

# Relationship between tactical and technical performance in youth soccer players

## *Relação entre desempenhos tático e técnico em jovens jogadores de futebol*

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**Abstract** – Soccer performance is multifactorial and is characterized by the interaction of technical, tactical, physical, physiological, and psychological components; however, few studies have investigated the direct relationship between these components in soccer players. The aim of this study was to evaluate the correlation between tactical performance indices (offensive and defensive) and passing, dribbling and shooting technical skills. The FUT-SAT test was used to evaluate tactical behavior and the General Soccer Ability Skill Test Battery to assess technical performance. The Shapiro-Wilk normality test and Spearman's correlation coefficient were used for statistical analysis. A low correlation was observed between tactical indices (offensive and defensive) and technical skills (shooting, pass and dribbling). Low correlations were also found between the dribbling skill and penetration/width and length with the ball, and between the shot on goal skill and shooting on goal during the game. These results indicate a gap between the knowledge of “how to do it”, i.e., technical skills, and the knowledge of “what to do”, i.e., tactical knowledge. This gap highlights the need to improve the assessment of technical skills, which should also occur in the game context, such as small-sided games. We conclude that offensive and defensive tactical performance is poorly correlated with passing, dribbling and shooting technical skills in youth soccer players.

**Key words:** Physical education and training; Soccer; Task analysis and performance.

**Resumo** – Componentes técnicas, táticas, físicas e fisiológicas participam no desempenho de jogadores de futebol, contudo, pouco investigou-se acerca das relações entre estas variáveis. Este estudo objetivou comparar o Índice de Performance Tática – Ofensivo e Defensivo – com o desempenho técnico em condução, passe e chute a gol. Utilizou-se o FUT-SAT para avaliar o comportamento tático, e o teste de habilidades e destrezas técnicas, para avaliar o desempenho técnico dos futebolistas. Realizou-se a análise estatística através do teste de normalidade de Shapiro-Wilk e do coeficiente de correlação de Spearman. Observou-se uma correlação de baixa intensidade entre os Índices de Performance Tática ofensivo e defensivo e o desempenho nos testes de remate, passe e condução, e uma baixa correlação entre condução e Penetração/Espaço com bola e remates à baliza. Os resultados apontam para o distanciamento entre saber “como fazer”, ou seja, dominar a habilidade técnica, e o saber “o que fazer”, entendido como o conhecimento tático, na medida em que é necessário que a avaliação do desempenho técnico se dê também em contextos mais próximos do jogo de Futebol, a exemplo de situações de Pequenos Jogos. Conclui-se que a performance tática – ofensiva e defensiva – de jovens jogadores de futebol relaciona-se em baixa intensidade com o desempenho técnico em condução, drible e remate ao gol.

**Palavras-chave:** Análise e desempenho de tarefas; Educação física e treinamento Futebol.

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## INTRODUCTION

Because of its unpredictable, random and complex nature<sup>1</sup>, soccer requires from its players a permanent tactical-strategic attitude<sup>2,3</sup>, directed at solving problem situations that emerge within the person-task-environment relationship<sup>4</sup>. Within this context, cognitive processes that underlie decision-making permit the player to propose solutions to problem situations that emerge from the game<sup>1,5-7</sup>.

With respect to solving tactical problems that direct the action in team sports<sup>4,7</sup>, including soccer, performance components do not manifest themselves in a separate manner, but rather as a whole where each component interacts with the others and reveals sports performance<sup>8</sup>. During a game, tactically the player should know “what to do” and, to solve the subsequent problem, i.e., the “how to do it”, the player should select and use the most adequate motor response in an intelligent and/or creative manner<sup>7</sup>. Hence, the technical actions characteristic of a soccer game, such as shot on goal, passing and dribbling, emerge from decisional processes, i.e., the choice of “what to do”<sup>3</sup>. The action in team sports must therefore be understood based on the inseparable relationship between tactical and technical skills.

Studies have analyzed the tactical behavior of soccer players at different ages and positional statuses using the System of Tactical Assessment in Soccer<sup>9</sup> (FUT-SAT)<sup>10,11</sup>. The FUT-SAT test permits to evaluate tactical behavior based on 10 core tactical principles, including five for the defensive phase (delay, defensive coverage, concentration, balance between recovery and defense, and defensive unity) and five for the offensive phase (penetration, offensive coverage, depth mobility, width and length (with and without the ball), and offensive unity). Two indices can be obtained from these indicators: the offensive tactical performance index (TPI-O) and the defensive tactical performance index (TPI-D)<sup>9</sup>, which indicate specific knowledge of the soccer player about tactical actions during a game. Two of these principles are directly related to dribbling on the pitch: penetration and width/length (with the ball).

With respect to the technical component, studies have used the protocol of Mor and Christian<sup>12</sup> and reported a low correlation between technical and physical performance<sup>13</sup> and improvement of technical performance when the training emphasis was on tactical rather than technical skills<sup>14</sup>. This test evaluates the actions of dribbling, shooting on goal and passing, technical skills considered to be fundamental for soccer performance<sup>15</sup> and frequently addressed in other protocols. Although this protocol was published more than 30 years ago, it continues to be applied in scientific studies.

Knowledge of the interactions between technical skills and tactical knowledge in soccer is fundamental for the understanding of team sports performance and consequently for the adaptation of teaching-learning-training processes to sporting demands.

Although the high time pressure characteristic of soccer simultaneously requires from its players elevated technical and tactical performance,

little attention has been given so far to the knowledge of the relationships between these components, indicating a gap that should be filled to assist coaches with the correct assessment of athlete performance. Therefore, the objective of the present study was to verify the relationship between tactical performance indices (offensive and defensive) and technical skills in federated male youth soccer players. It is expected that the findings of this study permit the reflection of coaches about soccer player assessment.

## METHODOLOGICAL PROCEDURES

This study was approved by the Ethics Committee of the Federal University of Minas Gerais (Universidade Federal de Minas Gerais) (Protocol No. ETIC 0218.0.203.000-10).

### Sample

The sample of this study was chosen in a non-random manner by judgement sampling and consisted of 24 federated male soccer players aged between 14 and 15 years. The athletes belonged to a soccer team from the city of Belo Horizonte that participated in national competitions. The athletes trained on average 5 times per week and had a mean of  $4.3 \pm 1.2$  years of experience. These ages were chosen since they are the first to participate in national youth soccer competitions in Brazil.

### Tactical and technical tests

The tactical and technical tests were performed on a soccer field with a grass surface during the same session of data collection in a random order. The technical skills test lasted approximately 45 minutes and consisted of dribbling, shooting on goal and passing, in this order. The duration of the tactical behavior test was 24 minutes. The test consisted of 6 small-sided games of 4 minutes each, with a configuration of (GK+3)x(3+GK) (three field players plus one goalkeeper per team). The test is described in detail in the item Instruments.

### Instruments

- **Tactical behavior:** The FUT-SAT test<sup>9</sup> was used to evaluate the tactical behavior of soccer players and to obtain TPI-O and TPI-D, in addition to data regarding penetration and width/length with the ball. For this purpose, the players participated in a small-sided game with a functional structure of (GK+3)x(3+GK) whose objective is similar to that of a formal game: to score the largest number of goals possible and to prevent the other team from scoring. The test was performed in a space of 36 x 27 meters demarcated with cones and two goals (6 x 2 meters), with each game lasting 4 minutes. Data such as the tactical principle used, place of action in the game field, and action outcome were extracted from this test. The data extracted were used to obtain the TPI-O and TPI-D. These indices were calculated as the ratio of the product of the sum of tactical actions in relation to the four items

(performance of the principle, quality of principle performance, place of action in the game field, and action outcome) and total number of tactical actions. The calculations were made in *ad hoc* Excel spreadsheets. The procedures and weights attributed to each category have been described by Costa et al.<sup>9</sup>

- **Technical skills** - The General Soccer Ability Skill Test Battery proposed by Mor and Christian<sup>12</sup> was used to evaluate the technical skills of the players. In this battery, the performance of the players in dribble, pass and shot on goal tests was evaluated. In the dribble test, the performance of soccer players is evaluated based on the time spent running a previously known trajectory, dribbling the ball. The shorter the time spent, the better the performance. For the pass and shot on goal tests, the players should shoot at previously established targets and the highest scores are obtained as they hit the positioned targets.

### Quality of the data

For the FUT-SAT data, inter- and intra-rater reliability was tested using Cronbach's alpha coefficient. The results showed inter-rater agreement higher than 0.995 ( $p=0.0001$ ) and intra-rater agreement higher than 0.989 ( $p=0.0001$ ) for the tactical principles place of action and action outcome.

### Data analysis

First, the Shapiro-Wilk test was applied to determine whether the data showed a normal distribution. Since the results showed significant deviation from normality, nonparametric statistical tests were used, including Spearman's correlation matrix. For the tactical and technical variables, positive correlations indicate an increase in the value of one item followed by an increase in the corresponding item, while negative correlations indicate an increase in the value of one item followed by a reduction in the value of the other. For the dribble variable, the values obtained by the athletes correspond to the total time spent over the course, i.e., the lower this value, the better the performance of the athlete. For this item, positive correlations indicate that an increase in a given variable is associated with poorer dribbling performance (increase in total dribbling time) and negative correlations indicate that higher values of a variable are associated with improved dribbling performance (reduction in total dribbling time). The data were analyzed with the SPSS 20.0 statistical software.

## RESULTS

Table 1 shows the correlation between performances in the skill test battery and tactical performance indices obtained with the FUT-SAT.

As can be seen in Table 1, the dribble variable was positively correlated with shot on goal and TPI-O (significant for shot on goal) and negatively correlated with pass and TPI-D (no significant correlations). In contrast, the variables related to tactical behavior showed a significant negative cor-

relation with each other (-0.623). This result indicates that an increase in offensive tactical performance is strongly associated with a reduction in defensive tactical performance.

**Table 1.** Spearman correlation matrix between performance in the technical tests and tactical performance indices.

Variable	Dribble	Pass	Shot on goal	TPI-O	TPI-D
Dribble	1	-0.204	0.394*	0.342	-0.037
Pass	-0.204	1	-0.23	-0.252	0.127
Shot on goal	0.394*	-0.23	1	0.367	0.033
TPI-O	0.342	-0.252	0.367	1	-0.623*
TPI-D	-0.037	0.127	0.033	-0.623*	1

\* Significant correlation ( $p < 0.05$ ). TPI-O: offensive tactical performance index; TPI-D: defensive tactical performance index.

Among the core tactical principles, two are characterized by the need for ball possession: penetration and width/length with the ball. In both cases, the players dribble the ball across the pitch, in the first with movements towards the opponent's goal and in the second with lateral movements or movements to distant zones of the pitch. Table 2 shows the intensity of correlation between the occurrence of these two principles and the result of the dribble test. For this purpose, the principles were divided into positive execution, negative execution, and total number of executions. Additionally, the overall number of actions related to dribbling is reported.

**Table 2.** Correlation between performance in the dribble test and tactical principles related to dribbling.

		Total number of penetrations	Positive penetrations	Negative penetrations	Total width/length with the ball	Positive width/length	Negative width/length	Total number of dribbling actions
Time in the dribble test	Correlation coefficient	-0.072	-0.125	0.014	0.029	-0.171	0.538*	-0.136
	p	0.739	0.561	0.947	0.895	0.426	0.007	0.525

\* Significant correlation at  $p < 0.01$ .

A significant ( $p < 0.01$ ) and positive (0.538) correlation was observed between dribbling performance and the incidence of tactical actions of width/length with a ball with negative characteristics. No significant correlations were observed for the other variables.

Furthermore, the game performed to evaluate tactical performance with the FUT-SAT protocol was organized in a manner similar to that of a formal game and even included targets (goals) and goalkeepers to defend them. Therefore, the athletes had the objective to create situations of shooting the ball at goal and scoring goals. The number of shots on goal per player was thus quantified and a correlation was observed between this result and performance in the shot on goal test. A correlation of 0.188 was detected between the incidence of shots on goal in the (GK+3)x(3+GK) game and shot on goal performance in the Mor-Christian test<sup>12</sup>.

## DISCUSSION

The present study demonstrated a relationship between technical capacity, evaluated by testing motor actions independently of the game context, and tactical behavior, evaluated in a small-sided game [(GK+3)x(3+GK)] using the FUT-SAT protocol. The main finding of this study was the low correlation between the technical skills of dribbling, passing and shooting on goal and offensive (0.342, -0.252 and 0.367, respectively) and defensive tactical performance (-0.037, 0.127 and 0.033, respectively).

Two different processes are used to evaluate technical actions in soccer. On the one hand, studies<sup>13,16,17</sup> have adopted instruments designed to identify the level of technical skills in controlled situations in the absence of opposing players and complex decisional processes and in discrete tasks<sup>12,18-21</sup>. In those studies, performance is associated with the ability to execute movements at the highest velocity possible (in the case of dribbling actions and change of direction). On the other hand, studies using small-sides games<sup>22</sup> quantified technical actions in the game context by recording the number of passes, dribbles, shots and duels. These studies identified the total number of actions and the percentage of correct actions as indicators of technical performance<sup>23-25</sup>.

Based on the paradigm of assessment represented by technical tests similar to the protocol used in this study<sup>12</sup>, coaches can assess in a strictly controlled environment the technical performance of players in motor actions inherent to the demands of a soccer game<sup>15</sup>. In this respect, it was observed that the demonstration of elevated levels of technical skills may not correspond to their correct use in the tactical context of the game. For example, the low association between performance in the dribble test and efficiency in the utilization of penetration during the offensive phase reveals that components complementary to technical prowess, and notably associated with decisional capacity, act in the random, unpredictable and complex context of the soccer game<sup>1</sup>. It is initially assumed that the motor action, i.e., the execution of the technique, even when measured separately from the other performance components, is a good indicator of the athlete's technical ability shown during a game and can therefore be used by coaches for the control of training processes. However, the findings of the present study indicate that technical performance evaluated in situations of low situational demands, i.e., tactical-cognitive or technical skills tests outside the game context, shows a low association with tactical performance in the situation of a reduced game.

Also within this context, the core tactical principles that are directly associated with ball possession – penetration and width/length with the ball<sup>26</sup> – showed low correlations with the results of the athletes in the dribble test. Additionally, the number of shots on goal in the small-sided game were poorly correlated with performance in the shot on goal test. This result indicates that the accuracy of the technical test is insufficient to encourage players to use the dribbling and shooting actions in complex

contexts, such as a game<sup>27</sup>. It can therefore be speculated that structures other than the technical component interfere with the athlete's capacity to use the technical skills shown in the test in the context of the game.

In the technical skills test used in the present study<sup>12</sup>, the athlete should completely focus his attention on the execution of the sports technique, with internal focus on the execution of the movement. In contrast, in the context of a small-sided game as well as a formal game, the amount of information to be observed and analyzed implies the attention to be divided between motor execution and the perception of stimuli for correct decision-making, with greater demand for the external focus of attention<sup>5</sup>. Thus, an increase in the variability of the requirements requested by a game is observed, in which factors such as experience, competitive level<sup>28</sup> and time pressure<sup>5</sup> manifest in the actions of players and interfere at times when rapid visual information processing is required and motor actions need to be performed with maximum accuracy<sup>16</sup>.

Furthermore, in soccer, it is impossible to accurately predict the sequence of actions that will be performed during a game, a characteristic resulting from the random, unpredictable and complex context of team sports<sup>1</sup>. Good technical performance therefore requires stable structures that are able to elicit similar responses in similar contexts, as well as flexible structures that are able to permit the execution of a technique based on the person-environment-task relationship, i.e., in a game situation.

The evaluation of technical behavior in team sports, including soccer, should provide the coach with tools that permit to assess the technical performance of his athletes in a context of greater control characteristic of the protocol used in this study, but also to establish a link with the true context of interaction with tactical behaviors as demonstrated in studies on small-sided games<sup>23-25</sup>. In this respect, the solution of current problem situations during a sports action concomitantly relies on the knowledge of "how to do it" – the application of a specific motor action to a task – and "what to do" – the selection of responses to environmental constraints based on cognitive processes. From this point of view, determination of the performance of soccer athletes should provide an understanding of the interactions established between the knowledge of "what to do" – tactical component – and of "how to do it" – technical component – and consequently permit the correct planing of the teaching-learning-training process according to the necessities of the athletes and the game concept/model adopted by the coach/team. Thus, knowing "what to do" and "how to do it" (tactical and technical, respectively) potentiate and limit each other and the action performed by the player is the demonstration of the interaction between both.

Also in this respect, it is believed that the differentiation between "knowing what to do" and "knowing how to do it" is insufficient to fully assess the well-known multifactorial performance characteristic of soccer. It is therefore suggested that the assessment using controlled protocols, as proposed by Mor and Christian<sup>12</sup>, also includes evaluation in the context

of the game characterized by the permanent interaction with decisional components that underlie the decision-making in team sports<sup>1,5,7</sup>.

The present findings need to be interpreted with caution considering the population among which the sample was selected and the characteristics of the protocol adopted for technical evaluation in this study. In this respect, different performance levels, i.e., beginner or elite athletes of the modality, may present specific game demands that lead to distinct decisional processes and consequently different potentials in the use of a sports technique in the game context. Further studies involving a broader sample in terms of competitive levels, age and gender, as well as studies using other protocols to evaluate technical skills in soccer players, should therefore be conducted.

Finally, we propose that tactical and technical behaviors, as well as the training of soccer athletes, are evaluated using means that reproduce the true demands of a game characterized by the permanent interaction between tactical-technical components in a complex decisional context<sup>1,3</sup>. In this respect, small-sided games<sup>22</sup> are important tools for both assessment and training, which reflect the permanent use of techniques (passing, dribbling, shooting, etc.) contextualized as a function of cognitive processes that affect the decision-making. In addition to tactical-technical actions, physiological responses and motor variables<sup>22</sup>, as well as their respective interactions, also need to be investigated in these games in order to determine the full performance of players. It is important that new results permit to evaluate not only the effects of alterations in the configuration of small-sided games on the responses of athletes, but also the use of this tool for the process of teaching-learning-training of tactical-technical contents.

## CONCLUSIONS

Tactical performance showed a low correlation with performance in the technical skills of dribbling, passing and shot on goal in soccer players. Specifically, a low correlation was observed between performance in the dribble test and the tactical principles penetration/width and length with the ball, and between performance in the shot on goal test and shooting on goal during the game. The results indicate a gap between the evaluation of technical performance in discrete, poorly complex and predictable situations and the adaptive demand generated by a soccer game.

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