

COMPARISON OF TACTICAL PRINCIPLES EFFICIENCY AMONG SOCCER PLAYERS FROM DIFFERENT GAME POSITIONS

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Short title: Comparison of tactical principles

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ABSTRACT

Purpose. The aim of this study was to analyze the execution efficiency of core tactical principles in young soccer players and compare them among different game positions.

Methods. The sample was composed of 54 Brazilian young soccer players. Tactical performance was measured by the System of Tactical Assessment in Soccer through the GR3-3GR test in 3770 tactical actions. Friedman followed by Wilcoxon tests were used to analyze differences between tactical principles. Subsequently, Kruskal Wallis and Mann Whitney U tests were performed to compare tactical efficiency between defenders, midfielders, and forwards ($p < 0.05$).

Results. Offensively, the results indicated that young players demonstrated less efficiency in executing the principle "depth mobility" compared to "penetration", "offensive coverage", "width and length", and "offensive unity". Regarding defensive aspects, "concentration" was performed more efficiently than other principles. Comparisons between positions indicated that midfielders and forwards executed "offensive unity" more efficiently than defenders. Defenders tended to present high "defensive coverage" efficiency when compared to "midfielders".

Conclusions. High efficiency in the execution of "concentration" represents an obstacle to vertilize a pass and hinders offensive movements between the last defender line and goal, given low efficiency of "depth mobility". Midfielders and forwards performed "offensive unity" more efficiently than defenders. In defensive

principles, defenders presented better performance in “defensive coverage”, giving support to the first defender. As practical applications, it is suggested that coaches of young regional soccer players carry out activities which allow depth passes to teammates as well as games to promote “offensive unity” for defenders and “defensive coverage” for midfielders.

Key words: adolescents, soccer, decision making, efficiency

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Introduction

During a soccer game, the tactical dimension is fundamental to execute correct decision making and control a game situation with or without the ball. Thus, this must be assessed throughout the teaching–learning–training process [1]. This dimension has been highlighted thanks to the process of overcoming traditional approaches, giving space to methodologies guided by systemic paradigms [2]. Players with low skill levels but tactical understanding can play soccer [3]. On the other hand, limited tactical knowledge can imply in low technical efficiency as all skills should be executed in a complex game situation [4].

In this sense, there are two types of tactical knowledge that should be used to evaluate soccer players: declarative (“what to do”) and procedural (“how to do it”) [5]. This knowledge, organized and structured, represents cognitive parameters to identify the quality of players [6, 7]. Regarding procedural knowledge, it has been reported in the literature that there are ten core tactical principles to be performed by soccer players. Five principles are related to the offensive phase of the game: “penetration”, “offensive coverage”, “depth mobility”, “width and length”, and “offensive unity”. Defensively, five core principles can be identified: “delay”, “defensive coverage”, “balance”, “concentration”, and “defensive unity” [8].

These behaviors, when executed efficiently, allow a team to manage the playing space and solve problems presented during the game [8]. Moreover, execution of core tactical principles helps teams to maintain ball possession [9], change the pace of play, take opponents to previously defined sectors, and destabilize the organization of the opponent team [10]. Collective tactical efficiency during a match contributes to better performance as much for the player as the team. The way in which each principle appears will depend on the game style proposed by the coach [11].

Some studies have been performed analyzing core tactical principles efficiency in soccer. Carvalho and Teoldo [12] compared tactical efficiency between the results victory and defeat. Losing teams presented higher percentages of errors in "offensive coverage" and "balance" when compared with winners. Andrade and Teoldo [13] verified how tactical efficiency and date of birth affect tactical performance of soccer players. Positive associations between tactical behavior efficiency and tactical performance were identified for the principles "offensive coverage", "offensive unity", "defensive coverage", "balance", and "defensive unity". Collectively, these results indicate the relevance of understanding tactical efficiency in soccer as well as the relationship with other kinds of variables.

Although core tactical principles efficiency is important to increase soccer performance, few studies have actually been performed to analyze these behaviors in young regional soccer players, also characterized as non-elite players, according to their skill level [14] and participation in competitions. Teoldo et al. [15], investigated the frequency, efficiency, and performance index of soccer players in training, comparing them by game category, while the majority of studies have focused attention on high performance athletes [14, 16]. It is known that regional players tend to underestimate performance results of national players [17] however this should be investigated through tactical aspects, it being relevant to understand whether different principles are executed with similar efficiency between regional players. Furthermore, can tactical functions related to game positions influence offensive and defensive efficiency? The results may be used by coaches to plan training content, since core tactical principles of soccer are central components to reach high performance and better learning. Thus, the aim of this study was to analyze the execution efficiency of core tactical principles in young soccer players and compare them among different game positions.

Material and methods

Participants

Eighty-six young male soccer players were invited to participate in the study, participants of an extension project at a university in the south of Brazil. The following inclusion criteria were adopted: (1) participation in systematic training in soccer for at least one year; (2) absence of any muscular injuries; (3) participation in regional competitions; and (4) Free and Clarified Consent Term signed by parent or guardian. The final sample was

composed of fifty-four players (14.85±1.58). This project was approved by the local Research Ethics Committee (Opinion 653.698) in May, 2014.

Procedures

To evaluate the core tactical principles of soccer, the players executed the GR3-GR3 field test described by Teoldo et al. [18]. This test was designed to allow coaches and researchers to assess tactical performance in a small sided game. The GR3-GR3 consists of a reduced field (36m vs. 27m) where 6 players (3 vs. 3) are required to play for 4 minutes according to the official rules of soccer, except the offside rule. Players were divided by the coach into each game category in an aleatory way. This format is standardized with proportional dimensions to the game space delimited for each player on an official field. In addition, this basic structure allows participants to execute all tactical principles that constitute a formal game. Players were filmed during the test, after which the videos were analyzed using Soccer Analyser[®] software.

The core tactical principles performed by each player were evaluated according to the System of Tactical Assessment in Soccer - FUT-SAT [18] which analyses ten tactical principles of soccer. Offensively, "penetration", "offensive coverage", "width and length", "depth mobility", and "offensive unit" and defensively, "delay", "defensive coverage", "balance", "concentration", and "defensive unit" (Frame 1) were measured and the efficiency of all principles was classified according to the criteria described by Teoldo et al. [18]. In total 3770 actions of tactical principles were evaluated and the percentage of right decisions made was used as the final score. Players were divided into three groups according to game position: defenders (central backs and side backs; n = 16), midfielders (central midfielders and side midfielders; n = 18), and forwards (n = 20).

Frame 1. Definitions, category and sub-categories of variables assessed by the FUT-SAT [18]

Category	Sub-categories	Variables	Definitions
Tactical Principles	Offensive	Penetration	Movement of the player with the ball towards the goal line
		Offensive coverage	Offensive support to the player who has the ball
		Depth Mobility	Movement of the players between the final defender and goal line
		Width and Length	Movement of the player to extend and use the

			effective play-space
		Offensive unity	Movement of the last line of defenders towards the offensive midfield to support the offensive actions of teammates
	Defensive	Delay	Actions to slow down the opponent's attempt to move forward with the ball
		Defensive coverage	Offer defensive support to the "delay" player
		Balance	Positioning of off-ball defenders in reaction to the movements of attackers in an attempt to achieve numerical stability or superiority in the opposition relationship
		Concentration	Positioning of off-ball defenders to occupy vital spaces and protect the scoring area
		Defensive unity	Positioning of off-ball defenders to reduce the effective play-space of the opponents

Statistical analysis

Regarding the statistical analysis, normality of the data was obtained through the Kolmogorov-Smirnov test. Distribution was nonparametric, thus, data are presented as median and 25th (Q1) and 75th (Q3) percentiles. The Friedman and Wilcoxon tests were conducted to identify any differences between tactical principles. The Kruskal-Wallis test was performed to assess differences between defender, midfielder, and forward groups followed by the Mann Whitney U test to establish the source of differences. 377 (10%) tactical actions were re-evaluated by two researchers trained to use the FUT-SAT system. The reliability of the assessment of tactical performance was obtained using Cohen's Kappa test, which indicated agreement above 81% in all cases. The significance was set at 5%.

Results

Figure 1 presents the offensive tactical efficiency of the players. Significant differences were observed between "depth mobility" and all offensive core tactical principles ($p < 0.001$), which indicates low efficiency in actions performed between the last defender line and goal to attack. Values described for execution efficiency in each offensive principle were: Offensive Unity Md = 95.83 (66.67-100.00); Width and Length Md = 80.95 (67.80-90.12); Depth Mobility Md = 50.00 (00.00-100.00); Offensive Coverage Md = 85.71 (66.67-100.00); and Penetration Md = 89.44 (50.00-100.00).

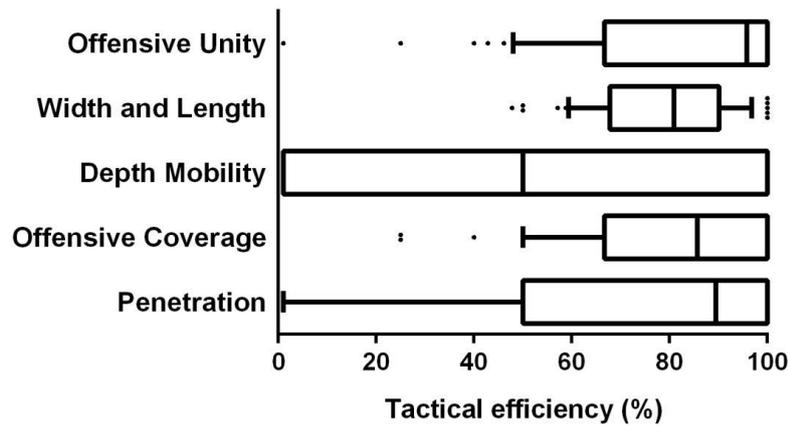


Figure 1. Offensive tactical efficiency executed by young soccer regional players, represented by median and 10th, 25th, 75th, and 90th percentiles

Figure 2 represents the defensive tactical efficiency of the players. "Concentration" was the principle executed with more quality by young players ($p < 0.001$). It was observed that "defensive unity" was performed with higher performance than "delay" (Md = 83.33 vs. 75.00; $p = 0.02$). Values described for execution efficiency in the other defensive principles were: Concentration Md = 100.00 (82.49-100.00); Balance Md = 77.35 (60.00-100.00); and Defensive Coverage Md = 100.00 (00.00-100.00).

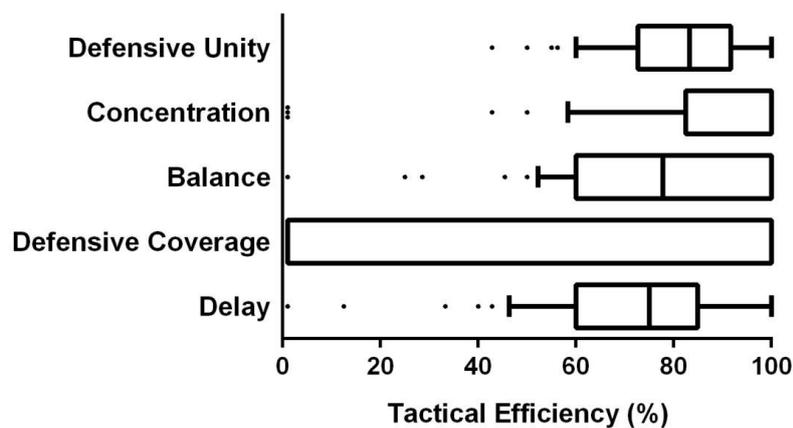


Figure 2. Defensive tactical efficiency executed by young soccer regional players, represented by median and 10th, 25th, 75th, and 90th percentiles

Table 1 presents comparison values between different game positions. "Offensive unity" was higher in midfielders and forwards than defenders ($p = 0.046$). Defensively, it was identified that "defensive coverage" was executed more efficiently by defenders than midfielders ($p = 0.025$).

Table 1. Comparison of offensive and defensive tactical efficiency among different positions in young soccer players

	Tactical Principle Efficiency (%)	Defenders (n=16)	Midfielders (n=18)	Forwards (n=20)	<i>p</i>
		Median (Q1 - Q3)	Median (Q1 - Q3)	Median (Q1 - Q3)	
Offensive	Penetration	100.00 (51.39-100.00)	87.30 (50.00-100.00)	92.85 (50.00-100.00)	0.804
	Offensive Coverage	83.76 (68.75-90.40)	83.33 (60.00-100.00)	93.49 (63.54-100.00)	0.711
	Depth Mobility	83.33 (0.00-100.00)	50.00 (0.00-87.49)	50.00 (8.33-65.00)	0.742
	Width and Length	83.33 (75.00-88.54)	76.39 (66.67-87.49)	82.22 (65.26-91.48)	0.600
	Offensive Unity	73.33 (66.67-90.68)	100.00 (77.49-100.00)*	100.00 (76.25-100.00)*	0.046
Defensive	Delay	72.50 (51.39-80.00)	75.96 (61.87-90.41)	69.05 (60.00-91.66)	0.697
	Defensive Coverage	100.00 (85.00-100.00)	25.00 (0.00-100.00)*	100.00 (0.00-100.00)	0.025
	Balance	88.31 (51.39-100.00)	75.96 (65.00-89.15)	74.17 (59.11-96.42)	0.873
	Concentration	100.00 (84.37-100.00)	96.66 (72.50-100.00)	100.00 (74.40-100.00)	0.542
	Defensive Unity	87.08 (64.64-93.50)	83.97 (75.18-89.58)	79.16 (62.94-91.86)	0.751

Note: * Significant differences for defenders. $p < 0.05$.

Discussion

The aim of this study was to analyze the execution efficiency of core tactical principles in young soccer players and compare them among different game positions. The main findings identified that "depth mobility" was the offensive principle executed with least efficiency and "concentration" was the defensive principle performed with highest efficiency, when considering all subjects evaluated. Players from different game positions tend to achieve different efficiency during a game. In a match situation, even if there are pre-determined rules and principles, there is also recurrent susceptibility to actions derived from confrontation. This is a consequence of the autonomy and individual diversity of players in a

team, and tends to happen even if the coach imposes a previously established game model [2]. Although actions within the same team usually occur in convergence, the shape that the game will take depends on a reasoning that aims to solve problems from game situations and also on the quality of individual tactical execution.

Study findings show that players demonstrated less efficiency to execute the offensive principle "depth mobility" compared to "penetration", "offensive coverage", "width and length", and "offensive unity", suggesting that players were not efficient when trying to expand effective playing area by performing breaking movements on the final defensive line [19]. Perhaps this situation can be explained due to the reduced field size and number of players, since this type of action can be seen as a risk in defensive transition. The forwards, who usually perform the principle "depth mobility", may not feel confident since the loss of ball possession arising from this situation could cause a counterattack in numerical superiority, leading to danger in the defensive area.

With the exception of "depth mobility", all other offensive principles presented a median percentage of tactical efficiency above 80%. Américo et al. [20] evaluated the efficiency of offensive tactical behavior of base-level players and found similar values for the under-15 category, which achieved an average percentage in performing effectiveness of 79.29%. On the other hand, the same study verified that "width and length" was performed less efficiently from under-13 to under-17 players, while "depth mobility" was one of the principles that attained a greater score of execution effectiveness, showing that the two samples have an offensive game model in which the offensive player without ball possession diverges in the strategy of occupying the free game space. It is also important to remember that high efficiency is related to the qualitative level of the players, the interaction promoted during confrontations, and the game model adopted by the team.

Regarding defensive aspects, "concentration" was performed more efficiently than other principles, reflecting that as a defensive strategy players try to minimize the offensive progression of the opposing team by reducing the effective play-space as well as "play between lines", avoiding free space left over, especially when close to the player performing "delay" [19]. The findings of the present study are in agreement with Américo et al. [20] who also verified that in all evaluated categories, the "concentration" principle was the most efficiently executed, evidencing that both samples are concerned about the importance of adopting block defense organization in a space on the field more favorable to opposition players shooting to goal.

In addition, results show that "defensive unity" was performed with higher quality than "delay" reflecting that although both principles are implemented with considerable effectiveness, players do not perform individual marking of the player with ball possession as well as when they position themselves to mark opponents without ball possession who are closest to their defensive goal [19]. In a study with soccer players from different age groups, Müller et al. [21] verified that the average percentage of execution errors of the offensive principle "delay" was higher than the one verified for "defensive unity", agreeing with the findings of the present study.

The comparison of offensive execution efficiency among positions indicated that midfielders and forwards executed "offensive unity" more efficiently than defenders, showing that players in these positions tend to perform actions of extension on the offensive lines effectively, aiming at the maintenance of ball possession, in a way that transmits confidence to the players inside the game center "in direct contact with the ball", and making it possible to create break situations in the composition of the opposing defense [19]. Complementing these findings, in a study with under-13 soccer players, Padilha, Moraes and Teoldo [22] found that midfielders presented a significantly higher "tactical performance index" in the principle "offensive unity" when compared to forwards, demonstrating better control over the execution of this specific principle.

In relation to the defensive situation, defenders tend to present higher "defensive coverage" efficiency when compared to midfielders. According to Teoldo et al. [19], this principle is executed with considerable quality when a player stands to support the first defender, who is performing "delay", further decreasing the chances of the opponent progressing towards the goal, or in other words "serving as a new obstacle to the opponent in ball possession, if he passes the other player". Furthermore, with results very similar to those found in the present study, Gonçalves, Resende and Teoldo [23], evaluating under-17 players from different positions, verified that in the defensive phase, the defenders presented less execution errors in tactical principles when compared to midfielders and forwards.

Small-sided games allow players to be in more frequent contact with the ball, resulting in a more intense game play. Moreover, in less complex situations than traditional games, players tend to commit a smaller number of execution errors, attaining better performance scores [24]. The way ball possession tends to switch between teams during a soccer match reflects the dynamics of the situations in which there is constant inversion between attack and defense [25]. These characteristics, when compared with the results of the present study

reveal that players of different positions and tactical functions may have similar performance due to different imposed requirements [22].

According to Gréhaigne and Godbout [26] the team must always seek to explore and conquer free space to play, in this way trying to use the maximum length and depth of the field, keep the defense stuck in one zone while playing in another, switch between long and short passes, always change the orientation of the move, and take advantage of speed and space to play. Garganta and Gréhaigne [2] argue that the game cannot occur as a mechanical thing, as only the reproduction of formulas learned in training, but rather be able to follow the evolution of the game structure, using heuristic reasoning to solve problems that are imposed.

As practical applications, we recommend adoption of training methodologies focused on tactical-technical behaviors based on tactical offensive and defensive principles as orientation guides during teaching-learning-training processes, especially “depth mobility” in general and “offensive unity” for defenders and “defensive coverage” for midfielders. The adoption of these kinds of methodology may improve tactical efficiency in regional teams where children and teenagers must learn content and solve problems related to “what to do” and “how to do it”. The literature contains some interesting proposals regarding how to teach sports, such as Teaching Games for Understanding [27], the Ball School Model [28], and the Decision Training approach [29], among others.

Conclusion

The young soccer players evaluated presented low quality of execution in “depth mobility” and high quality of execution in “concentration”. These findings indicate that when in offensive situations, players were not efficient in trying to perform breaking movements on the last defensive line. In defensive situations, players were efficient when reducing opponent playing area, avoiding their progression. When comparing game positions, with regard to offensive principles, midfielders and forwards executed "offensive unity" with more efficiency than defenders, which means that these players increase effective playing area, helping the offensive players to construct situations. In defensive principles, defenders presented better performance in “defensive coverage”, providing support to the first defender, who is performing “delay”.

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