played without the presence of spectators.

The effect of the absence of spectators during this period on the match outcome has been studied in different sports. In sports like rugby, the home advantage was drastically reduced during this time, to the point where there was no advantage for the home team at all (Sedeaud et al., 2021). In basketball (Ehrlich & Potter, 2022), the presence of spectators affirmed the existence of a home team advantage in the NBA, which was completely lost in their absence. Several top-level European football leagues also experienced a significant reduction in the home advantage (De Angelis & Reade, 2022), even with a relatively small number of fans present and adhering to the social distancing guidelines mandated by authorities. The home teams maintained their full advantage, similar to pre-pandemic matches (Ehrlich & Potter, 2022). In Major League Baseball, the presence of spectators was not a significant factor in the

home advantage (Chiu & Chang, 2022). In handball, spectators played a key role in the home advantage (Gershgoren et al., 2022), while in hockey, the advantage remained unchanged whether spectators were present or not, although it slightly decreased in the absence of a live audience (Arboix-Alio et al., 2022).

In football, McCarrick et al. (2021) analyzed the results of over 5,000 football matches from the 2019-2020 season in four European leagues (England, Spain, Italy, and Germany) before and after the closure of stadiums due to the pandemic, identifying a significant decrease in the home advantage after the closure of stadiums. Martins et al. (2022) identified a reduction in the number of goals scored during the COVID-19 period, with a decrease in home goals scored (Cross & Uhrig, 2023). However, the authors also highlighted that this effect is not consistent across all leagues, as in some leagues, the home advantage increased (Benz & Lopez, 2021). Points earned at home decreased for the home teams, accompanied by an increase in the number of cards issued (Leitner & Richlan, 2021) and a significant increase in goals scored by the visiting teams, resulting in no home advantage in the German league (Hill & Van Yperen, 2021; Jiménez-Sánchez, Lavín, & Endara, 2021).

Research linked to the effect of COVID-19 has been replicated in various leagues, with significant decreases observed in total shots and shots on target (Wunderlich et al., 2021), tackles, and successful passes for home teams. The disappearance of the home advantage has been identified in Germany, while it remains in other countries such as Spain, England (Almeida & Leite, 2021), Italy (Vandoni et al., 2022), or Portugal (Matos et al., 2021). Some physical and gameplay variables were also affected by the absence of fans (Santana et al., 2021). Therefore, it is essential to continue analyzing these variables individually in each league to obtain more specific conclusions.

The referee bias contributes to the home team advantage (Sors et al., 2021), and in the absence of spectators, the referee bias disappears (Bilalic et al., 2021). The referee's behavior induced by the absence of spectators led to a decrease in penalties against away teams, including fouls, yellow cards, and red cards (Wunderlich et al., 2021). Scoppa (2021), through their research, strongly supports the idea that social pressure has intense effects on referee behavior. Referee intervention directly affected matches played with spectators, with visiting teams receiving a higher number of cards and less added time in the second half when the visiting team was losing by one goal (Couto & Sayers, 2022). As revealed, the absence of spectators did not have the same influence in the different leagues analyzed. The home team advantage was not identified in the Brazilian league. In the Brazilian Serie B league, Ribeiro et al. (2022) indicated that the home advantage had no influence, so its existence remained both before and during the pandemic (Macedo-Rego, 2022). In the German top division, there was a reduced home team advantage, but this did not occur in the second and third tiers of German football, with no differences before and during COVID-19

(Fischer & Haucap, 2021). This may be due to differences in attendance, with a much higher number of spectators in the top division, while there is not as much public attendance in lower divisions. Psychologically, in lower divisions below the top tier, players are capable of experiencing a very similar atmosphere whether there are people present or not.

Unlike men's football, in women's football, Krumer and Smith (2022) analyzed the Swedish league and found a slight reduction in the home team advantage without reaching statistical significance in terms of goals scored and points obtained during this period of time. Teams playing away from home received more yellow cards in matches without spectators than in matches with spectators.

The playing style in professional football can be defined as the way a team approaches the game and performs on the field. It can vary from a more defensive and cautious approach to a more offensive and daring approach. Researchers include different game indicators to define the playing style, such as ball possession and loss patterns, player positioning and movement, tactics and game strategies, speed and intensity of play, and defensive and offensive focus (Hughes et al., 2019; Lago-Peñas & Dellal, 2010). Furthermore, it has been shown that a team's playing style can significantly influence its performance on the field (Sarmiento et al., 2014). The identification of a playing style should be based on objective and clearly identifiable game indicators, analyzing the interaction of different actions and identifying clusters of game indicators that can define it. Many authors argue for the need to investigate specific sports leagues in a more focused manner, as there are numerous factors that influence them, such as goals scored and conceded, and points obtained, in order to determine the impact of a pandemic on professional leagues. Due to the necessity of gaining in-depth knowledge about professional leagues, this research has identified studies that have analyzed differences in game indicators based on match venue, the influence of COVID-19, or the outcome (Fernández-Cortés et al., 2022). However, the literature contains few documents where this relationship is examined depending on the style of play. After observing the different defensive and offensive variables before, during and after COVID-19, which determine the importance of the presence or absence of spectators, the existing changes in regulations and the accumulation of matches in a short period of time and all this, After several months of not being able to train normally, it was decided to analyze the playing styles implemented with the intention of understanding the possible variations or uses of tactical variables used by the teams in different periods of time.

Due to the need to understand how COVID-19 affected playing styles in professional leagues, the objective of this research was to analyze the influence of the COVID-19 pandemic through playing styles measured by the interaction of game indicators to verify the existence of the home advantage effect in three different temporal moments: Pre-Covid, Covid, and Post-Covid, in the top professional

league in Spain, La Liga. To achieve this, the aim is to identify the playing styles in each analyzed moment through the interaction of game indicators.

Method

Design

This research was an empirical study with a quantitative analysis of data (Midgley & Christmas, 2014). A descriptive approach was employed for data collection using an arbitrary observational code through a pre-constructed notational record. It was an ex post facto and naturalistic study, as it was conducted in a natural context without any intervention on the analyzed matches (Montero & Leon, 2007).

Sample

The data sample consisted of 5320 cases corresponding to the seasons of La Liga (Spanish Men's First Division Football) 2014/2015, 2015/2016, 2016/2017, 2017/2018, 2018/2019, 2019/2020, and 2020/2021. All seasons were conducted normally except for the 2019/2020 season, which experienced a three-month hiatus of inactivity due to

the Covid-19 pandemic. On the one hand, the pre-covid matches were analyzed with situations with an audience, while the last 11 matchdays during covid were played without an audience. Therefore, during this season we have cases in both situations. A total of 2660 matches were recorded during the 7 seasons. Two cases, corresponding to the information of each participating team, were registered for each match. The data was collected from <https://www.flashscore.es>.

Variables

In this study, three independent variables were used: i) COVID moment (before, during, and after the pandemic); ii) match venue (home and away); iii) outcome (win, draw, and loss). The dependent variables analyzed were grouped into six categories (Table 1): i) cautions; ii) shots; iii) fouls committed; iv) ball possession; v) defensive actions; vi) offensive actions. Within each category, the game indicators included in the website were grouped. All variables were defined according to the FIFA regulations (FIFA, 2022) (Table 1).

Table 1.
Dependent variables of the research.

Categories	Variables	Definition
Warnings	Yellow Card	A serious prior infraction, in the judgment of the referee, is excessive.
	Red Card	A very serious prior infraction or aggression, in the judgment of the referee, is excessive.
Shots	Total Shots	Shots on goal and off goal.
	Shots on Goal	Shots on goal.
	Shots off Goal	Shot that doesn't go on target (including posts and crossbar).
Reported Infractions	Free Kicks	Direct or indirect free kicks and penalty kicks awarded for committed fouls.
	Offsides	When a player is, wholly or partially, in the opponent's half of the field and their head, torso, leg, or foot is closer to the opposing goal line than both the ball and the second-to-last opponent.
	Fouls	Foul committed by an opponent.
Ball Possession	Possession	Percentage of minutes that teams maintain ball possession relative to the total minutes.
Defensives Actions	Dives	Defensive actions performed by the goalkeeper to prevent the ball from entering their goal.
Offensives Actions	Corners	A corner kick is awarded when the ball crosses the goal line, either on the ground or in the air, provided that the defender is the last one to touch the ball and does not put it into their own goal.
	Attacks	The ball possession that a team has in their own half.
	Dangerous Attacks	The ball possession that a team has in the opponent's half.
	Total Pass	The passes made between players of the same team

Procedure

The data were collected from the website <https://www.flashscore.es> in the selected game indicators. A coding system was developed using the results from seven seasons. To ensure the correct data entry, an intra-observer agreement analysis was conducted. The agreement found in the different recorded variables was considered "almost perfect" (Landis & Koch, 1977), as Cohen's Kappa coefficient values above .83 were obtained. The different seasons were classified into three situational COVID moments: Pre-Covid, Covid, and Post-Covid. In this study, an initial analysis was conducted to identify and select the variables that could affect the outcome of a match and how they influenced before, during, and after the pandemic. ANOVA was performed to identify differences in game indicators between the different seasons. As no significant differences were found among the first five seasons, they were grouped into an initial period (Pre-Covid). The data for each team during each

match were considered as independent sampling units, assuming that the game indicators manifested independently due to the presence of a situational variable that influenced the behavior of teams and players. A new variable called "tempocovid" was created, representing the three previously defined categories.

In the second phase of the study, differences in game indicators were analyzed based on the season's moment. Finally, the first classification tree was developed to analyze the existing game models in La Liga, followed by second, third, and fourth classification trees to analyze the game models in each respective time period (Pre-Covid, Covid, and Post-Covid).

Statistical analysis

First, a descriptive analysis (mean and standard deviation) of the different variables was performed for the three temporal moments based on the match venue. To classify the playing styles of home and away teams, a classification tree analysis was used (Gómez et al., 2017) considering game-related statistics before, during, and after COVID.

The algorithm used was the CRT technique, which divides the sample into segments that are as homogeneous as possible in relation to the dependent variable (win/lose) (Breiman et al., 1984). This method allows for dividing large samples into different subgroups or nodes based on the impact of variables on the game. This procedure organizes the results visually in the form of a tree model, where each root split node establishes two subgroups, each following the same division (Breiman, 2017). The IBM SPSS version 26.0 software (SPSS Inc., Chicago, IL, USA) was used

for data analysis.

Results

The descriptive results of the independent variables (match venue: home and away) and COVID (Pre-COVID, COVID, and Post-COVID) and the dependent variables are shown in Table 2.

Table 2.
Descriptive results of teams based on match venue and the COVID situation.

	PRE-COVID				COVID				POST-COVID			
	Home		Away		Home		Away		Home		Away	
	M	DT	M	DT	M	DT	M	DT	M	DT	M	DT
Yellow Card	2,53	1,59	2,84	1,57	2,56	1,55	2,62	1,49	2,17	1,42	2,28	1,43
Red Card	0,10	0,32	0,13	0,36	0,11	0,37	0,13	0,34	0,09	0,29	0,09	0,31
Possession	51,81	10,70	48,19	10,70	51,38	11,31	48,62	11,31	50,73	12,55	49,27	12,55
Total Shots	13,51	4,77	10,48	4,30	12,48	4,74	10,14	4,08	11,43	4,73	9,92	4,27
Shots on Goal	4,84	2,54	3,75	2,20	4,34	2,45	3,51	1,96	3,98	2,28	3,43	1,97
Shots off Goal	8,67	3,68	6,73	3,30	8,14	3,74	6,63	3,40	7,44	3,64	6,49	3,36
Free Kicks	15,73	4,52	15,94	4,55	15,34	4,32	15,74	4,50	16,31	5,40	16,47	5,13
Corners	5,66	2,86	4,19	2,45	5,04	2,68	4,20	2,32	4,43	2,60	4,31	2,68
Offsides	2,51	1,93	2,30	1,82	2,32	1,79	1,92	1,62	2,08	1,63	1,94	1,61
Dives	2,59	1,74	3,28	2,05	2,47	1,67	2,91	1,97	2,30	1,59	2,63	1,91
Fouls	13,84	4,25	13,86	4,20	13,68	4,21	13,81	3,94	13,31	4,17	13,19	4,22
Attacks	105,79	24,23	97,33	21,75	111,58	24,80	103,74	21,79	104,54	27,12	98,68	23,49
Dangerous Attacks	61,37	19,18	48,94	16,91	50,62	17,93	42,30	14,56	48,90	19,85	44,36	17,96
Total Pass	441,85	124,43	415,75	114,64	434,60	125,91	411,56	119,30	439,68	136,24	425,77	130,42
Tackles	16,55	6,31	17,52	7,66	14,61	4,49	15,32	4,65	13,84	4,59	14,48	4,31

Figure 1 shows the results of the classification tree for the seven analyzed seasons. In La Liga, 15 different game models were identified. When playing at home and achieving victory, teams exhibited six different game styles:

I. Direct offensive play (-388 passes, -14 and +10 total shots, +38 dangerous attacks).

II. Horizontal possession play (+50 dangerous attacks, +387 passes, -14 and +10 total shots).

III. Direct play (-391 passes, -57 and +38 dangerous attacks, +13 total shots).

IV. Vertical possession play (+390 passes, -57 and +38 dangerous attacks, +13 total shots).

V. Highly offensive play (-3 dives, +56 dangerous attacks, +13 total shots).

VI. Offensive play with vertical possession (+2 dives, +56 dangerous attacks, +13 total shots).

Offensive play predominates, with some teams opting for direct play while others focus on maintaining possession, but all teams end up taking more than 10 total shots. When visiting teams achieved victory, they demonstrated nine game styles:

I. Passive play (-14 tackles, -7 total shots).

II. Passive and aggressive play in their own half (-21

and +13 tackles, -7 total shots).

III. Aggressive defensive play (+20 tackles, -7 total shots).

IV. Transition/counterattack play (-4 dives, -20 tackles, +6 and -11 total shots).

V. Direct/counterattack play (+3 dives, -20 tackles, +6 and -11 total shots).

VI. Direct play with active/aggressive defense (-42% possession, +19 tackles, +6 and -11 total shots).

VII. Aggressive play with horizontal possession (+41% possession, +19 tackles, +6 and -11 total shots).

VIII. Direct play (-39 dangerous attacks, +10 total shots).

IX. Vertical possession play (-51 and +38 dangerous attacks, +387 passes, -14 and +10 total shots).

Visiting teams mainly employed direct play and counterattacks, with an active and aggressive defense, while others utilized a passive defense with horizontal possession lacking depth.

There is a wide range of game styles due to the mixture of three different competitive realities: Pre-COVID, COVID, and Post-COVID. Hence, it was necessary to conduct a specific study for each competitive reality.

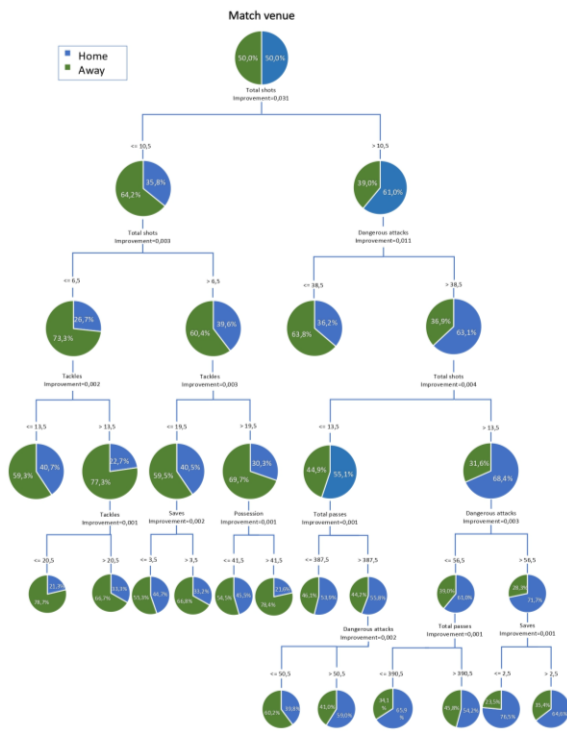


Figure 1. Graphical representation of the decision tree of the existing playing systems in La Liga in the seven analyzed seasons.

In Figure 2, the results of the Pre-COVID classification tree are presented. In La Liga Pre-COVID, eleven different game styles were identified for the analyzed seasons before COVID-19. When playing at home and achieving victory, local teams exhibited five different game styles:

- I. Offensive play with horizontal possession (+63 dangerous attacks, -11 total shots).
- II. Offensive play with vertical possession (+63 dangerous attacks, +10 total shots).
- III. Offensive play (-12 tackles, +37 and -64 dangerous attacks, +10 total shots).
- IV. Direct play with active defense (-386 passes, +11 tackles, +37 and -64 dangerous attacks, +10 total shots).
- V. Possession play with active defense (+385 passes, +11 tackles, +37 and -64 dangerous attacks, +10 total shots).

They opted for an offensive game with active defense, with some teams emphasizing possession play while others focused on direct play.

When visiting teams achieved victory, they demonstrated six different game styles:

- I. Passive defensive play (-361 passes, -16 tackles, -8 total shots, -64 dangerous attacks).
- II. Defensive play with horizontal possession (+360 passes, -16 tackles, -8 total shots, -64 dangerous attacks).
- III. Aggressive defensive play (+15 tackles, -8 total shots, -64 dangerous attacks).
- IV. Counterattack play with passive defense (-20 tackles, +7 and -11 total shots, -64 dangerous attacks).
- V. Counterattack play with active defense (+19 tackles, +7 and -11 total shots, -64 dangerous attacks).

VI. Direct play (-38 dangerous attacks, +10 total shots).

Visiting teams generally adopted a defensive approach, with some teams employing passive defense and horizontal possessions, while others exhibited a more aggressive style, utilizing counterattacks or direct play.

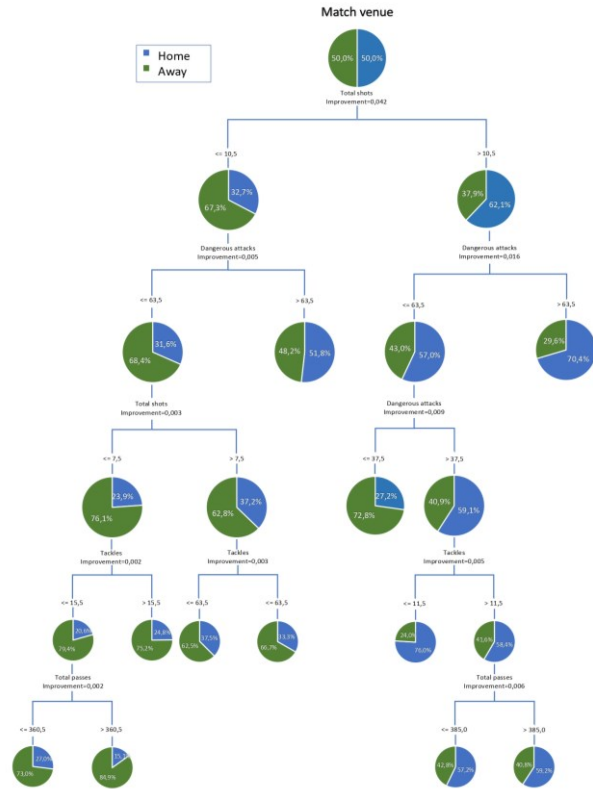


Figure 2. Graphical representation of the decision tree of the existing playing systems Pre-Covid in La Liga.

In Figure 3, the results of the during-COVID classification tree are shown. In La Liga, six different game styles were identified. When playing at home and achieving victory, local teams exhibited three different game styles:

- I. Offensive play (+12 total shots).
- II. Counterattack play (-317 and +282 passes, -13 total shots).
- III. Defensive play with horizontal possession (+15 fouls, -16 tackles, +316 passes, -13 total shots).

Local teams opted for offensive play, counterattacks, or long possessions. When visiting teams achieved victory, they demonstrated three similar game styles:

- I. Defensive play (-283 passes, -13 total shots).
- II. Horizontal possession play with active defense (+15 tackles, +316 passes, -13 total shots).
- III. Horizontal possession play with passive defense (-16 fouls, -16 tackles, +316 passes, -13 total shots).

Visiting teams employed a defensive approach, with some teams exhibiting active and more aggressive defense, while others showcased a passive defense by waiting in their own half, all while attempting to maintain horizontal ball possession without depth.

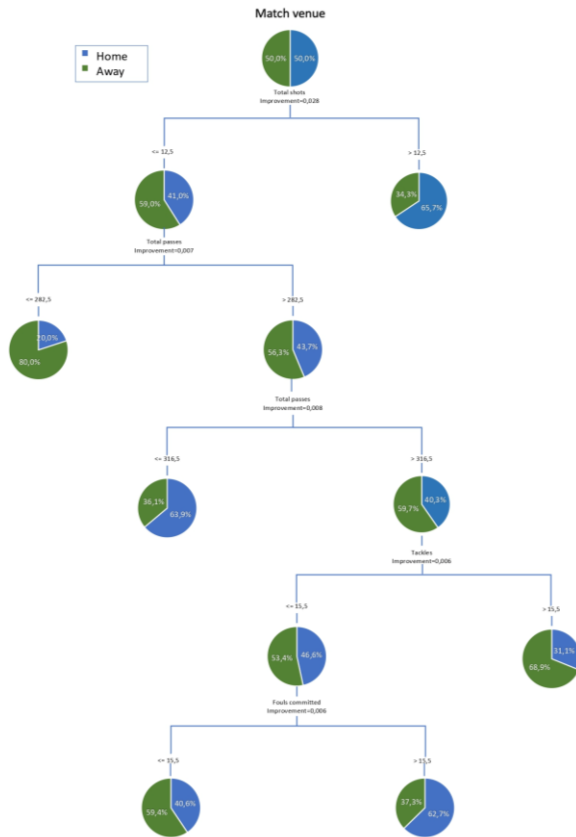


Figure 3. Graphical representation of the decision tree of the existing playing systems during Covid in LaLiga.

In Figure 4, the results of the Post-COVID classification tree are displayed. In La Liga, two different game styles were identified. The game style of home teams when achieving victory was:

- I. Offensive play (+123 attacks).

The game style of visiting teams when achieving victory was:

- I. Direct play / counterattacks with active defense (-123 attacks).

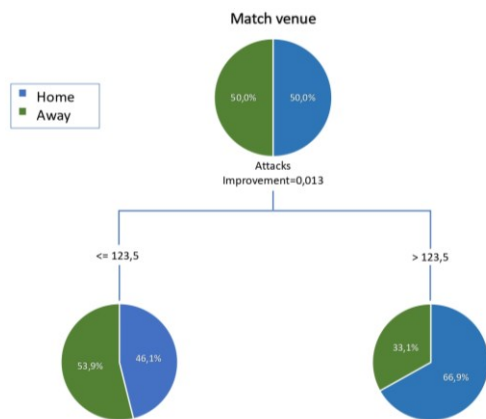


Figure 4. Graphical representation of the decision tree of the existing playing systems after Covid in LaLiga.

Discussion

The objective of this research was to analyze the playing styles before, during, and after COVID-19 in order to determine the importance of the presence or absence of spectators, rule changes, and the accumulation of matches in a short period of time following several months of inactivity and limited training. The study aimed to identify the variations in playing styles during these three temporal moments analyzed.

The impact of spectators in any sport has always been a subject of study to understand their influence on home and away teams. In rugby (Sedeaud et al., 2021), basketball (Ehrlich & Potter, 2022), and handball (Gershgoren et al., 2022), spectators have been identified as a key factor in the home advantage. In baseball (Chiu & Chang, 2022) or hockey (Arboix-Alio et al., 2022), the advantage did not change with the presence or absence of spectators. However, in football, studies have shown a reduced home advantage in the absence of spectators in various leagues (Martins et al., 2022), resulting in fewer goals scored (Cross & Uhrig, 2023), fewer total shots and shots on target (Wunderlich et al., 2021), or an increased number of cards received by the home team (Leitner & Richlan, 2021). This suggests that the presence of spectators is an important factor in the home advantage in professional football (McCarriek et al., 2021). Therefore, considering the different conditions such as months of inactivity, absence of spectators, and increased number of substitutions, this research has highlighted the decrease in playing styles throughout the seasons as coaches adapt to the extraordinary conditions that existed.

Playing Styles

In order to analyze the playing styles before, during, and after COVID and understand the possible modifications of different variables, a clear difference was found, with these styles decreasing as the seasons progressed. Different playing styles have been identified based on the interaction of game indicators recorded on the website. These styles showed greater variability when analyzing the complete sample of seasons (fifteen styles) compared to analyzing each individual period affected by COVID. The choice of a team's playing style should be based on the quality of the players, their technical and tactical abilities, and their ability to adapt to different game situations (Rampinini et al., 2007). The wide variety of identified styles reflects the adaptive process of the coaches, where the presence of spectators can enhance players' performance by providing motivation and reinforcing team cohesion (Sánchez et al., 2021).

The playing styles in the top Spanish football league were highly diverse, with fifteen different models identified. The home teams have clearer and more concise styles, consistently emphasizing an offensive style, while the visiting teams try to adapt more to the home team's style, primarily utilizing a direct and counterattacking approach.

Consistent with these results, the home teams maintained their advantage when spectators were present or when there was a relatively small number of fans while adhering to social distancing measures required by authorities (Ehrlich & Potter, 2022). This indicates that home teams have better-defined playing styles due to social pressure, better adaptation to their own playing field, and other factors. Matches between evenly ranked teams show greater variability in playing styles, whereas as the differences in rankings increase, the playing styles become more defined. The best teams had more defined playing styles that were less influenced by the opponent, while the worst teams had playing styles more susceptible to the opponent's influence (García-Rubio et al., 2015). As home teams have fewer playing styles, visiting teams can take advantage of this by preparing knowing what the rival team is likely to do in the next match.

Influence of playing styles before COVID

Depending on the match venue Before COVID, with the presence of spectators, eleven different playing styles were found, with five styles observed from the home teams emphasizing a more offensive game, and six styles from the visiting teams generally displaying a more defensive approach, some utilizing a direct and counterattacking style, while others adopting a passive defense and horizontal possessions. In line with these results, Scoppa (2021) strongly supports the idea that social pressure has intense effects on referee behavior, contributing to the advantage of playing at home (Sors et al., 2021), resulting in an increase in fouls committed by visiting teams. Liu et al. (2019) confirmed that the average values for home teams were significantly higher in attack-related variables. Therefore, visiting teams had to prepare for matches by attempting to balance the average values of offensive game indicators in order to achieve similar results to when playing at home.

Influence of playing styles during COVID

Depending on the match venue During COVID, with the absence of spectators, playing styles decreased, resulting in three styles observed from the home teams and three styles from the visiting teams. Home teams adopted offensive playing styles but with long possessions, while visiting teams continued to utilize a direct and counterattacking style, typically with an active and aggressive defense, coinciding with a focus on maintaining prolonged ball possessions. This may be attributed to the accumulation of matches and fatigue after several months of inactivity, as teams preferred to retain possession and slow down the pace of the game, leading to a conservative approach with a reluctance to take risks, resulting in shorter matches and a lower number of goals. Krumer and Smith (2022) found a slight reduction, although not statistically significant, in the home advantage, goals scored, and points obtained. Some physical variables were also affected by the absence of spectators (Santana et al., 2021). The reduction in goals and the decrease in physical variables indicate a more measured and

controlled style of play. Therefore, teams had to enhance the quality of their attacks, knowing when and how to execute them in order to score goals, as the emphasis shifted from quantity to quality in the analyzed period of time.

Influence of playing styles after COVID depending on the match venue

After COVID, playing styles became simplified, with home teams needing to launch numerous attacks to secure victories, while visiting teams had a higher probability of winning when they didn't engage in a high number of attacks. This indicates that home teams became disorganized and attempted to be offensive in any way possible, whereas visiting teams made better choices regarding when and how to launch their attacks, thus increasing the quality of their offensive maneuvers. In leagues where playing styles remained unchanged regardless of the presence or absence of spectators, home teams continue to enjoy the same advantages when playing on their home turf (Fischer & Haucap, 2021). Despite simplifying their playing style, home teams, when playing in front of spectators, maintain a similar style of play in different situations throughout the seasons. On the other hand, visiting teams have transformed their playing styles into a more defined and concise approach, capitalizing on offensive improvements and results during periods without spectators. Consequently, home teams must exercise more control, defining an organized style of play during attacks, as they launch numerous attacks without scoring, allowing visiting teams to exploit these situations and execute more effective offensive actions.

Throughout the different seasons, there has been a reduction in playing styles, with greater style variability observed before COVID and a simplification observed during and after COVID. Home teams were more reliable when there was greater variability in playing styles, whereas this reliability shifted for visiting teams when playing styles became more limited. In analyzing this reduction in playing styles based on performance indicators, factors such as fixture congestion, absence of spectators, calendar congestion, and substitution rules must be taken into account. These changes were implemented as a result of a global pandemic.

Conclusion

This study has served to conduct an in-depth analysis of playing styles before, during, and after COVID, in order to understand the differences in game indicators in football following the various changes implemented within a short period of time, taking into account the match venue due to the presence or absence of spectators.

Different playing styles have been identified by analyzing the recent seasons of La Liga. After examining the different periods (Pre-Covid, Covid, and Post-Covid), it was observed that playing styles decreased, indicating a simplification of the game during the last months of the Covid season (matches without spectators) and the Post-Covid

season. Inferential analysis is needed to know the differences Pre-Covid and Post-Covid. As the seasons progressed, visiting teams were able to define their playing style more clearly, simplifying it to achieve better results. The home advantage did not change.

After conducting this study, several practical applications can be extrapolated. The variety of playing styles has been identified in the different temporal moments analyzed: Pre-Covid, Covid, and Post-Covid. The influence of the match venue on the different playing styles has been highlighted. The main performance indicators and their importance in different playing styles have been discovered. Effective playing styles to achieve victory before, during, and after a pandemic, both as a home team and as an away team, have been demonstrated.

One of the main limitations of this research lies in the dissimilarity of the match samples in the analyzed groups, as there is a smaller number of matches without spectators. The congested schedule prevented some teams from playing their most effective game, which could also be attributed to player absences (even minor injuries could result in a player missing two or three matches), potentially leading to a decrease in playing styles. Another limitation of this research is the limited time that has elapsed after COVID, as only one complete season could be analyzed. Therefore, it is unknown whether these results are permanent, and this trend should be further examined in the future by including more Post-Covid seasons.

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