Socio-motor relationships, perceived enjoyment and competence of young players during the game of tag

Relaciones sociomotrices, disfrute y competencia percibida de jóvenes jugadores durante el juego *de pillar*

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Abstract

This study aimed to assess the socio-motor interactions and the perceived enjoyment and competence levels of young players during a game of tag. 21 players under 13s from two different teams of the same football club (subgroup-A and subgroup-B) played a new modified version of the game of tag for ten minutes. The motor relationships were analysed registering the number of counter-communications (i.e. catching attempts) and the players involved. The perceived enjoyment and competence levels were assessed using the BECS scale. The Chi-square test showed significant differences ($p < .001$; effect size [ES] = 0.65, moderate) in the counter-communications, according to the subgroup of the tagger and the runner: the 87% and the 68% of the total counter-communications involved only players of the same subgroup and only from subgroup-A, respectively. The mean enjoyment was significantly ($p = .03$) and substantially (ES = 0.98, large) higher for the subgroup-A players (4.0 ± 0.8; coefficient of variation [CV] = 20%) compared to subgroup-B players (3.8 ± 0.6; CV = 16%). Besides revealing the socio-motor interactions of the players, a game of tag could be an interesting alternative to experience the motor instability, identify the social relationships of a group and guarantee high enjoyment in young players.

Keywords: sport initiation, pedagogical intervention, motor game, motor communication, affectivity.

Resumen

Los objetivos del estudio fueron el análisis de las relaciones sociomotrices y la valoración de los niveles de disfrute y de competencia percibida de jóvenes jugadores en el juego *de pillar*. 21 jugadores menores de 13 años pertenecientes a dos equipos de categoría alevín del mismo club de fútbol (subgrupo-A y subgrupo-B) jugaron a una variante desconocida del juego *de pillar* durante 10 minutos. Las relaciones motrices fueron analizadas mediante el registro de las contra-comunicaciones (i.e. intentos de atrape) y los jugadores implicados. Los niveles de disfrute y de competencia percibida fueron evaluados mediante la escala BECS. La prueba Chi-cuadrado mostró diferencias significativas ($p < .001$; tamaño del efecto [TE] = 0.65, moderado) en la frecuencia de contra-comunicaciones en función del subgrupo del pillador y del huidor: el 87% y el 68% del total de contra-comunicaciones involucró a jugadores del mismo subgrupo y solo del subgrupo-A, respectivamente. El nivel medio de disfrute fue significativamente ($p = .03$) y sustancialmente (tamaño del efecto [TE] = 0.98, alto) mayor para los jugadores del subgrupo-A (4.0 ± 0.8; coeficiente de variación [CV] = 20%) en comparación con los del subgrupo-B (3.8 ± 0.6; CV = 16%). Además de revelar las relaciones sociomotrices de los jugadores, el juego *de pillar* puede ser una interesante alternativa para que jóvenes jugadores vivencien la inestabilidad motriz y disfruten durante la práctica de juegos motores.

Palabras clave: iniciación deportiva, intervención pedagógica, juego motor, comunicación motriz, afectividad.

Introduction

Like sports, traditional games are legal entities that regulate the motor behaviour of players (Martínez-Santos, 2018; Martínez-Santos et al., 2020; Parlebas, 2020). While the rules of each sport are institutionalised (Summerley, 2020), traditional games do not show any level of organisation (Martínez-Santos, 2018; Martínez-Santos et al., 2020); their rule systems are not regulated by any institution, but are administered and managed by the players themselves. The rule system of each traditional game is the fruit of a history that has shaped its structures according to the collective values and representations of each region (Lavega-Burgués et al., 2006; Parlebas, 2020). By researching and selecting traditional games from different cultures, the teacher and coach could offer a great variability in the use of space, the type of communication, the criteria for success (Martínez-Santos et al., 2020), and the use of material (Edwards, 2009) between students and the players, making the motor experience more enriching.

Tag is one of the best known and most used traditional games in Physical Education (PE) and in the training of various sports at the formative level (Belka, 1998; Merino Orozco et al., 2018; Oboeuf et al., 2020). In addition to being a socio-motor of oppositional motor interaction (tagger vs. runners [Parlebas, 2020]) this game is unstable and lacks memory because the motor relationships vary among participants changing roles (Martínez-Santos et al., 2020) and the rules do not establish a concrete way to end the game (Etxebeste et al., 2014). In this way, tag brings into play a model of human communication that is not found in sports (Martínez-Santos et al., 2020). Since groups and individuals exert a reciprocal influence and experience important temporal changes in their relationship (Moreland & Levine, 1982), games whose motor communication network is unstable, such as tag, can help participants to respond to the unstable social relationships that arise in the real world. The person must be prepared for the possible role transitions (Moreland & Levine, 1982) that occur in life; these involve changes in friendships, alliances, and antagonisms (Martínez-Santos et al., 2020). In addition, games whose rules do not include any interruption mechanism (i.e., no memory) trigger greater positive emotions among players (Etxebeste et al., 2014; Muñoz-Arroyave et al., 2020). In order to achieve a higher degree of specificity with respect to team-sports training, the internal logic of the traditional game of tag can be modified by introducing the use of a ball (Belka, 1998; Gonzalez-Artetxe et al., 2020).

Socio-emotional relationships seem to be omnipresent in all the protagonists' decisional choices during a game of sitting ball (ambivalent game, the player can choose with whom to cooperate with or oppose, and unstable relationships, the players' motor relationships vary during the game) (Obœuf et al., 2008). The freedom available to the catcher to choose whom to catch directly involves socio-emotional empathy as part of the playful development of the game (Obœuf et al., 2010) and the teacher/coach can identify the socio-emotional relationships of the group by analysing the development of the game (Obœuf et al., 2008). Given that motor experiences involve unique emotional experiences (Muñoz-Arroyave et al., 2020) that depend on the type of motor relationship allowed by the rules of each game (Gao et al., 2014), it seems necessary to analyse the socio-emotional relationships of young players according to the family of each motor game (Lavega-Burgués et al., 2011). For example, in exclusive-unstable motor games such as tag (Parlebas, 2020), in which the rules determine who to cooperate with or oppose depending on the socio-motor role, which varies during the game. In addition to the socio-motor relationships, the analysis of the degree of enjoyment and perceived competence would complement the assessment of the players' experience during this motor game. Since feeling able to play and enjoy according to one's abilities increases intrinsic motivation towards the activity (Arias-Estero et al., 2013), the analysis of the degree of perceived enjoyment and competence would help PE teachers and the formative sport coaches in the choice of motor games to be implemented. If traditional games can contribute to the development of fundamental social-emotional competences such as learning to recognise and manage emotions, establish healthy relationships and positive goals, satisfy personal and social needs, make responsible decisions and solve problems among young people (Dyson et al., 2021), we should analyse the consequences of playing tag on the relational dimension, and on the players' perceived enjoyment and competence, with the aim of optimising the learning process in both practice domains. Therefore, the objectives of the study were the analysis of socio-motor relationships and the assessment of the levels of perceived enjoyment and competence of young players in tag.

Method

Participants

Twenty-one youth-football players (U13: *N* = 21; age = 12 ± 1 years; football experience = 5 ± 1 years) from the same football club participated in the study. The participants belonged to two different teams of the same age and category (8 a-side): subgroup-A (*n* = 11; age = 12 ± 1 years; football experience = 5 ± 1 years) and subgroup-B (*n* = 10; age = 12 ± 1 years; football experience = 5 ± 1 years). Players completed the previous two weeks of training and matches prior to the study. The teams trained separately twice a week in non-consecutive sessions at the same time on an artificial turf pitch. Players from both teams trained together to play the game of tag designed for the research. Parents or guardians, coaches and players, as well as the club, were all informed of the objectives and procedures of the study before giving informed consent for the players' participation. Participants and their legal guardians were informed about the potential risks and benefits of the intervention, and participants could accept and withdraw from the study at any time. The study protocol followed the ethical principles for medical research involving human subjects of the World Medical Association (Declaration of Helsinki, 2013) and was approved by the Ethics Committee for Research Involving Human Beings (CEISH) of the UPV/EHU (Code: 132 / 2018).

Procedure and instruments

Although players were familiar with tag, the youngsters played an unfamiliar variant of it. Specifically, the player was caught, and thus took on the role of tagger, after being touched or hit anywhere on the body except the neck and head by the ball in possession of the tagger. The tagger could only use his hands to catch and before he could pick up the ball for the first time he had to count 1, 2 and 3 aloud while holding the ball in his hands above his head. Each player wore a different numbered bib to make it easier to identify in the video.

The 21 players played tag for ten uninterrupted minutes in a 15 m x 30 m rectangle. Six balls were placed around the playing field so that the tagger could immediately restart the game every time the ball went out of the playing space. The first tagger was the last to reach the playing space from a distance of 15 metres. Both the start and end of play were

indicated by the coach without the players knowing the duration and elapsed time. The coach ensured compliance with the rules during the game, but was unable to make any comments to the players. The recording of the game was carried out with a video camera (Supratech Supracam Zelus HD, 1/2.500" CMOS, 5.0 megapixels) placed approximately ten metres from the pitch and at a height of twelve metres.

Relational dimension: observational methodology

The observational design carried out was idiographic, punctual and multidimensional (Anguera et al., 2011). Idiographic because how tagger and runner interacted with each other was analysed; punctual because the analysis was carried out on a single occasion; and multidimensional because more than one variable was assessed. Observational instruments can be of two types (Anguera et al., 2011): a) category systems and b) field format. The observational instrument designed ad hoc to analyse the game of tag combined both structures, following the structures of field format due to its multidimensional character, and of category systems since the criteria were subdivided, in turn, into a system of exhaustive and mutually exclusive categories (Anguera et al., 2011). The criteria and categories considered the elements of the internal logic related to the motor interaction with the other participants (i.e. socio-motor role and type of counter-communication) (Parlebas, 2001) of the game and its consequences. The codes used were a mixture of letters and numbers. The observation instrument was incorporated into Lince (Gabin et al., 2012), a freely available software programme that allows the loading of observational instruments specifically designed for the systematic observation and coding of events, and which allows for data quality control and analysis. The time of occurrence of events and their duration (counted in seconds or frames) are automatically recorded. Table 1 shows the criteria and categories of the observational tool designed by the researchers. The counter-communications between the players during the game of tag were represented by a socio-gram produced with the graphics editor yEd (yWorks GmbH, version 3.21.1 for Windows, Tübingen, Germany). The arrows of the socio-gram represented the direction of the counter-communications (i.e. tagger vs. runner) and the thickness of the lines the amount of counter-communications observed between each pair of players.

The reliability of the resulting data was tested by analysing the degree of intra- and inter-observer agreement. Both observers, fourth-year degree students in Physical Education and Sport Sciences, underwent a period of training and education in the application of the coding instrument which was divided into two phases (Anguera et al., 2011): an initial theoretical stage in which the set of basic concepts, criteria and categories of the observation instrument were explained; and a theoretical/practical stage in which the observers were trained to use the instrument in the Lince software programme. The viewing of another game of tag was used to analyse the degrees of intra- and inter-observer agreement. Agreement analyses were carried out in Lince by calculating the Kappa coefficient for each of the criteria of the observation instrument. The resulting data in Lince were exported to the free software program GSEQ5.1 (Bakeman et al., 2009; Quera et al., 2007) to calculate inter-observer agreement for both sequential event and timed event data. The analysis of the degree of intra-observer agreement considered data recorded in two viewings carried out 72 hours apart. The results revealed an intra-observer agreement on the kappa index of 0.93 for event (± 1 event tolerance), and 0.97 for timed events (± 1 second tolerance). The degree of inter-observer agreement was 0.97 for the event (tolerance of ± 1 event), and 0.98 for the timed events (tolerance of ± 1 second). Therefore, the results showed satisfactory intra- and inter-observer agreements (Fleiss et al., 2003).

Table 1. Criteria and categories of the observational tool

Criterion	Category	Description	Code
Start / End	Start	The time when the coach indicates the start of the game	Start
	End	The time when the coach indicates the end of the game	End
Player	Player 1	Player identified by number 1	P1
	Player 2	Player identified by number 2	P2
	Player 3	Player identified by number 3	P3
	Player 4	Player identified by number 4	P4
	Player 5	Player identified by number 5	P5
	Player 6	Player identified by number 6	P6
	Player 7	Player identified by number 7	P7
	Player 8	Player identified by number 8	P8
	Player 9	Player identified by number 9	P9
	Player 10	Player identified by number 10	P10
	Player 11	Player identified by number 11	P11
	Player 12	Player identified by number 12	P12
	Player 13	Player identified by number 13	P13
	Player 14	Player identified by number 14	P14
	Player 15	Player identified by number 15	P15
	Player 16	Player identified by number 16	P16
	Player 17	Player identified by number 17	P17
	Player 18	Player identified by number 18	P18
	Player 19	Player identified by number 19	P19
	Player 20	Player identified by number 20	P20
	Player 21	Player identified by number 21	P21
Subgroup	Team A	The player belongs to Team A	TA
	Team B	The player belongs to Team B	TB
Socio-motor role	Tagger	After they are caught, the player who can tag any player with the ball	TAG
	Runner	Player that experienced counter-communication by the ball	RUN
Type of counter-communication	Throwing	Throwing the ball with the hand or hands towards him: the ball is directed towards the runner after the tagger has lost contact with his hands	THROW
	Contact	Approaching the ball with the hand or hands towards it: the ball is directed towards the runner by extending the hands and maintaining contact with one or two hands	CONTACT
	Anti-regulatory	The type of counter-communication that is not allowed by the rules of the game (e.g. throwing the ball with the leg)	ANTI
Result of counter-communication	Success	When the tagger succeeds in catching the player with whom he has counter-communicated after touching him or hitting him with the ball.	SUCCESS
	Non-success	When the tagger does not manage to catch the player with whom he has counter-communicated because he has not touched him or hit him with the ball	NSUCCESS

Perceived enjoyment and competence

Players rated their perceived enjoyment and competence during the game using the BECS scale (Arias-Estero et al., 2013). Players needed between three and five minutes to answer the questions individually. The scale has been validated for and used with young team-sport players (Arias-Estero et al., 2013). "Tag" replaced the word "basketball" in the original scale. Four of the seven questions that make up the BECS scale refer to the degree of competence perceived by the players: (1) after playing tag I feel pretty good; (3) I consider myself very good when playing tag; (5) I am satisfied with how well I play tag; and (7) I think I am pretty good at playing tag. The remaining three questions assess the players' perceived enjoyment after playing tag: (2) I enjoy playing tag; (4) playing tag is fun; and (6) I find tag very interesting. The scale is a 5-point Likert-type scale with a range of values from 1 (strongly disagree) to 5 (strongly agree). The rating of the players' perceived enjoyment was the average of questions 2, 4 and 6; while the rating of perceived motor competence was the average of questions 1, 3, 5 and 7.

Statistical analysis

Results are presented as means ± standard deviations (*SD*). The Chi-square test was used to analyse and compare the frequency of counter-communications as a function of the tagger and counter-communicator subgroups. The effect size (ES) was calculated using Cramer's V-test. Shapiro-Wilk and Levene tests were performed to analyse the distribution and homogeneity of variances (homoscedasticity) of the data on perceived enjoyment and competence. The t-test for independent samples was used to compare the enjoyment variable between the two subgroups because the data followed a normal distribution and respected the homogeneity of variances. The Mann Whitney U test was used to compare the variable perceived competence between the two subgroups because the data did not follow a normal distribution. In addition, the ES was calculated to assess the differences between the two subgroups for practical purposes. ES values less than 0.2, between 0.2 and 0.5, between 0.5 and 0.8 and greater than 0.8 were considered trivial, small, moderate and large, respectively. The coefficient of variation (CV) was

calculated to measure the variability between players in each subgroup. Statistical significance was $p < .05$ and data were analysed using the Statistical Package for Social Science (SPSS® Inc., version 23.0 for Windows, Chicago, USA).

Results

Relational dimension

A total of 41 role changes were recorded during tag (i.e. 4.1 times per minute). On 30 occasions (7:30 minutes of play) the tagger was a player from subgroup-A and on 11 occasions from subgroup-B (1:36 minutes of play), i.e. 74% of the times the tagger was from subgroup-A and the remaining 26% from subgroup-B. All 11 players from subgroup-A and 6 players from subgroup-B (i.e. 60% of the players from subgroup-B) were runners. Players who went through the role of tagger did so a mean of 2.5 ± 1.5 times (subgroup-A: 2.8 ± 1.8 times; subgroup-B: 1.8 ± 0.8 times), the range being between 1-6 times. Being tag lasted a mean of 14.5 seconds, with the range being between 5-52 seconds.

Players counter-communicated 59 times using the ball (Table 2, Figure 1). The Chi-square test showed significant differences ($p < .001$; ES = 0.65, moderate) in the frequency of counter-communications as a function of tagger and runner subgroup: 87% of counter-communications (51 in total) were carried out between players in the same subgroup (Figure 1), 76% (45 in total) by tagger in subgroup-A and 68% (40 in total) between players in subgroup-A (Table 2, Figure 1).

Table 2. Frequency of taggerrunner countercommunications as a function of subgroup membership during tag

		Runner		
		subgroup-A	**subgroup-B**	Total
Tagger	**subgroup-A**			
	number of counter-communications	*40*	*5*	*45*
	% within tagger	*88.9%*	*11.1%*	*100%*
	% within runner	93.0%	31.3%	
	% of the total	67.8%	8.5%	76.3%
	subgroup-B			
	number of counter-communications	*3*	*11*	*14*
	% within tagger	*21.4%*	*78.6%*	*100%*
	% within runner	7.0%	68.8 %	
	% of the total	5.1%	18.6%	23.7%
Total	*number of counter-communications*	*43*	*16*	*59*
	% within tagger	*72.9%*	*27.1%*	*100%*
	% within runner	100%	100%	

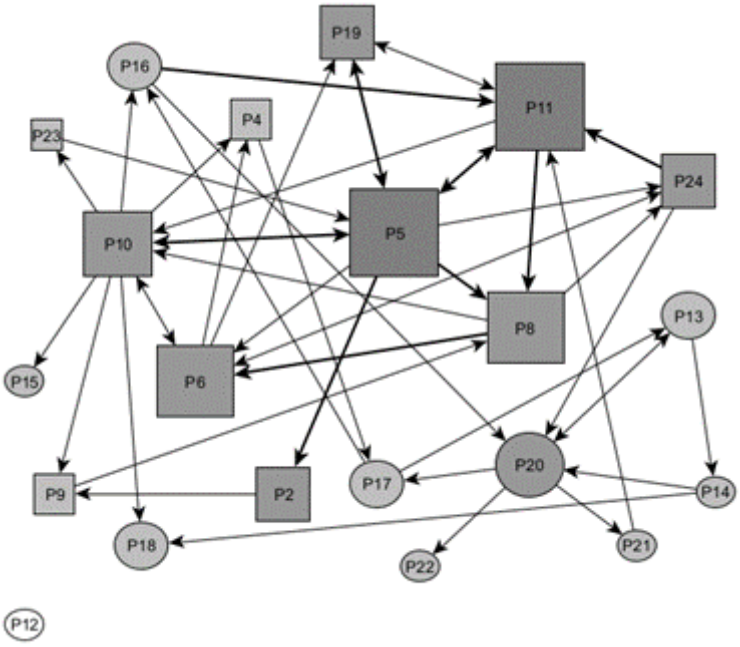

Figure 1. Representation of the counter-communications between the players during tag: Square: player of subgroup-A; Circle: player of subgroup-B. The size of the geometric figure varies according to the number of counter-communications made and received: the larger figures are those players with the highest number of counter-communications made and/or received. Thicker arrow: ≥ twice counter-communicated; Bidirectional arrow: counter-communication in both directions

Except for one player in subgroup-B, all players had at least one counter-communication (Figure 1). 100% of the counter-communications were throws (59 throws), of which 69% were successful (41 in total). Sequences of consecutive counter-communications (≥ 2) between players in the same subgroup were six for subgroup-A and two for subgroup-B. The shortest (2 consecutive counter-communication sequences) and longest (17 consecutive counter-communications) consecutive counter-communication sequences between players in the same subgroup occurred between players in subgroup-A (Figure 2).

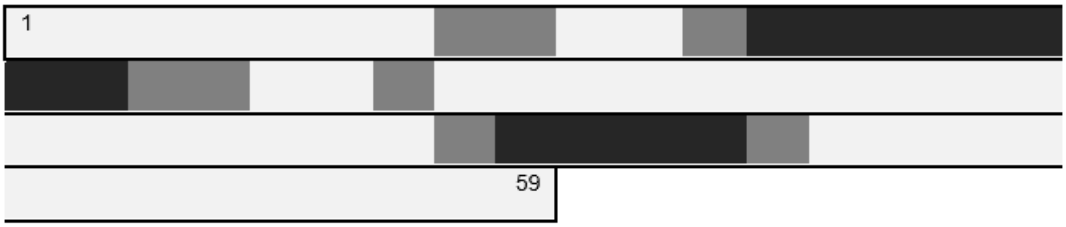

Figure 2. Sequences of counter-communications as a function of the subgroup of the tagger and the counter-communicator during the game of tag. White colour: counter-communications between players of Subgroup-A; black colour: counter-communications between players of Subgroup-B; grey colour: counter-communications between players of different subgroups

Perceived enjoyment and competence

The players' perceived level of enjoyment and competence during tag was 3.5 ± 1.0 (CV = 30%) and 3.3 ± 0.9 (CV = 29%), respectively. The mean level of enjoyment was significantly (p = .03) and substantially (ES = 0.98, large) higher for players in subgroup-A compared to those in subgroup-B (Table 3). No significant differences (p = .07; ES = 1.05, large) were found in the level of perceived competence between the two subgroups (Table 3).

Table 3. Levels of perceived enjoyment and competence means ± standard deviations coefficient of variation CV of the players during tag by subgroups

	subgroup A	subgroup-B
Perceived enjoyment	4.0 ± 0.8*	3.0 ± 1.2
	CV = 20%	CV = 40%
Perceived competence	3.8 ± 0.6	2.8 ± 1.2
	CV = 16%	CV = 43%

* Significantly (p = .03) higher for players in subgroup-A compared to those in subgroup-B

Discussion

The objectives of the study were the analysis of socio-motor relationships and the assessment of the levels of enjoyment and perceived competence of young players in tag, i.e. in a motor game whose motor communication network is exclusive and unstable, and there is no interruption mechanism (i.e. memory). The main findings were: a) the frequency of tagger-runner role switching was considerable during the game of tag, b) it seems that belonging to a certain social group (e.g. team) conditions the players' motor interaction during the game of tag, and c) the players' average level of enjoyment was high and the inter-player variability was high.

The high frequency of role switching (role permutation between two players [Parlebas, 2020]), i.e. a variation of motor relations between players, suggests that tag is an interesting alternative to experience motor instability. In addition to the 41 role changes (i.e. 4.1 times per minute), most of the players, all but four, were taggers. Relational analysis according to the subgroup of the tagger and the runner showed that 87% of the counter-communications were between players in the same subgroup. Although further studies are needed, it may be that the freedom that the game itself gives to the tagger to choose their escapee (Obœuf et al., 2008) has allowed the social relations of the participants to manifest themselves; in this case the membership of a certain team. The higher frequency of counter-communications between players in subgroup-A (68% of the total) (Table 2, Figure 2) compared to subgroup-B reflected the greater prominence, understood as the "control" exercised over the role of tagger, of one subgroup compared to the other. These differences suggest that the social relations of certain players may be imposed during the game to the detriment of the rest of the participants.

Several studies have shown that the type of motor communication enabled by the rule system determines the level of enjoyment perceived in young people (Gao et al., 2011, 2014). Specifically, memoryless socio-motor games generate positive emotions in young players because their internal logic allows them to free themselves from the outcome and, therefore, to focus on the playful dimension of the game itself (Etxebeste et al., 2014; Muñoz-Arroyave et al., 2020). As socio-motor games without memory, several games of tag taken as a whole represented an adequate level of enjoyment (Gao et al., 2014) and the game of tag with a ball a high level of enjoyment (mean of 3.5 ± 1.0 out of 5 points) among young players. Although the mean enjoyment of the players was high, the considerable inter-player variability (CV = 30%) indicates that the teacher and coach should expect considerably different levels of enjoyment among their students and players during this very well known game in both educational and training settings (Belka, 1998; Merino Orozco et al., 2018; Oboeuf et al., 2020). Since the study was carried out with players from a football school, i.e. in a homogeneous group, future research should assess the level of enjoyment and its variability in more heterogeneous groups such as those that can be found in PE. The higher enjoyment (Table 3) and prominence (Figure 2) of players in subgroup-A compared to those in subgroup-B suggest that players' enjoyment during the game of tag is associated with the tagger-runner relationship, i.e. the attempted role reversal allowed by this unstable game. By having interviews and short writings in which players express their personal experience in the game (Lavega et al., 2014) would allow us to identify the factors that condition players' enjoyment during tag. Players reported high values of perceived competence (mean 3.3 ± 0.9 out of 5 points) and high variability (CV = 29%), but in this case no significant differences (p = .07; ES = 1.05, high) were found between players in both subgroups (subgroup-A = 3.8 ± 0.6; subgroup-B = 2.8 ± 1.2). The p-values and ES suggest that the level of perceived competence might also be conditioned by the frequency of counter-communications in which each player is involved. Future studies may corroborate or refute this hypothesis.

Conclusions

The analysis of tag can help PE teachers and coaches in the choice of motor games in both educational and sporting settings. In particular, this game can be an interesting alternative to experience motor instability, to identify social relations within a group and to ensure a high level of enjoyment in young players. At the same time, the teacher/coach should expect varied "protagonism", i.e. the role of the tagger, and the level of perceived enjoyment and competence may vary considerably among players. Since the characteristics of the participants also condition the players' motor experience (Lavega et al., 2014), future research should assess the relational dimension, perceived enjoyment and competence in more heterogeneous groups, e.g. in PE.

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