Original Article

doi: 10.16926/par.2024.12.18

Crosses into the box: comparison of the top five European football leagues

Fernando Manuel Otero-Saborido [ABCDE], **Sergio Torreblanca-Martínez** [ABD], **José Antonio González-Jurado** [ABC]

Sports and IT Department, Faculty of Sport Sciences, Pablo de Olavide University, Seville, Spain

Authors' Contribution: A – Study Design, B – Data Collection, C – Statistical Analysis, D – Manuscript Preparation, E – Funds Collection

Abstract: The study aim was to examine crosses into the box in the Top Five European Football Leagues (TFEFL). All crosses in the 2020-2021 (N=44519) season were included in the sample as follows: Spanish LaLiga (SLL) (N=8959), English Premier League (EPL) (N=9753), German Bundesliga (GL) (N=7354), Italian Serie A (ISA) (N=9206) and French Laligue1 (FLL) (N=9247). The data was extracted from the Instat data provider. The results showed that crosses were the most frequently used technique-tactic (24.36 crosses/match) compared to other finishing events. In terms of total TFEFL, a moderate correlation was found between crosses into the box and other ball possession variables such as time ($r=0.442$; $p<0.001$), percentage ($r=0.484$; $p<0.001$) and average time of each possession ($r=0.328$; $p<0.001$). Identical correlations were found for game transition variables such as total ball recoveries ($r=0.442$; $p<0.001$) and ball recoveries from opponent ($r=0.484$; $p<0.001$). A moderate relationship was found between the crosses and the shots on target ($r=0.341$; $p<0.001$). Future observation studies should seek to determine the relationship between the crosses and different aspects of the game.

Keywords: Match analysis; notational analysis; data providers; soccer; tactical variables

Corresponding author: Sergio Torreblanca-Martínez, email: sergio.torreblanca.martinez@gmail.com

Recevied: 06.02.2024; Accepted: 6.03.2024; Published online: 3.07.2024

Citation: Otero-Saborido FM, Torreblanca-Martínez S, González-Jurado JA. Crosses into the box: comparison of the top five European football leagues. Phys Act Rev 2024; 12(2): 20-28. doi: 10.16926/par.2024.12.18

INTRODUCTION

Much of the scientific literature on football focuses on aspects of physical fitness. Variables such as distance covered by players or speed are easy to measure [1,2]. Although these data are useful, it is difficult to understand such a complex reality through fragmented and isolated physical phenomena. Therefore, the game needs to be examined using other variables, such as technical-tactical variables (goals scored/received, scoring opportunities, shots on target, crosses into the box, etc.) [3].

Football team performance has traditionally been evaluated based on scored goals. Yet, because football is a low-scoring sport, such an approach leads to a fragmented and incomplete evaluation [4-6]. Scoring opportunities, however, are three times more frequent and provide a more accurate statistical reflection of team performance [4]. Opportunities also allow identifying competition differences across various countries [8]. In the same way, shots on target are linked to scoring opportunities and can be performed and/or received by a team during a match. They are also better at explaining team performance than a mere count of received or scored goals. In this sense, metrics such as the "Expected goal" (xG) or "Expected goal on target" (xGOT) have been used to qualify (and not only quantify) a match to understand team performance [9]. Nevertheless, while this data type enables establishing a working hypothesis, it does not allow coaches to solve team performance problems. A technical staff member could be warned against an opponent's high "expected goal" value, but this parameter will not explain why a team is displaying a weak defense. Therefore, it is important to grasp the original tactics followed and the reasons behind the outcome of each match.

Moreover, crosses into the box represent a technical-tactical action that can explain football performance: indeed, crosses are often used in the completion phase of an attack. Specialised literature has used crosses into the box in different ways to explain a game. Gai et al. [10] identify the technical differences between domestic and foreign football players according to playing-positions based on the crosses. In this line, Zhou et al. [11] and Errekagorri et al. [12] included them as an indicator to verify how the game model evolved over several years. Notable is the study by Fernández-Navarro et al. [13] who found 8 attack styles based on a factor analysis of 97 matches of different leagues. Two of those 8 styles were linked to crosses into the box.

Regarding the impact of crosses into the box on match outcome, McHale et al. [14] studied the Premier League and found that crosses triggered 52% of shots on target. Similarly, Mitrotasios et al. [8] concluded that almost 20% of goal opportunities in European leagues were generated after a cross into the box. The conversion rate of crosses into goals ranges between 3% and 7% depending on different factors [15], but as stressed above, goals, as single events, are not sufficient to explain football team performance.

Therefore, the impact of crosses into the box on team offensive performance raises questions such as: What is the average number of crosses into the box in football compared to other events in the game? Do the TFEFL (Top Five European Football Leagues) present differences regarding crosses into the box? How are crosses into the box linked to other technical-tactical variables? The study objective was therefore to evaluate crosses into the box as a performance indicator compared to other performance indices of the Top Five European Football Leagues.

MATERIAL AND METHODS

Match sample and data collection

The data was extracted from the Instat data provider (InStat Ltd; Moscow, Russia). A total of N=44519 crosses into the box from the 2020-2021 season were imported into an Excel sheet. They were distributed as follows: Spanish LaLiga (SLL) (N=8959), English Premier League (EPL) (N=9753), German Bundesliga (GL) (N=7354), Italian Serie A (ISA)

(N=9206) and French Laligue1 (FLL) (N= 9247). A total of 1826 matches were analysed. All championships included 380 matches, except for the German league, which had 306.

Measurements

In order to analyse crosses into the box as performance indicators, the crosses were compared with other variables. In the finishing phases of attack, we analysed: goals, opportunities, shots, shots on target and key passes. During ball possession, we analysed: possession (sg and %), the number of possessions and average possession time. During the game's transition phase, we analysed: recovered balls from opponent and total; total lost balls and balls lost on opponent.

Statistical Analysis

The data was exported from Instat to Microsoft Office Excel (Microsoft Corporation, Washington, USA). It was later processed in the SPSS v25.0 programme (IBM Corp.) for Windows. Descriptive statistics were calculated, including means, medians and standard deviations for each dependent variable. A previous Kolmogorov–Smirnov test was performed to determine the use of nonparametric analysis ($p < 0.05$). Spearman correlation was employed to identify relationships between variables. Since the samples did not follow a normal distribution, a Kruskal Wallis test was conducted to quantify differences among the 5 leagues. Statistical significance was assumed when $p < 0.05$ after adjusting for ties. Effect size (ES) was also calculated in order to detect meaningful differences. The sizes of the differences were classified as: trivial (< 0.2), small (> 0.2–0.6), moderate (> 0.6–1.2), large (> 1.2–2.0) and very large (> 2.0–4.0) [16].

RESULTS

Figure 1 compares the average number of crosses into the box per game with technical-tactical actions. During the 2020-2021 season, an average of 24.36 crosses into the box were found per game in the TFEFL. This average exceeded that of other technical-tactical means to finish an attack (Figure 1): key passes (13.84), shots on target (8.80), total shots (22.13), opportunities (10.40) and goals (2.81).

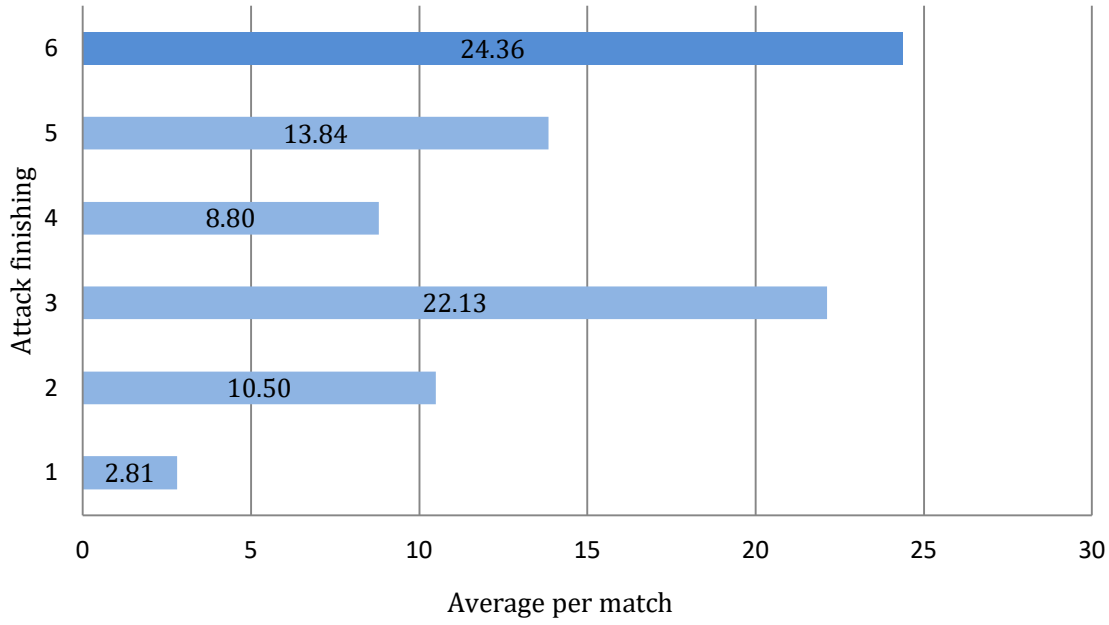

Figure 1. Attack finishing phase. Average per match of the top European leagues. Season 2020-2021.

A differentiated analysis between the leagues shows that the SLL presented the highest average number of crosses into the box, with 25.66 per match. Conversely, GL displayed the smallest average number of crosses into the box with 24.03 per match (Table 1). Since the samples did not follow a normal distribution, the Kruskal Wallis test was used to quantify differences among the 5 leagues. The results showed differences ($p<0.001$) between the tournaments. Additionally, a pairs comparative analysis only reflected differences between two tournaments, SLL and BG ($p<0.005$) as well as between SLL and FLL ($p<0.001$). The size of the differences was small in both cases (ES = 0.29 and 0.38, respectively).

Table 1. Attack finishing phase. Descriptive comparison of the top five European leagues

League	N	Goals		Opportunities		Total Shots		Shots on target		Key passes		Crosses	
		TF	AV	TF	AV	TF	AV	TF	AV	TF	AV	TF	AV
Bundesliga	306	928	3.03	3589	9.16	7082	23.14	2859	9.34	4657	15.21	7354	24.03
Calcio	380	1160	3.05	4372	11.50	8847	23.2	3464	9.11	5106	13.43	9206	24.22
Laliga	380	952	2.50	3773	9.92	7551	19.87	3017	7.93	5087	13.38	9753	25.66
Laligue1	380	1049	2.76	4098	10.78	8293	21.82	3271	8.60	5183	13.63	8959	23.57
Premier	380	1024	2.69	4236	11.14	8597	22.62	3422	9.03	5150	13.55	9247	24.33
Total	1826	5113	2.81	20068	10.50	40370	22.13	16033	8.80	25183	13.84	44519	24.36

N: Sample; TF: Total Frequency; AV: Average

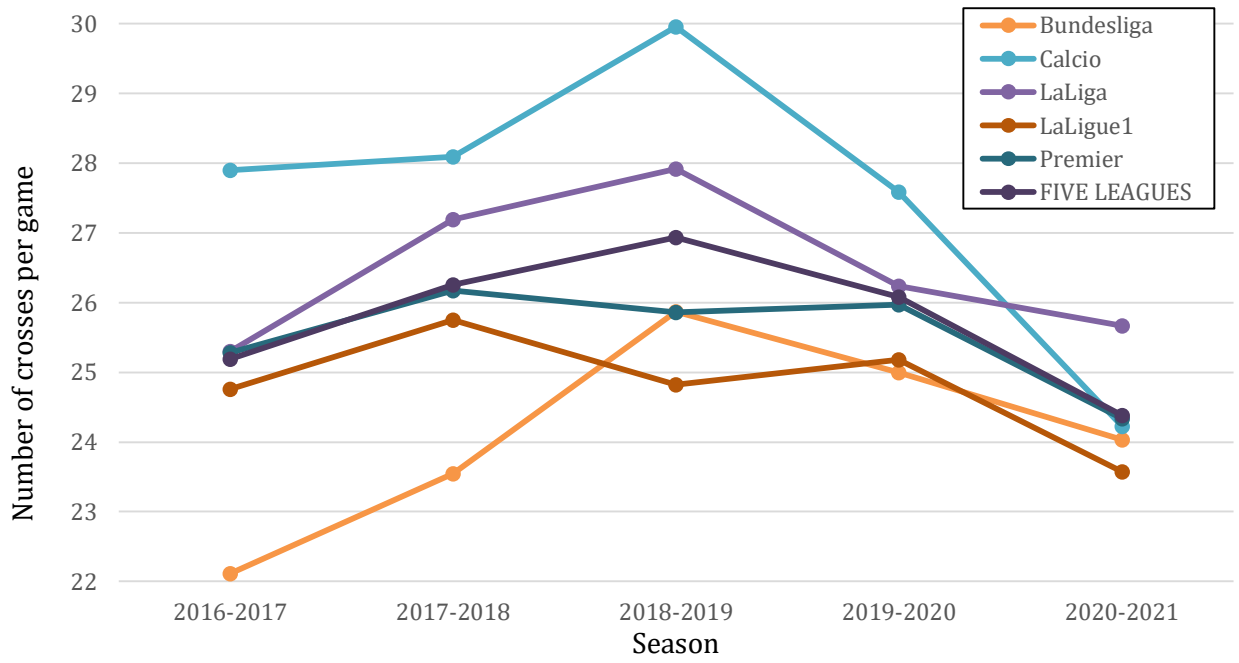

Figure 2. Evolution of the number of crosses per game of the Big Five leagues over the last 5 years.

We analysed the evolution of the crosses into the box of the TFEFL over 5 seasons, obtaining an average of 25.76 crosses per game (Figure 2). The ISA obtained the highest average (29.95 crosses) during the 2018-2019 season and GBL the lowest average (22.11 crosses) during the 2016-2017 season. Within this range of values, the TFEFL total average tended to drop slightly over the last three seasons. Subsequently, we compared the total average of the 5 competitions across the 5 seasons. The Kruskal Wallis test revealed significant differences among the crosses into the box totals of the 5 major leagues over the last 5 seasons ($p<0.001$). The 2018–2019 season (26. 93) presented higher values ($p<0.05$) compared with three other seasons (2016–2017, 2019–2020 and 2020–2021). The 2020–21 season showed lower values compared with the other four seasons (2016–2017, 2017–2018, 2018–19 and 2019–2020). The size of the differences among the seasons ranged from small to moderate (ES = 0.02–0.35). The greatest difference was found between the seasons 2018-2019 and 2020-2021 (ES = 0.35).

Table 2. Means and standard deviations (sd) of the crosses into the box of five top Europeans leagues over the last five years.

Season	Bundesliga	Serie A	Laliga	Laligue 1	Premier League	Season Means
2016-2017	22.11 [c,d,e] (6.10)	27.89 (7.07)	25.29 (7.82)	24.76 (6.93)	25.28 (6.87)	25.19 [b,c,d,e] (7.23)
2017-2018	23.54 [c] (6.18)	28.09 (8.18)	27.19 (7.53)	25.74 (7.29)	26.17 (6.82)	26.25 [a,b,e] (7.41)
2018-2019	25.87 [e] (7.26)	29.95 (7.21)	27.92 (7.90)	24.83 (6.38)	25.86 (6.96)	26.93 [b,c,d,e] (7.39)
2019-2020	24.99 (7.61)	27.59 (8.78)	26.23 (7.66)	25.18 (6.59)	25.97 (7.43)	26.08 [a,c,e] (7.75)
2020-2021	24.03 (7.01)	24.23 (6.54)	25.67 (7.34)	23.58 (6.08)	24.33 (7.49)	24.38 [a,b,c,d] (6.94)
Mean Five Leagues	24.11 (6.97)	27.55 (7.81)	26.46 (7.70)	24.80 (6.70)	25.52 (7.14)	25.76 (7.36)

a > 2016–17, b > 2017–18, c > 2018–19, d > 2019–20, and e > 2020–21 for a level significance $p<0.05$

Table 3. Correlation between 'crosses into the box' and the 'finishing', 'possession' and 'transition' variables of the 5 big leagues.

Variable		Bundesliga	Calcio	Laliga	Laligue1	Premier League	Total
Finishing	Goals	-0.060	-0.185**	-0.204**	-0.106**	-0.160**	-0.148**
	Opportunities	0.226**	0.133*	0.093**	0.230**	0.161**	0.159**
	Shots	0.403**	0.349**	0.331**	0.375**	0.307**	0.341**
	Shots on Target	0.196**	0.145**	00.051	0.169**	0.089*	0.124**
	Key Passes	0.191**	0.179**	0.076*	0.231**	0.169**	0.163**
Possession	Poss (sg)	0.537**	0.450**	0.316**	0.517**	0.466**	0.442**
	Poss (%)	0.546**	0.502**	0.361**	0.541**	0.497**	0.484**
	Nº poss (nº)	0.303**	0.191**	0.270**	0.235**	0.210**	0.224**
	Poss (Av)	0.422**	0.319**	0.190**	0.392**	0.386**	0.328**
Transition	Ball recoveries	0.537**	0.450**	0.316**	0.517**	0.466**	0.442**
	Ball Recovery opponent	0.546**	0.502**	0.361**	0.541**	0.497**	0.484**
	Lost Balls	0.303**	0.191**	0.270**	0.235**	0.210**	0.224**
	Lost Ball opponent	0.422**	0.319**	0.190**	0.392**	0.386**	0.328**

**The correlation is significant at 0.01; *The correlation is significant at 0.05.

Table 4. Predictive models of crosses into the box of the Top Five European Football Leagues during the 2020-2021 season

Model	Variable	R^2	p-value	DW	NC	SE	SC	t	p-value
Finishing	Shots	0.210	0.000	1.75	0.624	0.240	0.478	31.246	0.000
	Shots on target				-0.191	0.031	-0.077	19.876	0.003
	Key passes				0.130	0.064	0.089	-2.978	0.000
	Opportunities				-0.044	0.031	-0.022	4.242	0.447
	Goals				-1.441	0.058	-0.287	-0.760	0.000
Possession	Poss (sg)	0.231	0.000	1.58	0.020	0.002	1.160	9.743	0.000
	Nº poss (nº)				-0.099	0.033	-.172	-2.989	0.003
	Poss (Av)				-1.235	0.197	-.790	-6.272	0.000
Transition	Recovery Ball	0.337	0.000	1.71	0.238	0.009	0.415	25.811	0.000
	Ball recovery opponent				0.029	0.013	0.036	2.215	0.027
	Lost Ball				0.040	0.022	0.029	1.784	0.074
	Lost Ball opponent				-0.264	0.018	-0.249	-15.039	0.000

DW: Durbin Watson; NC: non-standardised coefficient; SE: Standard Error; SC: standardised coefficient

Finally, we examined TFEFL crosses into the box focusing on their links with different game sequences: attack "finishing", ball "circulation", and "transition" (Table 3). Direct links were found in most cases. Regarding attack "finishing" variables, a moderate relationship was found between the TFEFL crosses and shots on target (r=0.341; p<0.001). This correlation was even stronger in the case of the GB (r=0.401; p<0.001). Most ball circulation variables were also found to be directly linked with crosses into the box (possession time: r=0.442; p<0.001; possession percentage: r=0.484; p<0.001 and average time of each possession: r=0.328; p<0.001). Worthy of note, the GL (Sg: r=0.537; p<0.001; %: r=0.5464) and FLL (Sg: r=0.517; p<0.001; %: r=0.541 p<0.001) revealed strong correlations between crosses into the box and possession measured in seconds and percentage. Finally, some game transition variables presented links such as total ball recoveries (r=0.442; p<0.001) and ball recovery from opponent (r=0.484; p<0.001). An analysis differentiated by leagues showed a close transition link (ball recovery and ball recovery from opponent) in the case of the GL and FLL.

Table 4 summarises the three predictive models obtained. The first model (attack finishing) explains 21% of the "Crosses into the box" variance as a dependent variable. In this model, the "Shots" is the predictor variable that best explains the model with a standardised coefficient of 0.478 (p<0.001). The second model is based on "ball possession" variables and explains 23.1% of the variance. In this case, the "possession time" (seconds) variable is the one that best explains the model with a standardised coefficient of 1.160 (p<0.001). Finally, the third model (game transition) obtains an R2 which accounts for 33.7% of the variance of 0.415 (p<0.001). In all three models, the Durwin-Watson obtained values that rule out autocorrelation. An absence of multicollinearity was verified in all models.

DISCUSSION

The study objective was to analyse the crosses into the box as a performance indicator comparing it with other performance indices of the Top Five European Football Leagues. To do this, a descriptive analysis, correlational analysis and contrast tests were performed. The data obtained showed that crosses into the box could be considered as highly frequent technical-tactical events (occurring almost 25 times per game). This frequency is significant from a tactical perspective because it represents a skill used in the

attack finishing phase and therefore directly influences match score. In this way, this quantitative average presents an added value because it is more frequent than other finishing events (goals: 2.81; opportunities: 10.50; key passes:13.84; shots: 22.13; shot on target: 8.80). Therefore, crosses into the box can be described as high-frequency and qualitatively influential events in TFEFL.

Moreover, to meet the study objective, it was necessary to perform a comparative analysis of the TFEFL. Significant crosses in the box differences were found among the 5 tournaments during the 2020-2021 season. The samples did not follow a normal distribution and the differences obtained may owe to the fact that the Kruskal Wallis test does not compare averages, only entire distributions. In any event, an additional peer-reviewed analysis strategy of the different tournaments showed significant differences only between SLL and GL, and between SLL and FLL, with a low effect size. That is, only two out of 10 tournament pairing possibilities reflected significant differences. On the other hand, studies that use multiple European league samples rarely compare them [13, 17-20]. One exception is the study by Mitrotasios et al. [7], in which the authors compared major European leagues. They found significant differences among the four leagues' tactical variables, except when an "individual play" was performed in the penultimate action, finishing inside the "score pentagon" and the "goal conversion rate". The tactical variables included crosses into box ($p<0.001$) which triggered goal-scoring opportunities.

Studies on how game models historically evolve reveal that short passes have increased while direct play has declined [11, 21-23]. It was thus necessary to explore crosses into the box over time as this technical-tactical action can be used in any attack style (combination, direct or counterattack). As shown in this paper, however, crosses are one of the most widely used finishing actions in major European leagues. Nevertheless, the results showed significant differences among the last 5 seasons. Crosses cannot be defined as an indicator of game model changes because the range encountered was narrow: between 29.95 (2018-2019 at ISA) and 22.11 crosses per game (2016-2017 in GBL). The low technical-tactical significance of these differences can be explained not only by the non-parametric nature of the data, but also by the small effect size found between the season/league pairs – in which statistically significant differences were found. In this line, Errekagorri et al. [12] did not find differences either in the SLL's crosses into the box over the period under study.

Finally, based on a third strategy of exploration of crosses into the box, direct links were found between the crosses into the box and game sequences such as attack "finishing", ball "circulation" and attack-defence "transition". But these relationships did not show any cause-and-effect relationship between the crosses and the different correlated game sequences. Future observational studies could seek to explain the direct associations found and determine cause-and-effect relationships. In the case of the transition phase, observational designs should explore whether the close link found between crosses and recovered balls results from crosses cleared by opponent defences. The same question applies to the relationship with ball possession variables. Another relevant fact is the "average time" indicator of each possession. This indicator presented a moderate relationship with crosses into the box. It better explains the link between crosses into the box and possession from a qualitative viewpoint, since team % of possession sometimes corresponds to numerous short-duration possessions. These types of "ping-pong" possessions distort data interpretation if we do not focus on each average possession time. Fernández-Navarro [13] also found a link between crosses into the box and possession in the final third of the field, and even conceptualised it as an attacking style of play. Finally, in the case of the attack "finishing" phase, the moderate relationship found between shots and scoring opportunities in the present work was supported by the literature in other contexts [8, 24-26]. In the same way, although the conversion rate of crosses into goals is very low, half the crosses are necessary to complete the goal during the second ball after the cross [15]. Based on the regression models obtained, we interpreted that for each unit point increase of the variables "shots", "ball possession"

(seconds) and "ball recoveries", the crosses would increase by 0.478, 1.160 and 0.415 points, respectively.

This study presented some limitations. Several contextual factors that potentially influence performance were not evaluated, such as the time of the match and team performance level or ranking. Moreover, we did not consider certain anthropometric characteristics that can potentially significantly influence how these actions unfold in the game.

CONCLUSION

Regarding the TFEFL total, a moderate correlation was found between crosses into the box and other ball possession variables such as time, percentage, and average time of each possession. Identical correlations were found for game transition variables such as total ball recoveries and ball recoveries from opponent.

The data obtained in the present work, however, only establishes a working hypothesis. Future studies should explore this data further and address a number of questions: From which location do crosses into the box generate most scoring opportunities? From which location in the box are the crosses most effectively finished? Does numerical superiority in the box have an impact? Does the provisional match score have an effect? Can any sequential play patterns be identified before or after a cross? While the conversation rate of crosses into goals is clearly low [8, 15, 27], crosses should be examined in terms of how they influence second balls and the game cycle, that is, going beyond goals and shots.

Funding Statement: Funded Research following a Spanish State Research Agency evaluation for the call of the Fifth Own Specific Research and Transfer Plan 2018-2020 of the Pablo de Olavide University (Reference: PPI2201).

Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

1. Anderson L, Orme P, Di Michele R, Close GL, Milsom J, Morgans R, Drust B, Morton JP. Quantification of seasonal-long physical load in soccer players with different starting status from the English premier league: Implications for maintaining squad physical fitness. Int J Sport Physiol 2016; 11(8): 1038–1046. doi: 10.1123/ijspp.2015-0672
2. Lago-Peñas C, Kalén A, Lorenzo-Martinez M, Lopez-Del Campo R, Resta R, Rey E. Do elite soccer players cover longer distance when losing? Differences between attackers and defenders. Int J Sports Sci Coa 2020; 16(3): 840-847. doi: 10.1177/1747954120982270
3. Otero-Saborido FM, Aguado-Mendez R, Torreblanca-Martinez V, González-Jurado JA. Technical-Tactical Performance from Data Providers: A Systematic Review in Regular Football Leagues. Sustainability-Basel 2021; 13: 10167. doi: 10.3390/su131810167
4. Aguado-Mendez RD, Gonzalez-Jurado JA, Otero-Saborido FM. Observational analysis of goals conceded by Real Betis in LaLiga: Case study. Retos 2020; 83: 355–362. doi: 10.47197/retos.v38i38.76216
5. Reina-Gómez A, Hernández-Mendo A. Football performance indicators review. Riccafd 2012; 1(1): 1–14. doi: 10.24310/riccafd.2012.v1i1.1990
6. Tenga A, Ronglan LT, Bahr R. Measuring the effectiveness of offensive match-play in professional soccer. Eur J Sport Sci 2019; 10(4): 269-277. doi: 10.1080/17461390903515170
7. Aguado-Mendez RD, Gonzalez-Jurado JA, Callejas-Jeronimo JE, Otero-Saborido FM. Analysis of the goal-scoring opportunities conceded in football: a study case in the Spanish La Liga. Qual Quant 2021; 55(4): 1477–1496. doi: 10.1007/s11135-020-01066-7
8. Mitrotasios M, Gonzalez-Rodenas J, Armatas V, Aranda R. The creation of goal scoring opportunities in professional soccer. Tactical differences between Spanish La Liga, English Premier League, German Bundesliga and Italian Serie A. Int J Perf Anal Spor 2019; 19(3): 452–465. doi: 10.1080/24748668.2019.1618568

9. Brechot M, Flepp R. Dealing With Randomness in Match Outcomes: How to Rethink Performance Evaluation in European Club Football Using Expected Goals. J Sport Econ 2020; 21(4): 335–362. doi: 10.1177/1527002519897962
10. Gai Y, Volossovitch A, Lago C, Gomez MA. Technical and tactical performance differences according to player's nationality and playing position in the Chinese Football Super League. Int J Perf Anal Spor 2019; 19(4): 632–645. doi: 10.1080/24748668.2019.1644804
11. Zhou C, Gomez MA, Lorenzo A. The evolution of physical and technical performance parameters in the Chinese Soccer Super League. Biol Sport 2020; 37(2): 139–145. doi: 10.5114/BIOLSPORT.2020.93039
12. Errekagorri I, Castellano J, Echeazarra I, Lopez-Del Campo R, Resta R. A longitudinal analysis of technical-tactical and physical performance of the teams in the Spanish LaLiga Santander: An eight-season study. Biol Sport 2020; 39(2): 389–396. doi: 10.5114/biolsport.2022.105331
13. Fernandez-Navarro J, Fradua L, Zubillaga A, Ford PR, McRobert, AP. Attacking and defensive styles of play in soccer: analysis of Spanish and English elite teams. J Sport Sci 2016; 34(24): 2195–2204. doi: 10.1080/02640414.2016.1169309
14. McHale IG, Scarf PA, Folker DE. On the development of a soccer player performance rating system for the english Premier League. Interfaces 2012; 42(4): 339–351. doi: 10.1287/inte.1110.0589
15. Gelade G. The art of crossing. Stats Performs 2017. https://www.statsperform.com/resource/the-art-of-crossing/
16. Batterham AM, Hopkins WG. Making meaningful inferences about magnitudes. Int J Sport Physiol 2006; 1(1): 50–57. doi: 10.1123/ijspp.1.1.50
17. Jimenez-Sanchez A, Lavin JM, Endara DF. Repercussions of playing without an audience on home advantage, refereeing decisions and game components. Cuad Psicol Deporte 2021; 21(2): 198–212. doi: 10.6018/cpd.444811
18. Lago-Peñas C, Gomez-Ruano M, Owen AL, Sampaio J. The effects of a player dismissal on competitive technical match performance Int J Perf Anal Spor 2016; 16(3): 792–800. doi: 10.1080/24748668 .2016.11868928
19. Sarajärvi J, Volossovitch A, Almeida CH. Analysis of headers in high-performance football: evidence from the English Premier League. Int J Perf Anal Spor 2020; 20(2): 189–205. doi: 10.1080 /24748668.2020.1736409
20. Wagner F, Preuss H, Könecke T. A central element of europe's football ecosystem: Competitive intensity in the "big five". Sustainability-Basel 2021; 13(6). doi: 10.3390/su13063097
21. Barnes C, Archer DT, Hogg B, Bush M, Bradley PS. The evolution of physical and technical performance parameters in the english premier league. Int J Sports Med 2014; 35(13): 1095–1100. doi: 10.1055/s-0034-1375695
22. Barreira D, Garganta J, Castellano J, Prudente J, Anguera MT. Evolución del ataque en el fútbol de élite entre 1982 y 2010: Aplicación del análisis secuencial de retardos. Rev Psicol Deporte 2014; 23(1): 139–146.
23. Zhou C, Lago-Peñas C, Lorenzo A, Gomez MA. Long-Term Trend Analysis of Playing Styles in the Chinese Soccer Super League. J Hum Kinet 2021; 79(1): 237–247. doi: 10.2478/hukin-2021-0077
24. Ensum J, Pollard R, Taylor S. Applications of logistic regression to shots at goal in association football. In Science and football V; Reilly T, Cabri D, Araujo D, Eds.; Routledge: London, England 2005: 211–218
25. Hughes M, Churchill S. Attacking profiles of successful and unsuccessful teams in Copa America 2001. In Science and football V; Reilly T, Cabri D, Araujo D, Eds.; Routledge: London, England 2005: 221-224.
26. Lago-Peñas C, Lago-Ballesteros J, Dellal A, Gomez M. Game-related statistics that discriminated winning, drawing and losing teams from the Spanish soccer league. J Sport Sci Med 2010; 9(2): 288–293.
27. Flynn T. The effects of crosses across three levels of professional football. Insight: The F.A. Coaches Association Journal 2001; 4(2): 13–16.