"Unlocking Dynamics of Goal-scoring: The Showdown Between Direct and Indirect Transition Goals Across Football Leagues"

Original Investigation

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Abstract

In contemporary football, offensive transitions have an extraordinary impact on goal scoring patterns. Finding the factors that most influence its achievement is crucial, to adopt strategies adapted to the characteristics of the team and the specificity of the championship played. The objective of this study was to provide an analyze the separate and combined impacts of various variables on the success of offensive transitions and their outcomes. The sample consists of 1151 games from nine different countries, grouped into three leagues groups: Top Leagues, Marginal Leagues, and Emerging Leagues. In these matches, the total of 1649 goals scored were classified as direct offensive transitions and offensive transitions resulting from positive outcomes. Binomial logistic regression analysis revealed that goals resulting from positive outcomes of offensive transitions represented an important percentage of total goals scored in all league groups (ranging from 20% to 23%). Offensive transitions played a crucial role in competitive leagues, contributing to approximately 47% of total goals. The top leagues showed an even higher proportion, with over 53% of goals originating from offensive transitions. All league groups highlighted the central zones of the defensive midfield as essential to initiate successful direct offensive transitions. In Emerging Leagues direct offensive transitions are likelier to succeed with three passes than two passes. In marginal leagues, the number of players involved, and passes are related to the starting area.

In the top leagues, the results emphasized the effectiveness of defensive pressure in specific areas and involving more passes and offensive combinations. However, only a small proportion (7%) involved long actions in their first actions. The findings contribute to understanding the tactical aspects of offensive transitions in football to make them more impactful in scoring.

Introduction

Football (also known as "Association Football", or "Soccer") is characterized by being a highly complex game, making it difficult to objectify its observation and analysis [1]. Although football has been previously defined as a dynamic, interactive and uncontrollable phenomenon [2], the analysis of the tactical performance of teams allows for describing the dynamics of teams [3], and scrutinize the style of play and characteristics that best define a specific way of playing. Even though factors such as player and team ability must be considered [4], the pre-competition analysis allows it to be predictive and prescriptive [5], allowing teams to choose a specific combination of attacking and defensive styles, considering their strengths and weaknesses in order to increase their probability of success [6] and consequently improve their performance.

Whether the game style is defined as "Transitional Game", "Counter-Attack Game" [5,7] or simply "Counterattack" [8], it is unequivocal that there is dominance in the moments of transitions (attack/defense or defense/attack) and those have high scoring opportunity rates [9–11]. While possession of the ball and a team's ability to retain it is often overvalued, there is non-consensus about the importance of maintaining possession for extended periods versus shorter possessions. Numerous authors have reported that possessions that enable fast and transitional attacks are the ones most likely to lead to success [5,8,12,13].

Several studies have provided, provide insights into goal-scoring strategies in different competitions. The analysis of European Championship games in 2004 revealed that 20.3% of goals were scored through counterattacks and 35.6% from Set Pieces [9]. Similar findings were observed in the 2006 World Cup, with 20.3% of goals resulting from counterattacks and 32.6% from Set Pieces [14]. The 2010 World Cup knockout rounds characterization showed 18.8% of goals from counterattacks and 20.0% from Set Pieces [15]. However, Wright and collaborators [16] presented research of the English FA Premier League, with similar numbers of goals from Set Pieces (35.6%) but with 63% of all goals scored by transitions play, three times higher than the studies mentioned above. Understanding whether these numbers differ by competition (leagues versus knockout competitions) and how offensive transitions contribute to the goals scored by set pieces is essential. Thus, it is pertinent to analyze the successful direct offensive transitions, but also the goals obtained from positive outcomes of offensive transitions.

Positive outcome goals may be defined as those resulting from set pieces, originating in an offensive transition that culminates in a penalty kick, corner kick, free kick, or throw-in within the final third of the field. In this way, the play immediately preceding the goal must be an offensive transition. For example, a goal obtained by a penalty kick would traditionally be considered a goal obtained by Set Pieces; however, if an offensive transition has originated, it will be considered a goal obtained through a Positive Outcome.

The effectiveness of "coordination tactics" in football teams has already been demonstrated [17]. Several other variables, (i.e., first action, recovering area, and number of passes,) have been linked with the success of the transitions. Hewit and collaborators [18] explored the number of passes required to score a goal, building upon Pollard Reep's [19] finding that 80% of goals arise from just three passes, albeit without specifying the

attacking play involved. Additionally, Hughes and Franks' [10] research on the 1990 FIFA World Cup revealed that successful teams with passing sequences exceeding five passes per possession produced more goals than those with shorter sequences. According to Thoseby and their colleagues [4], professional football players typically cover a distance ranging from 9 to 13 kilometers during a match, with 600 to 1200 meters being covered at high speed and 60 to 100 accelerations. Also, Welch, Schaerf, & Murphy [20] demonstrate that the defending team's area is substantially smaller than that of the attacking team (300-1000m2 vs 300-2000m2), indicating that the moment of possession loss presents a window of opportunity for the attacking team to initiate an offensive transition and potentially compromise the success of the opposing team's defensive transition, leading to greater finishing opportunities.

The study aimed to investigate and analyze the factors influencing goals scored in offensive transitions, specifically examining the separate and synergistic impacts of various variables in different league groups. The study aimed to provide insights into the significance of direct offensive transitions and successful outcomes of transitions, as well as the associations between different factors such as the initial action, number of participating players, number of passes, origin and destination zones, transition length, match venue, and favorable outcome category. The ultimate goal was to enhance our understanding of offensive transitions in football and their contribution to goal-scoring, thereby contributing to advancing tactical knowledge in the sport.

Materials and methods

Sample and variables

This investigation utilized a sample of 1151 games from the 2019-20 season, encompassing the games played in the Emerging, Marginal, and Top Leagues analyzed from the season's commencement until the midpoint, leading to of 3497 goals. The leagues were grouped into three groups of three leagues based of the UEFA ranking and the latitude of each league. The Top Leagues group is comprised the Spanish (La Liga), Italian (Seria A) and German leagues (Bundesliga), then classified as 2nd, 3rd and 4th in the UEFA ranking (at the date the events were collected) and which are the leagues with the highest turnover and value invested in the transfer markets. The Marginal leagues, consisting of the Portuguese (Primeira Liga), Dutch (Eredivisie), and Russian (Premier League) leagues, which are in 6th, 7th, and 8th places respectively and which present a high number of transfers from these to the others analyzed leagues, and the Emerging Leagues, (EL), made up of the Qatar (Stars League), Saudi Arabia (Pro League), and UAE (Pro League) leagues that appear as markets with high financial potential that manage to attract some international players but those leagues are played mainly by local players.

All goals were categorized into three types: i) Non-offensive Transition (NT), ii) Direct Offensive Transition (OT), and iii) Set Pieces (SP). The goals that fell into Set Pieces were analyzed based on the precedent play. If the play that immediately preceded the goal was not a transition, the goal remains classified as Set Pieces, however if that immediately play was an Offensive transition play, the goal was classified as a Positive Outcome (POS OUT) (figure 1). A total of 1649 goals were scored due to direct offensive transitions and/or from positive outcomes.

Figure 1. Sample algorithm
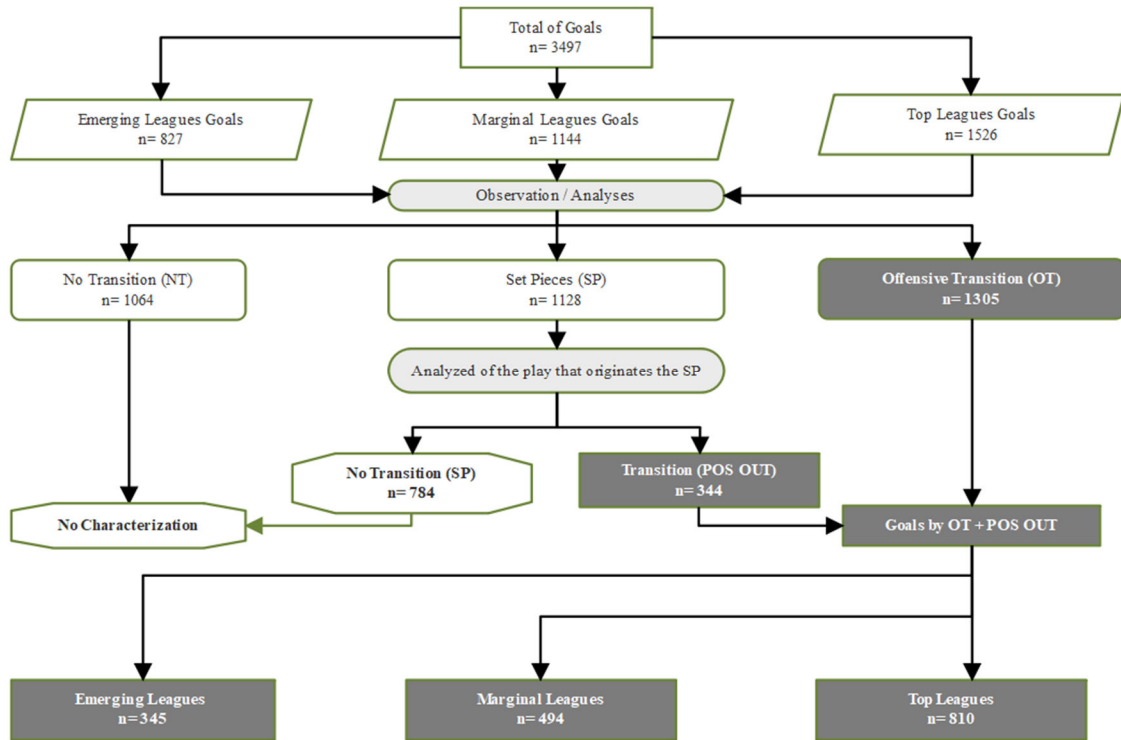
Note: All goals in the nine leagues are analyzed classified accordingly. The goals that result from Direct Offensive transition (OT) as well with those that result from a Positive Outcome (POS OUT) will be characterized and described in detail and will represent the sample. All others do not constitute the sample.

Procedures

The instrument used for the analysis was adapted from the system proposed by Turner and Sayers [11], along with an observation and registration instrument proposed by the authors, which is constituted by systems of categories, that precisely define the target registration criteria. The videos were obtained from two video providers, InStat and WyScout. To maintain methodological rigor and ensure comparability across teams, only games with goals from the first round to the midway point of each championship were included in the analysis. As a result, all teams were subject to an equivalent number of observations, and every team in each championship played with each other. All plays that

resulted in a goal were analyzed from the moment the ball was recovered until the goal was scored. This includes scenarios where a team gains or regains ball control through a tackle, interception, or rebound. In cases of quick restart of the game that led to an offensive transition, the moment of the beginning of the first action, such as a throw-in, goal kick, or free kick, was considered. The goals scored by Offensive Transition (OT) were meticulously described, focusing on the following variables: i) The first action taken after possession is gained: pass or drive; ii) The number of players involved: the number of players that touched the ball; iii) The number of passes made: the number of passes during the transition; iv) The starting zone: the area of ball recovery; v) Distance of the first action: the distance of the first pass/drive; vi) The Match status (home/away): whether the team was playing at home or away; vii) Type of positive outcome: corner kick, free kick, throw-in, penalty kick; viii) Chronology of the goals. The goals classified as Positive Outcome (POS OUT) were considered as Offensive Transition (OT), with the end of the play defined as the moment of the positive outcome. Figure 2 provides a visual representation of the algorithm for the various options considered for these variables.

Table 1: Variables and respective categories analyzed.

Variable	Category
The first action taken after possession is gained	Pass or Drive
The number of players involved	1 to 11
The number of passes made during the transition	0 to +12
The starting zone of the transition	Z1 to Z12 (See fig 2.1)
Distance of the first action	Short Medium Long (See fig 2.2)
The Match status (home/away)	Home or away;
Type of Positive outcome	Corner Kick, Free Kick, Throw-In, Penalty Kick
Chronology of the goals	1st to 10th

Figure 2. Variables decisions options

2.1 Football field – Divided by Zones

2.2 Distance of first action after ball recovery.

Note: 2.1) The starting zone: area of ball's recover.

2.2) Distance of the first action: Short if the first action ends in the same area as started; Medium if the first action finishes in the near zone; Long if the 1st action ends in a zone far from the beginning of the play.

Statistical analysis

The assumptions of normality and heterogeneity were verified with the Kolmogorov-Smirnov and Levene tests, respectively. Following this verification multiple Binomial Logistic Regression analyses investigate the association between the dependent variable Goals by Direct Transition (OT)," and "Indirect Transition (POS OUT)" and the independent variables (see table 1).

In the occasions where associations were identified among these variables, the findings were recorded and subsequently aggregated in the Adjusted model to investigate the persistence and magnitude of these associations. This adjustment aimed to ascertain the robustness of the observed associations and understand the extent to which they maintained significance. The adjusted model allowed for a more nuanced exploration of the relationships between the independent variables and the specified goal transition types. The aim was to identify categories and the predictors that influence the likelihood of scoring goals through Offensive Transitions (OT) and Positive Outcomes (POS OUT) in each group of leagues. All the analysis were performed by Jamovi – Software.

Ethics approval and consent to participate

All the video footage used is publicly available. Thus no informed consent or ethics committee approval was required [21,22]. Also, once the analyzed data was retrospective, the athletes were performing during their competitive season, and images of the games were broadcast on free-to-air TV. Ethics Methods Committee clearance was not required [23]. By informing all participating players, all tracking complies with the general data protection regulation (GDPR) https://gdpr-info.eu/, accessed 07/20/20. Nevertheless, the research received approval from the Ethics Committee of the University of Maia (37/2021) and was conducted in compliance with the guidelines of the Declaration of Helsinki.

Results

Descriptive Analysis

In the 1151 games analyzed (as shown in Table 2), 47% of all goals (1649) were scored through direct offensive transitions resulting in positive outcomes. This pattern is particularly notable in Top leagues, where 53% of goals originate from such transitions, followed by marginal leagues at 43%, and Emerging leagues at 42%. A detailed breakdown of the results for each league is available in Table S1.

Table 2: Distribution of the types of goals per leagues

	Games Observed with Goals	Total Goals	Goals by NT + SP	Goals by OT + POS OUT	% Of goals By OT + POS OUT
Top Leagues	498	1526	716	810	53,08 %
Marginal Leagues	391	1144	650	494	43,18 %
Emerging Leagues	262	827	482	345	41,72 %
Totals	1151	3497	1064	1649	47,15 %

Note: Top Leagues: German, Spain, and Italy Leagues Marginal Leagues: Netherlands, Portugal, and Russia leagues; Emerging Leagues: UAE, Qatar, and Saudi Arabia Leagues.

NT: Goals by No Transition; SP: Goals by Set Pieces; OT: Goals by Offensive Transitions (direct); POS OUT: Goals by Positive Outcomes; NT + SP – Goals where there is no offensive transition reported (direct or Positive outcome). Goals from Non-transitions and Set Pieces. OT + POS OUT – Goals obtained by Offensive transition and Positive Outcome.

As for the percentages and nominal values obtained in the different groups of leagues for each of the observed variables, direct offensive transitions account for 79% of the goals in the Top leagues, 76% in the emerging leagues, and 80% in the marginal leagues (see Table 3).

Table 3. Distribution of the OT+POS OUT goals, relative frequencies from the studied variables across the three groups classified.

Performance indicators	Top Leagues % (n=810)	Marginal Leagues % (n=494)	Emerging Leagues % (n=345)	Performance indicators	Top Leagues % (n=810)	Marginal Leagues % (n=494)	Emerging Leagues % (n=345)
Goals by Transition				Match Status			
OT	79,38 (n= 643)	80,36 (n= 397)	76,81 (n= 265)	Home	52,72 (n= 427)	54,66 (n= 270)	52,75 (n= 182)
POS OUT	20,62 (n=167)	19,64 (n=97)	23,19 (n=80)	Away	47,28 (n= 383)	45,34 (n= 224)	47,25 (n= 163)
Zone of 1st action				1st Action			
Short	41,60 (n= 337)	40,89 (n= 202)	38,84 (n= 134)	Pass	75,92 (n= 615)	68,42 (n= 338)	76,52 (n= 264)
Medium	51,60 (n= 418)	50,40 (n= 249)	52,17 (n= 180)	Drive	24,07 (n= 195)	31,58 (n= 156)	23,48 (n= 81)
Long	6,79 (n= 55)	8,70 (n= 43)	8,99 (n= 31)				
Goal by transition Nr				Nr players involved			
1	32,22 (n= 261)	33,40 (n= 165)	29,57 (n= 102)	1	5,93 (n= 48)	7,69 (n= 38)	4,06 (n= 14)
2	26,67 (n= 216)	26,11 (n= 129)	23,19 (n= 80)	2	16,67 (n= 135)	18,62 (n= 92)	19,71 (n= 68)
3	20,37 (n= 165)	18,42 (n= 91)	21,16 (n= 73)	3	26,06 (n= 211)	30,57 (n= 151)	32,75 (n= 113)
4	11,36 (n= 92)	12,35 (n= 61)	16,23 (n= 56)	4	25,06 (n= 203)	22,67 (n= 112)	25,80 (n= 89)
5	5,31 (n= 43)	6,68 (n= 33)	5,51 (n= 19)	5	15,31 (n= 124)	12,75 (n= 63)	12,17 (n= 42)
6	2,84 (n= 23)	2,63 (n= 13)	2,31 (n= 8)	6	6,91 (n= 56)	4,25 (n= 21)	3,48 (n= 12)
7	0,99 (n= 8)	0,40 (n= 2)	1,74 (n= 6)	7	2,35 (n= 19)	2,23 (n= 11)	1,16 (n= 4)
8	0,12 (n= 2)	0,00 (n= 0)	0,29 (n= 1)	8	0,99 (n= 8)	0,81 (n= 4)	0,87 (n= 3)
Nr of Passes				9	0,62 (n= 5)	0,20 (n= 1)	0,00 (n= 0)
0	6,17 (n= 50)	7,49 (n= 37)	3,77 (n= 13)	10	0,12 (n= 1)	0,20 (n= 1)	0,00 (n= 0)
1	16,67 (n= 135)	17,00 (n= 84)	17,68 (n= 61)	Start Zone			
2	20,49 (n= 166)	24,49 (n= 121)	26,38 (n= 91)	Z1	2,59 (n= 21)	4,86 (n= 24)	3,48 (n= 12)

3	21,35 (n= 173)	21,26 (n= 105)	26,67 (n= 92)	**Z2**	23,09 (n= 187)	23,48 (n= 116)	25,22 (n= 87)
4	17,65 (n= 143)	17,21 (n= 85)	14,78 (n= 51)	**Z3**	3,46 (n= 28)	2,43 (n= 12)	3,19 (n= 11)
5	8,77 (n= 71)	5,47 (n= 27)	6,67 (n= 23)	**Z4**	7,28 (n= 59)	7,09 (n= 35)	8,12 (n= 28)
6	4,20 (n= 34)	2,83 (n= 14)	2,03 (n= 7)	**Z5**	16,30 (n= 132)	16,19 (n= 80)	17,97 (n= 62)
7	2,22 (n= 18)	2,02 (n= 10)	1,16 (n= 4)	**Z6**	7,04 (n= 57)	7,69 (n= 38)	7,25 (n= 25)
8	1,23 (n= 10)	0,81 (n= 4)	0,29 (n= 1)	**Z7**	6,67 (n= 54)	6,07 (n= 30)	5,22 (n= 18)
9	0,25 (n= 2)	0,20 (n= 1)	0,29 (n= 1)	**Z8**	16,30 (n= 132)	16,60 (n= 82)	11,59 (n= 40)
10	0,25 (n= 2)	0,40 (n= 2)	0,29 (n= 1)	**Z9**	5,56 (n= 45)	6,68 (n= 33)	7,24 (n= 25)
11	0,37 (n= 3)	0,20 (n= 1)	0,00 (n= 0)	**Z10**	2,35 (n= 19)	1,62 (n= 8)	2,90 (n= 10)
12	0,12 (n= 1)	0,00 (n= 0)	0,00 (n= 0)	**Z11**	7,78 (n= 63)	6,28 (n= 31)	6,67 (n= 23)
POS OUT				**Z12**	1,60 (n= 13)	1,01 (n= 5)	1,16 (n= 4)
Corner Kick	29,94 (n= 50)	28,87 (n= 28)	31,25 (n= 25)				
Goal Kick	0,00 (n= 0)	0,00 (n= 0)	0,00 (n= 0)				
Throw in	2,99 (n= 5)	5,15 (n= 5)	2,50 (n= 2)				
Free Kick	24,55 (n= 41)	25,77 (n= 25)	27,50 (n= 22)				
Penalty Kick	37,13 (n= 62)	40,20 (n= 39)	38,75 (n= 31)				

Due to the relevance constraints of space, only the results demonstrating relevant associations are presented herein. Thus, the predicted variables found were i) Start Zone in the Top Leagues; ii) Start Zone, Nr of Players involved and Nr of Passes in the Marginal Leagues and iii) 1st Action and Number of Passes in the Emerging Leagues. Those associations are presented in tables 4, 5, and 6 within Top Leagues, Marginal Leagues, and Emerging leagues, respectively. The remaining outcomes are omitted as they did not demonstrate predictive capacity.

As an illustration, within the emerging leagues (table 6), transitions instigated through a passing action exhibit a 1.995-fold higher likelihood of culminating in a Direct Transition (OT) as opposed to an Indirect Transition (POS OUT), in comparison to transitions instigated through a driving maneuver, particularly when evaluating transitions that lead to a goal.

In the top leagues, it was observed that the "Starting Zone" variable can predict the variability of direct Transitions off Indirect Transitions (Table 4). Since the identified association between goals scored through direct and indirect transitions within a single variable, there was no need to perform the adjusted model.

Table 4. Binomial logistic regression of the performance indicators that were associated with Goals by Direct Transition (OT) vs Indirect Transition (POS OUT) – Top Leagues

Goals by Direct Transition (OT) vs Indirect Transition (POS OUT) – Top Leagues		
Binomial logistic regression		
Performance indicators	p	OR (95% CI)
Start Zone		
Z5 vs Z7	0.017	3.116 (1.23-7.90)
Z12 vs Z7	0.025	5.000 (1.23-20.34)
Z2 vs Z11	0.021	3.157 (1.19-8.39)
Z3 vs Z11	0.034	3.867 (1.11-13.52)
Z5 vs Z11	0.003	4.518 (1.68-12.15)
Z6 vs Z11	0.029	3.427 (1.14-10,33)
Z8 vs Z11	0.013	3.560 (1.31-9.66)
Z12 vs Z11	0.007	7.250 (1.71-30.70)

Note: *p*: *p* value; OR: Odd ratios; 95% CI: confidence intervals (95%);

Regarding the Marginal Leagues, several factors were significantly associated with the goals scored by different types of transitions (table 5).

Table 5. Binomial logistic regression of the performance indicators that were associated with Goals by Direct Transition (OT) vs Indirect Transition (POS OUT) – Marginal Leagues

Goals by Direct Transition (OT) vs Indirect Transition (POS OUT) – Marginal Leagues				
	Binomial logistic regression		Adjusted Model	
Performance indicators	p	OR (95% CI)	p	OR (95% CI)
Start Zone				
Z1 vs Z11	-	-	0.028	8,742 (1.27-60.24)
Z2 vs Z11	-	-	0.005	10,237 (2.05-51.21)
Z5 vs Z11	0.027	5,500 (1.21-25.01)	0.004	10,864 (2.18-54.08)
Z6 vs Z11	-	-	0.025	7,226 (1.28-40.91)
Z7 vs Z11	-	-	0.042	6,241 (1.07-36.39)
Z2 vs Z8	-	-	0.019	2,671 (1.17-6.09)
Z5 vs Z8	-	-	0.014	2.831 (1.23-6.63)
Nr Players Involved				
1 vs 4	0.001	4.333 (1.76-10.65)	-	-
3 vs 4	0.011	2.514 (1.24-5.11)	-	-
Nr of Passes				
0 vs 3	0.028	2.750 (1.12-6.78)	-	-
2 vs 3	0.008	2.540 (1.28-5.06)	-	-
7 vs 3	0.038	4.333 (1.09-17.31)	-	-
0 vs 4	0.019	3.173 (1.21-8.33)	-	-
2 vs 4	0.006	2.930 (1.36-6.33)	0.028	4.131 (1.17-14.59)
7 vs 4	0.027	5.000 (1.20-20.83)	0.024	6.787 (1.29-35.60)
0 vs 5	0.027	5.000 (1.20-20.83)	-	-
7 vs 5	-	-	0.048	6.573 (1.01-42.60)

Note: *p*: *p* value; OR: Odd ratios; 95% CI: confidence intervals (95%);

Table 6. Binomial logistic regression of the performance indicators that were associated with Goals by Direct Transition (OT) vs Indirect Transition (POS OUT) – Emerging Leagues

Goals by Direct Transition (OT) vs Indirect Transition (POS OUT) – Emerging Leagues				
	Binomial logistic regression		Adjusted Model	
Performance indicators	p	OR (95% CI)	p	OR (95% CI)
1st action				
Pass vs Drive	0.044	1.995 (1.02-3.91)	-	-
Nr of Passes				
3 vs 2	0.030	2.158 (1.08-4.33)	0.043	2.058 (1.02-4.15)

Note: *p*: *p* value; OR: Odd ratios; 95% CI: confidence intervals (95%);

Discussion

The objective of the present investigation was to examine the separate and synergistic impacts of diverse factors, such as the initial action, number of participating players, number of passes, origin and destination zones, transition length, match venue, and favorable outcome category, that determine the goals scored in the context of direct offensive transitions, as opposed to those achieved through successful indirect transitions. The variables scrutinized in these offensive transitions encompassed the initial action taken after gaining possession, the quantity of participating players, the number of passes executed, the origin and destination zones, the length of the transition, the venue of the match, and the category of favorable outcome.

Forty-seven percent of total goals in all group leagues came from these moments, with the figure rising to over 53% in the top leagues (Table 2). These results show the impact of transitions in most competitive leagues, confirming that transitions are a crucial moment to disrupt the balance between teams in today's football [24].

The study emphasizes the relevancy of including goals resulting from positive outcomes of offensive transitions as part of the overall goals scored from offensive transitions. These goals constitute a substantial percentage across different leagues (21% in Top Leagues, 20% in Marginal Leagues, and 23% in Emerging leagues), underscoring their importance, especially since over 20% of transition goals are currently not recognized as originating from offensive transitions. The impact of the goals that have not been considered goals from offensive transitions on goal-scoring surpasses conventional literature perceptions, which usually mention that goals from transitions are responsible for 18% to 20% of the total goals [9,14,15].

All group leagues exhibit a pattern where successful offensive transitions (OT+POS OUT) predominantly stem from central zones of the field (Z2, Z5, and Z8) (Table 3). This suggests that turnovers in central areas compromise defensive recovery, making the team more susceptible to conceding goals [25].

In the top leagues an association was found between the starting zone of the offensive transition and the type of successful transition. Thus, the probability of scoring a goal through a direct offensive transition is substantially lower when starting in zone Z11 than in zones Z2, Z3, Z5, Z6, Z8, and Z12. These findings differ from the conclusions drawn by Garganta and collaborators [26] and Larson [27], who suggested that recovering the ball closer to the opponent's goal increased the likelihood of scoring. Additionally, it should be noted that direct offensive transitions initiated in zones Z5 and Z12 predict greater success than those initiated in zone Z7. This implies that successful transitions require, offensive space to exploit [28], whether through off-the-ball runs that displace and create doubts in the team transitioning defensively, or through passes and even ball penetration. Defensive decision-making is hindered by the speed of events and the

necessity to make decisions at the moment, often at a numerical disadvantage compared to the attacking side [11,28,29].

The data presented in this study highlight the increasing effectiveness of defensive pressure applied in the lateral areas of the final third of the field, particularly in zone 12. This suggests that defensive teams often target the offensive build-up play, which has recently gained popularity. Like the side zones in the final third, zone 8 represents an opportunity for action as it is less occupied by teams attempting to create their organized attacks. Therefore, despite being a crucial game region, it is often less crowded as players try to spread out and cover a larger portion of the field. This dispersion and reduced mutual support among players create favorable conditions for the defensive team to exploit opportunities and initiate offensive transitions with higher chances of success, taking advantage of the defensive disorganization of the team that lost possession. Furthermore, it is noteworthy that only 7% of successful transitions involve long actions in their first movement. This indicates modern football transitions involve more players and rely on intricate combinations between teammates. This trend reflects the emphasis on teamwork, coordination, associations, and the utilization of various players to facilitate successful transitions [18].

In marginal leagues, the associations observed pertain to the area where offensive transitions (OT+POS OUT) occur, the number of players involved, and the number of passes executed to achieve success. The probability of scoring a goal through a direct offensive transition is higher when initiated in the defensive midfield (zones Z1, Z2, Z5, and Z6) than Z11 (central zone of the last offensive third). The results suggest that there is an important relationship between the distance of the transition start and the number of passes required for its execution [11]. Also, in line with the top leagues the number of successful offensive transitions initiated in the most forward zone, occurs less frequently

which is in opposition to the results obtained by Garganta and collaborators [26] and Larson [27]. Additionally, the possession recovered in this zone provides less space for a deeper and more expansive style of play since the goalkeeper can neutralize these plays. Furthermore, the fact that successful transitions predominantly start in the defensive midfield of the defending team reveals a lack of tactical maturity in defensive coverage, and lesser control of ball possession. This raises questions about the significance and the benefit of maintaining ball possession for extended periods. The debate on whether to maintain possession of the ball for extended periods has grown in the literature, with no consensus currently established. Additionally, the data derived from the adjusted Binomial Logistic Regression model for Z2 and Z5 (located in the defensive midfield) compared to Z8 (offensive midfield) indicate a greater likelihood of successful offensive transitions when initiated in the defensive midfield. Despite the common assumption that offensive transitions are extremely fast and exhaustive [26], these findings demonstrate that teams in these leagues can achieve high effectiveness even when engaging in a high number of passes and player interactions. This suggests that successful transitions initiated far from the goal do not necessarily require an extremely vertical and fast-paced approach. Rather, transitions commencing in the defensive midfield allow for increased interactions among players within the same team. This results align with the studies that show "no significant relationship between transition and speed" [11].

Furthermore, the central zones of the field are particularly relevant for initiating of successful offensive transitions (OT+POS OUT). For example, Z2 (the defensive zone closest to the team's own goal) accounts for 24% of successful transitions out of the total 62% initiated in the defensive midfield (as presented in table 3). Notably, transitions starting at Z8 (at the beginning of the offensive midfield) represent 17% of the successful transitions. These findings align with the results obtained from the adjusted Binomial

Logistic Regression model, which indicates that direct offensive transitions are four times more likely to succeed when two passes are executed rather than four passes. Since each offensive transition corresponds to a defensive transition by the opposing team, the reduced number of passes required suggests deficiencies in the opponent's defensive positioning and a lack of concentration around the ball carrier/loser at the onset of the transition, thus not necessitating the creation of imbalance through excessive passing. Considering the data presented in table 3, where 40% of transitions see their first action completed within the same area of possession recovery, it can be inferred that offensive transitions occur with players near each other, with decision-making being a crucial factor for success [30]. The long passes are used as the first action only in 9% of the total successful offensive transition which indicates more neutral and secure passes other than the disrupted long balls.

In Emerging Leagues, successful transitions most commonly started from the central zones of the field (Z2, Z5, and Z8) (table 3). The adapted model derived from the Binomial Logistic Regression analysis indicates that the defensive midfield had the highest frequency of transition initiations (Z2 and Z5), which explains the obtained results. This indicates that teams tactically displace themselves when possessing the ball in the offensive midfield, inadvertently taking risks without considering the preventive defensive tactical positioning for coverage [13]. This demonstrates a positional lack of control and tactical immaturity. The fact that successful offensive transitions begin in Zone 2 (Z2), closer to their own goal, suggests that the team in possession of the ball takes unnecessary risks regarding their tactical position, thereby allowing more space for the opposing offensive transition.

Moreover, the model suggests that in direct offensive transitions, the probability of using three passes was twice as high as using only two. This finding can be attributed to the

distance to the goal and the reduced density of opposing defensive players (in the defense position) during possession loss.

It is worth noting that 52% of the goals resulting from offensive transitions (OT+POS OUT) in these leagues, have in their first action the change of zone from where the transition starts (to the zones next to), indicating that these actions are disruptive of the defensive organizations. Results showed that the primary action used to initiate offensive transitions was 'pass', which had twice the success rate in direct offensive transitions compared to offensive transitions from a positive outcome. However, the relevance of this action decreased in the adjusted model when the number of passes in a successful offensive transition was considered. This indicates that the success of the offensive transition in these leagues is independent of the action that initiates it. Acquiring insights into how teams execute transitions will contribute to the development of a unique and distinctive collective profile akin to a fingerprint [17], enabling the anticipation of gameplay actions.

This study presents limitations. Football is a dynamic sport with many variables that impact game outcomes. Another constraint arises from the subjectivity inherent in notational analysis, as it is challenging to conduct within the confines of the game space and relies solely on the images captured by television broadcasts. By focusing on a single season and specific leagues, the study's findings may not apply to broader contexts or different seasons. The categorization of leagues into three groups based on UEFA rankings and financial indicators might not fully capture the diversity of football leagues worldwide. Additionally, while the study examines various variables related to offensive transitions, such as the first action after possession, the number of players involved, and starting zones, other factors (like player characteristics and team strategies) could also influence goal-scoring patterns. Furthermore, this study's findings may not apply to all

football contexts, especially at the amateur level, where player tactics and skills differ from those in professional leagues. Therefore, future studies should address these limitations by considering sample size and scope, league selection, variable inclusion, and results' external validity and generalizability.

Conclusion

The study's findings emphasize the importance of including goals from positive outcomes of offensive transitions into tactical analysis. These goals constitute a significant portion of the total goals scored in offensive transitions across all league groups. Almost half of all goals in all league groups, and over half in top leagues, originate from offensive transitions (OT+POS OUT), highlighting their impact on the competitive balance among teams. In Top Leagues, successful offensive transitions predominantly began in central zones of the field, with varying probabilities of scoring goals depending on the initiation zones. Conversely, in Marginal Leagues, commencing offensive transitions from defensive midfield zones increases the likelihood of scoring goals compared to starting in the central zone of the offensive third. Transitions from defensive midfield zones facilitate increased player interactions within the same team. In Emerging Leagues, successful transitions often start in central zones of the field, particularly from the defensive midfield. The number of passes involved in direct offensive transitions significantly influences their success rate. Additionally, transitions that alter zones from their starting points disrupt defensive organizations. These findings underscored the effectiveness of defensive pressure in lateral areas of the final third of the field. They emphasized the prevalence of intricate player combinations and teamwork in modern football transitions. Such insights into the dynamics and strategies of successful offensive transitions across different league groups contribute to a deeper understanding of football tactics and strategies to enhance team performance within these leagues.

Practical Application

Teams should prioritize the analysis of goals obtained from positive results of offensive transitions along with the total goals scored in offensive transitions, as they represent an important part of the total goals in different leagues. Likewise, understanding zone preferences to initiate successful offensive transitions is crucial. In elite leagues, central areas of the field are more effective, while in less competitive leagues, starting from the defensive midfield areas leads to higher success rates. The number of passes and player interactions also significantly influence the success of offensive transitions. Teams should focus on combining players and teamwork to facilitate successful transitions, especially in emerging leagues where these interactions are crucial. Defensive pressure in lateral areas of the final third of the field can effectively disrupt offensive transitions, emphasizing the need for coaches to target these areas with defensive strategies to disrupt opponents' offensive play. It is essential to adapt the tactical approach depending on the characteristics of the league. For example, focusing on the defensive midfield areas for offensive transitions in less competitive leagues can lead to higher success rates. Successful offensive transitions only sometimes require much passing. Teams can exploit defensive vulnerabilities by initiating quick transitions with fewer passes, especially when opponents show deficiencies in defensive positioning. Understanding opponent tactics and weaknesses in defensive organization can inform offensive transition strategies, allowing teams to exploit defensive zones and vulnerabilities to increase the probability of scoring goals. Strategic use of zone changes during offensive transitions can disrupt defensive organizations, allowing teams to strategically use zone changes to create imbalances and exploit defensive weaknesses. Thus, it is crucial to evaluate

possession strategies based on offensive transition dynamics and consider alternative approaches based on league characteristics.

Declarations

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

All data generated or analyzed during this study are included in this published article and its supplementary information files.

The data are not publicly available due to privacy.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Conceptualization, P.E and R.M.

Methodology, P.E and R.M.

Software, P.E and R.M.

Validation, P.E, P.P.-G and R.M.

 Formal Analysis, P.E, P.P.-G and R.M.

Investigation, P.E, P.P.-G and R.M.

Resources, P.E and R.M.

Data Curation, P.E.

Writing – Original Draft Preparation, P.E and R.M.

Writing – Review & Editing, P.E, P.P.-G and R.M.

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