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Influence of Game Indicators on the Ranking of Teams in the Spanish Soccer League

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Abstract: Soccer is dominated by game indicators that can influence the performance of teams and their players. Therefore, this study analyzed the influence of game indicators on the partial and final ranking of Spanish LaLiga teams, independently for the pre-COVID-19, COVID-19 and post-COVID-19 periods. In addition, the statistical differences between the pandemic periods were identified. A total of 2660 Spanish LaLiga matches played over seven seasons (from the 2014–2015 to the 2020–2021 season) were analyzed. The game indicators analyzed were the yellow cards, red cards, ball possession, total shots, shots on goal, shots off goal, free kicks, corners, offsides, goalkeeper saves, fouls committed, attacks, dangerous attacks, total passes, and tackles. Data were collected from the official Spanish LaLiga website, and recorded on a post hoc observation sheet. The intra-observer concordance was almost perfect (Cohen's kappa values > 0.83). In each pandemic period, the findings indicated that the statistically significant game indicators had a greater influence on the final ranking, with an intermediate and large effect ($\eta^2 \geq 0.060$), than on the partial ranking (little or no effect). In this regard, the LaLiga teams ranked in a European competition position (final ranking) reported a higher ball possession ($p < 0.001$) and total passes ($p < 0.001$). A higher ball possession allowed them to take more shots (offensive actions), and therefore to have a better chance of winning. Similarly, these game indicators were higher post-COVID-19, compared to pre-COVID-19 and during COVID-19. This is interesting information for the preparation and management of matches.

Keywords: COVID-19 pandemic; elite soccer; LaLiga; match analysis; opponent's quality

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1. Introduction

Soccer is one of the most popular sports in the world. In elite soccer, to achieve success in league rankings, a team must win the highest number of matches, influenced by game indicators/game actions (e.g., free kicks, cards, ball possession, shots, corner kicks, goalkeeper saves, fouls committed, or offsides) [1]. For this reason, there are assistants who collect statistical data from both their own, and the opposing, players, to identify potential strengths and weaknesses [2]. The authors of this paper highlight the influence of the aforementioned game indicators on the final result of a match, and how they thus become performance indicators. In addition, the opponent's quality and the match location are situational variables that can influence the performance of players and soccer teams [3].

Some of these game indicators and situational variables have been studied in the Spanish league, LaLiga [2]. The study [2] shows that the match location influences the final result in favor of the home team. A similar study [1] indicates that the match location, the effect of scoring first, and the quality of the opposing team influence the final result. Home teams are motivated by their fans, creating a feeling of territoriality, and visiting teams are

pressured [4] during matches. This means that home teams tend to take more shots and, therefore, the opposing team's goalkeeper makes more saves [5]. The differences in the movement profiles (intensities) in matches depending on the quality of the opponent have also been studied in the elite Spanish soccer leagues, in the First and Second Division [6], and the Second B Division [3]. Furthermore, it has been shown that teams participating in international competitions (e.g., the Champions League or the Europa League) are composed of coaches, assistants, and players who are more likely to withstand pressures, such as playing in crowded stadia, playing outside of the country, long-distance travel, etc. [7,8].

The COVID-19 pandemic interrupted the major European soccer leagues in mid-March 2020. The first league to resume competition was the Bundesliga on May 16. Subsequently, other European leagues resumed competition (e.g., LaLiga, the Premier League, Serie A, etc.). Except for the Russian League (at 10% capacity in each stadium), these leagues resumed competition without the attendance of fans [9]. Specifically in LaLiga, the competition was interrupted in March (the 27th round), and resumed on June 8 [7]. The COVID-19 pandemic brought major changes to the elite soccer leagues after their resumption. As a result, the Fédération Internationale de Football Association introduced new rules: (1) the banning of fans, in so-called ghost matches, or matches with a very limited fan attendance [9], and (2) an increase in player substitutions from 3 to 5 players [10]. For these reasons, the COVID-19 pandemic presents a unique situation in history for investigating the influence of game indicators that occurred in elite soccer matches.

Regarding performance in elite soccer matches, the current results on the effects of the COVID-19 pandemic report that the home advantage decreased in ghost matches [11,12]. In this regard, the number of fouls committed, and cards shown to visiting teams decreased, as the result of a lesser perceived social pressure on referees from the stands [13]. Moreover, a study on the four major leagues (i.e., Bundesliga, LaLiga, the Premier League, and Serie A), comparing statistics from before and after the COVID-19 pandemic, indicates a decrease in the expected points and goals scored by the home team. The decrease in the home team's advantage is due to the absence of fans in the stadium during the COVID-19 pandemic [14]. In other words, the performance of the home team is halved when the stadium is empty [7]. Nowadays, with stadia again crowded with fans, the video assistant referee helps referees in their decision-making during matches [15]. It can only be used in the following four basic situations: (1) goal, (2) penalty, (3) red card, and (4) player mix-up (in awarding a yellow, yellow–red, or red card) [9].

The results of soccer matches can be influenced by different game indicators [1,3,16]. This study analyzed, independently for the pre-COVID-19, COVID-19, and post-COVID-19 periods, the influence of game indicators on the partial (Study 1-S1) and final (Study 2-S2) ranking of Spanish LaLiga teams over seven seasons. The statistical differences between the pandemic periods were also identified in the two studies. For each pandemic period, we hypothesized that: (1) in the partial ranking, there would be differences in the game indicators between balanced, unbalanced, and very unbalanced teams (S1); (2) in the final ranking, there would be differences in the game indicators between the Europe, mid-table, and relegation teams (S2); and (3) in both studies, there will be differences in these game indicators between the pre-COVID-19, COVID-19, and post-COVID-19 periods, according to the team's ranking.

2. Materials and Methods

2.1. Study Design

For three different pandemic periods (pre-COVID-19, COVID-19, and post-COVID-19), a notational study was performed, using an arbitrary observation code [17]. In addition, the study was carried out in a natural context (LaLiga), and the researchers did not intervene in any way. It was divided into two stages: (S1) the analysis of different game indicators based on the mid-season (partial) ranking; and (S2) the analysis of the same game indicators based on the season's end (final) ranking.

2.2. Sample and Procedure

A total of 2660 matches in LaLiga (the First Division of men's soccer), played over seven seasons, were analyzed (pre-COVID-19: the 2014–2015, 2015–2016, 2016–2017, 2017–2018, and 2018–2019 seasons; COVID-19: the 2019–2020 season; and post-COVID-19: the 2020–2021 season). All seasons developed normally, except for the 2019–2020 season, when there was a three-month hiatus due to the COVID-19 pandemic, and the adoption of new rules for its resumption.

LaLiga is composed of 20 teams (38 matches per season), and is characterized by the aesthetic aspect of the game, and by the purpose of the teams to have a greater control of the game [3]. The scoring system of the Fédération Internationale de Football Association is used; i.e., three points for a win, one for a draw, and zero for a loss. Therefore, the sum of the points obtained in each match determines the partial and final ranking, and the team with the most points at the end of each season is the winner.

The following data (game indicators) were collected for each team and match played: (1) yellow cards, (2) red cards, (3) ball possession, (4) total shots, (5) shots on goal, (6) shots off goal, (7) free kicks, (8) corners, (9) offsides, (10) goalkeeper saves, (11) fouls committed, (12) attacks, (13) dangerous attacks, (14) total passes, and (15) tackles. These were the dependent variables. The quality of the opponents, the independent variable, was divided into three different groups according to the partial ranking (S1: equaled = 0–5 places; unbalanced = 6–10 places; very unbalanced = 11–19 places), and the final ranking (S2: Europe position = 1–7 places; middle position = 8–17 places; relegation = 18–20 places). The partial ranking referred to the position of each team at the mid-season point, while the final ranking referred to the position of each team at the end of the season.

All the data were collected from the official LaLiga website (http://www.laliga.es; accessed on 10 April 2022), and recorded on a post hoc observation sheet. They were also contrasted with two different official websites (https://www.flashscore.es and https://optaplayerstats.statsperform.com/en_GB/soccer; accessed both on 10 May 2022), to minimize errors. In addition, an intra-observer concordance analysis was performed, to ensure correct data entry. The agreement found in the game indicators was almost perfect [18], with Cohen's kappa values above 0.83. Finally, the data obtained were entered into the statistical software, for descriptive and inferential analysis.

2.3. Statistical Analysis

First, the normality of the data ($p > 0.05$) was assumed, after statistical analysis with the Kolmogorov–Smirnov test, using the Lilliefors significance correction [19]. Subsequently, for each study (S1 and S2), and the three pandemic periods (pre-COVID-19, COVID-19, and post-COVID-19), a descriptive analysis was performed using the mean and standard deviation of the game indicators.

In each pandemic period (pre-COVID-19, COVID-19, and post-COVID-19), an analysis of variance was performed, using an one-factor ANOVA test and a Bonferroni post hoc test to identify statistical differences in the game indicators, according to the partial (S1) and final (S2) ranking. The effect size was calculated using eta squared and Cohen's d (point estimate) [19–21]. The ranges used for eta squared were 0.000–0.009 (no effect), 0.010–0.059 (small effect), 0.060–0.139 (intermediate effect), and 0.140–0.200 (large effect). The ranges used for Cohen's d were <0.000 (adverse effect), 0.000–0.199 (no effect), 0.200–0.499 (small effect), 0.500–0.799 (intermediate effect), and 0.800–≥1.000 (large effect) [20,21]. Thus, the reported effect size complemented the significance value, to provide an estimate of the extent of our results, interpreting results with no effect or a small effect as unimportant.

A linear mixed model and Bonferroni post hoc [22] were also calculated, to identify the statistical differences between the pandemic periods in the two studies. In this model, the individual response of each team was controlled (R^2 conditional random factor = team), to analyze whether the repetition of the matches affected the results. An interclass correlation coefficient close to 0 indicated that the responses were stable, and the LRT test indicated whether the random factor had any effect or not.

Statistical analysis was performed using SPSS software, version 27 (IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27, IBM Corp., Armonk, NY, USA) and Jamovi software [23], version 2.3.24. A significance level of $p \leq 0.05$ was considered.

3. Results

Table 1 and first table in Section 3.2. show the statistically significant and non-significant results. However, due to space limitations, only statistically significant results are shown in other tables.

3.1. Partial Ranking of the LaLiga Teams

The differences in game indicators according to the partial ranking are shown in Table 1. Thus, in the pre-COVID-19 period, there were significant statistical differences in six game indicators: yellow cards, red cards, total shots, shots on goals, free kicks, and fouls committed. In the COVID-19 period, there were only significant statistical differences in two game indicators: shots off goal, and total passes. In the post-COVID-19 period, there were significant statistical differences in five game indicators: shots on goals, free kicks, offside, fouls committed, and total passes. Despite the significant differences noted, there was no effect (0.000–0.009) or a small effect (0.010–0.059) in these game indicators (Table 1).

Table 1. The differences in game indicators according to the partial ranking, independent of the pandemic period.

Game Indicator	Ranking	Pre-COVID-19				COVID-19				Post-COVID-19			
		M	*SD*	*F*	*p* (η^2)	*M*	*SD*	*F*	*p* (η^2)	*M*	*SD*	*F*	*p* (η^2)
Yellow cards	Equaled	2.83	1.60	17.31	<0.001 *	2.61	1.51	0.09	0.91	2.26	1.42	1.97	0.14
	Unbalanced	2.62	1.56		(0.01)	2.57	1.54		(0.00)	2.32	1.48		(0.01)
	Very unbalanced	2.46	1.58			2.57	1.52			2.03	1.36		
Red cards	Equaled	0.13	0.36	4.29	0.01 *	0.12	0.38	0.05	0.95	0.09	0.30	0.20	0.82
	Unbalanced	0.12	0.34		(0.00)	0.12	0.34		(0.00)	0.10	0.33		(0.00)
	Very unbalanced	0.09	0.30			0.11	0.31			0.08	0.27		
Ball possession	Equaled	50.00	10.19	0.00	1.00	50.00	10.99	0.00	1.00	50.00	11.41	0.00	1.00
	Unbalanced	50.00	10.64		(0.00)	50.00	10.73		(0.00)	50.00	13.42		(0.00)
	Very unbalanced	50.00	12.35			50.00	13.11			50.00	14.04		
Total shots	Equaled	11.81	4.61	4.30	0.01 *	11.31	4.50	0.99	0.37	10.45	4.24	1.26	0.29
	Unbalanced	12.01	4.70		(0.00)	11.59	4.70		(0.00)	10.76	5.01		(0.00)
	Very unbalanced	12.38	5.22			10.93	4.56			11.12	4.70		
Shots on goal	Equaled	4.17	2.31	6.56	0.00 *	4.06	2.33	1.86	0.16	3.61	2.07	3.88	0.02 *
	Unbalanced	4.30	2.35		(0.00)	3.69	2.09		(0.01)	3.56	2.11		(0.01)
	Very unbalanced	4.53	2.76			3.93	2.27			4.13	2.33		
Shots off goal	Equaled	7.64	3.57	1.03	0.36	7.25	3.50	3.41	0.03 *	6.83	3.33	0.72	0.49
	Unbalanced	7.70	3.65		(0.00)	7.90	3.86		(0.01)	7.19	3.91		(0.00)
	Very unbalanced	7.85	3.73			7.00	3.65			6.99	3.47		
Free kicks	Equaled	16.07	4.55	7.74	<0.001 *	15.60	4.24	0.62	0.54	16.98	5.27	7.84	<0.001 *
	Unbalanced	15.85	4.52		(0.00)	15.28	4.52		(0.00)	16.33	5.43		(0.02)
	Very unbalanced	15.34	4.50			15.76	4.65			15.02	4.76		
Corners	Equaled	4.89	2.70	0.66	0.52	4.78	2.61	1.49	0.23	4.46	2.71	0.42	0.66
	Unbalanced	4.91	2.85		(0.00)	4.52	2.48		(0.00)	4.27	2.54		(0.00)
	Very unbalanced	5.02	2.78			4.40	2.46			4.29	2.61		
Offsides	Equaled	2.35	1.84	1.46	0.23	2.13	1.69	0.16	0.86	2.14	1.69	3.27	0.04 *
	Unbalanced	2.46	1.83		(0.00)	2.07	1.61		(0.00)	1.96	1.46		(0.01)
	Very unbalanced	2.45	2.02			2.16	1.91			1.76	1.62		

Table 1. *Cont.*

Game Indicator	Ranking	Pre-COVID-19				COVID-19				Post-COVID-19			
		M	***SD***	***F***	***p*** **(** η^2 **)**	***M***	***SD***	***F***	***p*** **(** η^2 **)**	***M***	***SD***	***F***	***p*** **(** η^2 **)**
Goalkeeper saves	Equaled	2.87	1.92	1.97	0.14	2.76	1.88	1.30	0.27	2.39	1.64	2.27	0.10
	Unbalanced	2.97	1.87		(0.00)	2.52	1.76		(0.00)	2.40	1.76		(0.01)
	Very unbalanced	3.02	2.03			2.76	1.85			2.73	2.02		
Fouls committed	Equaled	14.12	4.25	11.21	<0.001 *	13.78	3.93	0.24	0.79	13.66	4.17	7.02	<0.001 *
	Unbalanced	13.84	4.22		(0.01)	13.60	4.28		(0.00)	13.30	4.46		(0.02)
	Very unbalanced	13.30	4.15			13.88	4.13			12.18	3.68		
Attacks	Equaled	101.71	23.41	0.33	0.72	106.84	24.07	1.52	0.22	101.95	23.02	0.10	0.91
	Unbalanced	100.83	22.68		(0.00)	106.94	21.58		(0.00)	101.53	27.77		(0.00)
	Very unbalanced	102.14	24.29			110.51	25.28			100.88	28.16		
Dangerous attacks	Equaled	54.75	18.56	0.43	0.65	45.43	16.81	1.66	0.19	46.09	17.37	1.10	0.33
	Unbalanced	55.82	19.42		(0.00)	46.91	15.72		(0.00)	46.16	19.85		(0.00)
	Very unbalanced	55.19	19.87			48.21	18.26			48.65	21.70		
Total passes	Equaled	423.84	117.74	1.68	0.19	417.79	116.46	3.05	0.05 *	424.83	123.22	3.71	0.03 *
	Unbalanced	425.26	108.06		(0.00)	416.53	116.81		(0.01)	428.33	133.94		(0.01)
	Very unbalanced	443.10	137.32			444.18	143.25			458.42	153.41		
Tackles	Equaled	16.96	8.59	0.05	0.95	14.86	4.83	0.50	0.61	14.28	4.60	0.73	0.48
	Unbalanced	17.05	5.19		(0.00)	14.91	4.31		(0.00)	14.22	4.21		(0.00)
	Very unbalanced	17.17	5.16			15.28	4.34			13.78	4.45		

Note: equaled = 0–5 places in the league table; unbalanced = 6–10 places in the league table; very unbalanced = 11–19 places in the league table. * $p \leq 0.05$.

Multiple comparisons between the game indicators, according to the partial ranking, are shown in Table 2. In the pre-COVID-19 period, the results indicated that equaled teams received more yellow cards, compared to unbalanced and very unbalanced teams. These first teams received more red cards, compared to very unbalanced teams, but they made fewer total shots and shots on goal, compared to very unbalanced teams. On the other hand, equaled and unbalanced teams took more free kicks, and committed more fouls than very unbalanced teams. In the COVID-19 period, unbalanced teams reported more shots off goal than very unbalanced teams. In the post-COVID-19 period, equaled and unbalanced teams reported fewer shots on goals than very unbalanced teams; in contrast, these same teams took more free kicks, and committed more fouls, compared to very unbalanced teams. Equaled teams committed more offsides, compared to very unbalanced teams; in contrast, they made fewer total passes than very unbalanced teams. Despite this, no effect (0.000–0.199) or a small effect (0.200–0.499) was reported on the significant game indicators.

Table 2. Post hoc comparisons between game indicators, according to the partial ranking, for each pandemic period.

Period	Game Indicator	Inferential Comparison	*p*-Bonferroni (*d*)
Pre-COVID-19	Yellow cards	Equaled > Unbalanced Equaled > Very unbalanced	0.00 * (0.13) <0.001 * (0.23)
	Red cards	Equaled > Very unbalanced	0.01 * (0.12)
	Total shots	Equaled < Very unbalanced	0.01 * (−0.12)
	Shots on goal	Equaled < Very unbalanced	<0.001 * (−0.15)
	Free kicks	Equaled > Very unbalanced Unbalanced > Very unbalanced	<0.001 * (0.16) 0.04 * (0.11)
	Fouls committed	Equaled > Very unbalanced Unbalanced > Very unbalanced	<0.001 * (0.20) 0.01 * (0.13)
COVID-19	Shots off goal	Unbalanced > Very unbalanced	0.05 * (0.24)
	Total passes	No differences were observed in the comparisons	
Post-COVID-19	Shots on goal	Equaled < Very unbalanced Unbalanced < Very unbalanced	0.03 * (−0.24) 0.04 * (−0.26)
	Free kicks	Equaled > Very unbalanced Unbalanced > Very unbalanced	<0.001 * (0.38) 0.05 * (0.25)
	Offsides	Equaled > Very unbalanced	0.04 * (0.23)
	Fouls committed	Equaled > Very unbalanced Unbalanced > Very unbalanced	<0.001 * (0.37) 0.03 * (0.27)
	Total passes	Equaled < Very unbalanced	0.02 * (−0.25)

Note: equaled = 1–5 places in the league table; unbalanced = 6–10 places in the league table; very unbalanced = 11–19 places in the league table; *d* = Cohen's d. Only statistically significant game indicators in the one-factor ANOVA test are shown in this table. * $p \leq 0.05$.

The proposed model, a linear mixed model (period*partial ranking), reported significant statistical differences in three game indicators (Table 3): free kicks, offsides, and fouls committed. The inter-class correlation coefficient was close to 0; thus, the responses of each team were stable, and the repetition of the matches had no effect.

Multiple comparisons according to the period*partial ranking interaction are shown in Table 4. In general, during the post-COVID-19 period, equaled teams took more free kicks, compared to the pre-COVID-19 and COVID-19 periods. Moreover, very unbalanced teams committed fewer offsides and fouls during this pandemic period.

Table 3. Differences in period*partial ranking interaction.

Game Indicator	*F*	*p*	R^2 Conditional	*BIC*	*ICC*	*LRT* (*p*)
Free kicks	2.99	0.02 *	0.06	31242.72	0.06	231 (<0.001 *)
Offsides	2.28	0.05 *	0.04	21495.06	0.03	90.3 (<0.001 *)
Fouls committed	2.39	0.05 *	0.09	29999.63	0.09	434 (<0.001 *)

Note: *F* = linear mixed model; *BIC* = Bayesian information criterion; *ICC* = interclass correlation coefficient; *LRT* = LRT test for random effect; Intercept | Team. Only statistically significant game indicators in the linear mixed model are shown in this table. * $p \leq 0.05$.

Table 4. Post hoc comparisons according to the period*partial ranking interaction.

Game Indicator	Period	Ranking	Period	Ranking	*t*	*p*-Bonferroni
Free kicks	Pre-COVID-19	Unbalanced	Post-COVID-19	Equaled	−4.60	<0.001 *
	Pre-COVID-19	Very unbalanced	Post-COVID-19	Equaled	−5.89	<0.001 *
	Pre-COVID-19	Equaled	Post-COVID-19	Equaled	−3.76	0.01 *
	COVID-19	Equaled	Post-COVID-19	Equaled	−3.86	0.00 *
	COVID-19	Unbalanced	Post-COVID-19	Equaled	−4.28	<0.001 *
Offsides	Pre-COVID-19	Unbalanced	Post-COVID-19	Very unbalanced	5.20	<0.001 *
	Pre-COVID-19	Equaled	Post-COVID-19	Very unbalanced	4.60	<0.001 *
	Pre-COVID-19	Very unbalanced	Post-COVID-19	Very unbalanced	4.59	<0.001 *
Fouls committed	Pre-COVID-19	Unbalanced	Post-COVID-19	Very unbalanced	4.02	0.00 *
	Pre-COVID-19	Equaled	Post-COVID-19	Very unbalanced	4.91	<0.001 *
	Pre-COVID-19	Very unbalanced	Post-COVID-19	Very unbalanced	3.33	0.03 *
	COVID-19	Equaled	Post-COVID-19	Very unbalanced	3.49	0.02 *
	COVID-19	Very unbalanced	Post-COVID-19	Very unbalanced	3.57	0.01 *

Note: Only statistically significant game indicators in the linear mixed model are shown in this table. * $p \leq 0.05$.

3.2. Final Ranking of the LaLiga Teams

Table 5 shows the differences in game indicators according to the final ranking. In the pre-COVID-19 period, the most prominent ($p < 0.001$) game indicators were as follows: the ball possession, shots on goal, and total passes, with an intermediate effect (0.060–0.139). In the COVID-19 period, the most prominent game indicators were as follows: the ball possession, and dangerous attacks, with an intermediate effect (0.060–0.139); and total passes, with a large effect ($\eta^2 > 0.140$). In the post-COVID-19 period, the most prominent game indicators were as follows: the total shots, shots on goal, attacks, and dangerous attacks, with an intermediate effect (0.060–0.139); as well as the ball possession and total passes, with a large effect ($\eta^2 > 0.140$).

Table 5. Differences in game indicators according to the final ranking, independent of the pandemic period.

Game Indicator	Ranking	Pre-COVID-19				COVID-19				Post-COVID-19			
		M	*SD*	*F*	*p* (η^2)	*M*	*SD*	*F*	*p* (η^2)	*M*	*SD*	*F*	*p* (η^2)
Yellow cards	Europe position	2.47	1.61	19.53	<0.001 *	2.40	1.40	4.50	0.01 *	2.05	1.39	6.14	0.00 *
	Middle position	2.77	1.55		(0.01)	2.63	1.57		(0.01)	2.41	1.48		(0.02)
	Relegation position	2.89	1.63			2.89	1.58			2.04	1.29		
Red cards	Europe position	0.11	0.32	4.32	0.01 *	0.07	0.27	4.17	0.02 *	0.07	0.25	2.41	0.09
	Middle position	0.11	0.34		(0.00)	0.14	0.39		(0.01)	0.11	0.34		(0.01)
	Relegation position	0.16	0.40			0.16	0.39			0.06	0.24		
Ball possession	Europe position	53.77	10.97	140.17	<0.001 *	55.16	11.08	50.11	<0.001 *	57.63	10.80	96.19	<0.001 *
	Middle position	48.43	10.28		(0.07)	47.83	10.49		(0.12)	45.37	11.73		(0.20)
	Relegation position	46.45	9.93			45.19	10.62			47.64	10.50		
Total shots	Europe position	13.42	5.19	96.36	<0.001 *	12.45	4.64	13.68	<0.001 *	12.52	4.73	41.68	<0.001 *
	Middle position	11.30	4.36		(0.05)	10.58	4.46		(0.04)	9.36	4.02		(0.10)
	Relegation position	11.00	4.39			11.09	4.29			10.76	4.44		
Shots on goal	Europe position	5.19	2.71	152.47	<0.001 *	4.61	2.42	19.46	<0.001 *	4.61	2.37	40.51	<0.001 *
	Middle position	3.86	2.13		(0.07)	3.57	2.13		(0.05)	3.16	1.85		(0.10)
	Relegation position	3.63	2.11			3.54	1.89			3.43	1.80		
Shots off goal	Europe position	8.23	3.81	21.86	<0.001 *	7.85	3.86	4.21	0.02 *	7.92	3.68	20.22	<0.001 *
	Middle position	7.44	3.51		(0.01)	7.02	3.52		(0.01)	6.20	3.19		(0.05)
	Relegation position	7.37	3.47			7.54	3.46			7.33	3.70		
Free kicks	Europe position	15.66	4.55	2.75	0.06	15.15	4.45	1.82	0.16	16.01	5.52	1.38	0.25
	Middle position	16.01	4.43		(0.00)	15.82	4.49		(0.05)	16.49	5.02		(0.00)
	Relegation position	15.68	4.85			15.54	4.01			16.93	5.42		
Corners	Europe position	5.47	2.99	40.96	<0.001 *	4.81	2.64	2.04	0.13	5.06	2.80	16.15	<0.001 *
	Middle position	4.67	6.63		(0.02)	4.61	2.52		(0.01)	3.88	2.49		(0.04)
	Relegation position	4.50	2.42			4.24	2.36			4.38	2.41		

Table 5. *Cont.*

Game Indicator	Ranking	Pre-COVID-19				COVID-19				Post-COVID-19			
		M	***SD***	***F***	***p* (η^2)**	***M***	***SD***	***F***	***p* (η^2)**	***M***	***SD***	***F***	***p* (η^2)**
Offsides	Europe position	2.69	2.00	29.39	<0.001 *	2.23	1.75	3.67	0.03 *	2.18	1.69	3.80	0.02 *
	Middle position	2.31	1.81		(0.02)	2.16	1.72		(0.01)	1.85	1.52		(0.01)
	Relegation position	2.04	1.74			1.73	1.59			2.14	1.72		
Goalkeeper saves	Europe position	2.71	1.79	24.76	<0.001 *	2.53	1.63	1.55	0.21	2.31	1.61	1.51	0.22
	Middle position	2.95	1.97		(0.01)	2.76	1.97		(0.00)	2.55	1.85		(0.00)
	Relegation position	3.39	2.05			2.83	1.84			2.53	1.82		
Fouls committed	Europe position	13.12	4.20	31.40	<0.001 *	13.21	3.66	5.97	0.00 *	12.33	3.99	10.53	<0.001 *
	Middle position	14.18	4.22		(0.02)	13.82	4.17		(0.02)	13.84	4.19		(0.03)
	Relegation position	14.42	4.07			14.75	4.49			13.44	4.33		
Attacks	Europe position	104.43	23.60	10.97	<0.001 *	113.88	25.37	14.73	<0.001 *	110.11	25.84	28.50	<0.001 *
	Middle position	101.27	23.73		(0.01)	104.51	22.27		(0.04)	95.28	24.11		(0.07)
	Relegation position	95.81	20.64			103.64	21.11			102.89	23.53		
Dangerous attacks	Europe position	59.02	20.19	18.70	<0.001 *	52.23	19.40	25.64	<0.001 *	55.26	21.53	52.63	<0.001 *
	Middle position	53.67	18.79		(0.02)	43.18	14.81		(0.06)	40.59	15.42		(0.12)
	Relegation position	51.05	15.82			43.94	12.90			46.64	16.00		
Total passes	Europe position	472.26	142.90	32.77	<0.001 *	502.24	137.44	110.36	<0.001 *	542.73	124.02	220.36	<0.001 *
	Middle position	413.26	103.45		(0.08)	385.08	90.10		(0.23)	369.87	98.26		(0.37)
	Relegation position	379.19	75.05			364.38	84.56			385.55	84.58		
Tackles	Europe position	16.70	4.98	0.48	0.62	15.28	4.33	3.50	0.03 *	14.27	4.26	0.32	0.73
	Middle position	17.19	8.47		(0.00)	14.54	4.77		(0.01)	14.03	4.60		(0.00)
	Relegation position	17.32	5.74			15.63	4.41			14.32	4.46		

Note: Europe position = 1–7 places in the league table; middle position = 8–17 places in the league table; relegation position = 18–20 places in the league table; light green color = intermediate effect size; dark green color = large effect size. Two colors have been used for the cells, to highlight the most significant results, and to help the reader understand them. * $p \leq 0.05$.

Table 6 shows multiple comparisons in game indicators according to the final ranking. In general, the most prominent game indicators, in favor of Europe teams, were the possession of the ball and total passes, which resulted in more attacking actions. The trend was similar in all three periods, although these game indicators were particularly prominent in the COVID-19 and post-COVID-19 periods, with a large effect (0.800–≥1.000).

Table 6. Post hoc comparisons of game indicators according to the final ranking for each pandemic period.

Period	Game Indicator	Inferential Comparison	*p*-Bonferroni (*d*)
Pre-COVID-19	Yellow cards	Europe position < Middle position	<0.001 * (−0.19)
		Europe position < Relegation position	<0.001 * (−0.26)
	Red cards	Europe position < Relegation position	0.01 * (−0.14)
		Middle position < Relegation position	0.03 * (−0.12)
	Ball possession	Europe position > Middle position	<0.001 * (0.51)
		Europe position > Relegation position	<0.001 * (0.69)
		Middle position > Relegation position	<0.001 * (0.19)
	Total shots	Europe position > Middle position	<0.001 * (0.45)
		Europe position > Relegation position	<0.001 * (0.49)
	Shots on goal	Europe position > Middle position	<0.001 * (0.56)
		Europe position > Relegation position	<0.001 * (0.61)
	Shots off goal	Europe position > Middle position	<0.001 * (0.22)
		Europe position > Relegation position	<0.001 * (0.23)
	Corners	Europe position > Middle position	<0.001 * (0.29)
		Europe position > Relegation position	<0.001 * (0.34)
	Offsides	Europe position > Middle position	<0.001 * (0.20)
		Europe position > Relegation position	<0.001 * (0.34)
	Goalkeeper saves	Europe position < Relegation position	<0.001 * (−0.36)
		Middle position < Relegation position	<0.001 * (−0.22)
	Fouls committed	Europe position < Middle position	<0.001 * (−0.25)
		Europe position < Relegation position	<0.001 * (−0.31)
	Attacks	Europe position > Middle position	0.05 * (0.13)
		Europe position > Relegation position	<0.001 * (0.38)
		Middle position > Relegation position	0.01 * (0.24)
	Dangerous attacks	Europe position > Middle position	<0.001 * (0.28)
		Europe position > Relegation position	<0.001 * (0.42)
	Total passes	Europe position > Middle position	<0.001 * (0.49)
		Europe position > Relegation position	<0.001 * (0.74)
		Middle position > Relegation position	0.02 * (0.40)
COVID-19	Yellow cards	Europe position < Relegation position	0.01 * (−0.34)
	Red cards	Europe position < Middle position	0.03 * (−0.29)
	Ball possession	Europe position > Middle position	<0.001 * (0.68)
		Europe position > Relegation position	<0.001 *(0.91)
	Total shots	Europe position > Middle position	<0.001 * (0.41)
		Europe position > Relegation position	0.02 * (0.30)
	Shots on goal	Europe position > Middle position	<0.001 * (0.46)
		Europe position > Relegation position	<0.001 * (0.47)
	Shots off goal	Europe position > Middle position	0.01 * (0.23)
	Offsides	Europe position > Relegation position	0.03 * (0.30)

Table 6. *Cont.*

Period	Game Indicator	Inferential Comparison	*p*-Bonferroni (*d*)
COVID-19	Fouls committed	Europe position < Relegation position	0.00 * (−0.39)
	Attacks	Europe position > Middle position	<0.001 * (0.40)
		Europe position > Relegation position	<0.001 * (0.42)
	Dangerous attacks	Europe position > Middle position	<0.001 * (0.54)
		Europe position > Relegation position	<0.001 * (0.47)
	Total passes	Europe position > Middle position	<0.001 * (1.05)
		Europe position > Relegation position	<0.001 * (1.11)
	Tackles	No differences were observed in the comparisons	
Post-COVID-19	Yellow cards	Europe position < Middle position	0.01 * (−0.25)
		Middle position > Relegation position	0.05 * (0.25)
	Ball possession	Europe position > Middle position	<0.001 * (1.08)
		Europe position > Relegation position	<0.001 * (0.93)
	Total shots	Europe position > Middle position	<0.001 * (0.73)
		Europe position > Relegation position	<0.001 * (0.38)
		Middle position < Relegation position	0.01 * (−0.34)
	Shots on goal	Europe position > Middle position	<0.001 * (0.70)
		Europe position > Relegation position	<0.001 * (0.53)
	Shots off goal	Europe position > Middle position	<0.001 * (0.51)
		Middle position < Relegation position	0.01 * (−0.34)
	Corners	Europe position > Middle position	<0.001 * (0.45)
	Offsides	Europe position > Middle position	0.03 * (0.21)
	Fouls committed	Europe position < Middle position	<0.001 * (−0.37)
		Europe position < Relegation position	0.05 * (−0.27)
	Attacks	Europe position > Middle position	<0.001 * (0.60)
		Europe position > Relegation position	0.03 * (0.29)
		Middle position < Relegation position	0.01 * (−0.32)
	Dangerous attacks	Europe position > Middle position	<0.001 * (0.81)
		Europe position > Relegation position	<0.001 * (0.43)
		Middle position < Relegation position	0.01 * (−0.39)
	Total passes	Europe position > Middle position	<0.001 * (1.58)
		Europe position > Relegation position	<0.001 * (1.38)

Note: Europe position = placed 1–7 in the league table; middle position = placed 8–17 in the league table; relegation position = placed 18–20 in the league table; light green color = intermediate effect size; dark green color = large effect size. Only statistically significant game indicators in the one-factor ANOVA test are shown in this table. Two colors have been used for the cells, to highlight the most significant results, and to help the reader understand them. * $p \leq 0.05$.

The proposed mixed model (period*final ranking) indicated significant statistical differences in ten game indicators (Table 7): the ball possession, total shots, shots on goal, shots off goal, free kicks, corners, offsides, attacks, dangerous attacks, and total passes. Except for in the total number of passes, the inter-class correlation coefficient was close to 0; thus, the responses of each team were stable, and the repetition of the matches had no effect.

Multiple comparisons according to the period*final ranking interaction are shown in Table 8. In general, the teams in a Europe position reported higher values in the game indicators in the three pandemic periods. The ball possession, total passes, and attacks by Europe-position teams were higher in the post-COVID-19 period, compared to the pre-COVID-19 and COVID-19 periods. On the contrary, the number of dangerous attacks by these teams was higher in the pre-COVID-19 period, compared to the COVID-19 and post-COVID-19 periods.

Table 7. Differences in the period*final ranking interaction.

Game Indicator	*F*	*p*	R^2 Conditional	*BIC*	*ICC*	*LRT* (*p*)
Ball possession	2.98	0.02 *	0.26	39,253.71	0.26	1062 (<0.001 *)
Total shots	3.34	0.01 *	0.01	31,112.48	0.08	318 (<0.001 *)
Shots on goal	1.96	0.01 *	0.11	23,623.16	0.10	375 (<0.005 *)
Shots off goal	2.77	0.03 *	0.04	28,690.35	0.03	108 (<0.001 *)
Free kicks	2.51	0.04 *	0.07	31,261.42	0.06	235 (<0.001 *)
Corners	3.06	0.02 *	0.04	25,632.37	0.03	80.9 (<0.001 *)
Offsides	2.56	0.04 *	0.03	21,481.62	0.02	37.2 (<0.001 *)
Attacks	5.46	<0.001 *	0.16	27,478.17	0.14	317 (<0.001 *)
Dangerous attacks	5.58	<0.001 *	0.21	25,848.70	0.17	317 (<0.001 *)
Total passes	4.23	0.00 *	0.52	26,788.22	0.51	1096 (<0.001 *)

Note: *F* = linear mixed model; *BIC* = Bayesian information criterion; *ICC* = interclass correlation coefficient; *LRT* = LRT test for random effect; Intercept | Team. Only statistically significant game indicators in the linear mixed model are shown in this table. * $p \leq 0.05$.

Table 8. Post hoc comparisons according to the period*final ranking interaction.

Game Indicator	Period	Ranking	Period	Ranking	*t*	*p*-Bonferroni
Ball possession	Pre-COVID-19	Relegation	COVID-19	Europe	−4.84	<0.001 *
	Pre-COVID-19	Middle	COVID-19	Europe	−3.54	0.02 *
	Pre-COVID-19	Relegation	Post-COVID-19	Europe	−6.04	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Europe	−5.06	<0.001 *
	Pre-COVID-19	Europe	Post-COVID-19	Europe	−4.29	<0.001 *
	COVID-19	Middle	Post-COVID-19	Europe	−3.76	0.01 *
Total shots	Pre-COVID-19	Europe	COVID-19	Europe	3.34	0.03 *
	Pre-COVID-19	Europe	COVID-19	Middle	4.61	<0.001 *
	Pre-COVID-19	Europe	Post-COVID-19	Europe	3.41	0.02 *
	Pre-COVID-19	Europe	Post-COVID-19	Middle	7.22	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Middle	5.60	<0.001 *
	COVID-19	Relegation	Post-COVID-19	Middle	3.23	0.05 *
Shots on goals	Pre-COVID-19	Europe	COVID-19	Europe	3.65	0.01 *
	Pre-COVID-19	Europe	COVID-19	Middle	4.83	<0.001 *
	Pre-COVID-19	Europe	Post-COVID-19	Relegation	3.60	0.01 *
	Pre-COVID-19	Europe	Post-COVID-19	Europe	4.16	0.00 *
	Pre-COVID-19	Europe	Post-COVID-19	Middle	6.28	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Middle	3.83	0.01 *
Shots off goal	Pre-COVID-19	Europe	Post-COVID-19	Middle	5.82	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Middle	4.93	<0.001 *
	COVID-19	Relegation	Post-COVID-19	Middle	3.24	0.04 *
Free kicks	Pre-COVID-19	Relegation	Post-COVID-19	Middle	−3.46	0.02 *
	Pre-COVID-19	Relegation	Post-COVID-19	Relegation	−3.78	0.01 *
Corners	Pre-COVID-19	Europe	COVID-19	Europe	3.69	0.01 *
	Pre-COVID-19	Europe	Post-COVID-19	Middle	6.12	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Middle	4.14	0.00 *
	COVID-19	Middle	Post-COVID-19	Middle	3.25	0.04 *
Offsides	Pre-COVID-19	Europe	COVID-19	Europe	3.91	0.00 *
	Pre-COVID-19	Europe	Post-COVID-19	Europe	4.09	0.00 *
	Pre-COVID-19	Europe	Post-COVID-19	Middle	4.40	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Middle	3.98	0.00 *

Table 8. *Cont.*

Game Indicator	Period	Ranking	Period	Ranking	*t*	*p*-Bonferroni
Attacks	Pre-COVID-19	Middle	COVID-19	Europe	−5.73	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Europe	−3.21	0.05 *
	Pre-COVID-19	Europe	COVID-19	Europe	−5.82	<0.001 *
	COVID-19	Relegation	Post-COVID-19	Relegation	3.42	0.02 *
	COVID-19	Europe	Post-COVID-19	Relegation	5.00	<0.001 *
	COVID-19	Europe	Post-COVID-19	Middle	6.09	<0.001 *
	COVID-19	Relegation	Post-COVID-19	Middle	3.32	0.03 *
Dangerous attacks	Pre-COVID-19	Middle	COVID-19	Europe	4.73	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Europe	3.62	0.01 *
	Pre-COVID-19	Europe	COVID-19	Europe	4.58	<0.001 *
	Pre-COVID-19	Europe	COVID-19	Middle	6.57	<0.001 *
	Pre-COVID-19	Europe	Post-COVID-19	Relegation	3.28	0.04 *
	Pre-COVID-19	Europe	Post-COVID-19	Europe	3.13	0.03 *
	Pre-COVID-19	Europe	Post-COVID-19	Middle	5.95	<0.001 *
	Pre-COVID-19	Middle	COVID-19	Middle	9.38	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Relegation	4.25	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Middle	8.02	<0.001 *
Total passes	Pre-COVID-19	Relegation	COVID-19	Europe	−3.84	0.01 *
	Pre-COVID-19	Relegation	Post-COVID-19	Europe	−4.45	<0.001 *
	Pre-COVID-19	Middle	Post-COVID-19	Europe	−3.50	0.02 *
	Pre-COVID-19	Relegation	Post-COVID-19	Middle	−3.26	0.04 *
	Pre-COVID-19	Europe	Post-COVID-19	Europe	−4.46	<0.001 *
	COVID-19	Relegation	Post-COVID-19	Europe	−4.06	0.00 *
	COVID-19	Middle	Post-COVID-19	Europe	−4.55	<0.001 *

Note: Only statistically significant game indicators in the linear mixed model are shown in this table. * $p \leq 0.05$.

4. Discussion

Soccer is dominated by game indicators that can influence the performance of teams [1,3,24]. Therefore, this study analyzed, independently for the pre-COVID-19, COVID-19, and post-COVID-19 pandemic periods, the influence of game indicators on the partial (S1) and final (S2) ranking of LaLiga teams over seven consecutive seasons. Additionally, the statistical differences between pandemic periods were identified. The main results reported that, according to the partial ranking, there was no or a small effect on these game indicators that was statistically significant for each pandemic period. So, hypothesis 1 was rejected. According to the final ranking, an intermediate effect and a large effect were obtained in some game indicators that were statistically significant (pre-COVID-19 period: the ball possession, shots on goal, and total passes; COVID-19 period: the ball possession, dangerous attacks, and total passes; post-COVID-19 period: the total shots, shots on goal, attacks, dangerous attacks, ball possession, and total passes). For this reason, hypothesis 2 was partially accepted. In addition, the pandemic period*ranking interaction only reported intermediate and large effects in terms of the final ranking. Therefore, hypothesis 3 was partially accepted. The mentioned indicators were decisive to reaching a Europe position at the end of each season and pandemic period, especially the ball possession and total passes. They had a greater influence on the final ranking than on the partial ranking.

In the pre-COVID-19 period, our results reported that the most prominent game indicators, in favor of the Europe teams, were the ball possession, shots on goal and number of total passes, with an intermediate effect. In the same competition, Fernández-Cortés et al. [2] indicated that teams who won at home played with more ball possession, and made more shots on goal, among other factors. Ball possession has previously been identified as marking out the top-ranked teams in both the Chinese Soccer Super League [25] and the

UEFA Champions League [26]. It is possible that teams ranked in Europe spend more time ahead on the scoreboard than their opponents [26]. This could mean that, when they are winning, they are not in a hurry to score a goal or reach the opponent's area, assuming a strategy of keeping the ball and slowing down the game [27]. Moreover, this strategy involves making a greater number of passes [25]. The indicators of ball possession and total passes are positively associated with the shots on goal [28]. Ball possession leads to better collective play and optimal shooting positions, and also limit the opportunities of the opposing team [29].

During the COVID-19 pandemic period, the most prominent game indicators, also in favor of the Europe-ranked teams, were possession of the ball and dangerous attacks, with an intermediate effect; and the number of total passes, with a large effect. As can be seen, the first two pandemic periods followed a similar trend. This could be because the teams did not have time to adapt to the new changes in the way of playing. In general, Europe-ranked teams would have a higher technical level/quality [30]. This led to a higher ball possession, linked to the total number of key passes [25]. In the major European competitions (i.e., Ligue 1, Serie A, LaLiga, the Premier League, and Bundesliga) during the 2019/2020 season, with fans in the stadia (before the restrictions), home teams scored more goals than visitors [7], because the number of dangerous attacks was higher. In contrast, another study [14] comparing the pre-COVID-19 and COVID-19 period in European soccer matches showed a decrease in the goals scored by home teams in ghost matches, which also affected the points and ranking. Another indicator that was affected during the COVID-19 period, in similar studies [9,12,13], was the higher number of fouls committed by home teams which, in turn, resulted in more yellow cards. It was essential to work on set pieces because, given the increase in this game indicator during the COVID-19 period, they became of great importance to the result [31]. The absence of fans and noise caused coaches and players to adapt their behavior to the empty environment in which they operated [32].

In the post-COVID-19 period, the most prominent game indicators, again in favor of Europe-ranked teams, were the total shots, shots on goal, attacks, and dangerous attacks, with an intermediate effect; and the total passes and ball possession, with a large effect. In the three pandemic periods studied, two interrelated game indicators stood out: the ball possession and total passes. Both game indicators, together with the attacks, were higher in the post-COVID-19 period, compared to the other two pandemic periods. The dangerous attacks were higher pre-COVID-19, compared to during COVID-19 and post-COVID-19. This last pandemic period differed from the rest, because there was an even greater interest on the part of the teams in maintaining possession of the ball and avoiding direct play, associated with more attacks and, therefore, greater possibilities of shots [28]; or in retaining the ball when they were winning [27]. In this particular period, the higher-ranked teams controlled the ball more, and imposed their style of play [6,33,34]. In this regard, in the major European leagues (i.e., Ligue 1, Serie A, LaLiga, the Premier League, and Bundesliga), the ball possession, number of key passes, and scoring first were correlated with the accumulation of goals scored and the points at the end of the season [16]. In turn, Yang et al. [33] reported that lower-ranked teams performed more defensive actions, especially in unbalanced matches.

The main differences found in this study were in the attack indicators, and not in the defense ones. This could be because teams tend to opt for the strategy of keeping possession of the ball, to achieve victories. It has been shown that higher-ranked teams show higher ball possession [25,26], and lower ranked teams show lower ball possession [33]. Maintaining ball possession implies an increase in attacking actions [28]. Despite this, it requires precision on the part of the teams, and the teams with the best technical/quality level achieve this [30]. In addition, when in possession of the ball, the teams defend simultaneously. As a result of this study, soccer coaches are advised to choose a technically sound starting eleven that allows them to maintain ball possession, i.e., to have few losses

per match. In this way, they will be able to stay in the top positions for a season. For managers, it is important, when recruiting players, to know that these game indicators are fundamental for a team to be in the upper part of the ranking. In addition, the more players with these profiles a team has, the easier it will be to obtain a better final ranking.

Limitations, Practical Applications, and Future Studies

Among the limitations, it should be noted that, among the major European leagues, this study collected data only from LaLiga. Despite the existing equality at the scorer level among the major European leagues [34], it is not possible to generalize our results to other leagues.

The notational analysis allowed the identification of the game indicators that should be reinforced to increase the probability of success (a better ranking). Following this line of thought, according to our results, LaLiga teams should play with more ball possession, related to the total passes. A greater possession of the ball allows them to take more shots (offensive actions), and thus to have a better chance of winning. This information is of interest to coaches and soccer assistants when preparing and directing matches.

Controlling the competitive balance in soccer is difficult, due to its rapid evolution. In this vein, team dynamics change between seasons, or even within a season [9]. Further research is needed to confirm the results obtained in this study. Moreover, it would also be interesting to analyze intensities according to the quality of the opponent.

5. Conclusions

The obtained study results indicate that the ball possession and total passes are two interrelated game indicators that significantly influence the final ranking. In all three pandemic periods, LaLiga teams ranked in a Europe position at the end of each season (the final ranking) reported higher ball possession and total passes. In turn, a greater possession of the ball allowed them to make more shots (offensive actions), and thus to have a better chance of winning. Similarly, these game indicators are higher in the post-COVID-19 period, compared to the pre-COVID-19 and COVID-19 periods. Based on the partial ranking, there is little or no effect on those game indicators that is statistically significant for each pandemic period. Thus, the game indicators analyzed have a greater influence on the final ranking, with an intermediate and large effect, than on the partial ranking.

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