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From Tactical Understanding to Tactical Awareness: Exploring Cognitive–Behavioral Links in Youth Players

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Abstract

This study aims to analyze the relationship between Understanding Tactics and Strategy and Tactical Awareness in futsal players and identify the relationship between the components of tactical understanding and tactical behavior that arises during the game. The main premise of the study is that tactical understanding not only reflects the player's conceptual knowledge, but also relates to the ability to make decisions, execute skills, provide support, organize the game, manage match situations, and adjust strategies. The study uses a quantitative approach with a cross-sectional correlational descriptive design. Participants consisted of 20 futsal players of SMAN 1 Palabuhanratu who were selected through a total sampling. Understanding tactics and strategies was measured using 15 valid items grouped into Organization and Coordination, Game Management, and Strategy Adaptation, while Tactical Awareness was measured through the GPAI approach which includes Decision Making, Execution of Skills, and Support. Since the two main variables did not meet the assumption of normality, the relationship between variables was analyzed using Spearman correlation. The results showed that Understanding Tactics and Strategy had a strong and significant positive relationship with Tactical Awareness ($\rho = 0.781$; $p < 0.001$). Tactical understanding was also significantly related to Decision Making and Execution of Skills, but not significantly to Support. All components of tactical understanding were positively associated with Tactical Awareness, with the strongest relationship found in Game Management, followed by Organization and Coordination and Strategy Adaptation. Thus, the research hypothesis was accepted: the better the player's understanding of tactics and strategies, the higher the tendency of Tactical Awareness displayed in the game. These findings confirm the importance of integrating conceptual tactical learning with representative and contextual game training.

Keywords: Tactical Awareness; Tactical Understanding; Decision Making; Game Performance.

INTRODUCTION

Futsal is a team invasion game that requires players to respond quickly to changes in game situations through the integration of technical, physical, cognitive, and tactical abilities. The dynamic character of the game makes the player's success not only explained by mastering techniques separately, but also by the ability to understand the context of the game, recognize relevant information, choose actions, and adapt behavior to the needs of the team. In the context of futsal, the demands of training and matches are also task-specific, so game-based training and pedagogical approaches that represent match situations are important in developing player responses (Krawczyk et al., 2026). In the context of football that has a similar tactical character, the technical and tactical components are the content that coaches most often place in the structure of weekly training, which shows that both are seen as important foundations in the formation of playing competencies (Sanmiguel-Rodríguez et al., 2026). However, performance in team games is inherently multidimensional; Physical, technical, tactical, psychological, and contextual indicators interact with each other, while player monitoring practices are still often carried out separately between domains (Afonso et al., 2025). This condition emphasizes the importance of viewing tactical understanding not only as theoretical knowledge, but as a cognitive resource that should be reflected in actual playing behavior.

Understanding tactics and strategies is related to the player's ability to recognize the principles of the game, read space and movement, understand roles, anticipate the opponent's actions, and determine responses that are appropriate to the situation. At the developmental stage of young players, an effective learning process needs to integrate knowledge, skills, strategies, decision-making, and technical abilities so that players have a more complete understanding of the game (Almonacid-Fierro et al., 2024). Decision-making is a central part because the quality of player choices will affect the efficiency of tactical behavior in changing game conditions. Dambroz and Teoldo (2023) show that players with better decision-making skills can maintain tactical behavior efficiency when experiencing physical fatigue. In small group games, tactical knowledge can also be assessed through the decision-making and motor efficiency indexes, and the results show that the expression of tactical behavior can differ according to the playing position (Matos et al., 2023). In addition, the development of decision-making is not only related to the accuracy of choices, but also the speed with which to process situations; more experienced players can make decisions faster than players of a younger age group (Machado et al., 2026). These findings show that understanding the new game has functional value when it can be translated into appropriate decisions and actions on the field.

The problem is the understanding of tactics that players conceptually possess is not necessarily identical to the tactical awareness that arises during the game. The literature still shows a separation between the measurement of cognitive-declarative aspects and behavioral assessment in the context of the game. Sánchez-López et al. (2023), for example, developed TesTactico for F7 to measure declarative tactical knowledge through image-based game situations and showed that players with higher competence obtained better scores. In contrast, the observation-based approach assesses how players act in the context of the game. Zhang et al. (2025) shows that game-situation-based instruments, including the Game Performance Assessment Instrument, are used to capture technical-tactical performance, decision-making, actions with and without the ball, and thinking awareness in more representative situations. Thus, there is an important difference between knowing what to do and being able to demonstrate appropriate actions when the game is taking place. In futsal, the need to understand the relationship between these two domains is increasingly relevant because decision-making styles can differ according to the characteristics of the sport, Álvarez-Kurogi et al. (2025) found that there are differences in decision-making styles between football and futsal players and emphasized that these aspects are still not studied specifically in both branches.

The literature offers several approaches to bridging tactical knowledge and behavior. Representative training approaches such as small-sided games allow players to simultaneously face information about space, opponents, peers, and time pressures. Ferreira-Ruiz et al. (2022) show that manipulation of the format of small-sided games can alter player distribution, tactical behavior, and the type and frequency of technical actions. Paun et al. (2025) also reported that small-sided games programs in young players support the development of technical-tactical indicators and game cohesion. However, a review by Clemente et al. (2021) found that although small-sided games programs provide a favorable effect on technical execution, the intervention studies they synthesized have not adequately included tactical behavior outputs. From a pedagogical perspective, Bergmann et al. (2021) show that training designs that encourage player exploration in representative situations have empirical support for the development of technical and tactical skills, while the impact of traditional repetitive approaches on match performance is still relatively underexplored. More recent findings show that creative teaching-based programs can simultaneously improve tactical knowledge, technical-tactical efficiency, and in-game performance (Duda et al., 2026). Verbal instructions that

direct players to scan before receiving the ball have also been shown to increase the frequency of visual exploration and the chances of success of subsequent actions (Hintermann et al., 2025). Overall, the literature suggests that interventions that combine cognitive, perceptual, and game action processes have the potential to strengthen tactical competence.

However, there are gaps that have not been fully answered. Some studies have focused on the effectiveness of training methods, others on the development of tactical knowledge instruments, decision-making, or observation of game behavior. Afonso et al. (2025) even assert that player monitoring is still fragmented and that few studies integrate multiple performance domains simultaneously. Newer tactical observation instruments have shown high validity and reliability for recording patterns of game behavior (Callejas-Rosales et al., 2026), while game scenario-based tools can measure aspects of decision and awareness in a more contextual way (Zhang et al., 2025). However, evidence that directly tests whether players' level of tactical and strategy understanding is related to tactical awareness displayed when playing, especially in school-age futsal players, is still limited. This gap is important because a strong relationship between the two constructs would support the assumption that tactical knowledge can be embodied in game behavior, while a weak relationship would indicate a gap between conceptual understanding and applicability. The available futsal studies also deal more with training intensity, load, or decision-making style than directly linking tactical understanding with tactical awareness observed in the game (Álvarez-Kurogi et al., 2025; Krawczyk et al., 2026).

Based on these gaps, this study aims to analyze the relationship between tactical and strategy understanding and tactical awareness in SMAN 1 Palabuhanratu futsal players. Understanding tactics and strategies is placed as a representation of the cognitive-conceptual aspects of players, while tactical awareness is positioned as an expression of playing ability observed through three main components, namely decision making, execution of skills, and support. The novelty of this research lies in the integration of two levels of tactical competence that have tended to be studied separately, namely Understanding Tactics and Strategy as a representation of cognitive-conceptual understanding and Tactical Awareness as a manifestation of actual tactical behavior in the game. Previous research has focused more on measuring tactical knowledge, decision-making, observation of game performance, or the effectiveness of training methods separately (Sánchez-López et al., 2023; Zhang et al., 2025), while integration between performance domains is still limited (Afonso et al., 2025). In the context of school-age futsal, evidence that directly links tactical understanding to actual tactical behavior is also limited. This study fills this gap by examining the relationship between Understanding Tactics and Strategy and Tactical Awareness represented through Decision Making, Execution of Skills, and Support, as well as analyzing the contributions of Organization and Coordination, Game Management, and Strategy Adaptation. The scope of the study is limited to the analysis of relationships in high school futsal players and is not intended to infer a cause-and-effect relationship. The results of the study are expected to provide an empirical basis for coaches to evaluate the connection between learning tactics outside the game and their application on the field, as well as to provide a foothold for the development of more representative, contextual, and tactical awareness-oriented exercises.

METHODS

Research Design

This study uses a quantitative approach with a cross-sectional correlational design. This

design was chosen to identify the direction and strength of the relationship between Understanding Tactics and Strategy as a representation of players' cognitive-conceptual understanding of game organization, game management, and strategy adaptation, and Tactical Awareness as a representation of tactical behaviors displayed in game situations. The study did not provide experimental treatments or interventions to participants but rather measured the two constructs in the same group of players and then analyzed their relationships. An approach that combines a measure of game knowledge or reading with tactical behavior observation is relevant in team game research because cognitive aspects and actual behavior are two complementary levels of competence. Badari et al. (2021), for example, used different instruments to evaluate game reading, decision making, and actual tactical behavior so that tactical abilities can be understood more contextually. With this framework, the design of this study is directed to test associations and is not used to deduce cause-and-effect relationships.

Participants

The study participants consisted of 20 futsal players of SMAN 1 Palabuhanratu. All members of the population available on the team were involved as samples so that the sampling technique used was total sampling. With this approach, all players who were members of the research target population and had data on both variables were analyzed as a group. The use of school-age players as units of analysis is relevant to technical-tactical studies of young players, because this phase is an important period in the development of the ability to understand the game and apply decisions in a real context. Ceruso et al. (2026) show that the assessment of technical-tactical performance in young players can be carried out in game situations using performance-based instruments to capture the development of skills and decisions in a more representative manner. The individual identity of the participants is not used as an analysis variable; each player is treated as an observation unit and data from the questionnaire is paired with the results of game observation from the same player.

Procedure

Data collection was carried out through two complementary forms of measurement. First, players completed the Understanding Tactics and Strategy instrument to obtain an overview of their level of understanding of the principles of game organization and coordination, game situation management, and the ability to adjust strategies. Second, the actual tactical abilities of players were observed in the context of the game using the Game Performance Assessment Instrument (GPAI) approach with a focus on three components, namely Decision Making, Execution of Skills, and Support. The game-based assessment approach was chosen because it allows players' abilities to be observed when they must recognize game information, make decisions, execute actions, and interact with teammates. Yudiana et al. (2021) used GPAI to evaluate playing skills in a tactical learning approach, while Ceruso et al. (2026) applied GPAI to evaluate the development of young players' technical-tactical competencies in game situations.

The data from the two instruments were then matched at the individual level so that each player had one Understanding Tactics and Strategy score, a score of each of its components, three GPAI observation scores, as well as an overall Tactical Awareness score. The use of game context in tactical assessment is important because player behavior can change according to situational demands. Badari et al. (2021) show that game status and configuration can affect the efficiency of tactical behavior, while Dahlan et al. (2024) show that game situational settings and interaction patterns can result in changes in players' tactical actions. Therefore, game behavior observations are used to complement the information obtained from cognitive measurement of understanding.

Instrument

This study used two main instruments, namely the Understanding Tactics and Strategy questionnaire and the Game Performance Assessment Instrument (GPAI)-based observation instrument. The Understanding Tactics and Strategy instrument in the early stages consisted of 20 statements used to measure players' understanding of tactics and strategy aspects in the game of futsal. Before being used in the main analysis, all items were tested for validity. Based on the test results, the r-value of the table used as a criterion was 0.443. Of the 20 items, as many as 15 items met the validity criteria, namely Q1 (r = 0.859), Q2 (0.590), Q4 (0.684), Q6 (0.469), Q7 (0.480), Q8 (0.711), Q9 (0.716), Q10 (0.825), Q11 (0.826), Q13 (0.670), Q14 (0.578), Q16 (0.475), Q17 (0.842), Q19 (0.622), and Q20 (0.803). On the other hand, five items, namely Q3 (r = 0.239), Q5 (0.218), Q12 (0.234), Q15 (0.420), and Q18 (0.344) were declared invalid because the correlation value was below the critical value, so the five items were excluded from the final score of the instrument. Thus, the instrument used in the research analysis consisted of 15 valid items with a response score of 1–5 and a total theoretical score range of 15–75; the higher the score obtained, the higher the level of understanding of the player's tactics and strategies.

The fifteen final items are grouped into three components based on the substance measured. The Organization and Coordination component consists of Q2, Q4, Q10, Q13, and Q20, which represents an understanding of formation, position rotation, player substitution, coordination between players, and consistency in strategy implementation. The Game Management component consists of Q1, Q7, Q8, Q9, Q17, and Q19, which represent the ability to understand pressing, counterattack, tempo regulation, power play, tactical foul, and game time management. The Strategy Adaptation component consists of Q6, Q11, Q14, and Q16, which reflects the ability to understand strategies to face the opponent's game character, apply coach instructions, evaluate strategy effectiveness, and anticipate changes in opponent strategy. With this structure, scores can be analyzed both as a total score of Understanding Tactics and Strategy and as three component scores. In the initial reliability test, the 15-grain instrument showed Cronbach's alpha of 0.904, indicating high internal consistency in the final version of the instrument.

The second instrument uses the GPAI approach to observe actual game behavior through three components, namely Decision Making, Execution of Skills, and Support. Decision Making represents the accuracy of the player's choice of actions according to the game situation; Execution of Skills describes the effectiveness of the implementation of skills after the decision is made; while Support describes the player's ability to provide relevant support options for teammates. The three components are used to form the Tactical Awareness indicator as an overview of the player's ability to apply tactical understanding in real game situations. The use of GPAI as a game situation-based assessment tool has been applied to evaluate playing skills and technical-tactical competencies in the context of game learning (Yudiana et al., 2021), while the game assessment approach in young players is also used to capture the quality of performance, decisions, and actions that arise contextually (Salimin et al., 2022).

Data Analysis

The analysis was carried out using JASP. The first stage included checking the completeness of data and descriptive statistics in the form of sample counts, mean, standard deviation, minimum, and maximum for Understanding Tactics and Strategy scores, the three components, Decision Making, Execution of Skills, Support, and Tactical Awareness. Furthermore, the normality of the distribution was checked using the Shapiro–Wilk test because the number of samples was relatively

small. The p> value of 0.05 was used as an indication that there was no significant evidence of normality deviations.

The primary analysis tested the relationship between the total score of Understanding Tactics and Strategy and Tactical Awareness. The secondary analysis examined the relationship between Understanding Tactics and Strategy and the Decision Making, Execution of Skills, and Support components, while the component analysis examined the relationship between Organization and Coordination, Game Management, and Strategy Adaptation with Tactical Awareness. Each coefficient was reported with a p-value and a 95% confidence interval; in the interval estimation using the bootstrap procedure, 1,000 replications were applied. Scatter plots were used as a visual examination of the direction and pattern of relationships. This kind of nonparametric approach is appropriate when the distribution or characteristics of tactical behavior do not meet parametric assumptions and has been used in the study of tactical performance based on game situations (Badari et al., 2021).

RESULTS

The analysis was carried out on 20 players with the variables Understanding Tactics and Strategy and Tactical Awareness. Tactical Awareness in this study represents the achievement of tactical performance formed by three observational components, namely decision making, execution of skills, and support. The results of descriptive statistics and data distribution testing are presented in Table 1.

Table 1. Descriptive statistic

Descriptive Statistics

	Valid	Missing	Mean	Std. Deviation	Shapiro-Wilk	P-value of Shapiro-Wilk	Minimum	Maximum
Organization and Coordination	20	0	21.8	3.488	0.819	0.002	11.00	25.00
Game Management	20	0	25	3.713	0.902	0.045	18.00	30.00
Strategy Adaptation	20	0	16.8	2.262	0.888	0.024	11.00	20.00
Understanding Tactics and Strategy	20	0	63.6	8.905	0.897	0.036	40.00	70.00
Decision Making	20	0	6	4.329	0.95	0.363	-5	13
Execution of Skills	20	0	4.7	3.511	0.924	0.118	-4	10
Support	20	0	5.9	2.808	0.957	0.477	1	11
Tactical Awarness	20	0	16.35	7.714	0.891	0.028	1	29

The Understanding Tactics and Strategy variable obtained an average score of 63.60 ± 8.905 with a score range of 40–70. When compared to the theoretical range of 15-point instruments of 15–75, the average score shows that the player's understanding of tactics and strategies is relatively high. At the component level, Organization and Coordination has an average of 21.80 ± 3,488 with a range of 11–25, Game Management of 25.00 ± 3,713 with a range of 18–30, and Strategy Adaptation of 16.80 ± 2,262 with a range of 11–20. Descriptively, these three components show that players have relatively good capacity to organize and coordinate games, manage match situations, and adjust strategies to game dynamics. The importance of tactical organization and coordination is supported by Caldeira et al. (2023), who show that player formation and roles form interpersonal relationships as well as patterns of space control during play. The ability to manage the game is also relevant because changes in tactical decisions during a match can affect the team's attacking chances and performance (Forcher et al., 2022), while the ability to adapt strategies is an important part of tactical behavior because the player's spatial organization can change in response to match status, opponent strength, and other contextual conditions (Augusto et al., 2023). The results of the Shapiro–Wilk test

showed that Organization and Coordination (W = 0.819; p = 0.002), Game Management (W = 0.902; p = 0.045), Strategy Adaptation (W = 0.888; p = 0.024), and Understanding Tactics and Strategy overall (W = 0.897; p = 0.036) had p < 0.05, so that the score distribution on the construct of tactical and strategy understanding and all its components did not meet the assumption of normality.

In the Tactical Awareness variable, an average score of 16.35 ± 7.714 with a score range of 1–29 was obtained, indicating a considerable variation in actual tactical abilities between players. Based on its components, Decision Making had an average of 6.00 ± 4,329 with a range of −5 to 13, Execution of Skills of 4.70 ± 3,511 with a range of −4 to 10, and Support of 5.90 ± 2,808 with a range of 1–11. The relatively large variability in Decision Making and Execution of Skills shows that the ability of players to transform tactical understanding into decisions and the implementation of real actions in the field differs between individuals. Klatt and Nerb (2021) point out that the ability to perceive game information and find tactical solutions can differ according to the demands of position and situational attention, while Dos Reis et al. (2023) assert that the quality of the implementation of technical skills is related to the efficiency of tactical behavior and player performance. In the Support aspect, the player's contribution to the collective structure of the game is also important because changes in game constraints can affect support actions, distance between players, and collective tactical behavior (Moniz et al., 2021). More broadly, Tactical Awareness represents the integration of several indicators of game behavior, in line with Kostiukevych et al. (2022) who emphasize the importance of evaluating tactical performance through a number of quantitative and qualitative indicators, as well as Sánchez-López et al. (2021) who show that procedural tactical knowledge can be assessed through the observation of roles, actions, and game principles. The results of the normality test showed that Decision Making (W = 0.950; p = 0.363), Execution of Skills (W = 0.924; p = 0.118), and Support (W = 0.957; p = 0.477) showed no significant deviation from normality, whereas Tactical Awareness as a whole was not normally distributed (W = 0.891; p = 0.028). Therefore, since the main variables of Understanding Tactics and Strategy and Tactical Awareness both did not meet the assumption of normality, further relationship analysis was more appropriate using Spearman correlation, this choice is also relevant when technical-tactical performance characteristics show heterogeneity between players (de Souza Pfeiffer et al., 2025).

Table 2. Correlation understanding tactics and strategy and tactical awareness component

Spearman's Correlations

			Spearman's rho	p	Lower 95% CI	Upper 95% CI
Understanding Tactics and Strategy	-	Decision Making	0.451	0.046	0.011	0.745
Understanding Tactics and Strategy	-	Execution of Skills	0.596	0.006	0.208	0.822
Understanding Tactics and Strategy	-	Support	0.31	0.183	-0.154	0.662

Understanding tactics and strategy had a positive and significant relationship with Decision Making (ρ = 0.451; p = 0.046; 95% CI [0.011–0.745]), which suggests that players with a higher understanding of tactics and strategy tend to have better decision-making abilities in game situations. These findings are relevant to Rechenchosky et al. (2022), who place *decision making* as one of the key dimensions in the player's tactical knowledge construct and assert that the ability to understand game principles is closely related to the cognitive process of choosing appropriate responses. A stronger relationship was found between Understanding Tactics and Strategy and Execution of Skills

(ρ = 0.596; p = 0.006; 95% CI [0.208–0.822]), indicating that improved tactical understanding tends to be followed by better ability to execute skills during games; this pattern is supported by Oneda et al. (2022), who show that higher-performing players have a simultaneous advantage on tactical and technical indicators, so skill effectiveness cannot be completely separated from the quality of game understanding. In contrast, the relationship between Understanding Tactics and Strategy and Support showed a positive but not statistically significant direction (ρ = 0.310; p = 0.183; 95% CI [−0.154–0.662]). Confidence intervals that crossed zero showed that the evidence regarding the relationship was not strong enough in this sample. This result is understandable because *support* behavior not only relies on individual tactical knowledge, but is also influenced by game configuration, peer position, interpersonal distance, and collective coordination; Coutinho et al. (2022) show that changes in perceptual conditions in play can alter distance between players, team synchronization, and collective behavior. Overall, the results show that understanding tactics and strategies have a clearer correlation with decision-making processes and skill execution compared to supportive behaviors to teammates, in line with Mazzardo et al. (2022) who show that tactical knowledge, technical-tactical performance, and specific skills are interrelated components of team sports learning and performance.

Table 3. Correlation tactical awareness and understanding tactics and strategy component

Spearman's Correlations

			Spearman's rho	p	Lower 95% CI	Upper 95% CI
Tactical Awarness	-	Organization and Coordination	0.714	< .001	0.475	0.847
Tactical Awarness	-	Game Management	0.765	< .001	0.455	0.915
Tactical Awarness	-	Strategy Adaptation	0.677	0.001	0.321	0.888

Note. Confidence intervals based on 1000 bootstrap replicates.

All components of Understanding Tactics and Strategy have a positive and significant relationship with Tactical Awareness. The strongest association was found in Game Management (ρ = 0.765; p < 0.001; 95% CI [0.455–0.915]), which suggests that players with better ability to manage tempo, situations, and tactical choices during games tend to exhibit higher tactical awareness, this is in line with González-Rodenas et al. (2022), who show that the combination of various technical-tactical dimensions, including offensive support, defensive pressure, and choice of action, contributes significantly to the success of game behavior. A strong positive relationship was also found between Organization and Coordination and Tactical Awareness (ρ = 0.714; p < 0.001; 95% CI [0.475–0.847]), indicating that a player's ability to understand positional organization, coordination, and interaction between players is closely related to tactical awareness that emerges during play. These findings are supported by Perepelytsia et al. (2026), who show that the application of the team's tactical model can improve the quality of technical-tactical interactions, help players understand roles, predict teammates' movements, and establish more systematic coordination in game structures. Furthermore, Strategy Adaptation also showed a strong and significant positive relationship with Tactical Awareness (ρ = 0.677; p = 0.001; 95% CI [0.321–0.888]), which suggests that players who are better able to adapt strategy to changing situations tend to have better tactical awareness; González-Rodenas et al. (2021) show that changes in configuration and game constraints result in different tactical demands that players need to implement adaptive tactical solutions. The entire 95% confidence interval obtained through 1,000 bootstrap replications was above zero, thus reinforcing the consistency of the positive direction of the three relationships. Overall, these results show that *tactical awareness* is most strongly related to Game Management followed by Organization and Coordination and Strategy Adaptation so that the player's tactical awareness seems to be associated

not only with the ability to understand the organization of the game but also with the ability to manage and adapt tactical actions to the dynamics of the game.

Table 4. Correlations understanding tactics and strategy and tactical awareness

Spearman's Correlations

			Spearman's rho	p	Lower 95% CI	Upper 95% CI
Understanding Tactics and Strategy	-	Tactical Awarness	0.781	< .001	0.517	0.909

* p < .05, ** p < .01, *** p < .001

The results of Spearman's correlation analysis showed a strong and significant positive relationship between Understanding Tactics and Strategy and Tactical Awareness ($\rho = 0.781$; $p < 0.001$; 95% CI [0.517–0.909]). These findings suggest that players who have a higher level of tactical and strategy understanding tend to show better tactical awareness in game situations. The entire confidence interval limit is above zero, thus reinforcing the consistency of the positive direction of the relationship in the study sample. This pattern is supported by Miao et al. (2025), who found that increased understanding of tactical knowledge goes hand in hand with improved tactical decision-making skills in match scenarios, demonstrating a connection between the mastery of tactical concepts and their application in the game decision process. The findings are also in line with the systematic review of Jia et al. (2024), which showed that the development of tactical skills through simulation-based exercises can improve perceptual-cognitive and *decision-making aspects*, which are important components in the formation of tactical awareness during games. Furthermore, Collins et al. (2026) emphasized that game performance is the result of the interaction of various components and that cognitive-perceptual skills, including decision making, anticipation, and situational awareness, are an important part of players' tactical competence. Thus, the results of this study indicate that understanding tactics and strategies are closely related to the player's ability to recognize, interpret, and respond to game situations tactically.

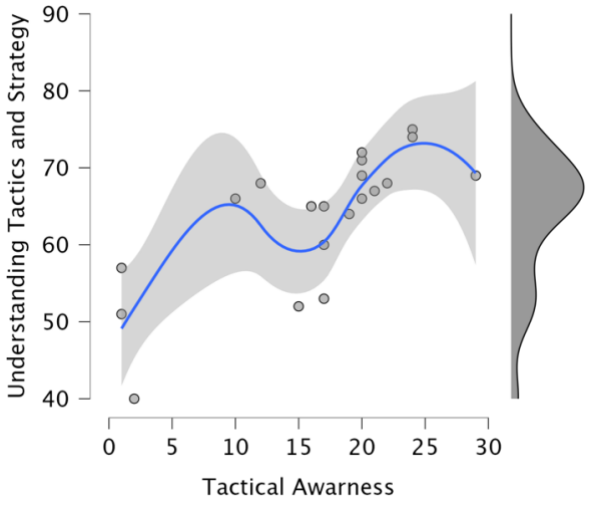


Figure . Scatter plots correlations understanding tactics and strategy vs tactical awareness

Figure shows a tendency for a positive relationship between Tactical Awareness and Understanding Tactics and Strategy, where players with higher levels of tactical awareness generally have higher scores of tactical and strategy comprehensions. The pattern of smoothing lines shows that the relationship is Figure, where players with higher levels of tactical awareness generally have higher scores of tactical and strategy understandings. The *smoothing* line pattern shows that the relationship is not entirely linear as there are some tilt changes at the low to medium level of tactical

awareness, but the overall direction of the relationship remains improved, especially in the score range of around 18–25. The observation points also show individual variation, particularly in the low and medium tactical awareness scores, indicating that similar levels of tactical understanding may arise at different levels of tactical awareness. The gray area around the estimation line indicates greater uncertainty at the extremes of the distribution, especially when there are fewer observations. The marginal distribution on the vertical axis also shows that the Understanding Tactics and Strategy score is not perfectly concentrated on a single score but is spread across several score groups. Visually, this pattern is consistent with the results of the previous Spearman correlation which showed a strong positive relationship between the two variables, thus reinforcing the image that the higher *the* tactical awareness, the higher the tendency to understand the player's tactics and strategy.

DISCUSSION

The main findings of the study show that Understanding Tactics and Strategy is closely related to the Tactical Awareness of futsal players. Empirically, the relationship can be understood because tactical behavior in the game is not just the result of mastering techniques but is a series of processes that start from recognizing game information, understanding position relationships between players, estimating the development of situations, choosing responses, and then translating them into motor actions. Thus, tactical understanding serves as a cognitive framework that allows players to interpret game situations in a more directed way. Popovych et al. (2021) show that football players' tactical thinking involves analytical abilities, flexibility, prediction, awareness, and forward perspective, which can even differ according to the role of the game. This strengthens the argument that players with better game understanding structures have a stronger cognitive basis for displaying tactical awareness in an actual manner.

The relationship between tactical understanding and Decision Making and Execution of Skills can also be explained through the sequence of perception, decision, action. Players must first understand the game problem before choosing and executing solutions. However, different results on Support suggest that the transfer of knowledge to behavior does not take place with the same force in all aspects. Support behavior is more dependent on the position and movement of teammates, available space, opponent structure, and changes in match conditions. Moreira Praça et al. (2024) show that individual and collective positional behavior changes after teams score or concede goals, including in the exploration of space and the team's wide organization. Thus, support is more appropriately understood as emergent behavior of collective coordination than simply a manifestation of individual knowledge.

The strong connection between Game Management and Tactical Awareness is also rational because the ability requires players to understand not only what to do, but when and under what conditions an action is used. In the game, players are constantly dealing with changes in scores, opponent pressure, transitions of possession, space, and time. Aguado-Méndez et al. (2021) found that football analysts view understanding of the game and observation of situations as important competencies for interpreting opportunities and adjusting the style of play with opponents. Thus, the ability to manage the game is the form of tactical knowledge that is closest to contextual application.

The findings of this study are supported by the literature that places technical-tactical quality as an important determinant in game performance. Oliva-Lozano et al. (2023), through longitudinal analysis of professional competitions, showed that technical-tactical indicators in general are more closely related to team success than the running variable of the match. This evidence reinforces the

view that the ability to understand and manage the game has performative relevance, not just cognitive value off the field. Otero-Saborido et al. (2021) also show that the development of modern match analysis increasingly emphasizes indicators of style of play, position, and contextual variables to understand technical-tactical performance more completely.

The relationship between comprehension and execution is also supported by evidence that cognitive capacity development can go hand in hand with the improvement of technical actions. Vargas Idarraga et al. (2024) report that psychokinetic games training geared towards concentration, attention, and anticipation can improve tactical creativity as well as passing effectiveness in young players. These findings are relevant because they show that technique performance is not a separate component of cognitive processes; effective technical actions can develop through the ability to read action choices and spatial opportunities.

However, the relationship between knowledge and action is not always automatic. Torquato Ferreira et al. (2026) found that five sets of small-sided games in a single session did not result in meaningful changes in decision-making or passing execution, while changes were only found in certain aspects of support actions. The authors attribute this to the physical-cognitive demands and the quality of the opponent's defense. The findings are an important contradiction to the overly simplistic interpretation that more exposure to the game will directly improve all technical-tactical abilities. This means that tactical knowledge is an important prerequisite, but its expression remains limited by the demands of the task, fatigue, the opponent's pressure, and the structure of the game.

This contextual variability is also shown by Clemente et al. (2023), who through meta-analysis showed that changes in field size in small-sided games resulted in different physiological, physical, technical, and tactical responses. Thus, the relationship between understanding and tactical awareness in this study needs to be interpreted as the relationship that occurs in a dynamic game system. Players who understand tactics well have a greater chance of acting effectively, but the actualization of actions is still influenced by the constraints faced at a given moment.

Theoretically, the results of this study can be explained through the perspective of interactionism and ecological dynamics. Hallé Petiot et al. (2021) argue that the tactical learning process is not enough to be built through the reproduction of the response that the coach has determined. Game behavior develops through the interaction between individual characteristics, the content of the task, colleagues and opponents, and the context of the game. This approach explains why Understanding Tactics and Strategy can be an important foundation, but Tactical Awareness only emerges when players are able to adapt knowledge to the information available at the time of play.

From a developmental point of view, school-age players also cannot be treated as athletes with stable perceptual-cognitive abilities. Androulakis and Koundourakis (2026) emphasize that the development of young players is simultaneously influenced by biological maturation, neuromuscular coordination, technical-tactical abilities, psychological factors, and perceptual-cognitive competencies. Therefore, two players who have similar conceptual understandings can produce different tactical responses due to different levels of experience, maturation, attention, or the ability to integrate game information.

This explanation is also relevant to the difference between Decision Making, Execution of Skills, and Support. Technical actions and decisions can be developed individually, while support coordination demands alignment with the behavior of other players. Plakias et al. (2026) show through a holistic analysis of matches that tactical success can arise from a combination of tactical

discipline, cohesion, utilization of the opponent's structural weaknesses, and contextual awareness, even when teams have lower traditional performance indicators. This means that game intelligence cannot always be reduced to one individual ability but is the result of the integration of individuals and collective systems.

Psychological aspects also have the potential to influence the transformation of knowledge into action. Dalbudak et al. (2026) show that the Psychological Skills Intervention program in young players results in improvements in decision making and tactical skills. These findings suggest that mental readiness, pressure control, and psychological toughness can act as factors that help players access and apply tactical knowledge under match conditions. Therefore, variations in tactical awareness should not be considered solely as variations in knowledge, but as a product of cognitive, technical, psychological, and contextual interactions.

The main implication of the study is that school-age futsal training should ideally integrate conceptual understanding with representative playing experience. Coaches can teach principles of organization, pressing, transition, tempo setting, power play, and strategy adaptation, then place players in games that require the direct application of those principles. This approach is more appropriate than separating "tactical theory" from game practice.

Practice priority can be given to game management, as this ability links understanding with decision adjustments to game changes. Exercises should use score variations, time remaining, numerical superiority or inferiority, touch limits, playing areas, and different targets. Chootsungnoen et al. (2026) show that the manipulation of task constraints in small-sided games results in different physical and technical-tactical demands, so the type of constraint needs to be selected according to the purpose of the exercise, not applied uniformly.

Coaches should also evaluate players through two levels of measurement, namely what the player understands and what they display. If a player obtains a high comprehension score but actual tactical awareness is still limited, interventions can be focused on knowledge transfer through videos, reflective questions, situational play, and decision-based feedback. Conversely, players who can act effectively but are not yet able to explain their tactical reasons can be directed to a reflection process to strengthen the representation of game knowledge. With this approach, player development does not stop at mastering techniques or memorizing patterns, but is directed at the ability to read, decide, execute, coordinate, and adapt in the ever-changing futsal environment.

CONCLUSION

This study concludes that understanding tactics and strategy has a strong positive relationship with tactical awareness in futsal players. Players who have a better understanding of game organization and coordination, game situation management, and strategy adaptation tend to show better tactical awareness when playing. At the component level, understanding tactics and strategies is related to decision making and execution of skills, while its relationship with support has not shown a significant relationship. Among the dimensions of tactical understanding, Game Management shows the strongest association with tactical awareness, followed by Organization and Coordination and Strategy Adaptation. These findings confirm that tactical ability is not only determined by conceptual knowledge, but also by the ability to translate this knowledge into decisions, skill execution, coordination, and action adjustments in game situations. Therefore, school-age futsal coaching needs to integrate tactical learning with representative game situation-based exercises.

Because the study used a correlation design and limited samples, the results showed relationships between constructs and could not be used to deduce cause-and-effect relationships.

RECOMMENDATION

Based on the results of the research, futsal coaches are advised to integrate learning to understand tactics and strategies with representative game situation-based exercises. Training programs need to pay special attention to aspects of Game Management, including tempo setting, pressing, transitions, power play, time management, and decision-making in changing game situations. In addition, aspects of Organization and Coordination and Strategy Adaptation need to be developed through exercises that require communication, position rotation, coordination between players, and the ability to adjust strategies to opponent characteristics. Player evaluation should not only use a conceptual understanding test but also combine it with observation of game behavior through the components of Decision Making, Execution of Skills, Support, and Tactical Awareness. Players with a good understanding of tactics but cannot apply them optimally need to receive situational training, video analysis, reflective discussions, and decision-based feedback. Further research is suggested involving larger sample sizes, different age levels and competition levels, as well as multiple teams or schools to make the results more generalizable. Longitudinal or experimental designs are also needed to test whether a particular tactical training program can directly improve the tactical awareness and tactical performance components of futsal players.

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