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Original Article

EARLY FUTSAL EXPERIENCE AND SOCCER TACTICAL PERFORMANCE. A COMPARATIVE STUDY IN BRAZILIAN PLAYERS

EXPERIÊNCIA PRÉVIA NO FUTSAL E DESEMPENHO TÁTICO NO FUTEBOL. UM ESTUDO COMPARATIVO EM JOGADORES BRASILEIROS

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RESUMO

Futsal pode influenciar as habilidades do futebol devido adoção de restrições que melhoram a adaptação e geram melhor desempenho. Pouco se sabe sobre a prática inicial do futsal no conhecimento tático no futebol tardiamente. Um estudo transversal foi conduzido para verificar a associação entre a experiência no futsal e o conhecimento tático no futebol. Setenta e um jogadores foram avaliados quanto à experiência no futebol e futsal, idade, classificação e posição. Um questionário de histórico esportivo foi aplicado, juntamente com a avaliação do conhecimento tático declarativo (DTK) e processual (PTK). Partidas oficiais foram selecionadas para análise do PTK, subdivididas em ações realizadas (PAM) e não realizadas (NPAM) por minuto e princípios táticos ofensivos. Não houveram diferenças para nenhuma variável independente quanto à experiência no futsal ou nível de competição com o DTK e PTK, sem correlação entre ambas. Houve diferença para "Club Rank" ($p<0,05$) favorecendo Rank A em PTK e PAM. Na amostra geral (71) para DTK, Rank C apresentou pontuações mais altas, não sendo mais encontradas na subamostra (29) ($p=0,078$). Sugerimos que a experiência no futsal não medeia um melhor desempenho tático tardiamente no futebol. Estudos futuros devem avaliar o desempenho tático em relação à competência percebida pelo jogador.

Palavras-chave: futebol; futsal; conhecimento tático; comportamento tático; desempenho esportivo.

ABSTRACT

Futsal practice could influence soccer skills due to adoption of constraints enhancing adaptation and leading to a better performance. However, little is known about early futsal practice on later soccer tactical knowledge. A cross-sectional study was conducted to verify the association between early futsal experience and tactical knowledge in soccer. Seventy-one soccer players were assessed regarding soccer and futsal experience, starting age, player ranking and position. A sports history questionnaire was applied, along with assessment of declarative tactical (DTK) and procedural (PTK) knowledge in match. Official matches were selected for PTK analysis, subdivided into actions performed (PAM) and not performed (NPAM) per minute and offensive tactical principles. No differences were found for any independent variable regarding futsal experience or competition level with the DTK and PTK in soccer, without correlation between both. There was a significant difference for "Club Rank" ($p<0.05$) favoring Rank A in PTK and PAM, however, for DTK in the overall sample (71), Rank C presented higher scores, which differences were no longer found in the subsample (29) ($p=0.078$). We suggest that earlier futsal experience does not mediate a better soccer tactical performance later on. Future studies should assess tactical performance concerning player perceived competence.

Keywords: soccer; futsal; tactical knowledge; tactical behavior; sports performance.

Introduction

Futsal emerged as a way to endure the lack of soccer fields in the 1930s and 1940s[1]. Despite its predominance, there has been a rise in the availability of public and private facilities for futsal[2], which increases the possibility of practice. From a conceptual point of view, soccer and futsal share the same characteristics, both classified as invasion sports[3] and only differing by the number of players, size, and surface of the field of play, along with some specific rules, type of ball and goal size. Besides these aforementioned characteristics, futsal shares similar tactical components to soccer, such as the creation of free spaces, overcoming pressure from opponents, and control of the ball and its possession[4,5], however, due to the limited space, the

players need to quickly adjust technical and tactical behaviors increasing the frequency of decision-making components.

Regardless environmental differences between both sports, futsal could serve as a better option than small-sided games for soccer development, since different perceptual-motor actions are required due to constraints such as court surface, different types of ball and shoes used[6]. In this context, variability is key to increasing skill learning, whereas the adoption of these constraints would enhance adaptation, as the need for increased ball control skills and higher frequency of passing[7].

In a comparison between futsal and soccer, it was observed that futsal players could demonstrate superior reactive agility and quicker decision-making abilities in comparison to their soccer counterparts, likely attributable to the higher pace of actions and faster decision-making inherent to their sport[8]. It was evidenced that task constraints imposed by the practice of futsal, like using a ball with a low coefficient of restitution, on hard surfaces, or even with high-pressure situations from other players could promote a better development of the soccer passing skill, which accelerated the learning process promoting a crossed skill transfer, due to players capacity to change their attentional focus[9].

However, futsal could have some detrimental aspects for soccer such as not having an offside rule and possibly having an initial struggle when transferring their movement behavior[10]. Through coaches' perceptions, it was found a positive response regarding the potential use of futsal as a tool for talent development in soccer, which skills such as decision-making, ball control, awareness, and passing identified as the most important for both modalities[11]. Through this, there is a need to better understand the factors associated with transference effects between the two practices, such as early experience in futsal.

Nevertheless, it is shown that elite players from Under-16 soccer categories in Brazil, presented, in its majority, an earlier futsal practice history, possibly being a factor to increase skill performance later in their career[12]. Research has suggested there is a potential transfer of decision-making ability from different sports due to their similarity, especially regarding invasion sports[13]. When assessing decision-making skills between groups from related sports with similar components, it appears that there was no difference in the response accuracy, supporting the transfer of learning theory[14].

Due to its relation to tactical knowledge, decision-making skills express the player's competence to incorporate their expertise acquired during years of training with the information provided by the environment leading to select the most suitable action to be performed[15], as well, tactical knowledge refers to the ability to the player perform the appropriated actions in the game scenario with time, task and space constraints[16]. To become an intelligent and creative player, several variables must be managed, including proficiency in controlling space-time dynamics, rhythm, current match scoreline, assessing the quality of opponents, personal limitations, and gauging the team's potential during each play[17], which contribute to the player's capacity to adapt to the game's context[18].

Nonetheless, game performance, technical skills, and tactical skills have three distinct meanings. Game performance encompasses not only technical and tactical proficiency but also demands physical and psychological abilities. Technical skills are related to the specific abilities an athlete needs to perform effective movements (such as dribbling, passing, and shooting). These skills can be evaluated in a controlled scenario, like a closed situation (e.g., dribbling velocity without external interference). As for tactical skills, they refer to an athlete's ability to comprehend and take action in different game situations. Their effectiveness depends on the athlete's decision-making ability and strategic coordination with teammates.

It is evident that futsal could influence later soccer performance regarding an increase in technical skill proficiency, however, this influence in soccer tactical skills development remains to be unveiled. Despite the notable transfer effect of technical skills between futsal and

soccer, measuring technical skill in isolation does not answer the question about the improvement of tactical performance in the game. From a practical point of view, the increase in the performance of tactical skills from futsal to soccer may occur due to factors related to the ability to make decisions quickly in smaller spaces. Despite research having been interested in understanding perceptual-cognitive and decision-making ability, it occurs throughout tactical actions and behavior evaluations in situations without possession of the ball, becoming a limiting factor to assess player's tactical knowledge[19]. Thus, results found through declarative knowledge assessments must be interpreted with caution, since sample characteristics and contextual factors are not accounted, which play a huge role when determining these responses. Therefore, assessing declarative knowledge isolated could be an issue, since perceptual-cognitive tests through video-based analysis, may not be as strong determinants of actual performance as may have previously been assumed[20], and the use of procedural tests becomes necessary to assess tactical knowledge in real game scenarios.

In summary, some gaps could be drawn from the literature. First, the transfer effect of early futsal practice into soccer tactical performance due to its similarity in technical-tactical abilities, which could be an enhancing factor due to decision-making and perceptual-cognitive abilities regarding similar elements of soccer tactics, but in an environment of higher pressure demand with fast-paced actions; and second, the use of declarative knowledge to assess tactical behavior and its relationship with procedural knowledge. Therefore, the objectives of this study were to verify the potential association between futsal experience with the declarative and procedural tactical knowledge in soccer (verify if players who had an early futsal experience present a later higher individual offensive tactical performance in soccer), and to assess the relationship between declarative and procedural tactical knowledge. Alongside, comparisons between players' positions and club ranks were collected to provide more information about tactical knowledge. It was hypothesized that an early futsal practice could provide better tactical behavior later in soccer, and that declarative and procedural tactical knowledge don't correlate well with each other.

Methods

Sample

The sample was composed of 71 male soccer athletes intentionally selected from four state-level teams in the Under-20 (U20) age category, all duly registered in the State Soccer Federation, where only professional clubs are allowed to participate. There was no prior sample calculation in the classical statistical sense to define the total population, as the intention was to work with a group representative of the competitive levels available in the state, considering the logistics and feasibility of access to the clubs. The sample of 71 athletes were the total amount of participants that answered the Sports History Questionnaire and DTK adequately, from a sample of 113 athletes that all teams could provide at the moment to participate in the study. The teams were organized and divided into three groups according to their ranking level. Group A, for the team competing in the first division of the Brazilian Championship (A series), Group B for the team competing at the same championship but second division (B series), and Group C for the team competing in the fourth division and a team whose compete only at the state level. This group division follows for the comparison between different ranking levels. From the overall sample, a subsample of 29 athletes was then selected for the PTK analysis, comprising players that participated in at least 1/3 of the official match provided by the participating clubs.

Participants were included if they were part of the U20 age category, duly registered with the federation in the state championship, and included in the game team's roster. In addition, participants need to be free of injuries and have participated in at least one game for the tactical behavior analysis to be possible. The exclusion criterion was applied if the club did

not release the participant to being part of the research, if the participant inadequately filled the sports history questionnaire and/or the declarative tactical knowledge test, and if they participated in less than 30 minutes of any match analyzed. Also, with their respective club authorization as well from their legal guardian, all participants presented the informed consent form duly signed. The study was approved by the Research Ethics Committee of 4.064.613, with all participants signing the Free and Informed Consent Form.

Procedures

A crossover research design was implemented to verify the association of early futsal participation and experience into a later soccer tactical performance, assessed by a questionnaire in which players had to report their amount of experience and level of participation in futsal early in their athlete career, as well for soccer. In addition, offensive tactical performance was evaluated through declarative (DTK) and procedural (PTK) tactical knowledge, the latter being assessed by the frequency of occurrence of the offensive tactical principles, and established a coefficient of performance.

Sports History Questionnaire

To carry out this study, three stages were considered. The first and second stages took place on the same occasion. In the first stage, all U20 athletes, from the four selected clubs, answered the sports history questionnaire. The players answered the questionnaire composed with questions that involve: information about starting age and years of practice in futsal and soccer; if they played futsal at recreational or federated level; how many years they were federated in soccer; if they had sports club accommodations and/or salary; and self-reported height and body weight. Players were instructed to answer the questions as accurately as possible. From this data, 5 categorical variables were elaborated to compare the results found from tactical assessments: Soccer Starting Age (Up to 9 years, 10 to 11 years and 12 or more years); Club Rank (A, B and C); Futsal Competition Level (Federated and Not-Federated); Futsal Experience (Up to 2 years and more than 2 years), and Soccer Experience (Up to 5 years and more than 5 years duly federated).

*Declarative Tactical Knowledge Tes*t

In the second stage, after having answered the sports history questionnaire, all athletes answered the Declarative Tactical Knowledge Test (DTK), which took place in the same environment and moment as the first stage. For the test, the situational videos of matches were projected through a multimedia projector device. After the projection of each video, the athletes were instructed to answer the questions, according to the protocol suggested in the literature[21].

During the test, participants filled their answers through a formulary in Google Forms, directly on their smartphones. The participants then watched sets of videos consisting of 20 scenes of approximately 6 to 10 seconds in duration, which were selected from Brazilian Soccer Championship games, between the years 2011 and 2013[22]. When the scene stopped, they had 45 seconds to write down four decision options they thought were the best for the player with the ball in that scene. Then after writing down the possible options in each scene, they had 30 seconds to rank their answers from the best to the worst option. A score of 100 points was assigned to the best answer placed in the first position, 75 for the second position, 50 when in the third, 25 when in the fourth, and zero when there was no correct answer. The answers classification ranking was already predetermined from the previous instrument validation for the test. The maximum attainable score was 2000 points. The participants were kept away from each other so that there was no communication or consultation of each other's answers.

Procedural Tactical Knowledge

In the third stage, the tactical behavior was evaluated through an in-match analysis of Procedural Tactical Knowledge (PTK). However, just 29 athletes from the overall sample were able to be assessed, which required observing the player in at least 1/3 of the total game time, reducing the sample to a subsample, since the matches were chosen by the coaches at random selection and not all athletes in the sample participated in the selected games for the time required. Furthermore, not all athletes were selected for the games as starters, as this depended on the coach's decision regarding the strategy he employed. For the evaluation of tactical behavior, the researchers used the PADTI instrument, which proposes to evaluate the frequency of the fundamental soccer tactical principles for a formal and official game situation, contemplating the control of offensive and defensive fundamental tactical principles frequencies performed by athletes in a real game situation[23], assessing the four defensive tactical behaviors (containment, defensive coverage, balance and concentration) and the four individual offensive tactical behaviors (progression, mobility, covering, space). In summary, the instrument provides the notational analysis for the frequency of tactical actions. Furthermore, the players' actions in the game were divided into "performed" (PAM) and "not performed" (NPAM) actions per minute, which represented information about the players' decision-making aspect. Its reproducibility was tested previously and showed very strong agreement and correlation indicators for all tactical principles analyzed[23]. A soccer expert evaluator, with more than 10 years of coaching experience and performance analysis, conducted the assessment. The evaluator also was a performance analyst for the national soccer team during 7 years.

The observations of the tactical actions of the athletes focused on the individual offensive tactical behavior, and the athletes were identified through the numbering of their shirts used in the game. The participants' procedural knowledge assessment occurred only for the offensive aspects, as the declarative knowledge test only contemplates actions with ball possession, also characterizing only the offensive actions.

Statistical analysis

All the data collected were first organized in an Excel spreadsheet, and then the categorization of group analysis variables was adjusted for further analyses. Data were exported to the SPSS.20 statistical software for the subsequent analysis. Assumptions of normality of data distribution were tested through the application of the Komolgorov-Smirnov (KS) test — this for the total sample of 71 athletes — and the Shapiro-Wilk test for the sub-sample of 29 athletes. For the variables that presented normal distribution, the comparative statistics of the t-test for independent variables were applied; variables with non-parametric distribution were analyzed using the U-Man Whitney test — this was done to compare the scores obtained in the DTK and PTK tests. The relationship between tactical knowledge with the categorical variables (starting age in soccer, experience in soccer and experience in futsal) were analyzed using Spearman's correlation coefficient. The Kruskal-Wallis and One-Way ANOVA tests were adopted to compare the relationship of tactical principles in the PTK and DTK tests for variables that have more than two comparison groups, in addition to the Bonferroni's (parametric) or Dunn's (non-parametric) post-hoc for data correction. A significance level of $p<0.05$ was adopted.

Effect sizes were calculated using a self-purposed spreadsheet in Microsoft Excel, using Hedges' *g* for the PTK, NPAM, PAM, Covering, and Space variables and Cliff's Delta for DTK, Progression, and Mobility since it presented a non-normal distribution (non-parametric). The effect size for the parametric variables was calculated using Hedges' *g* and were classified as trivial effects between 0.01 and 0.19, as small between 0.2 and 0.49, as moderate between 0.5 and 0.79, and as large above 0.8[24]. For the non-parametric variables, effect size was

calculated through Cliff's Delta and were classified as trivial effects when between 0.01 and 0.15, as small between 0.16 and 0.33, moderate between 0.34 and 0.46, and large when above 0.47 [25].

Results

There was a statistically significant difference for the overall sample between soccer and futsal starting age [t(70)=2.310; p=0.024] showing that in general, Brazilian soccer players start playing futsal earlier than soccer. No difference between club teams' ranks was found for soccer starting age [H(2)=1.669; p=0.434], however, for "Futsal Starting Age", Kruskal-Wallis test showed a significant difference between club ranks [H(2)=6.019; p=0.049] but without post-hoc significance (A vs. B, p=1.000; A vs. C, p=0.261; B vs. C, p=0.053). The descriptive data from the overall sample are presented in Table 1. Figure 1 presents absolute and relative data regarding teams that provide salary, support, and accommodations (i.e. meals, dormitory) for players by "Club Rank".

Table 1 – Descriptive data for overall soccer athletes' sample (n=71).

	Mean±SD		
Club Rank (sample size)	Rank A (27)	Rank B (20)	Rank C (24)
Body weight (kg)	75±8.14	73.93±9.08	72.54±6.40
Body height (cm)	180.59±6.84	178.95±5.59	179.67±7.41
Age (years)	18.22±1.01	18.75±0.97	18.29±0.69
Soccer Starting Age (years)	11.00±1.54	10.35±1.63	11.00±1.93
Futsal Starting Age (years)	9.78±2.24	9.40±2.26	10.67±2.18

Source: The authors.

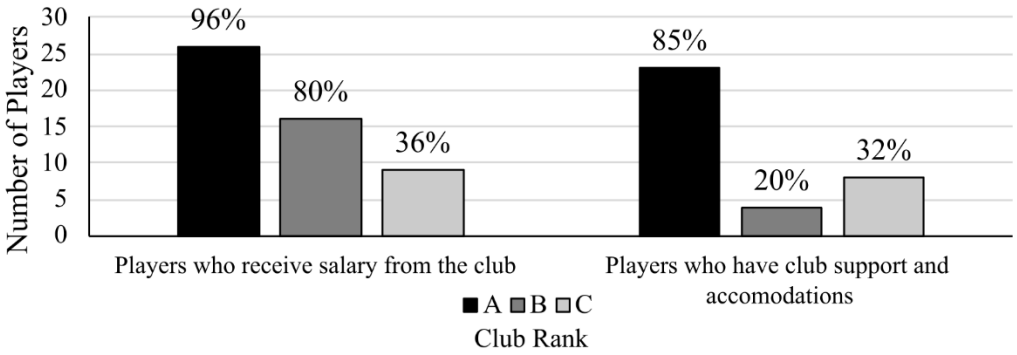

Figure 1 – Absolute and relative data of players that received salary, support, and accommodation by club rank.
Source: The authors.

Regarding DTK in the overall sample (n=71), neither "Starting Age" and "Experience" in soccer, nor "Futsal Experience", presented significant differences between the categories, as well as for "Futsal Competition Level" (p>0.813). Differences were only found for the "Club Rank" variable (p<0.01) whereas the athletes in the "A" rank had a worse score than those in the "B" and "C" rank (Table 2). However, when analyzing the sub-sample of 29 players (Table 3), the difference for "Club Rank" was not found anymore (p=0.078).

Table 2 - Relationship between the independent variables and the performance of the athletes' tactical behavior with the total sample (n=71).

Categorial Variable	Sample Size (71)	DTK	
		Median (IQR)	S (p)
Starting Age Soccer[1]	Up to 9 years (23)	1525 (300)	2.15 (0.341)
	10 to 11 years (29)	1425 (250)	
	12 or more years (19)	1375 (425)	
Club Rank[1]	A (27)	1350 (325)	11.26 (0.004)[a]
	B (20)	1512.5 (175)	
	C (24)	1525 (275)	
Futsal Competition Level[2]	Not Federated (37)	1425 (300)	608.5 (0.813)
	Federated (34)	1450 (275)	
Futsal Experience (Years of Practice)[2]	Up to 2 years (35)	1425 (350)	558.5 (0.410)
	More than 2 years (36)	1462.5 (212.5)	
Soccer Experience (Years Federated)[2]	Up to 5 years (38)	1475 (375)	548.5 (0.353)
	More than 5 years (33)	1437.5 (325)	

Notes: Data are expressed as Median and IQR (Interquartile range), and S(Statistical Value: U for Mann-Whitney; H for Kruskal-Wallis).
DTK: Declarative Tactical Knowledge. [1]Kruskal-Wallis; [2]Mann-Whitney. [a] Post-hoc analysis Club Rank A < B and C ($p<0.05$).
Source: The authors.

For the PTK along with the analysis of the frequency of performed (PAM) and non-performed actions per minute (NPAM), the sub-sample (n=29) analysis presented significant differences for the variables in "Club Rank" (PTK: p=0.041; NPAM: p=0.049; PAM: p=0.036), which post-hoc analysis showed that "A" ranked athletes presented higher scores for PTK, however, despite significant differences for NPAM and PAM, post-hoc significance was not found. For the offensive tactical principles, difference was found only for the variable of Mobility regarding "Starting Age in Soccer" [H(2)=6.196; p=0.045] showing post-hoc differences (S=9.942; p=0.038) favoring players who started soccer early (up to 9 years, Median:3; IQR:5.5) in comparison to players whose started later (12 years or more, Median:0; IQR:0.25). No other statistically significant differences were found for any of the remaining variables. Tables 3 and 4 present the data for the sub-sample analysis.

Table 3 - Relationship between the independent variables and the performance of the athletes' tactical behavior with the sub-sample (n=29).

Categorial Variable	Sample Size (29)	DTK Median (IQR)	DTK S (p)	PTK Mean (SD)	PTK S (p)	NPAM Mean (SD)	NPAM S (p)	PAM Mean (SD)	PAM S (p)
Starting Age Soccer[1]	Up to 9 years (13)	1500 (300)	0.105 (0.949)	0.25 (0.07)	0.118 (0.889)	9.94 (1.08)	0.002 (0.998)	3.26 (1.03)	0.159 (0.853)
	10 to 11 years (10)	1425 (175)		0.26 (0.07)		9.96 (1.46)		3.46 (0.91)	
	12 or more years (6)	1550 (275)		0.25 (0.08)		9.99 (1.78)		3.32 (0.93)	
Club Rank[1]	A (10)	1387.5 (500)	5.113 (0.078)	0.29 (0.07)	3.635 (0.041)[a]	9.14 (0.93)	3.392 (0.049)[b]	3.64 (0.93)	3.795 (0.036)[c]
	B (9)	1450 (225)		0.26 (0.06)		10.44 (1.28)		3.64 (0.92)	
	C (10)	1575 (300)		0.21 (0.06)		10.34 (1.42)		2.72 (0.70)	
Futsal Competition Level[2]	Not Federated (16)	1475 (362.5)	101.5 (0.912)	0.25 (0.06)	0.042 (0.967)	10.04 (1.30)	0.387 (0.702)	3.37 (0.93)	0.261 (0.796)
	Federated (13)	1500 (150)		0.25 (0.08)		9.85 (1.14)		3.27 (0.97)	
Futsal Experience (Years of Practice)[2]	Up to 2 years (15)	1425 (575)	93 (0.599)	0.26 (0.07)	0.417 (0.680)	10.04 (1.32)	0.348 (0.730)	3.45 (0.97)	0.733 (0.470)
	More than 2 years (14)	1500 (150)		0.25 (0.07)		9.87 (1.37)		3.19 (0.91)	
Soccer Experience (Years Federated)[2]	Up to 5 years (16)	1513 (300)	94 (0.660)	0.25 (0.08)	0.116 (0.908)	9.76 (1.41)	0.871 (0.391)	3.22 (0.92)	0.656 (0.518)
	More than 5 years (13)	1450 (175)		0.25 (0.06)		10.20 (1.22)		3.45 (0.97)	

Notes: Data are expressed as Median and IQR (Interquartile range), and S(Statistical Value: U for Mann-Whitney; H for Kruskal-Wallis; t for T-Test; and F for One-way ANOVA). DTK: Declarative Tactical Knowledge; PTK: Procedural Tactical Knowledge; NPAM: Non-performed actions per minute; PAM: Performed actions per minute.
[1]Kruskal-Wallis (DTK); One-way ANOVA (PTK; ANPM; APM)
[2]Mann-Whitney (DTK); Independent T Test (PTK; ANPM; APM)
[a] Post-hoc analysis Club Rank: A > C (p=0.039)
[b, c] Post-hoc analysis Club Rank showed no differences
[d] Post-hoc analysis Defenders > Attackers (p=0.034)
Source: The authors

Table 4 – Relationship between the independent variables and the frequency of offensive tactical principal for the sub-sample (n=29).

Categorial Variable	Sample Size (29)	Progression Median (IQR)	Progression S (p)	Mobility Median (IQR)	Mobility S (p)	Covering Mean (SD)	Covering S (p)	Space Mean (SD)	Space S (p)
Starting Age Soccer[1]	Up to 9 years (13)	3 (7)	0.243 (0.883)	3 (5.5)[a]	6.196 (0.045)	60.62 (39.09)	0.404 (0.672)	14.08 (10.85)	0.020 (0.980)
	10 to 11 years (10)	5 (5)		2 (3.25)		75.60 (42.60)		13.40 (11.29)	
	12 or more years (6)	3.5 (3.5)		0 (0.25)		64.83 (37.31)		13.00 (13.80)	
Club Rank[1]	A (10)	5.5 (4.75)	4.563 (0.102)	1.5 (5.25)	5.071 (0.079)	79.8 (44.26)	1.030 (0.371)	16.50 (12.00)	0.627 (0.542)

	B (9)	9 (7.50)		3 (3.50)		65.22 (29.02)		10.67 (5.89)	
	C (10)	3 (2.25)		0 (2.25)		54.80 (41.36)		13.40 (11.21)	
Futsal Competition Level[2]	Not Federated (16)	3 (6)	115 (0.650)	1 (3.5)	110.5 (0.779)	61.69 (41.20)	0.608 (0.548)	12.23 (12.36)	0.595 (0.557)
	Federated (13)	4 (5.5)		1.5 (3.75)		70.69 (38.27)		14.75 (10.45)	
Futsal Experience (Years of Practice)[2]	Up to 2 years (15)	3 (6)	105 (1.000)	2 (3)	121 (0.505)	67.27 (36.09)	0.086 (0.932)	15.53 (11.11)	0.950 (0.351)
	More than 2 years (14)	4.5 (5.5)		0 (4)		66 (43.56)		11.57 (11.35)	
Soccer Experience (Years Federated)[2]	Up to 5 years (16)	4.5 (3.75)	101 (0.914)	0 (2.75)	140 (0.121)	73.06 (45.66)	0.977 (0.337)	13.63 (12.37)	0.002 (0.998)
	More than 5 years (13)	3 (7)		3 (4)		58.77 (29.12)		13.62 (10.10)	

Notes: Data are expressed as Median and IQR (Interquartile range), and S(Statistical Value: U for Mann-Whitney; H for Kruskal-Wallis; t for T-Test; and F for One-way ANOVA). [1]Kruskal-Wallis (Progression, Mobility); One-way ANOVA (Covering, Space) [2]Mann-Whitney (Progression, Mobility); Independent T Test (Covering, Space)
[a] Post-hoc analysis Up to 9 years > 12 or more years ($p<0.05$).
Source: Authors

Effect sizes for the variables of interest are presented in Figures 2 and 3. The direction of the effect size is presented according to the variable that was favored in the grouped category variables described on the left in the graphs.

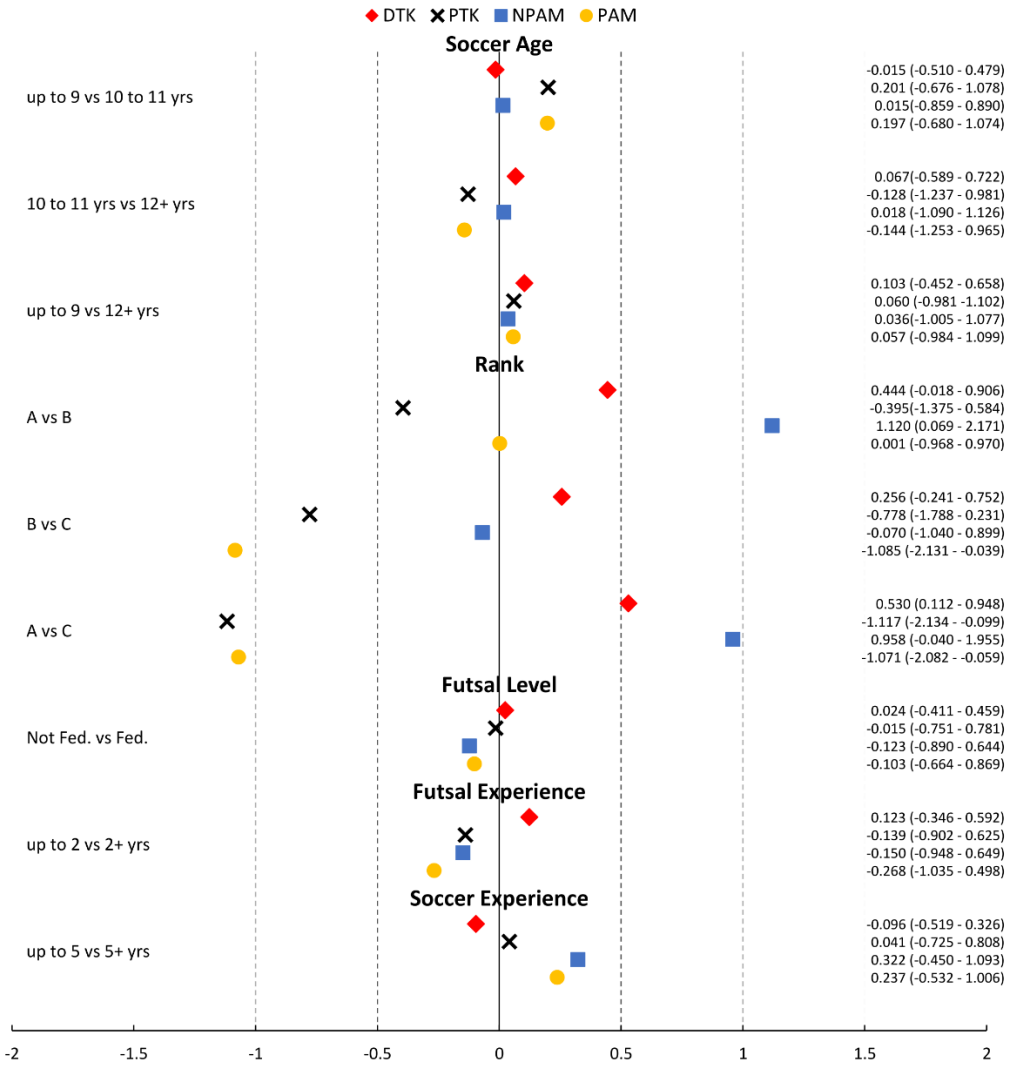

Figure 2 –Effect Sizes comparisons of the Declarative (DTK) and Procedural (PTK) Tactical Knowledge, and of the Frequency of Performed (PAM) and not Performed (NPAM) actions per minute for the Categorical Variables.

Notes: Values of effect sizes are presented favoring the variable described on the left or on the right (Example: Up to 9 [Left] vs 10 to 11 yrs [Right]). DTK: Declarative Tactical Knowledge; PTK: Procedural Tactical Knowledge; NPAM: Not performed action per minute; PAM: Performed actions per minute. Yrs: Years; Not Fed.: Not federated players; Fed.: Federated players. Cliff's Delta effect size for DTK and Hedges' g effect size for PTK, NPAM, and PAM.

Source: Authors

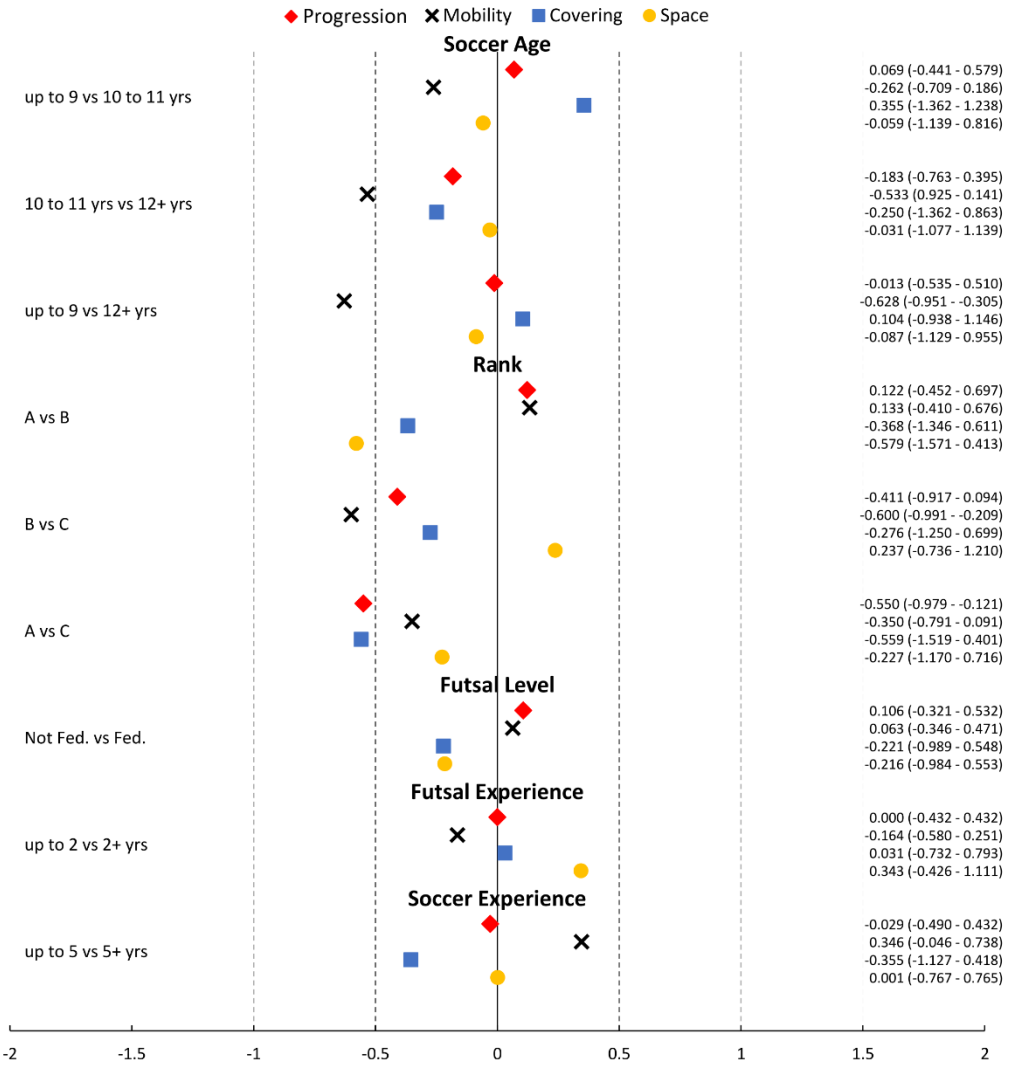

Figure 3 – Effect Size comparisons of the Offensive Tactical Principles (Progression, Mobility, Covering and Space) for the Categorial Variables.
Notes: Values of effect sizes are presented favoring the variable described on the left or on the right (Example: Up to 9 [Left] vs 10 to 11 yrs [Right]). Yrs: Years; Not Fed.: Not federated players; Fed.: Federated players. Cliff's Delta effect size for Progression and Mobility, and Hedges' g Effect Size for Space and Covering.
Source: Authors

For Spearman's correlation analysis, regarding the overall sample, weak correlations were found for Tactical Knowledge with the Soccer Starting Age (DTK: r^2=0.051, p=0.794; PTK: r^2=0.008, p=0.969), Soccer Experience (DTK: r^2=0.163, p=0.397; PTK: r^2=-0.177, p=0.359) and Futsal Experience (DTK: r^2=0.145, p=0.452; PTK: r^2=-0.096, p=0.621), being statistically not significant. As well, subsample showed no significant correlation for DTK and PTK ($r^2 < 0.001$; p=0.983).

Discussion

The main aims of this research were to verify the association between futsal experience on declarative and procedural tactical knowledge in soccer, to find if previous practice in futsal could have influenced the players' tactical knowledge in soccer, later in their careers, and if there was a correlation between DTK and PTK. It was found no difference between players who started futsal early or later in their careers, neither for those who competed at higher levels

(federated) in futsal nor for more years of soccer practice. Interestingly, for the total sample, players of the lower ranked club (C) presented higher scores of DTK in comparison to their counterparts in the higher ranked (A), which difference was absent when comparing the subsample. However, as shown by this research, DTK and PTK presented no correlation, which could be a determinant factor in how to assess tactical knowledge, since higher-ranked players presented better scores in PTK.

Regarding the early futsal practice for elite soccer players, it was reported that there was a higher accumulation of time in soccer-specific play activities and futsal for Brazilian players' childhood in comparison to other countries[12]. In addition, Yiannaki, Carling, and Collins [11] assessed high-level coaches' and players perceptions about futsal as a tool for talent development in soccer, showing that approximately 90% of the participants suggest that futsal skills could positively transfer for soccer, which the top skills reported were decision-making, ball control, awareness, and passing. Therefore, there is evidence presenting that futsal players have a positive transfer effect regarding passing actions in the soccer game, as well as having more accuracy in performing these passes compared to their soccer players counterparts, which could suggest a positive transfer between the two modalities[10]. In addition, Machado, González-Víllora, and Teoldo[26], found that for female professional soccer players, a high amount of hours of futsal practice, distinguished between higher and lower-skilled players, however, decision-making skill was assessed via video-based test. Although, as seen in this research, the level of expertise in futsal did not show higher influence in tactical knowledge, however, it is important to note that in the study sample, all players had some level of practice in futsal, being not possible to affirm that the lack of futsal practice would result in lower achievements for tactical knowledge.

The relation between declarative and procedural tactical knowledge in team sports, especially soccer, has been the subject of major concern. Existing evidence shows that players with higher scores of DTK and PTK present less cognitive effort during soccer performance tasks[27]. However, it has been shown there is a lack of correlation between DTK and PTK, indicating that they may be two distinct constructs. Maleki and Zarei[28] reported that for soccer players, independently of the level of experience, tactical knowledge had no significant relationship with tactical behavior and technical skills. In the same way, the research found that once your proficiency level reaches expert level, declarative knowledge can no longer distinguish between elite and sub-elite players, although elite players outscored their sub-elite counterparts to some aspects of procedural knowledge[29]. This evidence suggests that declarative knowledge may not always translate into procedural knowledge. Following these studies, the present research also did not find a correlation between DTK and PTK, nor did the higher rank athletes were superior to their lower rank counterparts for DTK, reinforcing the findings in the literature.

However, there is some evidence showing there is a correlation between these two constructs, especially for younger players[22]. These findings suggest that the relationship between declarative and procedural knowledge in soccer may not be as straightforward as initially assumed. One possible explanation for the lack of correlation is that declarative and procedural knowledge is acquired through different mechanisms and processes, such as sports experience[30]. However, the present research did not find any influences from futsal or soccer experience on levels of tactical knowledge. A recent review[31] discussed that tactical offensive patterns tend to change due to age, experience, and skill. From age and skill differences, older and skilled (professional) soccer players reported a higher index of offensive actions when compared with young and lesser-skilled counterparts[32,33]. In comparison with Silva et al.[22], whose research found a relationship between DTK and PTK, it can be argued that this relationship could be influenced by the age of players, agreeing with the findings in the literature.

Indeed, for the present research, PTK scores were higher for those players in the higher ranked team (Club Rank A), but no difference was found for player age, soccer, and futsal starting age between the teams since there were no baseline differences. It could be argued that motor expertise between players from different rank levels, along with their perceived ability to act or not act in certain game situations (perceived competence), are factors influencing these findings, since players in the lower-ranked clubs had significantly higher scores of actions not performed, suggesting a lack of confidence to perform. Research has shown that young soccer players who had better sporting potential presented higher performance in tactical skills, as well as higher motivation and perceived competence compared to their lower sporting potential counterparts[34]. Yet, due to Brazilian conditions of sports development, it could be hypothesized that players in higher ranked teams have better opportunities, since for the actual sample, more than 85% of players from the "A" rank, have accommodations and meals available at the club itself, alongside a sports contract and salary. As for clubs in the B and C rankings, less than 35% have accommodations, while 80% of the players in the B rank and less than 40% of "C" rank have a sports contract with salary. Due to this, other psychosocial covariables, such as anxiety, motivation, confidence, and group cohesion, could influence their results[35], or even the quality level and number of professionals in the club staff, which would induce a higher level of athletic development. However, the present research cannot suggest a possible relationship between social support and tactical performance, since several other factors may play a role despite only technical and tactical proficiency.

Some limitations could be drawn from this research. Scores for the tactical knowledge assessment, declarative or procedural, were judged by a single evaluator, which could have influenced the results, biasing the answers, not having disagreement between measures. As well, it is possible that team coaches had strategies that may bias the evaluation, due to opponents level and defensive tactical organization. Given the difficult access to high-level teams during training and competition in soccer, the sample size was deemed small, as well as the number of games evaluated, however, the research was performed in a real competition environment. Although this research only had players who had an early experience in futsal, it could not be argued that subjects without it may not have reached a high level in soccer training and competition, since research shows that despite Brazilian soccer players having a greater amount of futsal practice, they had more specific-soccer play activities compared to other countries[12].

It is important to note that the way each coach sees the soccer game and works with his athletes could interfere with the declarative tactical knowledge responses and the procedural knowledge assessment, as they make the main decision-making in their training and contribute to their learning and development. Likewise, through the guidance of the coaches, the athlete may or may not perform actions and this will affect their PTK score. Nonetheless, the final decision is always the athlete's. Therefore, the evaluation of athletes needs to take into account that the athlete's choice is based on all the interactions he has had throughout his professional training up until that match, but it is his decision in the match

Conclusion

Despite futsal has been to be credited to play a major role in soccer development, the present research didn't find any effects of early futsal practice to improve later soccer tactical performance. However, it's a consensus that the futsal previous experience could help athletes for their development of some perception-action aspects in soccer, similar to or even better than structured games as small-sided games. Although, the evaluation of tactical knowledge must be cautiously interpreted, since declarative assessment may not reflect the actual tactical knowledge of players. In addition, future studies should investigate the relation of perceived

competence and socio-psychological aspects with tactical performance, since lower ranked players presented a significantly higher frequency of actions not performed in-match compared to their higher rank counterparts, suggesting that possibly a lack of confidence, increase in anxiety or even social and financial motivation for competition may be important factors affecting individual tactical performance.

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