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Original Article

Differences in situational efficiency between playing positions of elite U-19 soccer players

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Abstract
Purpose: There is a literature gap regarding positional differences between variables of situational efficiency during official matches in youth soccer. This study analyzed differences in offensive and defensive situational efficiency parameters based on playing positions among elite junior soccer players. ***Methods:*** A total of 22 elite U-19 players who participated in 17 matches of the first junior soccer league participated in the study. Players were categorized by the position: center backs, full backs, center midfielders, and forwards. Situational efficiency was assessed using 19 variables, including 11 related to offensive efficiency and 8 to defensive efficiency. Differences between positions were determined by the use of one-way analysis of variance (ANOVA) with the Bonferroni post-hoc test for significant comparisons. ***Results:*** Differences between positions in variables regarding attacking efficiency in 90 minutes were found in: the percentage of accurate passes, accurate passes, accurate and inaccurate long balls, accurate progressive passes, and unsuccessful dribbles. In the defensive parameters of situational efficiency in 90 minutes, differences were found in the following variables: number of second-balls wins, successful aerial duels, number of interceptions, blocked shots, clearances, and total defensive actions. ***Discussion:*** Center backs and full backs are increasingly demanded to play with ball in order to maintain possession play or even to create chances for other teammates. During matches the most accurate passes and long balls were performed by center backs, while most progressive passes and crosses were performed by full backs. Expectedly, the most defensive actions were achieved by center backs, except for the second-ball wins, where central midfielders achieved the highest average values. On the other hand, forwards played more freely and took more risks than other players, which resulted in the lowest passing accuracy and the highest number of unsuccessful dribbles. ***Conclusion:*** Obtained results provide an additional insight and understanding of the situational efficiency and match demands for different playing positions in elite youth soccer. These results can improve the identification and selection process of players, especially for the assessment of the position potential.
Key words: junior soccer players, selection process, offensive efficiency, defensive efficiency

Introduction

Match performance of soccer teams or individuals playing different positions often varies depending on different tactical and technical requirements during matches. Situational efficiency parameters in offense and defense are often obtained via some sort of notational analysis. It is a method for marking events at a sports competition and their statistical analysis (Hughes, 2003, James 2006). In modern soccer, technological progress enables sophisticated, fast, and more precise analysis and insight into the statistical data of players during the match (James 2006, Sarmento et al., 2022). It is used in the process of sports preparation to improve sports performance (Hughes, 2004). Based on recorded events and their statistical analysis, obtained performance parameters indicate technical-tactical activity, i.e. the quality of the performance of individual players and the entire team (Carling, Williams, Reilly, 2007; Dellal, et al., 2010, Lago-Peñas & Dellal, 2010, Novak et al., 2015). It can be used to compare the effectiveness of different tactical approaches, as well as to track individual player progress (Carling, Williams, Reilly, 2007, Sarmento et al., 2024).

This analysis allows coaches, professional staffs and players to identify the strengths and weaknesses of opposing teams (Carling et al., 2008). It is performed in specialized programs such as LongoMatch and Once, which is suitable for a quick and easy use (Sarmento et al., 2014). A large number of studies have been using notational analysis for observing differences between teams with their focus primarily being on: physical performance (Mohr et al., 2003, Baros et al., 2007, Di Salvo et al., 2007, Modrić, Veršić and Sekulić, 2020, Altman et al., 2021, Hills et al., 2022, Bortnik et al., 2024), technical and tactical performance (Lago, Martin 2007, Alberti et al., 2013, Sapp et al., 2018, Ispyrlidis et al., 2020, Clemente, Sarmento and Aquino, 2020, Low et al., 2022), player recruitment (Frick, 2007; Littlewood et al., 2011), injury pattern (Waldén et al., 2011, Page et al., 2023), and competitive balance (Brandes and Franck, 2007,). In addition to considering team differences, the observation of differences between playing positions is also of great importance (Yi et al., 2018). Position-

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specific technical demands in large number of studies were not controlled for the effects of situational factors (team and opponent strength, competition phase, match location), which largely affect the technical performance of football players (Liu et al., 2015, Akyildiz et al., 2022). Redwood-Brown, Bussell & Bharaj 2012 claim that studies that observed inter-positional differences are limited by the number of matches and the lack of reliability or validation procedures used when collecting the data. Taylor et al., 2004 claim that the differences between the positions are mainly determined by the style of play of the whole team and that conclusions should be made by considering that aspect. Literature that observed differences in technical parameters is scarce and insufficient (Yi et al., 2018, Li et al., 2022), even though some authors (Lago-Peñas, Lago Ballesteros & Rey, 2011, Vaeyens et al., 2008) claim that technical characteristics are the main predictors of success. Vale et al. (2009) observed differences between playing positions regarding passing ability using three technical skill test, but no significant differences were found. Research on situational efficiency in soccer is important for several reasons, as it provides a deeper understanding of game dynamics and helps to improve performance at all levels. Likewise, differences between different playing positions can provide necessary information regarding specific positional demands.

Furthermore, coaches prepare junior players for the senior (professional) level in a way that they could endure both physical and technical-tactical demands of modern-day soccer. Determining the position on the field that best suits an individual, and key factors that could influence a team's performance based on individual technical characteristics is one of the most important tasks for coaches. However, there is a literature gap regarding positional differences between variables of situational efficiency during official matches in youth football. To determine differences between playing positions through pre-established parameters would be useful for coaches during selection and match preparation process. Therefore, main goal of this study was to analyze differences in offensive and defensive situational efficiency parameters, based on playing positions among elite junior soccer players.

Material & methods

Participants

A total of 22 elite players who played 17 matches of the first junior Croatian football league (U19) participated in this research. The participants were divided by positions: 5 center backs, 5 full backs, 7 central midfielders and 5 forwards. “The Ethical Committee of the Faculty of Kinesiology” (approval number: 2181-205-02-05-24-009, Split, Croatia) approved the research. The entire study design was approved by the committee according to the ethical standards of the 1964 Helsinki Declaration. Inclusion criteria for participating in this study were: i) player's participation in more than 85% of the training, ii) participation in competitive matches, iii) having a sports card, and iv) good health condition. Players were holders of a signed Croatian Soccer Federation identity card, and were healthy subjects, medically examined by a sports doctor. The subjects did not consume caffeine products 24 hours before the matches.

Variables

The number of 19 variables of situational efficiency were observed, out of which 11 were variables of offensive efficiency, and 8 were variables of defensive efficiency. The variables were collected by notational analysis in the program LongoMatch (Fluendo VAS, Barcelona, 2014). Variables were summarized and reduced to situational efficiency per 90 minutes of the match.

Table 1. Attack and defense efficiency parameters

Parameters of attacking efficiency		**Parameters of defensive efficiency**	
AC	Accurate crosses per 90’	**SB**	Second balls won per 90’
ALB	Accurate long balls per 90’	**SDUE**	Successful duels per 90’
APP	Accurate progressive passes per 90’	**SADUE**	Successful aerial duels per 90’
AP	Accurate passes per 90’	**INTER**	Interceptions per 90’
%PASS	Percentage of accurate passes per 90'	**BLS**	Block shots per 90’
SDRIB	Successful dribbles per 90’	**CLEAR**	Clearances per 90’
%DRIB	Percentage of accurate dribbles per 90'	**RB**	Recovered balls per 90’
INAC	Inaccurate crosses per 90’	**TDA**	Total number of defensive actions per 90’
INALB	Inaccurate long balls per 90’		
INAP	Inaccurate passes per 90’		
NSDRIB	Non-successful dribbles per 90’		

Statistical analysis

The variables were collected by notational analysis in the program LongoMatch and the data obtained from the research were entered into the spreadsheet software Microsoft Excel (Microsoft Corporation. (2018). *Microsoft Excel)*. Furthermore, the software Statistica ver. 13.0 (Dell Inc., Round Rock, TX USA) was used for data analysis. Descriptive statistics parameters were calculated (M - arithmetic mean, RANGE - minimum, maximum). Differences between positions ($p<0.05$, $p<0.01$) were determined by using one-way analysis of variance (ANOVA) with the Bonferroni post-hoc test for possible significant comparisons.

Magnitude-based Partial eta Squared (η^2) was also used with the following measures: η^2= 0.01-0.05 indicating a small effect, η^2= 0.06-0.13 a medium effect, and $\eta^2 \geq$ 0.14 a large effect.

Results

Table 2. Descriptive statistics of all attacking efficiency parameters and the Bonferroni Post-hoc.

	Center backs N=5		**Full backs N=5**		**Central midfielders N=7**		**Forwards N=5**		
Variable	**M**	**RANGE**	**M**	**RANGE**	**M**	**RANGE**	**M**	**RANGE**	**F, η^2**
AC	0.02	0.00-0.10	0.90	0.25-1.75	0.44	0.00-1.18	0.40	0.00-1.02	2.57, 0.30
ALB*	2.88 ^{b,c,d}	1.29-4.76	0.87	0.26-1.75	0.66	0.00-2.29	0.59	0.20-0.88	6.67, 0.30
APP*	4.29	3.45-6.02	5.04 ^{d}	3.29-6.00	3.33	2.06-5.34	2.46	0.98-4.01	5.03, 0.46
AP**	46.81 ^{c,d}	22.41-59.42	29.77	20.26-38.25	24.34	12.45-46.27	13.17	9.95-16.47	8.92, 0.60
%PASS**	91	80-97	89	83-94	88	79-94	75 ^{a,c,d}	71-82	9.96, 0.62
SDRIB	1.58	0.40-3.64	2.36	0.55-3.50	1.11	0.00-3.41	2.15	0.81-1.40	1.25, 0.17
%SDRIB	92	80-100	69	23-93	56	0-92	68	55-12	2,61, 0,30
INAC	0.04	0.00-0.21	0.95	0.00-2.24	0.53	0.00-0.97	0.47	0.00-0.30	2.68, 0.31
INALB*	2.00 ^{b,c,d}	0.64-3.93	1.17	0.68-1.75	0.52	0.00-1.27	0.31	0.00-0.33	6.52, 0.52
INAP	3.89	1.50-5.52	3.59	2.50-4.37	2.94	1.81-4.32	4.43	2.36-1.44	1.64, 0.21
NSDRIB*	0.11	0.00-0.34	0.91	0.25-1.83	0.50	0.11-0.97	1.09 ^{a,c}	0.27-0.88	3.24, 0.35

*Legend : Variables - variable, (M) – arithmetic mean, RANGE (min-max result), F value, η^2- effect size, a - denotes significant differences from center backs, b-denotes significant differences from full backs, c-denotes significant differences from central midfielders, d-denotes significant differences from forwards, *- p<0.05, **- p<0.01*

Analysis of variance showed significant differences between positions in the variables: percentage of accurate passes (F=9.96, η^2=0.62) and accurate passes per 90 minutes (F=8.92, η^2=0,60) where center backs had the highest average values. Additionally, full backs and center backs had the highest number of accurate progressive passes (4.29/5.04). Center backs (2.88) also had the most accurate long balls per game (p<0.05) compared to full backs, central midfielders and forwards (0.87/0.66/0.59, respectively). Furthermore, center backs had the most inaccurate long balls per a match (F=6.52, η^2 =0.52, p<0.05) compared to all other positions. The highest number of accurate crosses was recorded by full backs (0.9), while center backs recorded almost no crosses per 90 minutes (0.02). On average, full backs and forwards had the highest number of attempted dribbles during 90 minutes in which 2.36/2.15 were successful while 0.91/1.09 were unsuccessful.

Table 3. Descriptive statistics of all defensive efficiency parameters and the Bonferroni Post-Hoc

	Center backs N=5		**Full backs N=5**		**Central midfielders N=7**		**Forwards N=5**		
Variables	**M**	**RANGE**	**M**	**RANGE**	**M**	**RANGE**	**M**	**RANGE**	**F, η^2**
SB**	3.89 ^{d}	3.45-4.83	2.43	2.01-3.27	4.96 ^{b,d}	2.92-6.63	2.11	1.18-2.88	12.31, 0.67
SDUE	2.35	1.72-3.13	1.60	0.49-4.25	1.19	0.49-2.62	1.61	0.45-3.23	1.35, 0.18
SADUE*	2.92 ^{b,c,d}	1.89-4.39	1.09	0.50-1.64	0.96	0.00-1.91	1.16	0.56-2.69	7.64, 0.56
INTER*	4.15 ^{b,d}	3.10-6.23	3.13	1.75-5.44	2.25	0.97-3.56	1.10	0.63-2.07	7.24, 0.55
BLS*	0.65 ^{b,c,d}	0.00-1.03	0.32	0.00-0.75	0.22	0.00-0.70	0.00	0.00-0.00	4.46, 0.43
CLEAR**	1.50 ^{b,c,d}	0.63-2.41	0.23	0.00-0.50	0.22	0.00-0.49	0.08	0.00-0.27	14.69, 0.71
RB	3.62	2.10-4.83	3.57	2.53-4.63	3.31	1.88-4.38	2.55	1.18-4.56	1.09, 0.15
TDA**	19.72^{b,c,d}	15.52-22.41	12.78	9.91-15.50	13.27	9.28-16.60	8.77	5.90-11.32	15.17, 0.72

*Legend : Variables - variable, (M) – arithmetic mean, RANGE (min-max), F value, η^2- effect size, a-denotes significant differences from center backs, b-denotes significant differences from full backs, c-denotes significant differences from central midfielders, d-denotes significant differences from forwards, *- p<0.05, **- p<0.01*

It can be seen from Table 3that center backs had the highest average values in most parameters of defensive efficiency. Also, thy achieved best results in ($p<0.05$): successful aerial duels ($F=7.64$, $\eta^2=0.56$), number of interceptions ($F=7.24$, $\eta^2=0.55$), blocked shots ($F=4.46$, $\eta^2=0.43$), clearances ($F=14.69$, $\eta^2=0.71$), and overall defensive actions ($F=15.17$, $\eta^2=0.72$). Central midfielders won most second balls won per game ($F=12.31$, $\eta^2=0.67$, $p<0.05$). On the other hand, forwards achieved the lowest values in variables: number of second ball wins (2.11), number of interceptions (1.10), blocked shots (0.00), clearances (0.08), recovered balls (2.55) and the total number of defensive actions (8.77). Additionally, central midfielders lost the most duels both on the floor and in the air (1.19/0.96).

Discussion

The main goal of this research was to examine differences between offensive and defensive parameters of situational efficiency according to positions among elite junior soccer players. Significant differences with a large effect ($\eta^2 \geq 0.14$) were found in some parameters of offensive and defensive situational efficiency. When it comes to variables of attacking efficiency, differences were found in accurate long balls per 90 minutes, in which center backs differed significantly (Table 2) from all the other positions. Similar results were obtained by Yi et al., 2018, which determined a higher number of accurate long balls ($p<0.05$) for center backs (4.36) compared to full backs, center midfielders and forwards (4.02/3.17/2.12, respectively). Center backs (91%) and full backs (89%) had the highest percentage of accurate passes, immediately followed by the central midfielders (88%), while the lowest percentage was recorded among forwards (75%). Dellal et al., (2010) observed senior players of the first French league. Their results slightly differ from this study showing that central midfielders made successful passes ranging from 75% to 78%, while lower values were recorded for forwards with 71% and central defenders with 63%. These results could be an indicator of the evolution of soccer as a sport. It is evident that in recent years the percentage of accurate passes has increased compared to the results obtained 10-15 years ago (Bush et al., 2015, Zhou, Gómez, & Lorenzo 2020, Arjol-Serrano et al., 2021, Subak, 2022). Progressive passes are a specific type of passes, mostly used to go through defensive lines or to play teammate in an advanced position on the pitch (closer to opponent goal).

Unfortunately, it is a relatively unexplored topic that needs further scientific research. Nonetheless, current study has obtained valuable information. On average, full backs make the most progressive passes during 90 minutes of play (5.03), followed by the center backs (4.29) and midfielders (3.33). Forwards make the least number of progressive passes (2.46) and significantly differ ($p<0.05$) from full backs. Being located in the opponents' back third of the playing field, forwards are the most exposed players to defensive reactions and therefore have reduced opportunities to play progressive passes. Additionally, Dellal et al., (2011), claim that attacking players (forwards) have their back to goal during the build-up play, which may explain the fewer progressive passes observed in these positions compared with the other position, who start the build-up play from defense and transfer the ball with those type of passes. Forwards and full backs had the most unsuccessful dribbles (1.09/0.91) probably due to the highest number of attempts that they had during the match. Differences were found in the parameters of defensive efficiency where center backs had statistically higher results in 5 out of 8 variables. Midfielders and center backs achieved significantly higher results in second balls wins compared to forwards (4.96/3.89 vs. 2.11).

Additionally, midfielders won more second balls than full backs ($p<0.05$). Possible reasons for these findings could be contributed to the specific tasks midfielders perform during the match. More often than not, they operate in the areas of the pitch where loose and cleared balls finish. Furthermore, center backs won the most aerial duels per 90 minutes compared to other positions (Table 3). Defensive players, especially central defenders, are usually the tallest players in the team (Gil et al., 2007; Malina et al., 2004; Wong, et al., 2009). Based on their height alone, they have a significant advantage over the others (Yi et al., 2018, Ermidis, 2019). Center backs have almost 3 successful aerial duels per 90 minutes, which is also confirmed by research by Dellal et al., 2010, who also established the dominance of center backs in aerial duels. Except for center backs, the highest achieved results were obtained by forwards who had 1.16 successful aerial duels per 90 minutes indicating their good ability in offensive headers and involvement during set pieces. Center backs had the largest number of intercepted balls per 90 minutes, while forwards had the least number of such defensive actions (4.15 vs. 1.10). Ermidis, 2019, observed that central defenders, fullbacks and central midfielders made a similar number of interceptions, which suggests that forwards stay high and in front of the opponent defenders, without giving a possibility of 1 vs. 1 as proposed by (Van Lingen, 1998). Center backs had the highest number of clearances and blocked shots, while the lowest number was recorded in forwards. Given the primary tasks of center backs such as defending goal and eliminating opponents attacks from areas in front of the goal, these

results have been mostly expected. On the other side, forwards are predominantly asked to score goals, but are also used during pressing play on the opponent back line. During the defensive phase, if the pressing play from forwards is good, team defenders can take aerial duels from long balls of the opponents, or midfielders might collect second balls. These are possible reasons for the results obtained by current research. Obtained results indicate complexity of the soccer and differences of situational efficiency parameters between playing positions.

Conclusion

For elite junior soccer (U19) players, significant differences were obtained in parameters of situational efficiency between positions. Center backs and full backs are increasingly demanded to play with ball in order to maintain possession play or even to create chances for other teammates. During matches, the most accurate passes and long balls are performed by center backs while most progressive passes and crosses are done by full backs. Expectedly, center backs had the most defensive actions, except in the second balls wins where central midfielders achieved the highest average values. On the other hand, forwards played more freely and took more risks compared to other players which can be seen from the lowest passing accuracy and the highest number of unsuccessful dribbles. Obtained results provided an additional insight and understanding of the situational efficiency and match demands for different playing positions in elite youth football. These results can improve the identification and selection process of players, especially when assessing position potential. Understanding the differences in match performance parameters across various positions in youth soccer has significant and practical implications for coaches. These data allow coaches to adjust their training methods, tactical strategies, and player selection in ways that maximize team effectiveness and success. This approach contributes to better tracking of young talents, their development and situational abilities.

Some differences between positions in actions, like progressive passes, highlight the need for further research on this relatively unexplored topic. Future studying could be implemented on the analysis of passing type and accuracy during matches for different playing positions that might provide new evidence and guidelines for soccer coaches.

Conflicts of interests

The authors have no conflicts of interests to declare.

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