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ORIGINAL

DESIGN AND VALIDATION OF THE SOCCER TACTICAL KNOWLEDGE TEST (STKT)

DISEÑO Y VALIDACIÓN DEL TEST DE CONOCIMIENTO TÁCTICO OFENSIVO EN FÚTBOL (TCTOF)

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ABSTRACT

The purpose of the present study was to determine the validity of a tactical knowledge assessment test in soccer. Seven experts reviewed the instrument and 465 children aged 8 to 14 years completed the test. The experts' opinion (100% agreement), internal consistency ($\alpha=.87$), *Test-retest* correlation ($r=.75$), and the correlations between the soccer tactical knowledge and the external criterion of soccer coaches ($r=.46$, $p<.01$), showed reasonable evidence for assessing the test reliability. The sport context was determinant on the tactical knowledge ($p<.01$), supporting construct and concurrent validity. These results verify the validity of this instrument for assessing soccer tactical knowledge in young beginners who are starting to practice team sports.

KEY WORDS: tactical knowledge, declarative and procedural knowledge, teaching games for understanding, soccer.

RESUMEN

El propósito de este estudio fue determinar la validez de un test de evaluación del conocimiento táctico en fútbol. Siete expertos revisaron el instrumento y 465 niños/as de entre 8-14 años fueron encuestados. El 100% de acuerdo entre los expertos, la consistencia interna ($\alpha=.87$), la correlación *Test-retest* ($r=.75$) y la correlación entre el conocimiento táctico y el criterio externo de entrenadores de fútbol ($p<.01$), sugirieron que el instrumento era fiable. El contexto deportivo se mostró determinante sobre el nivel de conocimiento táctico ($p<.01$) apoyando la validez de constructo y concurrente. Estos resultados confirmaron la validez del instrumento para evaluar el conocimiento táctico en fútbol de jóvenes que se inician a los deportes de equipo.

PALABRAS CLAVE: conocimiento táctico, conocimientos declarativo y procedimental, enseñanza comprensiva del deporte, fútbol.

INTRODUCTION

One of the lines of research most related to the Game Based Approaches (GBA) (Thorpe, Bunker and Almond, 1986), is the study of prior knowledge of athletes and their relationship with the ability to play (De la Vega, Del Valle, Maldonado and Moreno, 2008; Dodds, Griffin and Placek, 2001; García-González, Iglesias-Gallego, Moreno-Domínguez, Gil-Arias and Del-Villar-Álvarez, 2011; Griffin, Dodds, Placek and Tremino, 2001). Athletes make decisions based on the structures of prior knowledge that they have and the ability to process new information (Domínguez de la Rosa and Espeso, 2002; Starkes and Ericsson, 2003). Because of this, it is suggested that a good base of knowledge (declarative and procedural), in combination with other factors such as experience or formal instruction, could help make game decisions or "do it" in a more efficient way (French and Thomas, 1987). For all these reasons the assessment of prior knowledge has become very important when it comes to the teaching-learning games process at an early age.

There are various techniques assess knowledge in sport that can be observed in the literature, specially the interviews, video clips, questionnaires, and written test and / or with figures. Griffin et al. (2001) designed a semi-structured interview to analyze the domain specific knowledge in soccer of secondary school students, which was validated by inter-observer agreement. It was divided into four levels of understanding, from basic understanding to a specific understanding. It consisted of seven basic tactical problems, and participants had to move a number of pieces representing players and respond to what they could do in that situation and why. This procedure has also been used in other studies. González-Víllora, García-López, Pastor and Contreras (2010) and

González-Víllora, García-López, Contreras and Gutiérrez (2010), designed an interview for the assessment of soccer specific knowledge of 13 players aged 10, and 14 players aged 12. The downside is that these types of instruments provide information on only a few subjects, and there have been difficulties in collecting the data, as the youngest respondents are not articulate when verbalizing their responses.

Something similar happens for the evaluation of specific knowledge through video sequences. Blomqvist (2001) designed an evaluation test for badminton that consists of 19 video sequences that he used with 12 years old players. Two experts validated the sequences, which had three phases: presentation, pause and response selection. Respondents observed a sequence of a badminton service and the situation of the opponent, and then they had to choose between three options on what hit style to use, providing two suitable arguments among ten possible ones. Blomqvist, Vääntinen and Luhtanen (2005) followed this scheme to design an evaluation test on soccer players aged 12-14, which consisted of 42 video sequences that were validated by two experts. This procedure was also used by González-Víllora, García-López, Contreras and Gutiérrez, (2010) and by González-Víllora, García-López, Pastor and Contreras (2010), to assess the procedural knowledge of soccer players aged 10-12. In this case, four experts with over ten years of experience validated six sequences.

Other similar instruments have been used by García-López, Gutiérrez, González-Víllora, Abellán and Webb (2010) or by Giacomini (2007). However, by using this technique more time for testing is required, and the quality of the data depends largely on the ability of the interviewer to obtain information (Anguera, 2003). These issues have led to the use of other assessment tools to evaluate specific knowledge in sports. Rulence-Pâques, Fruchart, Dru and Mullet (2005) designed an assessment tool to evaluate the soccer specific knowledge which was completed by 257 subjects aged 12-25. It consisted of 36 cards of short stories in which the authors contextualized: the importance of play, the numerical condition, results and remaining time. Blomqvist and Vääntinen (2006) designed a questionnaire adding figures for the evaluation of soccer specific knowledge in players aged 10-14. It consisted of 69 items on technique and tactics in defense and attack.

De la Vega, Del Valle, Maldonado and Moreno (2008) designed a board game ("smart soccer") validated through inter-observer reliability for the game understanding assessment of 37 soccer players aged 8-14. The instrument consisted of a board on which knowledge was projected through moving the chips / players. Otero, González and Calvo (2012), designed a questionnaire to assess declarative and procedural knowledge in soccer, which was validated by six experts and completed by 46 students from 6th grade of primary education. It consisted of 26 items that illustrate situations of 2 versus 1 and the student had to give the correct answer among four options.

The use of figures on sport situations is a common procedure in the evaluation of specific knowledge. This technique has been used even for the design of computerized test like the one carried out by Buscá, Riera and Garcia (2010), which was validated for the assessment of cognitive skills in sport. It was used with a group of 242 secondary school students. Along with the questionnaires and written test the use of figures is the most used technique. The knowledge of a larger number of subjects can be assessed using it. Elferink-Gemser, Visscher, Richart and Lemmink (2004) designed a questionnaire on declarative and procedural knowledge, which was validated with soccer and hockey players aged 16. This tool has been used to assess the specific knowledge of 191 soccer players aged 14 to 18 (Kannekens, Elferink-Gemser and Visscher, 2009). Other similar instruments are the ones by García-Herrero and Ruiz-Pérez (2007) for the assessment of the specific knowledge of handball in children aged 10-11, or the declarative and procedural knowledge questionnaires tennis designed by García-González, Moreno-Domínguez, Perla-Moreno, Iglesias-Gallego and Del Villar (2009). In the latter, declarative knowledge is assessed in different categories: the technique, rules, general knowledge and strategy, while for the procedural part, the strategy category of the original questionnaire by McGee and Farrow (1987) is used, and includes questions for possible game situations. This instrument has also been used in other studies to analyze the relationship between cognitive factors, experience and expertise in tennis (García-González et al., 2011), and has served for the design of other assessment tools in other sports like basketball (Del Villar, Iglesias, Moreno, Fuentes and Cervello, 2004).

Other questionnaires based on the one by McGee and Farrow are the one by Moreno, Moreno, García-González, Gil and Del Villar (2010), with 24 multiple choice questions for assessing declarative knowledge in volleyball, and the one by Moreno-Domínguez, Del Villar, García-González García-Calvo and Perla-Moreno (2013), for assessing procedural knowledge, consisting of 25 items. The downside is that, despite the number and variety of assessment knowledge techniques in sports, the revised instruments have been limited to the analysis of some cognitive domains that have little relation to the context in which the knowledge is applied. That is, in many cases it assesses what the players know in different situations, but these situations are not classified according to the tactical context of game in which they occur. This context, from a comprehensive perspective, is constituted by different tactical principles that a player or team may have to face during a match (Bayer, 1992). We use the term tactical principles (TP) to refer to the tactical problem or the contextual issues of a specific game situation (Thorpe et al., 1986).

This is about the set of maxims that the player must keep in mind in terms of the driving problem that he faces, and a structure of knowledge on which the initiates have proved to have deficiencies (González-Víllora, García-López, Contreras et al., 2010; González-Víllora, García-López, Pastor et al., 2010; Gutiérrez et al., 2011). These TP refer to attacking: keeping the ball, moving forward to the opposing goal and scoring, and in defense, getting the ball, stopping the advance of the opponent and protecting their-own goal or field.

Therefore, the aim of this paper is to present the validation process of an assessment tool for tactical knowledge (declarative and procedural) more complete than the above; the Soccer Tactical Knowledge Test (STKT), which analyze the knowledge of the player based on the contextual problem where this knowledge is applied.

MATERIALS AND METHODS

Participants

465 children aged 8-14 participated in the study, at three different sporting contexts: 163 players at a specific sporting context in U-10 soccer of a second division club in Spain (10.16 ± 1.21 years old, 3.38 ± 1.66 years of experience in competition, and 6.93 ± 6.25 hours a week in soccer practice), 265 students from 3rd to 6th grade in primary education from a public school in Spain in a school sporting context (10.16 ± 1.27 years old, 1.42 ± 2.06 years of experience in competition, and 3.53 ± 4.47 hours a week in soccer practice), and 37 children in a recreational and sporting soccer context in tU-10 and U-13 categories (11.03 ± 1.25 years old, 2.84 ± 2.06 years of experience in competition, and 6.94 ± 4.79 hours a week in soccer practice).

Procedure

The STKT has an ecological view of the assessment process of prior knowledge of athletes. It is a perspective that evaluates possible relationships between networks of propositions of declarative knowledge and procedural knowledge productions that allow "...to decide adaptively in sport" (Ruiz and Arruza, 2005, pp. 64-65). This is achieved by using the main link between these relationships, the TP for invasion games and sports. We refer to the structure that allows game actions to adapt to the tactical problems inherent to the game as an operational process influenced by factors inherent to the player and factors that are external to the context in which he operates, and that apparently, can be verbalized (Domínguez de la Rosa and Espeso, 2002), and even quantified (Iglesias, 2005).

STKT design criteria: content

The STKT has been designed for the evaluation of declarative and procedural knowledge related to TP when attacking for invasion games and sports such as soccer. With the aid of the proposal by Hernández, Fernández and Baptista (2006), Table 1 shows what variable and dimensions it values, what its indicators are, and what items are used to evaluate them.

TABLE 1. Variable, dimensions and indicators to assess by STKT.

<u>Variable:</u> tactical knowledge in soccer.	
<u>First Dimension:</u> declarative knowledge related to the attacking phase in soccer.	
<u>Indicators:</u>	<u>Item/s</u>
▪ Domain declarative specific knowledge on the technical and tactical individual elements in the sport of soccer related to TP when attacking for invasion games and sports.	1 to 7
▪ Domain declarative specific knowledge on the offside rule in soccer A-7.	8
▪ Domain declarative specific knowledge on roles and positions in soccer.	9 to 13
▪ Domain declarative specific knowledge on technical-tactical individual elements in soccer.	14 to 24
▪ Domain declarative specific knowledge on technical-tactical collective elements in soccer.	25 to 27
▪ Domain declarative specific knowledge on TP when attacking in invasion games and sports.	28 to 36
<u>Second Dimension:</u> procedural knowledge related to the attacking phase in soccer.	
<u>Indicators:</u>	<u>Item/s</u>
▪ Domain procedural specific knowledge on the use of individual technical and tactical elements in situations of keeping the ball in soccer.	3, 5, 6, 9, 11 y 13
▪ Domain procedural specific knowledge on the use of individual technical and tactical elements in situations of moving forward to the opposite goal in soccer.	1, 4, 7, 10, 12, 14, 15
▪ Domain procedural specific knowledge on the use of individual technical and tactical elements in situations of scoring in soccer.	2 y 8
▪ Domain procedural specific knowledge on the offside rule in soccer A-7.	16

Note. Each variable indicator is measured using the items shown on the right.

The TP constitute the tactical problem in which the interaction between the capacities of perception, decision making and technical and tactical execution in sport occur. Therefore, knowledge of respondents on this structure is valued. The STKT also assesses knowledge of the technical and tactical individual and collective elements in soccer. This is because they are key elements in the curricula of invasion sports (Mitchell et al., 2006). Also, they are key elements that have a similar function and application between these sports and its main knowledge is related to better decision making processes (Blomqvist et al., 2005; French and Thomas, 1987). Similarly, the STKT assesses the specific knowledge on the roles and positions in soccer. This is because it is a basic level of declarative knowledge of the sport itself. In addition, in combination with education and experience, it can facilitate the construction of more sophisticated structures, and is considered essential for the formation of other cognitive processes used during the game (Blomqvist and Vanttinen, 2006). This criterion was also used to include the indicator on the offside rule in A-7 soccer.

STKT design criteria: format

The STKT was made by following the criteria and phases proposed by Anguera (2003), Hernández et al. (2006) and Morales (2011) for the design of

questionnaires, surveys and psychometric tests. It is aimed at children and adolescents aged between 7 and 14. This is because the application of the test with lower age children could be a very complex form of access to information. On the other hand, after 14 years, children begin to compete in the category of A-11 soccer, and the knowledge to achieve at this stage is more complex (Lago, 2002; Sans y Frattarola, 1998). In addition, the literature states that around seven to eight years old more organized cognitive structures are developed and this is an aspect that this tool aims to study in depth (De la Vega et al., 2008). The instrument is divided into two distinct parts, one for the evaluation of the six indicators of the declarative knowledge dimension, with 36 items, and another for the evaluation of the four indicators of the procedural knowledge dimension, with 16 items. Both parts can be completed in fifteen minutes, as performed by the participants of the sample of this study. The structure of this tool is formed by multiple choice questions in the first part for the evaluation of declarative knowledge (eg: What is a pass for?), and multiple choice questions with figures, for the evaluation of procedural knowledge, in situations that follow the scheme "if..., then..." (McPherson and Thomas, 1989). In this case seven scenarios in A-5 soccer and eight in A-7 soccer are included. This design was made considering that: a) A-5 soccer and A-7 soccer are modalities practiced and recommended at this age; b) Sports such as soccer can be classified into segmental and functional specialties considering the immediacy and / or spatio-temporal delay in the appearance of problems inherent to the game; c) The core of the game (relating to the space or area where the ball is) is different depending on the specialty and / or sports categories (Lago, 2002). It is important to emphasize that the items of STKT include options for correct and incorrect answers (Figure 1). These were previously established by the percentage of agreement of seven experts who reviewed the instrument, and the findings observed in the exploratory phase of the validation process. This process is explained later.

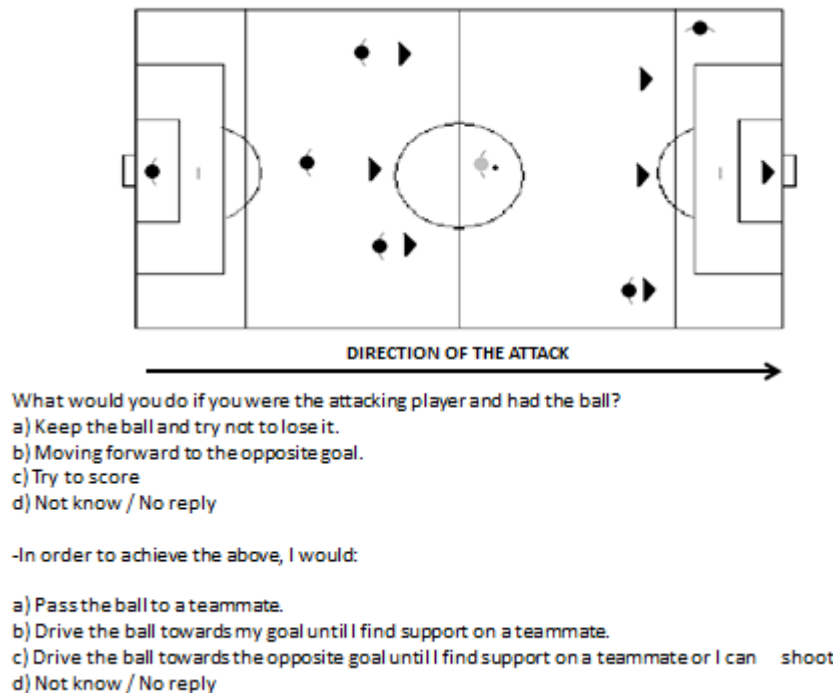


FIGURE 1. Example of an item on procedural knowledge in STKT. The criteria established for allocating the correct item is to check the option (b) first and option (c) later. Otherwise the item is scored as incorrect.

Seven experts were selected to validate the STKT in relation to content: objectives, content and items (Hernández et al, 2006; Vickers., 1990). The criteria for selection of these experts was the fulfillment of the following requirements: a) Being a teacher specialized in Physical Education or a Bachelor of Physical Activity and Sports Science, b) Being, at least, a Youth Soccer and Futsal instructor (First Level by the Spanish National School of Soccer Coaches) and c) having been involved in soccer training in the five years prior to the design of this tool. The instrument was analyzed considering the criteria of adequacy, intelligibility and representativeness of the items. Subsequently, the percentage according to these factors was calculated. On the other hand, we surveyed a group of 27 soccer beginners aged 8-10 who played in the youngest category and who belonged to the group of participants in the specific sporting context of soccer (Serra-Olivares, García-López and González-Villora, 2011), and content validity based on the proportion of choosing the option "Do not know / no reply" (Anguera, 2003) was calculated. Moreover, the stability of the instrument was calculated by using the correlation test *Test-retest* with a week to spare. In this case, the participant sample consisted of 30 players in this same context in a U-10 soccer team. The reliability of the test was also calculated differentiating the rest of the participants according to their sporting context: specific ($n=106$), school ($n=265$) and recreational ($n=37$).

The Cronbach's Alpha test and the corrected item-total correlation test for the total sample were performed. To determine the criterion validity we correlated

the results obtained in the STKT by respondents in the specific sporting context of soccer above ($n=106$), and their level of knowledge according to their coaches (six participants who complied with the requirements mentioned to be considered an expert). Each coach evaluated 17-18 players from his team. They were asked to rate 0-10 the general knowledge of soccer of their players (0= very low knowledge, 10= very high knowledge) and that value was correlated with each of the control indicators of the test. Finally, to calculate the construct and concurrent validity, the results obtained were analyzed and compared with other studies. In this regard, the total sample was classified with the exception of 41 participants that caused experimental death since they did not answer any of the two parts of the STKT ($n=424$), into three groups based on their sporting context: school ($n=265$), specific ($n=122$) and recreational ($n=37$), and differences in knowledge were analyzed by *T student* test and the analysis of the effect size. With all the above, and considering that the test was performed by at least five subjects per item, and that the final sample was not less than 100 subjects (Morales, 2011), the overall validity of the STKT was calculated.

RESULTS

Data Analysis

Seven items on declarative knowledge were modified and two on procedural knowledge were eliminated due to the content validity calculation. This procedure was based on the analysis of proportion "Not know / no reply" answers carried out with the 27 soccer beginners mentioned above, and the percentage of agreement among experts regarding the adequacy, intelligibility and representativeness of the items. Finally, 100% of agreement among experts was observed in the STKT content

Similarly, the findings for the proportion of choosing the alternative answer "not know/no reply" were lower than 65% in all analysis subsequent to this instrument modification. In relation to the *test-retest* reliability, significant correlations in the declarative knowledge ($r=.79$), the procedural knowledge ($r=.71$) and the tactical knowledge ($r=.75$) were observed. On the other hand, the test showed adequate internal consistency and the value of α was higher than .875 when removing any item of the test: ($\alpha=.78$) for declarative knowledge ($\alpha=.86$) for procedural knowledge and ($\alpha=.87$) for tactical knowledge. Regarding the criterion validity, the level of knowledge of the respondents in the specific sporting context ($n=106$) correlated significantly with the assessment of their knowledge by their coaches for almost all test indicators (Table 2).

TABLA 2. Average correlations between the level of tactical knowledge of 106 soccer players aged 8-12 in a specific sporting context in each indicator of the test, and evaluation of their knowledge by their coaches.

Indicator of knowledge	Rho Spearman Correlation	Significance
DCD_TTI-TP	.030	.788
DCD_RAP	.269*	.014
DCD_TTI	.333**	.002
DCD_TP	.248*	.024
DCD_TTG	.314**	.004
DGP_KB	.351**	.001
DGP_MFG	.358**	.001
DGP_S	.109	.330
Declarative knowledge	.350**	.001
Procedural knowledge	.446**	.000
Tactical knowledge	.466**	.000

*Correlation is significant at 0.05 level (bilateral). ** Correlation is significant at 0.01 level (bilateral). DCD (domain declarative specific knowledge), TTI (technical and tactical individual elements), TP (tactical principles of action), RAP (roles and positions), TTG (technical-tactical group elements), DGP (domain procedural specific knowledge), KB (keep the ball), MFG (moving forward to goal), S (scoring). Each coach evaluated 17-18 players from his team.

Differences in the levels of knowledge were noticed depending on the sporting context of the respondents (Table 3). The differences were significant among respondents in the specific sporting context and school context in the declarative knowledge ($F= 3.199, p= .000, r= .44$), procedural knowledge ($F= 7.854, p= .000, r= .23$), and tactical knowledge ($F= 0.156, p= 0.000, r= 0.39$).

The differences were also significant among respondents between the recreational sporting context and the school context for declarative knowledge ($F=15.266, p=.000, r=.58$), procedural knowledge ($F=5.288, p=.000, r=.46$), and tactical knowledge ($F=15.087, p=.000, r=.58$). No significant differences in knowledge were observed among respondents between specific sporting context and recreational context for declarative knowledge ($F=3.398, p=.347$), procedural knowledge ($F=7.023, p=.206$), or tactical knowledge ($F=14.127, p=.138$). These data indicated adequate construct and concurrent validity of the STKT to assess the tactical knowledge level of the respondents.

TABLA 3. Tactical knowledge depending on the sporting context of respondents.

	Specific sporting context in soccer		School sporting context		Recreational sporting context	
	Mean	SD	Mean	SD	Mean	SD
Declarative knowledge	60.10	18.85	41.79	18.22	63.20	10.89
Procedural knowledge	58.01	27.03	46.853	18.61	63.93	13.45
Tactical knowledge	59.05	17.43	44.32	16.63	63.57	9.39

SD (Standard deviation).

DISCUSSION

The aim of this paper is to present the design and validation process of the STKT. It is an instrument that, unlike interviews (Dodds et al., 2001; González Villora, García López, Contreras et al., 2010; González Villora, García López, Pastor et al., 2010), can record the level of tactical knowledge of a greater number of participants simultaneously. The main difference of this instrument in comparison with other tools is that it does not only evaluate "knowing what and how to do" in terms of declarative and procedural knowledge, but also "knowing why to do" in relation to the TP for attacking proposed by Bayer (1992). Thus, a further ecological perspective for the assessment of prior knowledge of the invasion games beginners is proposed, considering the importance of the specific vocabulary-language and the individual differences of each learner, which are two of the basic pedagogical principles outlined by the GBA (Mitchell et al., 2006).

The reliability and validity tests used in this research have been used by different authors in the construction of questionnaires and test in similar sporting contexts (Del Villar et al., 2004; García-González et al., 2009; Moreno et al., 2010). The supervision by experts in questionnaire design and pilot testing is a common method in research to determine the content validity (Blomqvist, 2001).

In addition, the validation process of the STKT included the calculation of the proportion of the "Not know / no reply" responses as well as the performance of internal consistency and stability tests which were also conducted in other studies (Blomqvist et al., 2005; Buscá et al., 2010; De la Vega et al., 2008; Moreno et al., 2013; Otero et al., 2012). Moreover, optimal results were observed for internal consistency by means of the Cronbach's alpha, both for the first and second parts of the test as well as for the final instrument.

These results are similar to other research studies that show values of internal consistency ($\alpha=.88$) and ($\alpha=.73$) in the validation of two different questionnaires for knowledge assessment in badminton and soccer (Blomqvist 2001; Blomqvist et al, 2005), and ($\alpha=.72$) and ($\alpha=.77$) for the declarative and procedural knowledge parts of a questionnaire for knowledge assessment in tennis (García et al, 2008). Likewise, they are similar to other studies that show values of ($\alpha=.89$) and ($\alpha=.72$) in the validation of an instrument for assessing the tactical processes in sport (Elferink-Gemser et al., 2004), of ($\alpha=.77$) in an evaluation test of cognitive skills in sport (Buscá et al., 2010) and ($\alpha=.79$) in the design of a questionnaire for procedural knowledge assessment in volleyball (Moreno-Domínguez et al., 2013). In this sense, the evaluation of reliability of questionnaires and evaluation tests for tactical knowledge in sports through this statistical processing is very common, establishing values of ($\alpha>.70$) as results that determine adequate internal consistency (Lowenthal, 2001) .

Moreover, satisfactory values of the STKT were observed in the corrected item-total correlation and ($\alpha=.87$) was the lowest result in reliability only when

removing any item. These results are also equivalent to other studies that show maximum values of reliability ($\alpha=.77$) in the process of validating a test of cognitive skills in sports (Buscá et al., 2010) and in the design of a questionnaire for declarative knowledge in volleyball (Moreno et al., 2010). They are also in line with other studies that show internal consistency results between ($\alpha=.72$) and ($\alpha=.89$) in the process of validation of an instrument for assessing the tactical processes in sport (Elferink- Gemser et al., 2004) and ($\alpha=.72$) in the design of a questionnaire for procedural knowledge assessment in volleyball (Moreno-Domínguez et al., 2013). Furthermore, we found values of temporary stability of the STKT ($r=.79$), ($r=.71$) and ($r=.75$) for the assessment of declarative, procedural and tactical knowledge respectively.

These findings can be regarded as less acceptable coefficients as they are among ($r=.70$) and ($r=.80$), in accordance with Gregory (2000). They are also similar to other studies that show values of ($r=.73$) and ($r=.75$) in the validation of a questionnaire for knowledge assessment in badminton (Blomqvist, 2001), and ($r=.72$) in the process of validating a questionnaire for knowledge assessment in soccer (Blomqvist et al., 2005). Also, the values of temporary stability of the STKT found in this study are similar to other studies that show results of ($r=.72$) in the validation of an instrument for assessing cognitive skills in sports (Buscá et al., 2010), and others that show values of ($r=.85$) in the validation of instruments for knowledge assessment in basketball (Del Villar et al., 2004), of ($r=.88$) in handball (García-Herrero and Ruiz-Pérez, 2007), and ($r=.76$) in volleyball (Moreno et al., 2010).

As regards the calculation of criterion validity, the scores provided by participating coaches in relation to the knowledge of their players in the specific sporting context, correlated significantly with the scores obtained by respondents in both parts of the STKT. These results are similar to others that calculated the relationship between the scores of the respondents in the test designed and the level of knowledge of these, which was valued by their teachers, between ($r=.37, p<.01$) and ($r=.41, p<.01$) (Buscá et al., 2010). They are also in line with other studies that used the external criterion for calculating the validity of their instruments like the one by De la Vega et al. (2008), who used the interobserver correlation in the design of a tool for the assessment of tactical understanding in soccer, or the one by Blomqvist (2001), who used the ranking position of tennis players in the validation process of a questionnaire for knowledge assessment in badminton.

On the other hand, no assessment tools for tactical knowledge were found that shared the characteristics of the tool designed in this paper. Therefore, the procedure for calculating the construct and concurrent validity of the instrument consisted of an analysis of the differences in knowledge of the participants according to their sporting context. This process has been done in other studies (Blomqvist, 2001; Moreno et al., 2010).

In this regard, it was found that participants who were in the specific or recreational sporting context of soccer had a significantly higher level of

knowledge than those participants who were in the school context. These differences were supported by the effect size values classified as moderate, between $r=.23$ y $r=.58$. In this line, the calculation of the effect size has been previously used in the validation of other instruments (Blomqvist, 2001). It is considered utterly important in the field of physical activity and sports science research (Tejero-González et al., 2012), and suggests an appropriate concurrent and construct validity of this particular STKT.

CONCLUSIONS

The results observed in the present study have determined that the STKT presents adequate psychometric properties for its use with youngsters that are initiated in team sports of different competitive and noncompetitive spheres. Unlike others, the STKT quickly, easily and inexpensively allows the assessment of both declarative and procedural tactical knowledge of the respondents in relation to the contextual dynamics of the game at every moment.

Thus, it more profoundly explores, if possible, the specific knowledge of tactical mastery in game situations that present a similar tactical problem. It also allow to the teachers/trainers to obtain information on "what, why and how to do" in terms of beginners sporting behaviors, but also information on "what for". Thus, valuable information on those dimensions of knowledge that respondents already have is collected, and also information on other dimensions in which the respondents have limited knowledge.

This aspect is crucial in designing and adapting the teaching-learning programs in sports to the individual characteristics of the learners: age, experience and above all, level of prior knowledge. In any case, in order to assess the robustness of the results observed in this study, the design of more assessment tools for tactical knowledge (that consider the importance of the TP as the most basic knowledge taxonomy in sports) is necessary.

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