Does the final ranking influence the physical performance of professional soccer teams?

¿Influye la clasificación final en el rendimiento físico de los equipos de fútbol profesional?

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Abstract

The present study analyzed the physical performance of SmartBank League teams according to their position in the table. Thirty-four professional soccer teams that competed in the SmartBank League (Spanish Second Division) during the 2015-2016, 2016-1017 and 2017-2018 seasons were analyzed. The data required for the work was collected by MediaCoach® and OPTA. The results obtained show that the lowest ranked teams (group 4) cover greater total distance (DT) than the teams at the top of the standings (group 1). However, the top-ranked teams covered a greater number of meters at high-speed (D > 24 km/h) and Sprints over 24 km/h (S > 24 km/h). As for the DT as a function of the match outcome, we find that the teams that lose the match are the ones that travel a lower DT. After analyzing the results obtained in the present study, it was found that the distance covered at more than 24 km/h and the number of sprints performed at speeds above 24 km/h can be considered as factors that bring you closer to achieving good results.

Key words: MediaCoach®, contextual variables, competition, match analysis, match outcome.

Resumen

El presente estudio analizó el rendimiento físico de los equipos de la Liga SmartBank en función de la posición que ocupan en la tabla. Se analizaron 34 equipos profesionales de fútbol que compitieron en la Liga SmartBank (Segunda División Española) durante las temporadas 2015/2016, 2016/2017 y 2017/2018. Los datos necesarios para el trabajo han sido recogidos por MediaCoach® y OPTA. Los resultados obtenidos muestran que los equipos peor clasificados (grupo 4) recorren mayor distancia total (DT) que los equipos de la parte alta de la clasificación (grupo 1). Sin embargo, los equipos mejores clasificados recorren una mayor cantidad de metros a alta velocidad (D > 24 km/h) y sprints a más de 24 Km/h (S > 24 km/h). En cuanto a la DT en función del resultado del partido, encontramos que los equipos que pierden el partido son los que recorren una menor DT. Después de analizar los resultados obtenidos en el presente estudio, se ha comprobado que la distancia recorrida a más de 24 km/h y el número de sprints realizados a velocidades superiores a 24 km/h sí pueden ser considerados como factores que te acercan a conseguir buenos resultados.

Palabras clave: MediaCoach®, variables contextuales, competición, análisis de partido, resultado final.

Introduction

At present, soccer is one of the most popular sports in the world and, consequently, research on this sport has increased in recent years. However, it is a type of collective sport characterized by having a complex and multifactorial character (Hook et al., 2013). This complexity is largely due to the fact that match performance depends on the interaction of different technical, tactical, mental (Carling et al., 2009) and physiological factors (Drust et al., 2007). Furthermore, to better understand the factors involved in achieving success in the world of sport, match analysis has assumed a very important role (Carling et al., 2009). Game analysis is commonly used in many sports, an essential process that allows coaches to gather objective information that they can use to help improve performance (Hughes & Bartlett, 2002). However, although there are a large number of studies that analyze performance in soccer (Castellano et al., 2014; Gregson et al., 2010), the number of those that have tested how physical and tactical aspects influence performance is rather smaller.

In line with Espitia-Escuer and García-Cebrián (2006), four different approaches are established to study professional sport: the analysis of the individual's contribution to team performance, the study of sports leagues and competitive forces, the achievement of club objectives, and competitive and cooperative relationships between teams.

Therefore, this work dedicated to the study of the Spanish Second Division Soccer would belong to the second of these approaches, in which an analysis of three recent seasons of this competition is carried out.

The main purpose of the analysis of the matches is to be able to identify the strengths and weaknesses of the analyzed teams, in order to develop the positive aspects and detect possible areas of performance improvement. In this way, a coach analyzing an opposing team can use the data to identify ways to counteract that team's strengths and exploit its deficiencies (Carling et al., 2009).

Following Castellano et al. (2014) we can say that research in sport has advanced considerably in recent years, and this has been driven primarily by the availability of new technologies that have helped develop our knowledge of training and assessment modalities to optimize performance. One such technology involves semi-automated video monitoring. This technique, known as video-monitoring, has evolved considerably since Van Gool et al. (1988) first used it in the late 1980s to analyze a noncompetitive soccer match. Because of the many limitations associated with this manual video-tracking technique, elite soccer teams now use expensive and sophisticated semi-automated measurement systems, which can track all players on a field, as well as the ball and the referee, allowing for almost automatic analysis of the match.

This advance in technology has permitted research on many occasions to investigate the influence of match location (i.e., playing at home or away) and how it influences tactical aspects. Some of the findings show us that away teams recover the ball and place the position of their defensive line nearer to their own goal (Santos et al., 2017), which leads to an increase in the number of total passes that are developed in their own field and a decrease in the total number of passes that are made in the attacking half compared to when they played at home (Taylor et al., 2010). Home-field advantage is a phenomenon that has been extensively studied in soccer (Lago-Peñas et al., 2017), and is often higher compared to other sports, such as baseball, basketball, field hockey, rugby, or football (Jamieson, 2010). Therefore, the location where the match is played is an important variable to consider due to its impact on match performance.

When establishing the criterion of success from which to determine offensive efficiency, the literature considers that although goals represent the highest level of achievement (Casáis & Lago, 2006; Lavín et al., 2023; Mombaerts, 2000; Tenga et al., 2010), there are other indicators such as shots (on target, wide, blocked or deflected; Ensum et al, 2005; Hughes & Churchill, 2005), and arrivals to the end zone or offensive third of the field (Tenga et al., 2010), which break down success into degrees and thus provide a wider range of possibilities when analyzing performance in soccer.

On the other hand, the quality and level of the opposing team has an impact on tactical variables. Generally, teams with a higher ranking have higher ball possession values compared to the values of teams in the lower part of the ranking (Bradley et al., 2014; Lago, 2009). Also, the place where the ball recovery occurs and the place where the defensive line is placed are closer to the team's own goal when the opposition is stronger (Santos et al., 2017). In relation to this, it should be remarked that there are very few studies describing the effectiveness of game tactics in order to produce a higher offensive performance in professional soccer. Existing literature based on observational methodology revealed that counterattacks (Tenga et al., 2010; González-Rodenas, 2013) and quick attacks (Sarmento et al., 2018) were more effective in creating offensive performance than positional attacks in Norwegian, American and European teams.

In contrast, Jones et al. (2004) showed that winning teams in English Premier League had more possession than losing teams, regardless of the outcome of the match (winning, drawing or losing). These authors suggested that ball possession was a good indicator of victory.

In this way, Sarmento et al. (2013) indicated that the different cultural, historical and social factors of each country make the way of understanding soccer and the implementation of playing styles in each region different. In this sense, soccer in Spain apparently has a more "possession-based" style of play compared to the English Premier League or Italian Serie A (Mitrotasios et al., 2019; Sarmento et al., 2013).

More specifically, at the physical level we can describe it as an intermittent type of sport characterized by moderate duration efforts in which a player moves at low, medium, high speed and sprint intensities (Bradley et al., 2010; Ramos-Álvarez et al., 2021). In addition, within these numerous high or maximum intensity actions that are necessary during a match, technical actions such as jumps, dribbles, shots, turns, sprints, quick changes of pace are included (Stølen et al., 2005). Therefore, according to Reilly (2007), due to the needs of soccer, both speed and strength-speed are two fundamental factors in the development of the game, because during a match, a player can complete many actions of this type. These actions are very important to score, win or lose duels or even determine the outcome of the game. Therefore, it could be said that sprinting is a limiting factor in soccer. Furthermore, according to Stølen et al. (2005) most sprints are performed over distances down to 30 meters (m.), while approximately 50% of all sprints are 10 m.

After analyzing previous literature about performance analysis in soccer, this paper aimed to analyze the performance of teams according to their ranking position, focusing on the physical differences between the teams that are fighting to win the championship and the teams that are at the bottom of the standings.

Methods

We analyzed 34 professional soccer teams that competed in the Spanish Second Division (SmartBank League) during the 2015/2016, 2016/2017 and 2017/2018 seasons.

Of the 2640 matches played in Second Division, we excluded all matches in which the necessary information was not available due to technical problems in the recording of some parameters by the data collection system, injuries to players, expulsions, etc. Measurements were recorded in 22 different stadiums, always taking into account the location of the match.

Instruments and procedures

On the one hand, regarding the consent, anonymity and confidentiality of the teams and players, the data were treated according to the privacy, ethics and protection policies of the American Psychological Association (2019).

On the other hand, OPTA collects the different events produced in the matches, while the data on the movement demands of the players were collected through the multi-camera monitoring system of the MediaCoach® application, through which the physical performance of the players is obtained. This video monitoring tool uses a system with eight super 4K - HDR cameras installed in each of the stadiums, which allows recording from various angles and analyzes the X and Y positions of each player, thus recording all player movements on the field, resulting in real-time three-dimensional tracking (tracking data is recorded at 25 Hz per second). This system has already been used by previous studies (Castellano & Casamichana, 2015; Gomez-Piqueras et al., 2019; Pons et al., 2019).

Moreover, the reliability and validity of this type of player monitoring through the MediaCoach® application has been proven in recent studies (Pons et al., 2019). Finally, an ad hoc database was created in Microsoft Excel to analyze the different variables chosen and the analysis of these variables was carried out.

Similar to previous studies (Castellano & Casamichana, 2015; Gomez-Piqueras et al., 2019), six physical variables were recorded for each match:

(a) Total distance covered (DT): total distance in meters covered by the players of a team during a match; (b) Distance between 14 km/h and 21 km/h (D 14-21): distance covered in meters by the players of a team during a match at a speed between 14 km/h and 21 km/h; (c) Distance between 21 km/h and 24 km/h (D 21-24): distance covered in meters by the players of a team during a match at a speed between 21 km/h and 24 km/h. (d) Distance over 24 km/h (D > 24): distance covered in meters by the players during a match at a speed of over 24 km/h; (e) Number of sprints between 21-24 km/h (S 21-24): number of sprints made by the players of a team during the match at a speed between 21-24 km/h; (f) Number of sprints over 24 km/h (S > 24): number of sprints made by the players of a team during a match at a speed of over 24 km/h.

On the other hand, the final position of the teams in the ranking was taken into account. This variable was divided into: teams in the top five positions (1), teams in positions 6-10 (2), teams in positions 11-15 (3) and teams in positions 16-20 (4).

Finally, as a performance situational variable, the final result was included, differentiating between victory (1), draw (0) or lost (-1).

Data analysis

The SPSS 25.0 statistical program (IBM SPPS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) was used for the analysis and treatment of the data. First, a descriptive analysis was performed for each of the distances, where the mean (M) and standard deviation (SD) were represented. In addition, Bonferroni post-hoc analyses were used to test for differences between the teams, based on both the final ranking and the results of each match during the season. The significance levels taken into account were $p < .05$, $p < .01$ and $p < .001$.

Results

Analyzing the results, in Table 1, we observe that the mean DT (m.) traveled by the teams is 109135.44 ± 4355.76 m. However, if we focus on the final ranking of the teams, we observe that the teams that finish the season in the first five positions are those that cover the least total distance

(108484.37 ± 4251.72 m.), without finding significant differences with group 3 (teams that finish the season between positions 10-15) but with group 2 (109653.57 ± 4266.08 m.; $p < .001$) and with group 4 (109341.14 ± 4424.90 m.; $p < .01$).

Regarding D 14-21, we also found that group 1 had the shortest distance covered between 14-21 km/h (22078.82 ± 2051.59 m.), while group 2 teams covered the most meters in this category (22783.24 ± 2124.04 m.).

In D 21-24 we can see how the teams in the first half of the table cover a greater distance at this intensity than the teams in the second half of the table, especially highlighting group 2, which is the one that covers more distance (3073.16 ± 392.26 m.).

Table 1. Comparisons of physical performance based on the final ranking of the teams

Variables / Teams	Total		1			2			3			4		
	M	SD	M	SD	p	M	SD	p	M	SD	p	M	SD	p
DT	109135.44	4355.76	108484.37	4251.72	b*** d**	109653.57	4266.08	a***	109066.57	4403.19		109341.14	4424.90	a**
D 14-21	22436.30	2182.34	22078.82	2051.59	b*** c* d***	22783.24	2124.04	a*** c*** d*	22331.55	2332.19	a* b*** d*	22551.81	2158.70	a*** b* c*
D 21-24	3019.69	385.98	3040.00	377.03	c***	3073.16	392.26	c*** d**	2953.48	379.62	a*** b*** d*	3010.04	385.58	b** c*
D > 24	2905.42	490.71	2958.83	508.68	c*** d**	2942.02	493.81	c*** d*	2821.21	473.90	a*** b*** d*	2896.78	474.47	c*
S 21-24	264.89	30.83	266.76	30.26	c***	269.74	31.32	c*** d**	259.11	30.05	a*** b*** d*	263.78	30.72	b** c*
S >24	161.06	23.02	162.95	23.33	c***	162.94	23.17	c***	157.07	22.04	a*** b*** d**	161.16	23.04	c**

Notes. M = mean; SD = standard deviation; 1 = teams in positions 1-5; 2 = teams in positions 5-10; 3 = teams in positions 10-15; 4= teams in positions 15-20. DT = total distance covered; D 14-21 = distance covered by the players during a match at a speed between 14 km/h and 21 km/h; D 21-24 = distance covered in meters by the players during a match at a speed between 21 km/h and 24 km/h; D > 24 = distance covered by the players during a match at a speed of over 24 km/h; S 21-24= number of sprints made by the players of a team during the match at a speed between 21-24 km/h; S > 24= number of sprints made by the players of a team during a match at a speed of over 24 km/h; a = significant differences with respect to teams occupying positions 1-5; b = significant differences with respect to teams occupying positions 5-10; c = significant differences with respect to teams occupying positions 10-15; d= significant differences with respect to teams occupying positions 15-20; *$p < .05$; **$p < .01$; ***$p < .001$.

In D > 24 we confirmed that the teams at the top of the ranking, i.e. groups 1 and 2, run a greater number of meters at high intensity than the teams in lower positions, such as groups 3 and 4. Specifically, in group 1 we observed the highest D > 24 (2958.83 ± 508.68 m.), finding significant differences with group 3 (2821.21 ± 473.90 m.; $p < .001$).

The last two variables refer to the number of sprints performed by the teams throughout a match, both sprints between 21-24 km/h and sprints at a speed greater than 24 km/h. In reference to S 21-24, group 2 performs the most sprints per match (269.740 ± 31.32), finding significant differences with both group 3 (259.11 ± 30.05; $p < .001$) and group 4 (263.78 ± 30.72; $p < .01$).

Finally, in the section of S > 24, group 1 is the one that performs more sprints at high intensity (162.95 ± 23.33). We observed significant differences with group 3 (157.07 ± 22.04; $p < .001$), so we can consider this aspect as a clear success factor in achieving positive results throughout the season.

Table 2. Comparisons of physical performance based on match outcome

	-1		0		1	
	M ± SD	p	M ± SD	p	M ± SD	p
DT	108660.32 ± 4447.15	b** c***	109391.16 ± 4321.23	a**	109440.46 ± 4247.47	a***
D 14-21	22565.79 ± 2230.73	c**	22473.73 ± 2175.81		22282.62 ± 2129.77	a**
D 21-24	2993.85 ± 394.53	c*	3031.66 ± 397.61		3037.54 ± 368.13	a*
D > 24	2850.89 ± 486.77	c***	2883.91 ± 494.90	c***	2973.92 ± 484.12	a*** b***
S 21-24	262.65 ± 31.32	c**	265.31 ± 31.41		266.85 ± 29.81	a**
S > 24	158.69 ± 23.02	c***	160.16 ± 23.48	c**	164.01 ± 22.40	a*** b**

Notes. M = mean; SD = standard deviation; -1 = lost; 0 = draw; 1= win; DT = total distance covered; D 14-21 = distance covered by the players during a match at a speed between 14 km/h and 21 km/h; D 21-24 = distance covered in meters by the players during a match at a speed between 21 km/h and 24 km/h; D > 24 = distance covered by the players during a match at a speed of over 24 km/h; S 21-24= number of sprints made by the players of a team during the match at a speed between 21-24 km/h; S > 24= number of sprints made by the players of a team during a match at a speed of over 24 km/h; a = significant differences with respect to -1; b = significant differences with respect to 0; c = significant differences with respect to 1; *p < .05; **p < .01; ***p < .001.

Table 2 shows data obtained after analyzing physical variables according to the final score of the match. In it we find that the teams that lose the match (group -1) are the ones that run a lower DT (108660.32 ± 4447.15 m). Moreover, we observe how these values are significantly lower with respect to group 0 (p < .01) and group 1 (p < .001). If we focus on D 14-21, we can observe that the opposite of the above occurs; the teams that lose the match are the ones that perform more meters at this intensity (22565.79 ± 2230.73 m.), with significant differences with respect to group 1 (p < .01).

As the intensity of meters run increases, i.e. in D 21-24 and D > 24, the teams that achieve victory in the match run a greater distance at high intensity than the teams that lose or draw. Specifically, in D 21-24 the group 1 teams travel (3037.54 ± 368.13 m.), with no significant difference with group 0, but with group -1 (p < .05). In D > 24, group 1 travels (2973.92 ± 484.12 m.) with significant differences with both group -1 (p < .05) and group 0 (p < .05).

If we analyze the sprints performed at high speeds we find that, in S 21-24 it is group 1 that performs the highest number of repetitions per match (266.85 ± 29.81), without significant differences with respect to group 0, but with group -1 (p < .01). Similarly, if we increase the intensity and focus on S > 24 we observe an even greater difference between group 1 and the others. Group 1 performs (164.01 ± 22.40) well above and with significant differences with respect to group -1 (158.69 ± 23.02; p < .001) and group 0 (160.16 ± 23.48; p < .01).

Discussion

The aim of the present work was to analyze the physical differences between the Spanish Second Division (SmartBank League) soccer teams according to the performance achieved by the teams, using both match outcome and final ranking. Following the line of Di Salvo et al. (2013) in their comparison study of different English soccer leagues we have to mention that, although currently the motion analysis method we are using is the most advanced methodology to provide motion information about professional soccer players during matches, there are some limitations that are based on the lack of measurement capability of some variables that affect the performance of the professional soccer player during matches. For example, match analysis systems that are responsible for movement analysis cannot take into account the relative fitness level of players (movement intensities, % VO2max, or fractional percentage of maximal aerobic speed). In addition, there are other variables that match analysis does not measure as well, such as individual and team style of play, tactical organization, and seasonal variations in movement. For that reason, due to the inherent variability of movement analysis measurements, a large sample size is used to provide the most accurate estimates and to detect real systematic differences in performance characteristics.

The results show that the best ranked teams (group 1) covered less distance at low intensities, but more distance at high intensities; in contrast, the worst ranked teams (group 4) covered the greatest total distance, but at high

intensities they were below the other groups in terms of meters covered. Like Rampinini et al. (2009), who observed in Italian Serie A, the total distance covered by the players of less successful teams was greater than that of the most successful ones. Following Collet (2013) one explanation for this may be that the more successful teams tend to have the ball for longer, which causes the opposing team to have to travel a greater number of meters in order to regain possession.

Similarly, Longo et al. (2019) also show that higher ranked teams run more distances at high intensity than lower ranked teams. Therefore, these findings indicate that distance run at high intensity is a decisive factor during competition. On the contrary, our results do not agree with those observed by Gómez-Piqueras et al. (2019), who established that, distance run during competition, especially at high intensity, is not a key factor of sport performance. Also contrary to our results, Asian et al. (2019), who analyzed performance around the final ranking, found no differences at high intensities between the best ranked and worst ranked teams.

In reference to the results we found in DT, in which we obtain that inferior teams in terms of performance level travel a greater number of meters, Di Salvo et al. (2013) mention that one of the causes of this is possibly individual superiority, players in group 1 make fewer technical errors than players in group 4, so these players must use more energy to compensate for these technical-tactical errors. In addition, it is possible that, for some teams, an increase in distance traveled or in the number of actions at a determined speed is due to superior decision making and the use of speed and change of pace to create more successful attacks.

Now, in D 14-21 we can observe how the worst ranked teams are the ones that run the longest distance at these intensities, something that agrees with the results of Rampinini et al. (2009), and partially in agreement with those observed by Mohr et al. (2003), who found that the players of the less successful teams performed a greater running distance at these intensities than the players of the highly successful teams.

Another interesting fact is that the second group with the least number of meters is group 3, specifically, the group of teams in positions 10-15, something that may be caused by the lack of motivation in certain matches before the absence of objectives to achieve.

On the other hand, if we look at the high intensity sprints (S > 24) that have been performed we find an M of 161.06 per match, data higher than the 154.70 sprints per match found by Di Salvo et al. (2009), which also indicates that the ability to perform these intense efforts seems to be reduced throughout the match, especially in those players who perform these intense actions more frequently.

Finally, referring to Table 2, from which we obtain the distance traveled as a function of the final result of the match, we find that when the match ends in victory both in D > 24 (2973.92 m.) and in S > 24 (164.01) the data are higher than those found with a draw or defeat. This coincides, with the results obtained in the research of Modric et al. (2019), who established that a greater sprint distance covered by a team's players can be very determinant for the team's success in matches. In line with this, previous research in soccer has shown that distance covered at higher speeds (high-intensity running and sprinting) is an important indicator of performance and influences league position.

Strengths, limitations and prospects for the future

With the present research, it has been possible to study the variability in the physical parameters considering the final result of the match and the position in the table occupied by the analyzed team. There are several strengths that can be found in this study. The first of these refers to the measurement system used to obtain the data. In this case MediaCoach®, an innovative software developed with limited accessibility, with a large amount of useful and complete information, which has provided us with a large amount of data for the study. Secondly, we must take into account the abundance of data that has been collected, using 3 seasons of the SmartBank League. By analyzing more than one season we are assured of having greater reliability in the results, as it allows us to check the variability in the data from one season to another. Finally, although there is a large number of studies that talk about the physical aspect in the field of soccer, there are not so many that relate this physical data to performance criteria such as ranking and match outcome.

As for limitations of the study we should mention the fact that only physical aspects have been analyzed, considering that in soccer match performance depends on the interaction of different technical, tactical and mental factors. We could assume that the best teams in the league use technical and tactical means to win matches, and when a team is lower in the league it is probably not exclusively due to poor physical performance. Therefore, it would be interesting in future studies to include technical-tactical aspects to support these physical aspects and to continue comparing the teams in the different groups. In addition, it would also be interesting to include a variable that analyzes the influence of the location of the matches, which would provide an analysis of this variable to see the differences and similarities between the distances traveled when a team plays a home or away match.

On the other hand, as a limitation it should also be added that all the data have been collected from the SmartBank League, so it could be interesting to collect data from different leagues, whether the Spanish First Division, Serie A, Premier League, etc., with the aim of making a more

comprehensive comparison and thus observe whether both in the highest level league in Spain, as well as in the leagues of other countries, the results follow the same trends as those found in our study.

Finally, it would also be interesting to analyze the distance covered by positions, taking into account the final ranking and match outcome. In this way we could obtain more concrete data on which players travel the most meters, according to the position in the team's ranking, and this could give us very valuable information on what could be done to improve a team's results.

Conclusions

After analyzing the results obtained in this study, it was found that the distance run at low intensities is not a factor that is necessarily accompanied by positive results. On the other hand, the distance covered at more than 24 km/h and the number of sprints at speeds greater than 24 km/h can be considered as factors that, although they do not ensure good results, bring you closer to achieving the proposed performance objectives. Therefore, it could be said that "the important thing is not to run a lot but to run well".

As for the distances run according to the result of the match, we also found that the teams that lose run a greater number of meters at low intensities, finding significant differences with the teams that win the match. While focusing on the distances covered at high intensity, the teams with a greater success in terms of results continue to be those that cover a greater number of meters.

The present research can help coaches and members of the coaching staff to improve planning during the season, as well as to regulate training loads to optimize team performance and achieve better results throughout the season.

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