Tactical Indicators and Situational Variables Affecting Goal-Scoring Opportunities in UEFA Youth League 2023–24

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Article

Tactical Indicators and Situational Variables Affecting Goal-Scoring Opportunities in UEFA Youth League 2023–24

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Abstract: This study addresses a critical knowledge gap by providing an in-depth analysis of the characteristics of goal-scoring opportunities in the UEFA Youth League, offering valuable insights into the attacking performance of elite youth teams. The primary objective of this study was to analyze the attacking characteristics of elite youth teams competing in the UEFA Youth League. Observational analysis was conducted on 18 knock-out matches from the 2023/24 season, examining tactical and situational variables. Open play (56.7%) significantly outperformed set play (43.3%) in generating final attempts. Organized attacks proved to be more effective than counter-attacks in creating scoring opportunities. While winning teams were more likely to employ counter-attacking strategies, final attempts were more frequent when the team initiated the attack without immediate pressure and when a penetrative action was involved. Notably, an initial penetrative action also increased the likelihood of observing counter-attacks. These findings have important implications for coaching practices and youth development programs, emphasizing the need to develop players with strong technical skills, tactical awareness, and the ability to execute patient build-up play under pressure. This study contributes to a deeper understanding of attacking play in elite youth football and provides valuable insights for coaches and youth development programs.

Keywords: performance analysis; soccer; football; final attempts; contextual factors

Introduction

Performance analysis in football has become an indispensable tool for evaluating and improving team and player performance, offering insights into tactical patterns, game outcomes, and player development [1,2]. Central to this domain is the analysis of critical moments such as goal-scoring attempts, which often define match success [3,4]. In particular, the study of goal-scoring attempts provides valuable insights into not only the effectiveness of offensive strategies [5,6] but also the effectiveness of defensive strategies in preventing them. While research at the senior level is extensive, research at the youth level, specifically within the context of the UEFA Youth League, remains relatively limited.

Previous research on adult soccer has highlighted that the creation of goal-scoring opportunities in football is influenced by a range of situational factors [7]. Match location, for instance, plays a significant role, with home matches associated with higher offensive penetration and more structured tactical patterns than away games, which often exhibit less complexity and diversity in attacking actions [5,8]. Furthermore, the relationship between match status and attacking patterns further highlights the tactical adaptability required in elite soccer. Many studies demonstrated that ball possession increases when teams are losing compared to when they are winning or drawing, indicating a shift in tactical priorities based on match status [9,10]. Teams trailing in a match tend to adopt longer passing sequences and more direct approaches to maximize scoring opportunities,

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whereas teams in the lead favor shorter, controlled sequences to maintain possession and control the game's tempo [11,12].

The interplay between the attack duration and goal-scoring opportunities has also been explored. Sarmento, *et al.* [13] found that an increase in the duration of an offensive sequence or the number of passes decreases the probability of success, aligning with the findings of Gonzalez-Rodenas, *et al.* [14] that shorter sequences are more efficient in creating goal-scoring opportunities. Moreover, initial penetration actions, such as forward passes or dribbles immediately after possession recovery, have been shown to significantly enhance the likelihood of a successful offensive sequence [15,16]. Indeed, studies by Kim, *et al.* [17] and González-Rodenas, *et al.* [5] emphasize that fast attacks and counter-attacks are more successful than elaborate build-ups in exploiting defensive vulnerabilities. Counter-attacks have been consistently identified as the most effective strategy for generating goal-scoring opportunities, with studies reporting their superior efficiency compared to positional or set-play attacks [13,18,19]. These rapid transitions often involve penetrative actions immediately after possession recovery, particularly in pre-offensive or offensive zones, enabling teams to exploit defensive disorganization [13,15]. In contrast, organized attacks, which are more common, are typically initiated in less advanced zones and rely on non-penetrative actions and longer sequences, which reduce their overall effectiveness [20].

While extensive research has been conducted on performance analysis at the senior level, studies focusing on youth competition remain relatively limited. For example, [21] investigated the interplay of gender, age, and match status on goal-scoring attempts across U17, U20, and senior FIFA World Cup tournaments, finding that senior and U20 teams demonstrated a greater propensity for counter-attacks and higher passing tempos compared to U17 teams. Smith, *et al.* [22], utilizing a case study design, compared goal-scoring methods across first-team, U18, and U16 levels in England. Their findings revealed distinct attacking styles for each age group, with the first team exhibiting a more elaborate approach, the U18 team favoring a direct style, and the U16 team demonstrating a greater emphasis on individual actions. Dayus, *et al.* [23] further investigated playing styles across 10 U16 teams, 16 U18 teams, and 16 First teams in England, finding that with increasing experience, teams exhibited a greater reliance on wing play, incorporating more forward-diagonal movements and crosses. However, this shift towards wing play was associated with a decrease in shooting opportunities, potentially attributed to the development of more robust defensive strategies in older age groups. While valuable, these studies primarily focus on youth competition outside the UEFA Youth League, highlighting a gap in the current literature.

Furthermore, performance analysis research has predominantly employed a static perspective, which, while useful for capturing summary statistics, fails to account for the dynamic and sequential nature of match events [24,25]. By neglecting the evolving match context, the static approach overlooks critical insights into how match status and game scenarios interact with shape performance [26,27].

This study aims to fill these gaps by adopting a dynamic perspective to analyze final attempts during the 2023-24 UEFA Youth League knockout phase. Specifically, it explores how key variables such as match status, match location, time period, attack duration, and type of play interact with tactical indicators to influence final attempts. The findings will provide a deeper understanding of offensive strategies in elite youth soccer, addressing the following research questions: (1) How do match status, match location, attack duration, and time period affect the type of attack and final attempts? (2) How do the variables of the initial sector, initial penetration, and initial pressure influence the final attempts at open play? Based on existing evidence, it is hypothesized that all of the aforementioned variables and types of play significantly influence the dynamics of final attempts in youth soccer.

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Methodology

2.1. Sample

The UEFA Youth League is an annual club soccer competition organized by the Union of European Football Associations (UEFA) since 2013. This brings together the under-19 teams of clubs competing in the UEFA Champions League league phase and the domestic youth champions of the best-ranked national associations. The knockout phase of the 2023-24 UEFA Youth League, which began on February 6, 2024, involved 24 teams, including the group winners and runners-up from the Champions League path and the eight winners of the Domestic Champions Path. The knockout phase featured single-leg ties, starting with the play-off round and progressing through the round of 16, quarterfinals, semifinals, and the final. This study focuses solely on the knockout phase of the tournament, specifically examining 18 of the 23 matches played during this stage.

2.2. Procedures

Video footage of the 18 matches played during the 2023-24 UEFA Youth League knockout phase was obtained from the Wyscout platform (Hudl, Nebraska, USA). All 319 final goal-scoring attempts observed within these matches were coded using the Hudl Sportscode software (Hudl, Nebraska, USA). A dedicated coding window was designed within the Sportscode interface to capture game-related indicators pertinent to the research question. Data from each match encompassing all coded variables in chronological order were exported and transferred to Microsoft Excel for subsequent analysis. To mitigate potential coding errors arising from fatigue, coding sessions were strictly limited to a maximum duration of 2 hours, followed by a mandatory 30-minute break between sessions, adhering to recommendations from previous research [28].

2.3. Observational instrument

Taking into account previous studies [21,29,30], the following indicators were recorded for each match (Table 1): 1) Match status; 2) Match location; 3) Time period; 4) Attack duration; 5) Type of play; 6) Type of open play; 7) Initial sector; 8) Initial pressure; and 9) Initial penetration.

Table 1. Dimensions and operational definitions of the selected performance indicators.

#	Indicators	Dimensions and definitions
1	**Match status**	**Win**: At the time of the attempt the sampled team was winning the match. **Draw**: At the time of the attempt the sampled team was drawing the match. **Loss**: At the time of the attempt the sampled team was losing the match. **Match status total:** the category "Draw" was retained, while the other two categories ("Win" and "Loss") were merged into a single category, "Win/Loss," encompassing all instances where the match score was not tied at the time the final attempt was made.
2	**Match location**	**Home**: The sampled team was playing at their home ground. **Away**: The sampled team was playing at an opponent's home ground.
3	**Time period**	**1-15**: The final attempt was made between the 1st and 15th minute of the match. **16-30**: The final attempt was made between the 16th and 30th minute of the match. **31-45**: The final attempt was made between the 31th and 45th minute of the match. **46-60**: The final attempt was made between the 46th and 60th minute of the match. **61-75**: The final attempt was made between the 61th and 75th minute of the match. **76-90**: The final attempt was made between the 76th and 90th minute of the match.
4	**Attack duration**	Duration of the offensive sequence (in seconds) from the moment the ball was gained by the sampled team to the moment the scoring opportunity took place.

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5	**Type of play**	**Open play**: Open play refers to all instances where the ball was in play and the possession developed organically through player actions such as passing, dribbling, or winning tackles. Open play encompassed any possession that did not originate from a free kick, corner kick, penalty kick, offside, kick-off, or throw-in. Additionally, it included possessions that, while originating from one of these set plays, occurred more than 10 seconds after the set play was executed. **Set play**: A set play refers to a possession that originated from a free kick (direct or indirect), corner kick, penalty kick, offside, kick-off, or throw-in. This definition includes possessions that occurred within 10 seconds of the set play being executed. Essentially, it encompasses any situation where the attacking phase directly stems from a pre-defined restart of play.
6	**Type of open play**	**Organized attack:** 1) The possession started by winning the ball in play or restarting the game, 2) the progression towards the opponent´s goal had high percentage of non-penetrative and short passes and long duration (evaluated qualitatively) or long passes, as well as 3) this kind of possession allowed the opponent to have more opportunity to minimize surprise, reorganize his system and be prepared defensively. **Counter-attack:** 1) The possession starts by winning the ball in play, 2) the first or second player in action tries to penetrate using penetrative passes or dribbles, 3) the progression towards the opponent´s goal has high percentage of penetrative passes and short duration (evaluated qualitatively) as well as 3) this kind of possession tries not to allow the opponent to have opportunity to minimize surprise, reorganize his system and be prepared defensively.
7	**Initial sector**	**Defensive**: The team possession starts in the defensive sector of sampled team. **Pre-defensive**: The team possession starts in the pre-defensive sector of sampled team. **Pre-offensive**: The team possession starts in the pre-offensive sector of sampled team. **Offensive**: The team possession starts in the offensive sector of sampled team.
8	**Initial pressure**	**Pressure**: One or several opponent players pressure the attackers within the first 3 seconds of the possession (the defender(s) are always located within 1.5 meters of the first attackers. **No pressure**: None of the players pressures the attackers during the first 3 seconds of the possession.
9	**Initial penetration**	**Penetrative**: Passes or dribbles towards the opponent´s goal past opponent player (s) performed during the first three seconds of the ball possession. **Non-penetrative**: Any technical action towards any direction that does not past opponent player (s) performed during the first three seconds of the ball possession

2.4. Reliability

This study incorporated a reliability assessment procedure to establish the reliability of collected data. Two experienced observers independently coded a randomly selected subset comprising 10% of the total final goal-scoring attempts (n = 32). Observer 1 possessed a UEFA Pro coaching qualification, whereas Observer 2 held a UEFA A qualification and had over a decade of experience in performance analysis. The intra-observer reliability was evaluated by the same observer after a six-week interval. The level of agreement between observers was assessed using Kappa statistics, yielding a mean Kappa of 0.94 for intra-observer reliability and 0.91 for inter-observer reliability [31]. These results, presented in Table 2, indicate a high degree of consistency in data collection across observers, thereby enhancing confidence in the validity and generalizability of the study findings.

Table 2. Intra-observer and inter-observer reliability values.

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Indicators	Intra-rater Observer 1 - Observer 1	Inter-rater Observer 1 - Observer 2
Match status	1.00	1.00
Match location	1.00	1.00
Time period	1.00	1.00
Attack duration	0.87	0.81
Type of play	0.93	0.88
Type of open play	0.91	0.88
Initial sector	0.93	0.87
Initial pressure	0.96	0.90
Initial penetration	0.89	0.84
K_{total}	0.94	0.91

2.5. Data analysis

The following statistical analyses were performed:

a) Chi-square tests to identify differences for Open play final attempts between categories in the variables Match status total, Match Location, Time period, Initial sector, Initial pressure, Initial penetration and Type of open play.

b) Chi-square tests to identify differences for Set play final attempts between categories in the variables Match location, Time period and Match status total .

c) Mann-Whitney U test to identify differences in the variable Attack duration between final attempts made during Open play and those made from Set plays.

d) Binary regression analysis for Open play final attempts to examine the effect of the variables Match status, Match location, Time period, Initial sector, Initial pressure, and Initial penetration on the variable Type of open play.

e) Generalized linear model (GLM) for open play final attempts to examine the effects of the variables Match status, Match location, Time period, Initial sector, Initial pressure, and Initial penetration on the variable Attack duration.

f) Kolmogorov–Smirnov test to assess the normality of data where necessary.

All statistical analyses were performed using the IBM SPSS Statistics software (version 29, IBM SPSS Inc., Chicago, IL, USA). The level of significance was set at $p = 0.05$.

3. Results

3.1. Descriptive statistics

Table 3 presents the descriptive statistics of final attempts during the 2023-24 UEFA Youth League season, categorized by various factors, for both open play (N=181) and set play situations (N=138). The data revealed that the majority of final attempts originated from open play (57.7%) compared to set play (43.3%), with significant variations observed across these factors. The table further categorizes open play attempts based on key tactical factors. The majority of these attacking sequences involved organized attacks initiated from the pre-defensive sector, suggesting a preference for structured build-up play from deeper positions. Furthermore, a significant proportion of these attempts were characterized by initial penetrative actions occurring while facing limited opponent pressure. Notably, the analysis also included the Attack duration, with open play attempts exhibiting a longer mean duration (20.38 ± 14.62 seconds) compared to set play attempts (11.72 ± 11.37 seconds).

Table 3. Frequency of Final Attempts in the 2023-24 UEFA Youth League.

Indicators	Dimensions	Open plays N=181	Set plays N=138

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Match status	Win	55	32
	Draw	74	55
	Loss	52	51
Match location	Home	98	73
	Away	83	65
Time period	1-15	29	16
	16-30	25	17
	31-45+	24	23
	46-60	31	23
	61-75	30	24
	76-90+	42	35
Initial sector	Defensive	53	
	Pre-defensive	58	
	Pre-offensive	51	
	Offensive	19	
Initial pressure	Pressure	40	
	No pressure	141	
Initial penetration	Penetrative	107	
	Non-penetrative	74	
Type of open play	Organized attack	109	
	Counter-attack	72	

3.2. Chi-square goodness-of-fit tests

From Table 4, it is evident that for set plays, a statistically significant difference was observed only in terms of Match status. Specifically, final attempts from set plays were less frequent when the match score was tied ($p = 0.017$) compared to situations in which one of the two teams was leading. In contrast, no statistically significant differences were found in terms of Time period ($p = 0.075$) or Match location ($p = 0.496$).

Table 4 indicates that for open-play final attempts, no statistically significant differences were observed in terms of Time period ($p = 0.232$) or Match location ($p = 0.265$). However, significant differences were found in several other variables. First, the final attempts were more frequent when the score was not tied ($p = 0.014$). Second, attempts were more common when there was no Initial pressure from the opponent ($p < 0.001$). Third, attempts were more frequent when there was Initial penetration ($p = 0.014$). Furthermore, organized attacks were associated with a higher frequency of final attempts than counter-attacks ($p = 0.006$).

Table 4. Results of Chi-square goodness-of-fit tests.

Indicators	Open plays			Set plays		
	Chi-Square	df	p	Chi-Square	df	p
Match status total	6.017	1	0.014	5.681	1	0.017
Match location	1.243	1	0.265	0.464	1	0.496
Time period	6.856	5	0.232	10	5	0.075
Type of open play	7.564	1	0.006			
Initial sector	20.878	3	<0.001			
Initial pressure	56.359	1	<0.001			
Initial penetration	6.017	1	0.014			

Moreover, statistically significant differences were found in the Initial sector of the attack ($p < 0.001$). For this indicator, since there were more than two categories, post-hoc tests were conducted to examine which categories showed differences. Owing to multiple (six) comparisons, the adjusted

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significance level was set at 0.05/6 = 0.0083. Table 5 presents the results of the post-hoc tests, which show that final attempts starting from the Offensive sector are fewer than those starting from the Defensive ($p < 0.001$), Pre-Defensive ($p < 0.001$), and Pre-Offensive sectors ($p < 0.001$).

Table 5. Post-hoc tests for the indicator Initial sector.

Pair	Chi-Square	df	p
Defensive vs Pre-defensive	0.225	1	0.635
Defensive vs Pre-offensive	0.038	1	0.845
Defensive vs Offensive	16.056	1	<0.001
Pre-defensive vs Pre-offensive	0.45	1	0.503
Pre-defensive vs Offensive	19.753	1	<0.001
Pre-offensive vs Offensive	14.629	1	<0.001

3.3. Mann-Whitney U test

As the assumption of normality was violated for Attack duration data in both open play and set play groups, a non-parametric Mann-Whitney U test was chosen for the analysis. The findings presented in Table 6 indicate a statistically significant difference ($p < 0.001$), confirming that final attempts arising from open play had significantly longer Attack durations than those stemming from set plays.

Table 6. Mann-Whitney U test for Attack duration.

	Type of play	Cases	Mean Rank	Median	Mann-Whitney U	Z	p
Attack duration	Open play	180	189.4	15.66	7217.5	-6.479	<0.001
	Set play	139	121.92	7.00			

3.4. Binary regression analysis

The procedure, focusing on the final attempts created during open play, modeled organized attack as the response and treated counter-attack as the reference category. The Omnibus test is statistically significant (Likelihood Ratio Chi-Square = 95.073, df = 13, $p < 0.001$), indicating that the model with the selected predictors is statistically superior to the null model. The Hosmer-Lemeshow test was not statistically significant (Chi-square = 7.255, df = 8, $p = 0.509$), indicating that the model fits the data well, with no significant discrepancies. Additional metrics included Akaike's Information Criterion (AIC) = 152.192, Cox & Snell R Square = 0.409, and Nagelkerke R Square = 0.553.

Table 6 reveals several key findings. First, teams that are winning tend to make more final attempts through counter-attacks compared to organized attacks when compared to teams that are losing ($p = 0.049$, OR=1/0.318=3.145). Second, the Defensive, Pre-defensive, and Pre-offensive sectors demonstrated a greater propensity for organized attacks than the Offensive sector ($p = 0.002$, OR=22.068; $p = 0.002$, OR=19.977; and $p = 0.007$, OR=14.613 respectively). Third, the presence of Initial pressure (compared to the absence of Initial pressure) favors the creation of counter-attacks over organized attacks (p=0.025, OR=1/0.304=3.289). Finally, when a Penetrative action occurred within the first three seconds of the possession, there was an increased likelihood of observing counter-attacks compared to situations where a Non-penetrative action took place ($p < 0.001$, OR=1/0.031=32.258).

Table 6. Parameter estimates of binary regression analysis.

Indicators	Dimensions	B	p	OR (Exp (B))
Match	Win	-1.144	0.049	0.318

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status	Draw	0.128	0.835	1.136
	Loss	0		1
Match location	Home	-0.244	0.576	0.784
	Away	0		1
Time period	1-15	-0.397	0.604	0.672
	16-30	-0.434	0.528	0.648
	31-45+	0.196	0.802	1.216
	46-60	-0.11	0.872	0.896
	61-75	-0.462	0.508	0.63
	76-90+	0		1
Initial sector	Defensive	3.094	0.002	22.068
	Pre-defensive	2.995	0.002	19.977
	Pre-offensive	2.682	0.007	14.613
	Offensive	0		1
Initial pressure	Pressure	-1.19	0.025	0.304
	No pressure	0		1
Initial penetration	Penetrative	-3.488	<0.001	0.031
	Non-penetrative	0		1

3.5. Generalized linear model

In the model in which the dependent variable was Attack duration in open play, a Gamma Probability Distribution with a Log Link Function was selected due to the nature of the dependent variable (Time measured in seconds). The Omnibus test was statistically significant (Likelihood Ratio Chi-Square = 115.954, df = 13, $p < 0.001$), and the Akaike's Information Criterion (AIC) was 1316.187.

Table 7 reveals that the Initial sector significantly explains the variations in the model ($p < 0.001$ in all cases). As indicated by OR values (2.586, 2.2, and 1.982 respectively), attacks initiated further away from the Offensive sector tended to have longer durations. Furthermore, the presence of pressure on the attackers during the first three seconds of possession significantly reduced the attack duration ($p = 0.008$, OR=0.775). Finally, performing a penetrative action during the initial three seconds of possession also resulted in significantly shorter attack durations ($p < 0.001$, OR=0.541). Therefore, if there is pressure (OR = 0.775), the average duration is reduced by (1-0.075)*100%=22.5%, while if there is penetrative action (OR = 0.541), the average duration is reduced by (1-0.541)*100%=45.9%.

Table 7. Parameter estimates of generalized linear model.

Indicators	Dimensions	B	p	OR (Exp (B))
Match status	Win	-0.182	0.085	0.834
	Draw	-0.029	0.79	0.972
	Loss	0		1
Match location	Home	0.142	0.088	1.152
	Away	0		1
Time period	1-15	-0.082	0.551	0.921
	16-30	0.055	0.678	1.056
	31-45+	0.055	0.689	1.056
	46-60	0.162	0.192	1.175
	61-75	-0.154	0.216	0.857
	76-90+	0		1
Initial sector	Defensive	0.95	<0.001	2.586
	Pre-defensive	0.788	<0.001	2.2
	Pre-offensive	0.684	<0.001	1.982
	Offensive	0		1

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Initial pressure	Pressure	-0.255	0.008	0.775
	No pressure	0		1
Initial penetration	Penetrative	-0.615	<0.001	0.541
	Non-penetrative	0		1

4. Discussion

This study aimed to investigate how key variables such as match status, match location, time period, attack duration, and type of play interact with tactical indicators to influence final attempts during the 2023-24 UEFA Youth League knockout phase. Our findings shed light on the key factors influencing goal-scoring attempts and offer insights that both corroborate and extend existing research in the field. This knowledge can be used to inform training methodologies, tactical decision making, and player development strategies at the elite youth level.

4.1. Situational Variables

Previous research on adult soccer has demonstrated that various situational factors, including match location, match status, and team ranking, significantly influence the creation of goal-scoring opportunities [7,9]. In line with these findings, our analysis revealed the significant effects of match status on final attempts. Specifically, the chi-square test revealed that final attempts were more frequent when the match was not tied compared to situations where the match was tied, for both open play and set play situations. Furthermore, binary regression analysis demonstrated that winning teams were more likely to employ counter-attacks than organized attacks when compared to teams that were losing.

This finding aligns with previous research on FIFA senior and youth tournaments by González-Rodenas, *et al.* [21]. Their findings revealed that losing and drawing teams exhibited lower odds of progressing through counter-attacks than organized attacks. In this line, Gonzalez-Rodenas, *et al.* [32] observed that winning teams in Spanish and English top division had higher odds of implementing counter-attacks rather than organized attacks. Previous studies on senior tournaments have observed that losing teams often exhibit higher levels of ball possession than winning teams [9,10]. This phenomenon can be attributed to the fact that losing teams may actively seek to regain control of the match by dominating possession and creating scoring opportunities. In contrast, winning teams may prioritize defending their lead by reinforcing their defensive structure, which can inadvertently create opportunities for counter-attacks. Teams need to be able to adjust their attacking strategies based on the scoreline and opponent's behavior. Winning teams may benefit from emphasizing counter-attacking strategies to maintain control and exploit spaces [15], whereas losing teams may need to prioritize patient build-up play to regain control and create scoring opportunities.

While the statistical analyses did not reveal significant differences in the final attempt frequencies between home and away matches or across different time periods in the UEFA Youth League, some interesting trends emerged. Regarding match location, a higher number of both open play and set play final attempts were observed when the team was playing at home. This finding aligns with previous research on senior soccer, which has consistently demonstrated a home field advantage, suggesting that home teams tend to create more scoring opportunities overall [33,34] and score more goals [35]. The home field advantage likely stems from several factors, including familiarity with the playing surface, reduced travel fatigue, and psychological and tactical benefits associated with playing in front of their own supporters [36].

Regarding the distribution of final attempts across different time periods, the analysis revealed a relatively consistent rate of goal-scoring opportunities throughout the match, with no significant peaks or troughs. However, a slight increase in both open play and set play final attempts was observed in the last period (76-90+ min). Almeida, *et al.* [35] analyzed how situational variables affect the goal-scoring period in the regular phases of Portuguese U17, U19, and U23 national

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championships. The results revealed that there were more goals in the last match period (76-90+ min), whereas the opposite was observed in the opening period (1-15 min). This trend could be attributed to various factors, including increased urgency and potential fatigue in opposing players as the match progresses, as well as tactical adjustments made by coaches in the final stages of the game [37].

4.2. Pre-Attack Conditions

In relation to the initial sector of team possession, the binary regression analysis demonstrated a greater propensity for organized attacks when initiated from deeper positions compared to those starting from the offensive sector. The GLM revealed that attacks initiated further away from the offensive sector tended to have longer durations, which is expected given the greater distance covered. These findings suggest that teams in the UEFA Youth League tend to create more scoring opportunities when building attacks from deeper positions, potentially allowing for more controlled possession, greater player movement, and increased opportunities to penetrate the opposition's defense.

Smith, *et al.* [22], employing a case study design, compared the attacking methods of U16s, U18s, and First team squads. The First team, characterized by a more tactically sophisticated playing style, exhibited a higher number of actions prior to goal-scoring opportunities, suggesting a greater emphasis on patient build-up play and a more intricate approach to attacking phases compared to the younger age groups. Similarly, Dayus, *et al.* [23] observed that the first teams in their study exhibited significantly more possessions leading to final third entries, with an increased reliance on passing and crossing, compared to younger age groups. These findings collectively suggest that as players progress through the youth development pathway, there is a gradual shift towards more sophisticated and possession-oriented attacking styles characterized by patient build-up play and a greater emphasis on controlling the tempo of the game. Furthermore, while a direct comparison with senior teams was not conducted in this study, it is plausible to suggest that UEFA Youth League teams, comprising elite young players, may exhibit a greater emphasis on combinative and possession-based attacking styles.

The analysis revealed a significant impact of the initial pressure exerted by the opposing team on the dynamics of the attacking play. Final attempts were more frequent when the team initiated the attack without immediate pressure from the opponent, which is in line with previous studies on senior tournaments that examined only counter-attacks [15,29]. Furthermore, the presence of an initial pressure was found to favor the creation of counter-attacks over organized attacks. This finding suggests that when faced with immediate pressure, teams may resort to more direct and opportunistic attacking strategies, such as counter-attacks, to quickly exploit the opponent's defensive disorganization. In this vein, Armatas [15] suggested that bypassing the initial pressing creates space and time for attackers to develop the attacking sequence and potentially penetrate the opponent’s defense.

The GLM analysis demonstrated that the presence of pressure on the attackers during the first three seconds of possession significantly reduced the attack duration. This finding highlights the importance of effective pressure resistance and ball retention skills in maintaining possession and progressing the ball effectively under pressure. These findings align with research conducted at higher levels of competition, such as the 2022 FIFA Men's World Cup [38] and 2010-11 German Bundesliga season [39]. These studies have demonstrated that successful defensive strategies at the elite level often prioritize aggressive pressure, aiming to force turnovers and regain possession quickly.

The analysis revealed a significant impact of initial penetrative actions on the dynamics of the attacking play. First, the final attempts were more frequent when the attack was initiated with a penetrative action, such as a successful dribble or penetrating pass. This finding highlights the importance of early penetration in disrupting the opposition's defensive structure, creating space for attacking players, and increasing the likelihood of reaching goal-scoring positions. Furthermore, the presence of an initial penetrative action was associated with an increased likelihood of observing

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counter-attacks, which is in line with previous studies on counter-attacking [40,41]. Specifically, Hughes and Lovell [40] highlighted the critical importance of the first pass, or initial action, in determining the outcome of transitional phases during Champions League knock-out phase. Finally, the GLM analysis demonstrated that performing a penetrative action during the first three seconds of possession significantly reduced the attack duration. This finding suggests that while early penetration can be beneficial for creating scoring opportunities, it can also lead to quicker transitions, either through successful attacks or through turnovers if the penetration attempt is unsuccessful.

4.3. Attacking Phase Characteristics

The attack duration was significantly affected by both the initial pressure and initial penetrative actions, as previously discussed. These findings highlight the complex interplay between various factors that determine the duration of an attack. While early penetration can be a valuable tool for creating scoring opportunities [15], it can also lead to quicker transitions, either through successful attacks or through turnovers if the penetration attempt is unsuccessful.

The analysis revealed that the majority of the final attempts during the knockout phase of the UEFA Youth League originated from open play (56.7%), with 43.3% stemming from set plays. Previous research on senior tournaments reported that the majority of goals are scored from open play, typically exceeding 65% [26]. However, the proportion of final attempts from set pieces in the UEFA Youth League (43.3%) was notably higher than the typical range observed in senior soccer, where studies have reported that the majority of goals are scored from open play, typically exceeding 65% [26]. This finding may partially be attributed to the unique characteristics of the knockout phase. As proposed by Yi, *et al.* [42] in their analysis of Champions League men's matches, the increased number of yellow cards and technical indicators observed in the knock-out stage suggests a greater emphasis on defensive actions and a more proactive approach to preventing scoring opportunities. Teams may be more inclined to commit fouls to disrupt opponents' attacks and maintain defensive solidity, potentially leading to more set play situations.

Previous studies, such as González-Rodenas, *et al.* [21] reported that senior and U20 teams demonstrated a greater propensity for counter-attacks, and Smith, *et al.* [22] observed that the First team exhibited a more elaborate approach, whereas the U18 team favored a direct style within an English club context. On the contrary, our findings in the UEFA Youth League revealed that organized attacks were associated with a higher frequency of final attempts compared to counter-attacks, suggesting a patient build-up play and structured possession. The UEFA Youth League knock-out stage features highly competitive matches between top European clubs, demanding a high level of technical skill, tactical awareness, and the ability to break down well-organized defenses. These findings collectively suggest that the attacking styles employed at the highest levels of youth competition may differ from those observed in younger age groups or in less competitive environments.

4.4. Limitations

This study has several limitations that should be considered when interpreting the findings. First, the study focused solely on the knock-out phase of the UEFA Youth League and during a single season, limiting the generalizability of the findings to the entire competition. Moreover, the study relied on observational data, which may have been subject to observer bias and limitations in data collection. The study did not account for individual player characteristics, such as age, playing position, and technical abilities, which may significantly influence individual and team performance. Finally, the study did not explicitly control for potential confounding variables, such as team quality, coaching styles, and opponent strength, which may have influenced the observed patterns in attacking play.

5. Conclusion

This study provides valuable insights into the attacking characteristics of elite youth teams competing in the UEFA Youth League knock-out stage. The findings highlight the importance of patient build-up play, organized attacks, and effective pressure resistance in creating scoring opportunities. The relatively high proportion of final attempts from set play emphasizes the importance of developing well-rehearsed set-play routines. These findings have significant implications for coaching practice, emphasizing the need to develop players with strong technical skills, tactical awareness, and the ability to execute patient build-up play under pressure. Future research should investigate attacking patterns throughout the entire UEFA Youth League competition, explore the impact of individual player characteristics, and compare the findings to other elite youth and senior competitions to further enhance our understanding of attacking play at the highest level of youth soccer.

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