



RELATIONSHIP BETWEEN IMPULSIVENESS AND TACTICAL PERFORMANCE OF U-15 YOUTH SOCCER PLAYERS

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ABSTRACT

Purpose. The aim of this study was to examine the relationship between impulsiveness and tactical performance of U-15 youth soccer players. **Methods.** The sample comprised 100 U-15 youth soccer players. Impulsiveness and tactical performance were assessed using the Continuous Performance Test-II (CPT-II) and the System of Tactical Assessment in Soccer (FUT-SAT), respectively. FUT-SAT enables evaluation of ten core tactical principles of soccer game: (i) penetration; (ii) offensive coverage; (iii) depth mobility; (iv) width and length; (v) offensive unity; (vi) delay; (vii) defensive coverage; (viii) balance; (ix) concentration; and (x) defensive unity. Impulsiveness values were obtained using the Omission and Commission Error analysis. Tactical performance values were obtained through the Game Tactical Performance Index (GTPI), Offensive Tactical Performance Index (OTPI) and Defensive Tactical Performance Index (DTPI). The Kolmogorov–Smirnov test and Spearman’s Correlation one were performed ($p < 0.05$) through SPSS, v. 22. **Results.** We observed a positive correlation between impulsiveness and GTPI ($\rho = 0.226$; $p = 0.018$). **Conclusions.** It is concluded that impulsiveness is related to tactical performance of U-15 youth soccer players.

Key words: soccer, impulsiveness, tactical performance

Introduction

Tactical performance in soccer and the cognitive processes related to decision-making have been associated with the efficiency of game actions, and consequently with sport expertise [1, 2]. Tactical performance can be defined as the result of individual and collective actions performed in the game [3]. Thus, the knowledge about tactical domain must be examined through the assessment of both individual performance and players’ interactions, as well as the factors which may affect these interactions [4, 5].

One of these factors that may influence the performance of players and have been associated with players’ behaviour is impulsiveness. Impulsiveness can be defined as the tendency to inhibit responses to a lesser extent than in most people before taking an action [6]. Previous studies involving impulsiveness and motor behaviour identified differences among people due to response inhibition in a determined task [7–10].

In this respect, investigations have examined impulsiveness in sports. In one of these investigations, Svebak and Kerr [11] examined the relationship between impulsiveness and sport preference in an Australian sample. They found that people engaged in explosive sports (e.g. soccer) obtained higher scores on impulsiveness measures than people who prefer an endurance sport. Recently, in a study involving team sports, Lage

et al. [12] investigated the relationship between impulsiveness and technical performance of handball players. They found that high scores on impulsiveness (i.e. more impulsive people) produce errors in game responses. Although some cases of impulsiveness are related to negative factors, there is no unanimity regarding its effect in sports responses.

Therefore, studies related to physical and technical variables present in literature advance with studies that investigate the influences of impulsiveness in sports. However, studies involving tactical components are scarce and this variable demands further attention, as the quick action responses might directly influence the tactical response and consequently team performance [12, 13]. Thus, the aim of this study was to examine the relationship between impulsiveness and tactical performance of U-15 youth soccer players.

Material and methods

Sample

The sample comprised 100 U-15 youth soccer players from soccer clubs and schools from the state of Minas Gerais (Brazil) who performed 6,640 tactical actions. The inclusion criteria were: (i) players from clubs and soccer schools must participate in regular training sessions, at least three times a week; (ii) they must participate in competitions at regional level.

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Categories	Sub-Categories	Variables	Definitions
Tactical Principles	Offensive	Penetration	Movement of player with the ball towards the goal line.
		Offensive Coverage	Offensive supports to the player with the ball.
		Depth Mobility	Movement of players between the last defender and goal line.
		Width and Length	Movement of players to extend and use the effective play-space.
		Offensive Unity	Movement of the last line of defenders towards the offensive midfield, in order to support offensive actions of the teammates.
	Defensive	Delay	Actions to slow down the opponent's attempt to move forward with the ball.
		Defensive Coverage	Positioning of off-ball defenders behind the "delay" player, providing defensive support.
		Balance	Positioning of off-ball defenders in reaction to movements of attackers, trying to achieve the 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.

Figure 1. Ten core tactical principles of soccer [14]

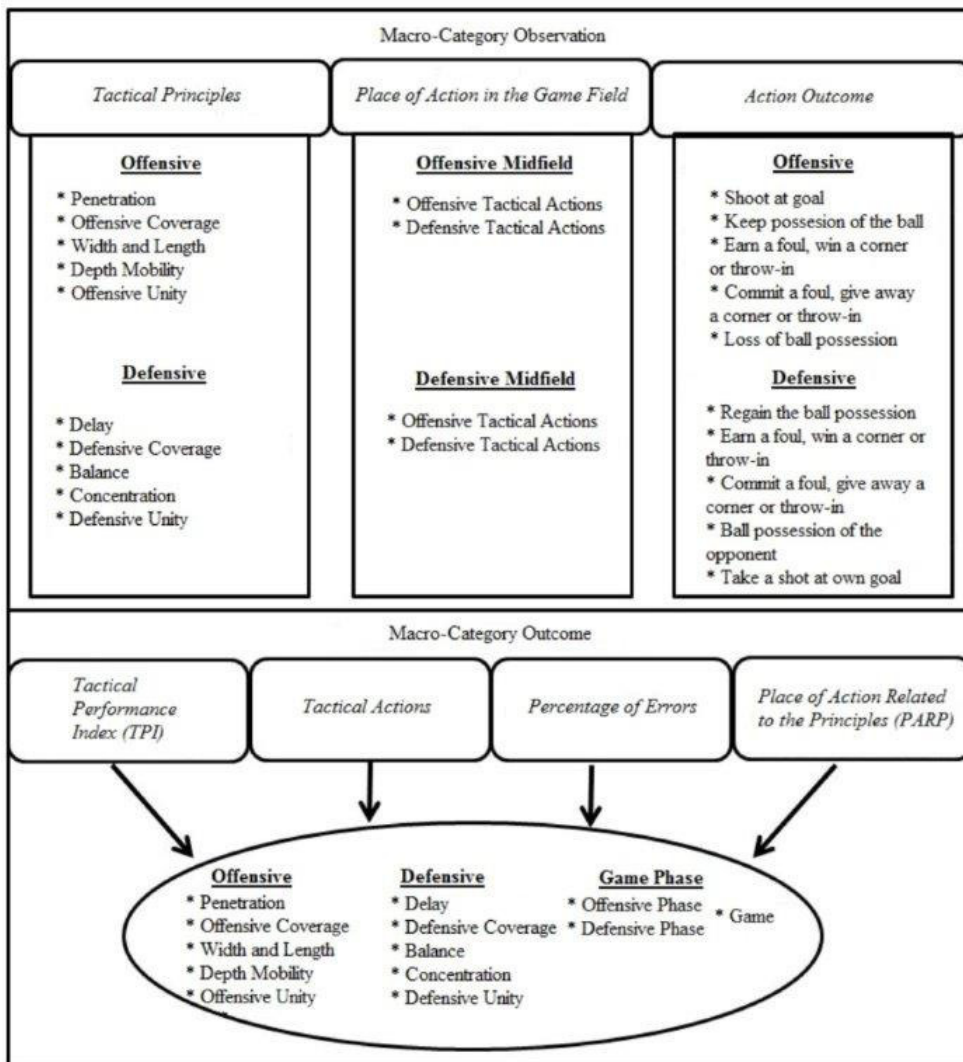


Figure 2. The Macro-Category Observation and Macro-Category Outcome of FUT-SAT [14]

Instruments for data collection

As a means to assess the tactical performance, the System of Tactical Assessment in Soccer (FUT-SAT) [14] was used. This system enables the evaluation of tactical actions according to ten core tactical principles of soccer, as shown in Figure 1.

The FUT-SAT comprises two macro-categories (Figure 2). The Macro-Category Observation refers to aspects that can be assessed in the instrument. The Macro-Category Outcome refers to results provided by the instrument.

Regarding the assessment of impulsiveness, the Continuous Performance Test (CPT-II) was used [15]. This instrument is performed via computer and enables evaluation of processes related to vigilance, response inhibition, signal detection, and other aspects of performance, among them, attentional and motor impulsiveness.

Ethical procedures

This research was approved by the Research Ethics Committee from Universidade Federal de Viçosa, Brazil (Of. Ref. N. 132/2012/CEPH) and meets the norms established by the National Health Council (CNS 466/2012) and by the Declaration of Helsinki (1996). To participate in this research, players and parents/tutors were previously contacted and provided with the information about research procedures and thereafter they signed an informed consent. Data collection began after parents/tutors had authorized players to participate in the research. Players were free to withdraw from the study at any moment.

Data collection procedures

In order to assess tactical actions, the FUT-SAT field test (GK+3 vs. 3+GK) was conducted. The structure of the test consists of a small-sided game (playing area is 36 m long by 27 m wide) in which players are divided into two teams, each with 3 outfield players and a goalkeeper, who wear numbered vests. Players are asked to play for four minutes according to the rules of soccer, except for the offside rule. Prior to the start of the test, players are given 30 seconds to familiarize with the activity. The field tests were filmed and recorded on a digital camera (Sony HDR-XR100). Video footage was introduced in digital format in a laptop (POSITIVO Premium 4A015RX8T) via USB cable and converted into AVI format through Format Factory Video Converter software. For video processing and analysis, Soccer Analyser[®] software was used. The Soccer Analyser[®] software enables assessment of the tactical actions performed by participants, as it is possible to calculate the Tactical Performance Index (TPI) of each soccer player using the following formula:

$$\text{Tactical Performance Index (TPI)} = \frac{\sum \text{tactical actions} (\text{performance of principle} \times \text{quality of principle} \times \text{performance} \times \text{place of action in the game field} \times \text{action outcome})}{\text{number of tactical actions}}$$

In order to assess impulsiveness, the Continuous Performance Test (CPT-II) was used. The test consists in a task in which letters show up randomly and alternately in the centre of computer screen (in this study a POSITIVO Premium 4A015RX8T laptop computer was used). The players sitting in front of the computer screen in a quiet room have to press the spacebar on the computer keyboard when letters appear, except when the letter “X” appears. In this case, the participants should not press the spacebar. The duration of test was fourteen minutes. We used two main scores measured in this test: (i) Omission Errors, which indicates the number of times that the stimuli (non-X letters) appeared and the player did not respond to it. This variable is related to the attentional impulsiveness; and (ii) Commission Errors, which indicates the number of times the player responded when the letter X appeared on the screen. This variable is related to the motor impulsiveness.

Statistical analysis

Initially, descriptive analyses were conducted (means and standard deviations). Tactical performance data were obtained using the Tactical Performance Indexes (TPI) in each game phase: (i) Offensive Tactical Performance Index (OTPI), (ii) Defensive Tactical Performance Index (DTPI), and for both phases of play: (iii). Game Tactical Performance Index (GTPI).

With respect to impulsiveness data, the measures used to analyse participants’ performance were the number of Omission Errors (when the subject omits responses) and Commission Errors (when the subjects give inappropriate responses).

The Kolmogorov–Smirnov normality test was used to verify data distribution. To verify the relation between tactical and impulsiveness measures, Spearman’s Correlation Test was used. For statistical procedures, SPSS (Statistical Package for Social Sciences) v. 22 was used.

Test-retest reliability of the observations was measured using Cohen’s Kappa test. Analyses were verified through the reassessment of 1,260 tactical actions, i.e. 18.97% of the sample, a higher value than that indicated by literature (10%) [16]. Two observers participated in the procedure respecting a three-week interval for reanalysis, thus avoiding task familiarity issues [17]. Values of intra-observer reliability were between 0.885 (SE = 0.009) and 0.929 (SE = 0.009), while values of inter-observer reliability were between 0.847 (SE = 0.033) and 0.958 (SE = 0.014). These values are defined by literature as “almost perfect” [18].

Results

Table 1 presents the correlation between the CPT measures (Omission Errors and Commission Errors) and the Tactical Performance Indexes (Offensive, Defensive, and Game). Positive correlation was observed between CPT Commission and GTPI ($\rho = 0.226$; $p = 0.018$).

For the remaining cases, no significant correlations were found.

Table 1. Correlation between the CPT measures and Tactical Performance Indexes

		OTPI	DTPI	GTPI
Omission Errors	ρ	0.054	-0.150	-0.012
	p	0.579	0.119	0.905
Commission Errors	ρ	0.165	0.030	0.226
	p	0.086	0.753	0.018*

* significant correlation at $p < 0.05$

Discussion

Assessment of cognitive processes and how these processes affect the performance have received some attention in recent years. However, specific studies that assess the influence of impulsiveness in soccer (mainly in tactical aspects) are scarce. Accordingly, the aim of this study was to examine the relationship between impulsiveness and tactical performance of U-15 youth soccer players.

Results displayed positive correlation between impulsiveness and Game Tactical Performance Index (GTPI). Players who committed more errors by commission (i.e. executed quicker decisions and consequently more mistakes) have displayed higher tactical performance than others. These data suggest that impulsive players may present higher scores of tactical performance compared to less impulsive players.

In this respect, a pioneer investigation conducted by Vestberg et al. [19] suggested that specific cognitive processes predict the success of soccer players. When discussing their findings, the authors suggest that what is demanded of a “successful player” is not only quickness of decisions during actions, but also quick inhibition of planned decisions. In this context, this research corroborate with findings from other studies which demonstrated that more impulsive people showed more accuracy than less impulsive people when the time available for decision-making is extremely short [6, 20].

Although game accuracy aspects might decrease as the time set to perform actions decreases, the results of this research suggest that high tactical performance is positively related with quick responses. Errors by commission are related with quickness in motor responses [15] and it seems to be a positive factor for tactical de-

mands, whereas game success depends on risk choices even when mistakes are made. Thus, players’ behaviour should be guided by the need to perform tactical principles within the shortest possible time, once tactical management efficiency is closely related to response quickness such as space creation that may influence other game demands [21, 22].

Therefore, in learning/training process, the efficient execution of tactical principles is related to quick game responses. Accordingly, such responses might be influenced by impulsiveness. However, there are few studies investigating the role of impulsiveness in soccer tactical performance. Thus, we suggest further investigation regarding impulsiveness in different samples, age groups and expertise level to better understand its role in soccer.

Conclusions

1. We concluded that motor impulsiveness was related to tactical performance of U-15 youth soccer players. Players that are more impulsive presented higher tactical performance in the game.

2. The attentional impulsiveness did not show correlation to tactical performance of U-15 youth soccer players.

3. This study furthers the knowledge about players’ impulsiveness and how it is related to the tactical domain in soccer. However, more research is necessary.

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