

Relationship between offensive tactical efficiency and technical actions performed by school futsal players

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LUCAS S.C. UEDA^{1®}, VANESSA M. MENEGASSI^{2®}, JÚLIO C. COSTA^{3®}, LEANDRO RECHENCHOSKY^{2®}, MATHEUS O. JAIME^{2®}, ADOLPHO AMORIM^{2®}, WILSON RINALDI^{2®}, PAULO H. BORGES^{1®}

¹ Department of Physical Education, Federal University of Santa Catarina, Florianópolis, Brazil

² Department of Physical Education, State University of Maringá, Maringá, Brazil

³ Department of Physical Education, State University of Londrina, Londrina, Brazil

ABSTRACT

Purpose. The aim was to analyse the significance and magnitude of the correlation between the offensive tactical efficiency and technical actions performed by schoolchildren practicing futsal during a reduced game in the GR3-3GR test format. **Methods.** The sample was composed of 33 child and adolescent futsal players aged between 9 and 14 years – from elementary and middle schools – and divided into Under-10 (21 players), Under-12 (6 players), and Under-14 (6 players) categories. The players were filmed during the execution of a small-sided game (GR3-3GR). To assess tactical efficiency, core tactical principles of penetration, offensive coverage, depth mobility, width and length (with and without ball), and offensive unit were observed through the FUT-SAT test, while technical actions were analysed using an observational protocol, which recorded the occurrence of the actions 'passing', 'shooting', 'receiving', and '1:1 duel'. Spearman's correlation coefficient was used to verify the degree of relationship of the analysed variables, followed by correlation-based network analysis. Significance was set at 5%.

Results. The results showed associations between efficiency in the execution of offensive tactical principles performed by the attacker with the ball and the execution of technical actions. The principle 'penetration' was positively correlated with 'receiving' (r = 0.41), and the principle 'width and length with ball' was negatively correlated with the execution of '1×1 duel' (r = -0.34).

Conclusions. It is concluded that the technical quality when receiving and controlling the ball favours movements related to progression on the playing court. Players who are less skilled in direct confrontations tend to prefer to carry the ball to spaces with less adversary pressure.

Key words: youth sports, sports, team sports, futsal

Introduction

Futsal is a popular team sport, widely practiced in several countries around the world [1]. Its practice requires the player to solve several problems that are embodied throughout the game, given the context that motor actions are required during constantly changing states within the game environment, arising from a systemic context of cooperation and opposition [2–4]. In view of the aforementioned findings, this sport is frequently practiced at early ages as a form of preparation for the practice of football [5] and in the school curriculum, aiming at human development and teaching of the main techniques and tactics of the game [6].

Based on the ingrained and growing presence of team sports in the culture of different countries, several authors in the area of sports pedagogy have proposed and developed teaching models that contribute to the transmission of culturally developed knowledge in this context [7–10]. However, the number of studies related to the practice of futsal in the school context is still small, which highlights the need to investigate, in par-

Correspondence address: Lucas S.C. Ueda, Department of Physical Education, Federal University of Santa Catarina, Engenheiro Agronômico Andrei Cristian Ferreira St., Agronômica, Florianópolis, 88040-900, Brazil, e-mail: lucashoiti@hotmail.com, https://orcid.org/0000-0002-2389-7557

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ticular, the tactical and technical indicators that constitute the teaching-learning process of the sport [1].

The tactical dimension refers to the movements made by players in the game space to properly manage the space-time constraints inherent in the game [11]. During these displacements, players need to choose an appropriate motor response (technique) that best adapts to the urgent circumstances of the confrontation [7]. In this sense, concerning tactical behaviour, studies with young futsal practitioners have mainly sought to analyse the differences between categories/ ages [12, 13], specifically the frequency of carrying out the fundamental tactical principles [14], as well as seeking to identify the association of tactical efficiency with specific skill tests [15].

Technical actions can be understood as motor gestures selected and performed by the player to continue the development of the game and solve the problems present there. Therefore, it is considered that the movements performed during a match undergo adaptations arising from the context of the game and are influenced by experience in the game, motor components, the individual experiences of each player, physical development, and psychological aspects, in addition to the tactical scenario to which they are exposed. Individual techniques can be classified and divided into passing, shooting, receiving, dribbling and feint, marking, and heading [16].

From this context, it was observed that studies with young schoolchildren practicing futsal have not systematically considered whether efficient movements in the playing space corroborate with better technical efficiency. This is important because the correct management of the playing space contributes to the resolution of match interactions [17], favouring the effective occupation of the playing space, maintenance of ball possession, progression through the playing court, and completion in the opponent's goal [18]. In addition, the present study has a practical justification by providing data to coaches so they can improve training, considering technical efficiency as something linked to the tactical dimension of the game, in which the efficient movement of players can advance motor performance actions. Therefore, the aim of the study was to analyse the significance and magnitude of the correlation between the offensive tactical efficiency and technical actions performed by schoolchildren practicing futsal during a reduced game in the GR3-3GR test format. Our initial hypothesis was that players who place themselves efficiently on the field tend to show better performance in the technical actions of the game.

Material and methods

Participants

The study included 33 male students, futsal practitioners, enrolled in a private educational institution in the city of Maringá, Brazil, with a tradition of training and competitions. The players were aged between 9 and 14 years and were grouped in the categories U-10 (21 players), U-12 (6 players), and U-14 (6 players). All subjects participated in training offered by the school and competed in local competitions. The following inclusion criteria were adopted: (I) enrolled in the selected school; (II) participated in training with a frequency equal to or greater than once a week; and (III) presented the free and informed consent form (ICF) signed by the parents or guardians.

Procedures

Tactical and technical actions were recorded using a Canon PowerShot SX 510 HS digital camcorder positioned above the game plan to capture the entire length of the court. In each evaluated category, the subjects performed the GR3-3GR test [19] on the school's court (dimensions 26 m \times 15 m), with a duration of four minutes. Each practitioner played only once and was evaluated within their age category.

Instruments

The analysis of tactical actions was carried out through the System of Tactical Assessment in Soccer (FUT-SAT), based on the recorded videos. Although this instrument was initially developed by Teoldo et al. [17] to be used during the stages of sports training in football, several studies in the literature have used the tool for futsal analysis. In addition, fundamental tactical principles were considered for the analysis of procedural tactical knowledge in both modalities in the mentioned studies and also in other research [20, 21]. The test evaluates the management of the playing space, considering the actions of the players with the ball, their teammates, and opponents. Furthermore, the quality of execution of the following offensive fundamental tactical principles was observed: penetration, offensive coverage, depth mobility, width and length (with and without ball), and offensive unit. The analysis was performed by one researcher with experience in tactical and technical analyses in futsal, duly certified and qualified for tactical evaluation through the FUT-SAT tool, which obtained reliability values above

81% concerning the original protocol. Intra-observer reliability was performed through 747 actions (18.48% of the total), obtaining an intra-observer reliability value of 92.13%. Soccer View® software was used for tactical analysis of the videos, as this tool enables spatial references to be inserted that aid the rigorous evaluation of movements.

With regard to technical execution, an observational methodology proposed by Maarseveen et al. [22] was used to assess the quantity and quality of technical actions, considering three different functions of the player: striker with ball, striker without ball, and defender. In the present study, the offensive technical variables were considered: kick on goal, pass, reception, and 1×1 duel [22]. The technical actions were analysed using the Lince® software [23].

Statistical analysis

To verify the associations between technical actions and efficiency in offensive core tactical principles, the Spearman correlation coefficient and correlational network analysis were employed. Each variable was represented by a node in the graph, and its association was presented though the edges between the nodes. The widths of the edges indicate the strength/degree of the correlation [24]. To identify the network's centrality, the indicators strength, closeness, and betweenness were used. The R (version 3.5.1) and R Studio (version 1.1.456) software and the Qgraph package were utilised. Significance was set at 5%.

Ethical approval

The research related to human use has complied with all the relevant national regulations and institu-

tional policies, has followed the tenets of the Declaration of Helsinki, and has been approved by the authors' institutional review board (approval No.: Proc. 2.853. 653).

Informed consent

Informed consent has been obtained from all individuals included in this study and their legal guardians.

Results

Table 1 presents the characteristics of the students practicing futsal based on the technical and tactical actions performed.

Figure 1 presents the network of correlations between the technical actions and the efficiency in the core tactical principles (p < 0.05). It can be observed that both offensive principles which players perform in contact with the ball ('Penetration' and 'Width and Length with Ball') presented significant correlations with technical actions. The tactical principle 'Penetration' was positively correlated (r = 0.41; p = 0.01) with the 'Receiving' technical action, evidencing that a higher frequency and quality of receiving the ball is directly related to the effectiveness of performing this individual tactical behaviour during the match.

Figure 1 also shows that the efficiency of offensive tactical principles near the game centre and performed with the ball, represented by 'Penetration' and 'Width and Length with Ball', are directly related (r = 0.49; p = 0.01). In addition, the same positive association was demonstrated by the efficiency in the offensive tactical principles far from the game centre, represented by 'Offensive Unity' and 'Depth Mobility' (r = 0.41; p = 0.01).

Table 1. Descriptive statistics of technical action	ns and offensive	core tactical	principles	performed by	youth futsal	players
	during the GK3	-3GK test				

		Median	IR	P25	P75	Min	Max
Technical actions	Shooting (points)	21.00	24.00	6.00	30.00	0.00	54.00
	Passing (points)	9.00	11.00	4.00	15.00	0.00	24.00
	1:1 duel (points)	10.00	13.50	4.00	17.50	0.00	48.00
	Receiving (points)	10.00	8.50	6.00	14.50	3.00	19.00
Tactical efficacy	Penetration (%)	50.00	87.30	0.00	87.30	0.00	100.00
	Width and length with ball (%)	80.00	55.00	45.00	100.00	0.00	100.00
	Width and length without ball (%)	87.50	21.96	78.04	100.00	0.00	100.00
	Offensive coverage (%)	90.00	7.73	86.36	94.09	73.08	100.00
	Depth mobility (%)	55.56	100.00	0.00	100.00	00.00	100.00
	Offensive unity (%)	100.00	18.33	81.66	100.00	0.00	100.00

IR – interquartile range, P25 – percentile 25, P75 – percentile 75

Min – minimum observed value, Max – maximum observed value

HUMAN MOVEMENT

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Figure 1. Correlational Network Analysis of technical actions and efficiency in offensive core tactical principles performed by youth futsal players during the GRK-3GK test

Regarding the associations among the technical action variables, Figure 1 shows that the scores in 'Receiving', '1:1 Duel', and 'Shooting' were all positively related. The actions '1:1 Duel' and 'Shooting' presented the strongest correlation (r = 0.61; p = 0.01), followed by '1:1 Duel' and 'Receiving' (r = 0.51; p = 0.01), and finally 'Receiving' and 'Shooting' (r = 0.40; p = 0.01). The efficiency in the offensive core tactical principles 'Offensive Coverage' and 'Width and Length without Ball' and the score in the technical action 'Passing' did not present any significant associations with the other variables.

Lastly, Figure 2 shows the graph centrality indicators 'strength', 'closeness', and 'betweenness' of each technical and tactical variable. The action of 'receiving' the ball and the principle of 'penetration' presented higher z scores in all centrality indicators, illustrating that they are central components in the network, influencing the other variables. The indicator strength is related to the total number and degree of correlations, closeness refers to the proximity to other variables, and betweenness reflects the intermediation relationship that a variable has with two other variables.

Discussion

The main objective of this study was to analyse the significance and magnitude of the correlation between the offensive tactical efficiency and the technical actions performed by schoolchildren practicing futsal during a reduced game in the GR3-3GR test format. Although the most expressive results show a correla-

tion, indicating that players with good ability to perform the 'reception' technical action tend to be more efficient in executing the 'penetration' tactical principle, and that players with less efficiency in the '1×1 duel' end up performing the 'width and length with ball' more efficiently, statistically, this correlation is weak and inconclusive. In contrast to Praça et al. [15] in their study with young federated soccer players aged 14 and 15, who found a low association between tactical performance and specific skills, our study observed that the technical actions obtained from the observational methodology, which favours player decisionmaking processes by using ecological methodological tools, are moderately related to offensive tactical efficiency. The differences in the findings may be related to the method of analysis of the technical variables, as the present study used a protocol for technical and tactical analysis that considers the character of cooperation and opposition present in the game.

Although the literature indicates that offensive coverage is the tactical principle predominantly performed by young players [25, 26], in the present study, the tactical principle that showed greatest efficiency was 'offensive unit'. This might be explained by the fact that these movements are performed far from the game centre, favouring players able to manage the game space with more time and less pressure, presenting a scenario with more freedom and time to act. It may also indicate concern about the loss of ball possession, causing the players to position themselves in the rear, which is in line with the findings of Carneiro et al. [27], who identified a greater number of balls recovered in the defensive sectors of the game.

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Figure 2. Network centrality indicators of technical actions and efficiency in offensive core tactical principles performed by youth futsal players during the GK3-3GK test

In this regard, Ueda et al. [14] found that the young futsal practitioners who most frequently performed the 'offensive unit' principle were those who performed the pass with the highest quality. This principle consists of making movements of approach and support to the attack, building an offensive block that allows the team to add fluidity to the collective game [17].

Furthermore, the results found by Ueda et al. [14] can be explained as the players who execute the 'offensive unit' are in areas of the court with less pressure from opponents, which favours the quality of the pass. In the present study, there was an association between the reception of the ball and efficiency in the tactical principle 'penetration'. In addition, both indicators were presented as central variables in the tactical-technical performance correlation network (Figure 2). The penetration principle is characterised by a movement performed by the player with the ball towards the opponent's bottom line [28]. Based on this definition, good reception and control of the ball is believed to favour efficient progression in the playing space, enabling the ball to be kept close to the feet, generating a greater probability of using dissociative attention in contextual elements of the game [11].

The results of this study also point out that subjects who showed better efficiency in the action of protecting the ball and moving with it to an empty space (side or back) showed less efficiency in the 1×1 duels. Teoldo et al. [25] state that protecting the ball and moving it to an empty space proves to be an intelligent tactical action on the part of the player, when pressed, who intends to gain time-space to make decisions. Thus, it is reasonable to infer that young schoolchildren who are less efficient in overcoming individual marking $(1 \times 1 \text{ duel})$ choose to move back and forth, even with only a little pressure, until they find a more advantageous situation.

As limitations of the study, we highlight: (I) the small number of participants that compose the sample, which weakens the ability to generalise the results found to other populations and game categories; (II) the lack of control over body size variables, since the indicators of physical growth and maturation impact the establishment of connections and the management of the playing space in basic categories; and (III) the absence of inter-observer reliability. On the other hand, the present investigation brings positive contributions to Physical Education, by evaluating the technical actions ecologically, favouring the cooperation and opposition relationships inherent to the modality. As practical applications, these results can help professionals linked to teaching futsal at school understand the importance of teaching techniques for the development of tactical actions throughout the match.

Further studies between the technical and tactical variables should include a larger sample in order to obtain a greater number of actions. In addition, the expansion of the analysis to other categories and higher levels of competitiveness could generate new studies that reinforce or come to oppose the findings of the present study.

Conclusions

It is concluded that, in the scope of futsal practice in schools, tactical efficiency is related to the technical L.S.C. Ueda et al., Relation among tactical and technique

actions performed by young practitioners. Specifically, displacements towards the opponent's bottom line are directly related to the quality of the ball's reception, while players who are less proficient in 1×1 duels prefer to perform movements with the ball to the side and back in order to find viable solutions that guarantee continued possession of the ball for their team. Furthermore, it is evident that the technical action of receiving the ball and the tactical principle 'penetration' are fundamental behaviours that must be stimulated during the teaching-learning process, since they impact the performance of other tactical-technical indicators.

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Disclosure statement

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Conflicts of interest

The authors state no conflict of interest.

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References

- 1. Beato M, Coratella G, Schena F. Brief review of the state of art in futsal. J Sports Med Phys Fitness. 2014;56(4): 428–432.
- 2. Garganta J, Gréhaigne J. Systemic approach in football: vogue or necessity? [in Portuguese]. Movimento. 1999; 5(10):40–50; doi: 10.22456/1982-8918.2457.
- 3. Gréhaigne J-F, Godbout P. Dynamic systems theory and team sport coaching. Quest. 2014;66(1):96–116; doi: 10.1080/00336297.2013.814577.
- 4. Rechenchosky L, Menegassi V, Borges P, Praça G, Greco P, Oliveira A, et al. Decision making in soccer: interactions with physical and technical performance. J Exerc Physiol. 2017;20(3):122–129.
- Cavichiolli FR, Cheluchinhak AB, Capraro AM, Marchi Jr W, Mezzadri FM. Formation process of indoor and outdoor soccer athletes: an ethnographical analysis [in Portuguese]. Rev Bras Educ Fis Esporte. 2011;25(4): 631–647; doi: 10.1590/S1807-55092011000400008.
- 6. Silva GHO, Marques PG, Codonhato R, Borges PH. Analysis of the execution of defensive tactical principles among students practicing futsal [in Portuguese]. Rev Bras Futs Fut. 2019;11(45):490–496.
- Greco PJ, Benda R. Universal sports initiation: from motor learning to technical training [in Portuguese]. UFMG: Belo Horizonte; 1998.

- 8. Kröger C, Roth K, Memmert D. School of the Ball: An ABC for Beginners in Sports Games [in Portuguese]. Phorte: São Paulo; 2002.
- 9. Rink J. Teaching Physical Education for Learning. McGraw-Hill Higher Education: Boston; 2010.
- Teodorescu L. Problems of Theory and Methodology in Sports Games [in Portuguese]. Livros Horizontes: Lisbon; 1984.
- 11. Praça GM, Greco PJ. Tactical Training in Soccer: Theory and Practice [in Portuguese]. Appris: Curitiba; 2020.
- 12. Américo HB, Kowalski M, Cardoso F, Kunrath CA, González-Víllora S, Teoldo I. Difference in declarative tactical knowledge between U-11 and U-15 soccer players. Hum Mov. 2017;18(5):25–30; doi: 10.1515/ HUMO-2017-0045.
- Reis M, Santos J, Matos M, Cruz T, Vasconcellos F, Almeida M. Assessment of the performance of novice futsal players in the execution of futsal-specific motor skills. Hum Mov. 2019;20(3):29–37; doi: 10.5114/ hm.2019.83994.
- Ueda LSC, Menegassi VM, Avelar A, Rechenchosky L, Silva FLO, Borges PH. Analysis of the execution of core tactical principles and technical efficiency of primary school futsal players. Rev Bras Cineantropom Desempenho Hum. 2020;22(2):22:e65221; doi: 10.1590/ 1980-0037.2020v22e65221.
- Praça GM, Soares VV, Matias CJAS, Teoldo I, Greco PJ. Relationship between tactical and technical performance in youth soccer players. Rev Bras Cineantropom Desempenho Hum. 2015;17(2):136–144; doi: 10.5007/ 1980-0037.2015v17n2p136.
- Voser RC, Giusti, JGM. Futsal and School: A Pedagogical Perspective [in Portuguese]. 1st ed. Artmed: Porto Alegre, Brazil; 2002.
- 17. Teoldo I, Garganta J, Greco PJ, Mesquita I, Maia J. System of tactical assessment in Soccer (FUT-SAT): Development and preliminary validation. Motricidade. 2011;7(1):69–83; doi: 10.6063/motricidade.121.
- Bayer C. Teaching Team Sports [in Portuguese]. Dina Livros: Lisbon; 1994.
- 19. Teoldo I, Garganta J, Greco PJ, Mesquita I. Tactical principles of the soccer game: concepts and application [in Portuguese]. Motriz. 2009;15(3),657–668.
- 20. Teoldo I, Guilherme J, Garganta, J. For a Football Played with Ideas [in Portuguese]. 1st ed. Apris: Curitiba; 2015.
- 21. González-Víllora S, Serra-Olivares J, Pastor-Vicedo, JC, Teoldo I. Review of the tactical evaluation tools for youth players, assessing the tactics in team sports: football. Springerplus. 2015;4:633; doi: 10.1186/s40064-015-1462-0.
- 22. Maarseveen MV, Oudejans R, Savelsbergh G. System for notational analysis in small-sided soccer games. Int J Sports Sci Coach. 2017;12(2):194–206; doi: 10.1177/1747954117694922.
- Almeida C, Volossovitch A, Duarte R. Influence of scoring mode and age group on passing actions during smallsided and conditioned soccer games. Hum Mov. 2017; 18(5):125–34; doi: 10.5114/HM.2017.73621.

- 24. Hevey D. Network analysis: a brief overview and tutorial. Health Psychol Behav Med. 2018;6(1):301–28; doi: 10.1080/21642850.2018.1521283.
- 25. Teoldo I, Garganta J, Greco P, Mesquita I, Muller E, Silva B, et al. Comparing tactical behaviours of youth soccer teams through the test "GK3-3GK". Open Sports Sci J. 2010;3:58–61; doi: 10.2174/1875399X01003010 0058.
- 26. Müller E, Garganta J, Santos RMM, Teoldo I. Tactical behaviour and performance: comparative study between soccer and futsal players [in Portuguese]. Rev Bras Cienc Mov. 2016;24(2):100–109.
- 27. Carneiro ML, Reis MAM, Petiot GH, Silva TCA. Analysis of patterns of ball recovery in youth futsal. Hum Mov. 2021;22(3):84–91; doi: 10.5114/hm.2021.100327.
- Borges PH, Guilherme J, Rechenchosky L, Costa LCA, Rinadi W. Fundamental tactical principles of soccer: a comparison of different age groups. J Hum Kinet. 2017;58:207–214; doi: 10.1515/hukin-2017-0078.