JOURNAL OF PHYSICAL ACTIVITY NUTRITION AND REHABILITATION

Journal of Physical Activity, Nutrition and Rehabilitation, 2025
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Cross execution positions and defensive behavior. A comparative study between the national championships of the Premier League, La Liga, and the Bundesliga.

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Abstract

The purpose of this study was to investigate the defensive behavior of the top 5 teams in the English, Spanish, and German leagues during the 2023-24 season regarding their response to different types of crosses delivered into the penalty area, aiming to minimize the percentage of goals scored through this type of offensive action. For this reason, the effectiveness of the defense of the aforementioned teams was examined in relation to crosses that ended up inside the penalty area, based on the zone from which the cross was executed. For the statistical analysis of the data, frequency and percentage ratio analyses were performed, as well as an independence test using the Crosstabs function and the non-parametric chi-square (χ^2) test, in order to explore the relationships between all categories. The study observed the defensive behaviors of these teams in a total of 1,428 crosses. The data analysis showed that: In the English league, higher percentages of crosses were executed from intermediate spaces, whereas in the Spanish and German leagues, higher percentages were recorded from wide zones. No statistically significant differences ($p<0.05$) were found between the teams of the English, Spanish, and German leagues regarding the effectiveness of their defense in dealing with crosses from all zones where the cross took place. Higher percentages of defensive failure were observed in the English league, followed by the Spanish league, while the lowest frequencies of defensive line failures were recorded in the German league.

Keywords: cross execution positions, defensive line height, defensive line effectiveness, Premier League, La Liga, Bundesliga.

1 Introduction

Modern football is constantly evolving, both in terms of tactics and athletic performance, which presents ongoing challenges and opportunities for scientific research and performance analysis. As the game becomes increasingly complex and data-driven, coaches, analysts, and researchers rely more heavily on technological advancements to gain insights into player performance, team dynamics, and strategic decision-making. One of the most significant developments in recent years has been the widespread use of tracking technologies and the sophisticated collection of performance data. These advancements enable a detailed analysis not only of the individual performances of players but also of entire teams. Additionally, they provide critical insights into the tactical behaviors of opposing teams, assisting in identifying their strengths and vulnerabilities, which is essential for effective match preparation and strategic planning (Salvo M., 2015). Defensive organization has become a major focus of such analyses, particularly given its critical role in preventing goal-scoring opportunities and ensuring team balance during

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both structured play and transitional phases. As offensive strategies grow increasingly diverse and dynamic, defensive systems must also adapt to counter a wide variety of attacking maneuvers, including the use of crosses into the penalty area—a common and often decisive attacking strategy in modern football.

One of the most comprehensive recent literature reviews in the area of defensive behavior was conducted by Forcher et al. (2022). Their study aimed to analyze defensive strategies and behaviors through the systematic examination of 23 peer-reviewed research studies. These studies were selected from extensive searches in major electronic databases such as PubMed (n=604), Web of Science (n=593), and SPORTDiscus (n=872), applying strict scientific and methodological quality criteria. The findings of this review highlighted several key characteristics of successful defensive play: high-intensity pressing on an individual level; excellent synchronization within defensive subunits of the team (inter-team coordination); and efficient coordination between these subunits and the opposing team's offensive units (intra-team coordination). Furthermore, successful defensive performance was found to rely on maintaining balance at the subunit level and exhibiting compact and coordinated organization at the team level.

In a more recent study, Forcher et al. (2023) further investigated the relationship between defensive principles and the success of defensive actions. Analyzing 153 matches from the German Bundesliga, they explored two critical factors in defensive performance: *compactness*—defined as the area of the pitch occupied by the team or its subunits and the degree of spread or dispersion—and *organization*, which refers to the distances between the defensive lines. Their analysis revealed that, overall, there were minimal differences in the compactness and organization of entire teams when comparing successful versus unsuccessful defensive actions. However, a notable distinction was observed at the subunit level. Specifically, defensive subunits consisting of the five players nearest to the ball displayed greater compactness during successful defensive efforts. In these situations, the players covered a smaller area of the pitch and maintained a tighter formation, reducing gaps and opportunities for the attacking team. This finding suggests that localized compactness—particularly near the ball—is a critical determinant of defensive success. On the other hand, maintaining an overall compact team shape across the entire field did not appear to have the same impact on the ability to recover possession or disrupt the opponent’s attack.

These findings underscore the importance of studying defensive behaviors not only from a holistic team perspective but also by focusing on specific defensive units and their interactions with the immediate context of play. Understanding how teams defend in different situations—such as when facing crosses into the penalty area—can provide valuable insights for coaches and analysts seeking to optimize defensive strategies and minimize the risk of conceding goals.

The study by Bojan et al. (2019) focused on the success factors of football teams in the English Premier League (EPL) during the period from 2010 to 2017. It examined how defensive and offensive strategies can influence overall team success. The researchers concluded that, in general, having a stronger defense is slightly more important for achieving success than offensive performance.

A series of other studies have investigated defensive transitions as key factors in determining the effectiveness of defensive behavior among elite teams (Claudio Alberto Casal et al., 2016). These studies emphasized how teams organize and react immediately after losing possession, aiming to regain control of the ball and prevent dangerous situations from developing. In addition, other research has focused on the types and locations of ball recovery across different zones of the pitch, exploring how these defensive actions relate to overall team success (Barreira et al., 2014).

Despite the growing body of research on defensive strategies and transitions, there appears to be a notable gap in the literature regarding defensive tactics during the most dangerous phases of play—specifically, those that occur inside the penalty area. The critical nature of defensive actions in this area of the pitch, where scoring opportunities are significantly higher, makes this a key subject for further exploration.
The aim of this study is to analyze and document the defensive behaviors exhibited within the penalty area when defending against attacking actions initiated from wide areas through crosses during high-level football matches. Additionally, the study seeks to identify potential differences in defensive responses and effectiveness between teams competing in three major European leagues: the English Premier League, Spain's La Liga, and Germany's Bundesliga. Understanding these differences could provide valuable insights for coaches and analysts working to enhance defensive performance in elite football.

Method

Research Sample

The sample consisted of the top five teams from the 2022/2023 season in the following national leagues:
Premier League (Manchester City, Arsenal FC, Manchester United, Newcastle United, Liverpool FC)
LaLiga (FC Barcelona, Real Madrid, Atletico de Madrid, Real Sociedad, Villarreal CF)
Bundesliga (FC Bayern Munich, Borussia Dortmund, RB Leipzig, FC Union Berlin, SC Freiburg)
The study analyzed matches played between these teams. The selection of these specific matches was based on the premise that these were the most powerful teams within their respective national championships. Therefore, it was expected that their attacking actions would be both qualitative and quantitative, and that their defensive behaviors would demonstrate a high level of effectiveness. Additionally, since these teams are considered to be of similar competitive strength, the analysis would allow for the identification of differences that could be attributed to the distinct characteristics of each national league.
The sample consisted of 60 matches in total, during which 1,428 defensive sequences were analyzed, focusing on the tactical behavior of the defensive line. A *defensive sequence* was defined as a phase of play in which the team had lost possession of the ball, the ball was located in the attacking third of the field (either in the wide or intermediate channel), and the defensive line was positioned between the ball and the goal, with the objective of preventing the opponent from scoring.
The selection criteria for the sequences included the following:
Sequences that occurred during regular time or additional stoppage time of the match.
Video footage that allowed clear identification of all variables under evaluation.
Exclusion criteria for sequences included:
Defensive actions resulting from set-pieces or sequences directly following their execution.
Sequences following penalty kicks or actions resulting from goalkeeper saves after penalty attempts.
Phases that concluded with an infringement of the rules of the game.

Procedure

The data was collected from the Wyscout platform by selecting videos containing all offensive actions from the teams under analysis, focusing exclusively on sequences in

regular open play. Filters were applied to isolate attacking sequences that originated from wide areas. Subsequently, the defensive behavior of each team was analyzed in every sequence, individually and as often as necessary, by viewing the footage in normal speed, using pause, forward, and rewind functions as required. Both a laptop and a tablet were used for data analysis.

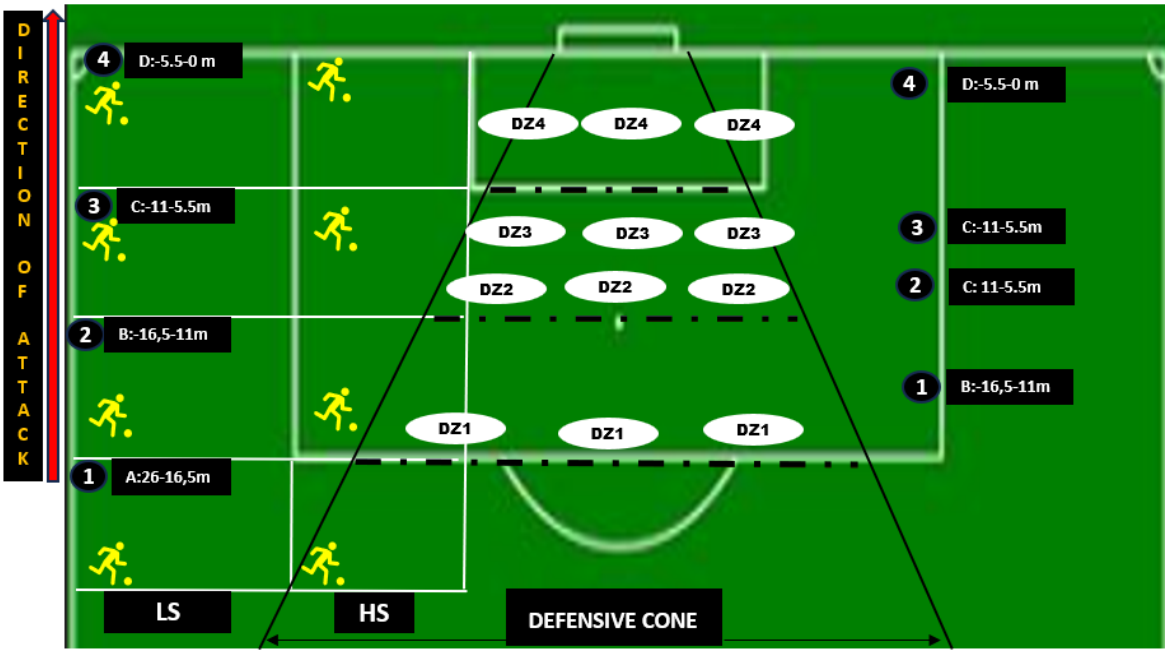
Observation Protocol

According to the literature (Marziali & Mora, 2011; Longo & Aquino, 2012, pp. 148-149; Luccessi, 2018, p. 115; Lucchessi, 2019, pp. 87-95), the following technical-tactical indicators were selected to evaluate the effectiveness of the defensive line's tactical behavior in the Premier League, LaLiga, and Bundesliga when responding to offensive actions from wide areas:

Ball zone from where the cross was executed in the wide channel:
LS:26 - 16.5 meters (Position Defence :16,5-11m)
LS:16.5 - 11 meters (Position Defence :11-5,5m)
LS:11 - 5.5 meters (Position Defence :11-5,5m)
LS: 5.5 - 0 meters (Posiotion Defence: 5,5-0m)

Ball zone from where the cross was executed in the intermediate channel:
HS:26 - 16.5 meters (Position Defence :16,5-11m)
HS:16.5 - 11 meters (Position Defence :11-5,5m)
HS:11 - 5.5 meters (Position Defence :11-5,5m)
HS:5.5 - 0 meters (Posiotion Defence: 5,5-0m)
Initial defensive line positioning (height) (Table 1)

Table 1. Diagram of the playing field for crosses and the positioning of the defensive line.



Statistical analysis

For the statistical analysis of the data, which was recorded through digital video and coded via computer, the statistical software package IBM SPSS Statistics 29.0.0.0 (241) was used. This software facilitated the description of the data, the performance of frequency analyses, the calculation of percentage ratios, and the testing of the independence of variables using the Crosstabs function and the non-parametric chi-square (χ^2) test to examine the relationships between all categories.

The non-parametric chi-square (χ^2) test is an analytical method commonly used when measuring the frequency with which observations (cases) appear in each category of a variable. The level of statistical significance was set at $p < 0.05$.

Reliability Testing

Intra- and inter-observer reliability tests were conducted using Cohen's kappa (κ) correlation coefficient. To assess intra-observer reliability, the primary observer analyzed 150 randomly selected crosses on two separate occasions, with a one-week interval between observations. Kappa values greater than 0.90 were reported, indicating an almost perfect level of agreement (McHugh, 2012).

For inter-observer reliability, a second independent football analyst analyzed the same number of crosses under similar conditions. Kappa values greater than 0.85 were observed for all performance indicators, demonstrating a strong level of agreement (McHugh, 2012).

Table 2. The Intra- and Inter-Rater Reliability Analysis (κ) for Crossing Variables

Variable	Intra-observer Kappa value	Inter-observer Kappa value
Defensive line height	0.91	0.85
Defensive line width	0.91	0.86
Cross execution zone	0.95	0.90
Cross landing zone	0.94	0.89
Defensive effectiveness	0.93	0.87

Results

In order to calculate the frequency and effectiveness of defensive tactical behavior during the phases in which crosses were executed, a count was conducted of all these sequences in relation to the national league. Based on the data analyzed, it was found that in the English Premier League, teams used various types of crosses more frequently across all intermediate channels (HS: 26-16.5m, HS: 16.5-11m, HS: 11-5.5m, HS: 5.5-0m) compared to the other leagues.

In contrast, in the German Bundesliga, a higher number of crosses were observed in the LS: 26-16.5m and LS: 11-5.5m zones relative to the other leagues. Meanwhile, in the Spanish La Liga, greater percentages of crosses were recorded in the LS: 16.5-11m and LS: 5.5-0m zones (Table 3).

Table 3. Defensive effectiveness across the different national leagues

Zone of the crosser	Premier League	La Liga	Bundesliga
LS:26-16,5m	30,8%	34,2%	34,9%
LS:16,5-11m	33,3%	34,3%	32,3%
LS:11-5,5m	30,3%	31,5%	38,2%
LS:5,5-0m	32,7%	37,4%	29,8%
HS:26-16,5m	38,9%	30,2%	31%
HS:16,5-11m	39,2%	33,8%	27%
HS;11-5,5m	43,8%	24,8%	31,4%
HS:5,5-0m	39,7%	31,2%	29,1%

Table 4. Crossing frequencies across the different national leagues

Zone of the Crosser	x2, p
LS:26-16,5m	x2(2) =,619 p=0,734
LS:16,6-11m	x2(2) =2,653 p=2,265
LS:11-5,5m	x2(2) =1,199 p=0,549
LS:5,5-0m	x2(2) =1,061 p=0,970
HS:26-16,5m	x2(2) =,114 p=0,944
HS:16,5-11m	x2(2) =1,698 p=0,428
HS:11-5,5m	x2(2) =1,533 p=0,465
HS:5,5-0m	x2(2) =,144 p=0,930

P<0.05

In order to identify the differences in defensive success or failure based on the zones from which the cross was executed, in relation to the national league, the non-parametric chi-square (χ^2) test was used. The results showed that there was no statistically significant difference**. (Table 4).**

In general, a higher number of defensive failures were recorded in the English Premier League, followed by the Spanish La Liga, while on the other hand, fewer defensive failures were recorded in the German Bundesliga. (Table 5)

Table 5. Frequency percentages of defensive success and failure in relation to the national league

Zone of the crosser	**Premier League**		**La Liga**		**Bundesliga**	
	Success	Failure	Success	Failure	Success	Failure
LS:26-16,5m	91,2%	8,8%	89,1%	10,9%	92,2%	7,8%
LS;16,5-11m	83,6%	16,4%	89,9%	10,1%	92,3%	7,7%
LS:11-5,5m	80,8%	19,2%	82,9%	17,1%	87%	13%

LS:5,5-0m	89,3%	10,7%	90,6%	9,4%	90,2%	9,8%
HS:26-16,5m	77,6%	22,4%	76,3%	23,7%	79,5%	20,5%
HS;16,5-11m	75,9%	24,1%	84%	16%	90%	10%
HS:11-5,5m	73,6%	26,4%	80%	20%	84,2%	15,8%
HS:5,5-0m	86,1%	13,9%	83,9%	16,1%	84,5%	15,5%

Discussion

The present study aimed to analyze and compare the defensive behaviors of elite football teams from three major European leagues—Premier League, La Liga, and Bundesliga—specifically in relation to their ability to defend against crosses executed from different zones on the field. By focusing on teams of comparable competitive level (the top five teams from each league), this research sought to identify whether distinct defensive patterns and tactical responses exist across these leagues, and how these differences may reflect broader tactical trends within their respective national contexts.

Cross Execution Trends and Tactical Implications

The data analysis revealed clear differences in cross execution tendencies across the three leagues. In the Premier League, teams demonstrated a significantly higher frequency of crosses originating from the intermediate channels (HS zones) compared to the other two leagues, where a higher concentration of crosses was executed from the wide channels (LS zones). This tendency aligns with the evolving tactical preferences of many Premier League teams, particularly those under the guidance of foreign managers who favor positional play (*Juego de Posición*) and emphasize the occupation of half-spaces and intermediate channels to destabilize opposing defenses.

For instance, the managerial philosophies of Pep Guardiola (Manchester City), Jürgen Klopp (Liverpool), and Mikel Arteta (Arsenal) incorporate principles of positional superiority and dynamic movement in central and intermediate areas to create overloads and passing lanes, eventually leading to dangerous crossing opportunities. As Mitrotasios et al. (2022) reported, crosses originating from these intermediate zones (HS: 16.5-8m) tend to produce the highest percentage of goal-scoring opportunities (27.5%). This is corroborated by the present study, which found that defensive failures were most frequent when defending crosses from HS zones—specifically HS: 26-15.5m (22.2%) and HS: 5.5-0m (21.5%).

The tactical preference for utilizing intermediate zones in the Premier League may also reflect the physical and athletic profile of players within this league. English football is traditionally characterized by a fast-paced, physically intense style of play that often exploits transitional moments. However, in recent years, there has been a shift toward more structured positional attacks that involve intricate build-up play through central areas, culminating in crosses from positions closer to the goal or from more central zones. This evolution places additional strain on defensive units, requiring high levels of coordination, communication, and anticipation, particularly within the penalty area.

Defensive Effectiveness Across Leagues

Regarding defensive success and failure rates, the Bundesliga teams demonstrated superior effectiveness in defending crosses across nearly all execution zones. This consistent defensive solidity may be attributed to several factors inherent to German

football culture and tactical development. German teams, influenced by coaching methodologies that emphasize compactness, spatial control, and high defensive organization, often exhibit disciplined defensive structures. The Bundesliga places a strong emphasis on collective defending, pressing schemes, and coordinated movements, which may explain the higher success rates in neutralizing crosses.

Conversely, teams in the Premier League registered the highest frequencies of defensive failures in most zones, with the exception of LS: 26-16.5m, HS: 26-16.5m, and HS: 5.5-0m, where La Liga teams recorded the most defensive failures. The relative defensive vulnerability of Premier League teams may be partially explained by the league's attacking intensity and the quality of offensive players, who consistently pose significant threats through aerial duels and incisive movements within the box. Moreover, the high tempo and transitional nature of the league could lead to defensive disorganization during crossing scenarios, particularly when defending in retreat or under sustained pressure.

The Spanish La Liga's defensive shortcomings in specific zones might reflect the traditional Spanish football philosophy, which prioritizes ball possession and attacking play, potentially at the expense of defensive compactness in certain situations. While La Liga teams are renowned for their technical proficiency and controlled build-up play, their defensive approaches may be more vulnerable when forced into low-block situations or when defending direct crosses, especially from intermediate channels where defensive positioning are crucial.

Broader Tactical Considerations and Practical Implications

The findings of this study highlight the need for tailored defensive strategies to address the specific threats posed by different types of crossing scenarios. Defending crosses, particularly those delivered from intermediate channels, requires well-coordinated movements from the backline, effective marking strategies (both zonal and man-to-man), and the ability to track dynamic runs from opposing attackers.

For coaches and analysts, these insights emphasize the importance of:

Training defensive units to maintain compactness in and around the penalty area, particularly when the ball is in intermediate zones.

Developing specific drills that simulate crossing scenarios from various zones, encouraging defenders to anticipate and react under realistic game pressures.

Enhancing communication between defenders and goalkeepers, especially in situations where crosses are delivered from areas that challenge the defensive line's depth and spacing.

Adapting defensive strategies to the attacking tendencies of opponents, based on their preferred zones of cross execution and the profiles of their key offensive players.

Limitations and Future Research Directions

While this study provides valuable insights into defensive behaviors against crosses in elite football, there are limitations that warrant further investigation. The analysis focused solely on matches between the top five teams in each league, which may not fully represent broader league-wide trends. Additionally, other contextual factors such as match status (leading or trailing), game location (home or away), and player fatigue were not considered in this study.

Future research should explore:

The role of individual player attributes (e.g., aerial ability, positioning skills) in defensive success.

The influence of formation and tactical setups (e.g., back three vs. back four systems) on defending crosses.

The impact of opponent quality and game context on defensive organization and effectiveness.

Conclusion

The purpose of this study was to analyze the defensive behavior of the top five teams from the Premier League, La Liga, and Bundesliga during the 2022-23 season in relation to their ability to defend against different types of crosses delivered into the penalty area. A total of 1,428 crosses were recorded and analyzed.

From the data analysis, the following key findings emerged:

A higher percentage of crosses originated from intermediate zones in the Premier League compared to La Liga and the Bundesliga.

No statistically significant differences were observed in the overall defensive effectiveness between the teams of the Premier League, La Liga, and Bundesliga.

The highest frequency of defensive failures when defending crosses was recorded in the Premier League teams, followed by those in La Liga, with Bundesliga teams exhibiting the lowest rates of defensive failure.

These findings indicate that further, more detailed analysis is necessary to identify and understand the specific differences in defensive behavior among the teams of the Premier League, La Liga, and Bundesliga. Such analysis would provide valuable insights into the technical and tactical aspects of defending crosses in elite football competitions.

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