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Assessing relational, emotional, and physical dimensions of young players during unstable tag games

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Abstract

Background and purpose: Traditional games reflect the place where they originated, a way of life and behaviour, and a way of interacting with the environment and with other people. In addition, traditional games stimulate original social motor relationships. Many *tag games* present *unstable* motor communications between players, that is, the motor communication (i.e. cooperation, opposition or neutral interaction) varies during the play due to role-changing. An holistic point of view provides a more complete assessment of the experience of the players during the traditional *unstable* tag games. Thus, the aims of the study were to propose and use a specific guide to assess the *relational*, *emotional*, and *physical* dimensions during an *unstable* motor game in young players.

Methods: 22 young male soccer players (age = 11±1 years) that belonged to two different teams (subgroup-A and subgroup-B) of the same age and club took part in the study. For the first time, the players played a modification of the *it* motor game which lasted 10 minutes. The *relational dimension* was assessed by observational methodology identifying and analysing counter-communications (i.e. the touching and throwing of the ball) between the tagger and the runner who experienced the counter-communication (i.e. the target-player). The emotional dimension was assessed by the BECS scale and compared between subgroups. Physical dimension was assessed by differentiating the tagger, the runner, and the target-player measuring the Total Distance covered per second (TD_{second}) by a local positioning system (LPS).

Findings: Since the tagger role changed 5.3 times per minute, we could use the *unstable* traditional tag game to ensure a very variable relational experience in young players. Overall, 86% of the players were taggers (2.5 ± 1.9 times per players), suggesting that the relational experience is not similar for all players. Although no significant differences were found for the frequencies of counter-communications according to the subgroup of

the tagger and the tagger-player (Chi-Square: p = .38; ES = 0.11; trivial), the qualitative analysis (i.e. the differences in who was counter-communicated with by the tagger according to their subgroup and the different tendencies of the counter-communication sequences between subgroups) can provide clues about the social relationship of the group. The high values of enjoyment (4.4 ± 0.6) and perceived competence (4.0 ± 0.6) declared by players suggested the use of the *unstable* traditional tag game during PE lessons and sport training if a positive emotional experience of the players is desired. The tagger performed significantly greater TD_{second} than the target-player (p =.00; ES: large) and the rest of the players (p =.00; ES: = large), suggesting that the assessment of the physical dimension during *unstable* motor games should be carried out differentiating the roles and the target-player. The assessment of the experience of the players during the *unstable* motor games differentiating by roles and from an holistic point of view provide teachers and coaches with a broad knowledge of the consequences of motor games for the young players. This could help to optimise the pedagogical plan for this type of pedagogical strategy.

Keywords: Physical Education; training; traditional games; motor communication; socio-affectivity.

Introduction

Traditional games, also known as *local* games, are the fruit of a history that has shaped their structures according to the values and collective representations of each region (Parlebas 2013; Parlebas 2020; Pellegrini, Dupuis, and Smith 2007). Thus, they reflect the place where they originated, a way of life and behaviour, and a way of interacting with the environment and with other people (Edwards 2009; Lavega-Burgués et al. 2006; Pere Lavega et al. 2014; Parlebas 2013). Since the international authorities that have shaped them in the image of their socioeconomic universe do not vigorously promote *traditional games* (Parlebas 2013), public and other types of private entities try to support the maintaining of this type of tradition (Luchoro-Parrilla et al. 2021). Furthermore, *traditional games* are included in the Physical Education (PE) curriculum and several studies have assessed their educational and training effects in young players (Oboeuf et al. 2020; Parlebas 2020; Puente-Maxera, Mendez-Gomenez, and Martinez de Ojeda 2021; Trajkovik et al. 2018).

As sports, *traditional games* are legal entities that regulate human motor action (Martínez-Santos et al. 2020; Parlebas 2020). However, they are not institutionalised (Martínez-Santos et al. 2020; Summerley 2020) the system of rules is not regulated by international authorities and is instead managed by the players themselves. They are the fruit of the agreement between players and can be modified at any time if the players wish and it is agreed (Lavega-Burgués et al. 2020). Since the system of rules defines the principal structural traits (i.e. the constraints (Newell 1986)) of the motor games (Parlebas 2002) and vary considerably between regions, and even within regions, a great variability can be found with respect to the use of space, the type of communication, the criteria for success (Martínez-Santos et al. 2020), and the use of material (Edwards 2009) in

traditional games. For example, Edwards (2009) found very different relationships between other players, and regarding space and material between European regions, Mongolia, Brazilian tribes, and Australian Aboriginal and Torres Strait Islander Communities. The assessment of the relational response during the different type of social motor relationships could help teachers and coaches in the choice of the appropriate traditional games to obtain the desired pedagogical consequences and effects in young players. Since this is determined by the possibilities of motor interaction that the system of rules allow (Lavega-Burgués et al. 2020), the design of the analysis should adapt to each set of social motor relationships. In addition, the response of the players should be assessed from an holistic perspective; that is, the different dimensions of the person should be considered (i.e. the whole child (Dyson, Howley, and Shen 2021; Lavega-Burgués et al. 2020; Parlebas 2001)) to avoid a reductionist, simplistic, and disjunctive point of view. From an holistic perspective or systemic point of view (Lavega-Burgués et al. 2020), the teacher and the trainer can choose the traditional game by considering and assessing the expected consequences and effects with respect to several dimensions (i.e. negative, neutral, or positive) of the traditional games on the young players.

As far as socialisation is concerned, if the aim is the acquisition of the dominant rules, values, and meanings in a given society, *traditional games* of each region can be an interesting form (Lawson 1988; Koh 2005). On the other hand, if the intention is to experience diverse social relationships, the implementation of *traditional games* from different regions (Etxebeste 2001; Luchoro-Parrilla et al. 2021; Rauber et al. 2014) can be an optimal pedagogical strategy. In comparison to *sports*, *traditional games* can be put into play in far more diverse and enriching human communication models (Martínez-Santos et al. 2020). In addition to the symmetrical individual and collective duels,

traditional games propose original social motor relationships (Parlebas 2013; Lavega-Burgués et al. 2020). For example, many *tag games* present *unstable* motor communications between players (Martínez-Santos et al. 2020), that is, motor communication (i.e. cooperation [+], opposition [-] or neutral [Ø] interaction) varies during the play due to role-changing (Parlebas 2013; Parlebas 2020; Martínez-Santos et al. 2020) (e.g. suddenly your opponent can turn into your partner in the fishing net play). Since individuals should be prepared to respond to unstable social relationships in the real world (Martínez-Santos et al. 2020; Moreland and Levine 1982), it seems appropriate to experience *unstable traditional games* during PE lessons and sport training for young people. Previous studies have assessed the communication choices (i.e. cooperation [+]) and rejections (i.e. opposition [-]) of the players during *ambivalent* (i.e. players can decide at any time if they want to cooperate with or oppose the rest of the players) and *unstable* (Pere Lavega et al. 2018; Oboeuf, Collard, and Gérard 2008) or *stable* (Pic et al. 2020) motor games and *team duels* (Lavega-Burgués et al. 2020). Several studies found that the motor relationships observed during the motor game reflect the social relationship of a group (Pere Lavega et al. 2018; Oboeuf, Collard, and Gérard 2008). However, to our knowledge, no study has assessed the *relational dimension* during an *unstable traditional game* as in the tag games of young players.

Together with the relational dimension (Casey and Goodyear 2015; Dyson, Howley, and Shen 2021), an *emotional dimension* is an implicit aspect in the scope of PE (Pere Lavega et al. 2011) and sport pedagogy (Andersen, Ottesen, and Thing 2019). It is increasingly recognised as providing the foundation for children's positive behaviour in school, and it has been suggested that its optimal development helps in acquiring the necessary competencies to succeed in life beyond school (Fraser-Thomas, Côté, and

Deakin 2005; Jacobs and Wright 2018). In addition, among other factors, physical enjoyment and perceived competence influence the intrinsic motivation (Deci and Ryan 1985) and this conditions the adherence to the physical activity (McAuley and Tammen 1989; Pelletier et al. 1995). Thus, an assessment of the emotional experience during motor games helps teachers to design, select, and programme optimal interventions in PE and youth-sport training. Previous studies have found that motor games may arouse different types of emotions in players in accordance with the kinds of motor communication (i.e. *individual, pure cooperative, pure opposition, and cooperative–opposition motor games*) (Gao et al. 2011; Gao, Zhang, and Podlog 2013; Pere Lavega et al. 2014) and the presence/absence of competition the system of rules allows for (Pere Lavega et al. 2014). However, few studies have assessed the emotional dimension in traditional games, for instance the enjoyment level appropriate for elementary children (age = 9.8 ± 1.1 years) playing traditional tag games assessed as a whole (Gao, Zhang, and Podlog 2013). Since the possibilities of interaction can vary considerably between tag games and *unstable traditional* tag *games* widely used during PE lessons and sport training (Belka 1998; Coledam et al. 2012), the assessment of the emotional experience during this type of motor game could help PE teachers and youth-sport coaches to optimise their use of them during educational and training interventions in the young.

An analysis of the *physical dimension* enriches the holistic point of view to assess the motor experience during motor games (Lavega-Burgués et al. 2020). The measurement and assessment of the mean physical effort value and the inter-player variability can be used to optimise the physical effort distribution during the PE lessons and training sessions, and to foresee the magnitude of the differences in physical effort between players (Gonzalez-Artetxe et al. 2020; Lavega-Burgués et al. 2020). A previous

study found high inter-player physical effort (i.e. the total distance covered and player load) and variability (the coefficient of variation ranged from 18.9% to 34.9%) during the tail tag game in young players (age: 13.0 ± 0.4 years), in which only a sociomotor role (i.e. the potential motor conducts referred to as the rights and obligations prescribed for one or more players by the rules of the game (Parlebas 2001)) is possible. This study suggested that if a progressive and controlled increase in the physical effort is desired at the beginning of the PE or the training session, this motor game is not suitable for young players (Gonzalez-Artetxe et al. 2020). Since the physical effort and its inter-player variability was determined by the sociomotor role of the players during motor games in university students, the physical effort should be quantified identifying the sociomotor role players have in the exact moment (Lavega-Burgués et al. 2020). The differentiation by sociomotor role allows the assessment of the impact of each social structure (or system) (Parlebas 2020; Lavega-Burgués et al. 2020) of the traditional games on the physical dimension of young players.

Thus, the aims of the study were to propose and use a guide to assess the *relational*, *emotional*, and *physical* dimensions during an *unstable* motor game such as tag games in young players.

Material and Methods

Participants

Twenty-two Spanish young male soccer players from a soccer academy affiliated to a Spanish First Division Club (*LaLiga*) took part in the study. Players belonged to two different teams of the same age (i.e. under-12 [U12]) of the same club (U12A, subgroup-A: n = 11, age = 11 ± 1 years, experience playing soccer: 5 ± 1 years; U12B, subgroup-

B: *n* = 11 players, age = 11 ± 1 years, experience playing soccer: 5 ± 1). Natural groups were not modified for the research and all the players completed the last two weeks of training and competition before the investigation. The team trained twice a week on non-consecutive days on an artificial-turf pitch from 18:00–19:30. Parents and tutors, coaches, and players, as well as the club, were fully informed of the aims and procedures of the study before giving their informed consent for the children's participation. All participants and their legal guardians were informed about the risks and benefits and that the participants could volunteer for – and be withdrawn from – the study at any time. The study protocol followed the guidelines stated in the Declaration of Helsinki (2013) and was approved beforehand by the Bioethics Commission of the University of the Basque Country (Reg. Code 132/2018).

Procedure (tag game)

The study was carried out during the competition period, in the middle of the season (in January). Although tag games are widely used in PE lessons or training sessions (Belka 1998; Coledam et al. 2012; Forrest 2015) and players are familiar with these motor games, the first time they played it was with a variation of the role of the '*it*': (a) the tagger must catch a hare with a ball using their hands but they were only allowed to catch below the head; and (b) before starting their hunt, the tagger had to count to three (i.e. 1, 2, 3). The first tagger was the last to arrive in the playing zone from a line located at 15 metres. The game was played in a space of 15 x 30 metres and six balls were placed around the field to reinitiate the play immediately if the ball was a long way from the tagger. The game lasted ten minutes and started and finished when the coach indicated. During the game the coach ensured compliance with the game rules but no feedback was allowed (Gonzalez-Artetxe et al. 2021; Práxedes et al. 2019). Each player wore a training bib of a

different colour or number so that they could be more easily identified when watching the video. The analysis of the *relational dimension* was carried out taking into account all players by subgroups and according to the sociomotor roles (i.e. tagger and runner). In addition, the target-player was identified as the one who experienced the counter-communication (i.e. interactions that took place among adversaries). The assessment of the *emotional dimension* considered all players and each subgroup, while the *physical dimension* was assessed for all players, the sociomotor role, and the target-player.

Assessment of each dimension of the player

Relational dimension

In order to assess the *relational dimension*, two groups of players that did not train together during the season were gathered for the study because it was hypothesised that belonging to different teams would reflect in the social motor relationships during the motor game. An observational methodology study was undertaken, which is appropriate for analysing spontaneous behaviour in a natural setting. The specific design used was an I/P/M design (Anguera, Blanco, and Losada-Lopez 2001), where I refers to *idiographic* (this helps to focus all attention on a minimum unit: be it a subject, or a small group that functions as a unit (Anguera et al. 2000)), P refers to *point* (a single session with all the participants), and M refers to *multidimensional* (assessment of multiple levels of response). An observation instrument was created *ad hoc* (Tag-Game) and combined category systems and field formats, including exhaustive and mutually exclusive categories (Anguera, Magnusson, and Jonsson 2007). In addition to the subgroup to which each player belonged, the *sociomotor role* (and the target-player), the *type of counter-communication* (i.e. throwing and contact), and the result of the *counter-communication* (i.e. success and non-success) criterions were considered (Table 1). The

observation instrument was incorporated into Lince (Gabin et al. 2012), which is a freely available software program that can be loaded with purpose-designed observation instruments for the systematic recording and coding of events. The representation of the *counter-communications* between players were made by a graphic carried out with the yEd Graph Editor.

Table 1. Tag-Game observation instrument

Criterion	Category	Description	Code
Start/End of the game	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
	Player 22	Player identified by number 22	P22
Sub-group	Team A	The player belongs to Team A	TA
	Team B	The player belongs to Team B	TB
Sociomotor Role*	Tagger	After they are caught, the player who can tag any player with the ball.	TAG
	Target-Player	Player that experienced counter-communication by the ball	TARP
Type of counter-communication	Throwing	Throwing the ball with the hand or hands towards him: the ball is directed towards the runner after the catcher 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 catcher 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 catcher 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

* Sociomotor role: the potential motor conduct referred to as the rights and obligations prescribed for one or more players by the rules of the game (Parlebas 2001).

The reliability of the resulting data for each criteria of the observation instrument (intra- and inter-observer agreements) was evaluated using Cohen's kappa statistic (Cohen 1960). The same tag game, played by other players, was observed twice by IG, with one week between viewings, and once by IV using the LINCE Research Software for behaviour video analysis (Cohen 1960) and the calculations were performed by the free software program GSEQ5.1 (Bakeman, Quera, and Gnisci 2009; Quera, Bakeman, and Gnisci 2007). Intra-observer agreement kappa for event alignment (± 1 events tolerance) was 1.00 for all criteria; and intra-observer agreement kappa for time-unit kappa (± 1 second tolerance) was 0.98, 0.98, 0.96, 1.00, 0.99 for player, sub-group, sociomotor role, type of counter-communication, and result of the counter-communication criteria, respectively. The inter-observer agreement (± 1 events tolerance) was 0.94, 0.94, 0.96, 0.94, and 0.96 for the same criteria, respectively; and inter-observer agreement kappa for time-unit kappa (± 1 second tolerance) was 0.97, 0.97, 0.99, 0.99, and 0.99 for the same criteria, respectively. These results indicated satisfactory intra- and inter-observer agreements (Joseph, Levin, and Cho-Paik 2003).

Emotional dimension: Enjoyment and perceived competence

Players assessed the intensity of their emotional experience using the (BECS) scale of perceived enjoyment and competence (Arias-Estero, Alonso, and Yuste 2013) two days after playing the tag game. This scale has been validated in youth athletes (Arias-Estero, Alonso, and Yuste 2013) and used for youth team players (Arias-Estero, Alonso, and Yuste 2013) and sailing (Morales-Belando and Arias-Estero 2017). The original scale was modified by changing 'basketball' to 'tag game' to assess the enjoyment and perceived competence during the motor game. The BECS scale has four items out of seven that refer to feeling good or considering oneself to be good at playing tag: (1) After the tag game, I felt pretty competent; (3) I think I am pretty good at playing the tag game; (5) I am satisfied with my performance in this motor game; and (7) I am pretty skilled at playing the tag game. The remaining three items refer to the enjoyment of this motor game: (2) I enjoyed the tag game very much; (4) the tag game was fun; and (6) I would describe this motor game as very interesting. The scale was a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The players answered individually in the grandstand where they trained for three to five minutes. Evaluation of enjoyment was carried out using the average of questions 2, 4, and 6 and the assessment of perceived motor competence was determined using the average of questions 1, 3, 5, and 7. Since two groups of players that did not train together during the season were gathered for the study, the assessment of both variables was carried out for all the players and by subgroups.

Physical dimension

Total Distance (TD) was taken as an example to assess the physical dimension during an *unstable tail tag* because it is easily used by PE teachers and sport coaches. In addition to the measurement of the TD during the *motor game* (Gonzalez-Artetxe et al. 2020), it was calculated per second (TD_{second}) because the unstable structure of the traditional game means that players are not tagger and runner (and target-player) the same amount of time. TD was measured using a commercial local positioning system (LPS) (IMU; WIMU PROTM, RealTrack Systems, Almeria, Spain) based on ultra-wideband (UWB) technology. UWB technology operates on a much wider frequency than other traditional radio communication technologies and a previous study did not report any problems in UWB-based tracking system accuracy in multipath conditions (Bastida-Castillo et al. 2018; Bastida-Castillo et al. 2019) and different places (Pino-Ortega et al. 2020). This equipment is valid and reliable for measuring external load (Rico-González, Los Arcos, Rojas-Valverde, et al. 2020; Rico-González, Los Arcos, Nakamura, et al. 2020). The UWB-based tracking system consists of a reference system, antennae, and tracking devices worn by all the players in a suitably fitted body vest. The antennae are transmitters and receivers of radio-frequency signals, which record the position of the devices that are in their coverage area, while the device receives the calculation using the difference in time of arrival (Alarifi et al. 2016). The devices were attached to the players' upper back in a pocket on a tight-fitting garment, placed between the scapulae at the T2–T4 level to avoid unwanted movements, and fitted before the players performed on-field exercises as per previous study protocols (Reche Soto et al. 2019). Moreover, data collection followed the protocol suggested by (Rico-González, Los Arcos, Rojas-Valverde, et al. 2020) on the use of technology, scoring 21 points out of 23 in their survey. Data were recorded in a training space away from metallic materials where there were low temperatures, humidity gradients, and slow air circulation; these conditions were maintained to allow

easier positioning. The antennae with UWB technology were fixed 1.6 metres from the perimeter in line with the corners (n = 4), 2.8 metres behind the goal (n = 2), and 0.8 metres from the middle line of the field (n = 2), creating the shape of an octagon. All of the antennae were positioned at a height of 1.7 metres (Pino-Ortega et al. 2021) and held by a tripod (Bastida-Castillo et al. 2019). Once installed, they were switched on one-by-one, with the master antenna turned on last, with a five-minute waiting period to avoid technology lock (Rico-González, Los Arcos, Clemente, et al. 2020). In this study, LPS devices operated at a sampling frequency of 18 Hz, because low frequencies have displayed worse data quality, and 18 Hz have not shown less accuracy with UWB caused by noise problems. Data were downloaded after each session (Rico-González, Los Arcos, Clemente, et al. 2020) and processed by S PRO ^{TM} software (RealTrack Systems, Almeria, Spain) (Bastida-Castillo et al. 2019).

Statistical analysis

The data were presented as means ± standard deviations (*SD*). Cross-tabulations (Pearson's Chi-square test) were used to compare the frequencies of counter-communications according to the subgroup of the tagger and the target-player. The effect sizes (ES) were calculated using Cramer's V test. The data of the consecutive counter-communications between players of the same subgroups were not normally distributed and did not satisfy the equality of variances according to the Shapiro–Wilk test and Levene test, respectively. Thus, the Mann–Whitney U test was used to compare consecutive counter-communications between subgroups A and B. Enjoyment and perceived competence data and TD_{second} data of the taggers, target-players, and the rest of the players were distributed normally and satisfied the equality of variances according to the Shapiro–Wilk test and Levene test, respectively. Thus, student t-tests for independent

samples were used to compare players' enjoyment and perceived competence values between subgroup-A and subgroup-B; and one way analysis of variance (ANOVA) with Bonferroni's post-test was used to compare the TD_{second} between the tagger, the target-player and the rest of the players. Statistical significance was set at $p < .05$. In addition, Cohen's *d* effect size (ES) was calculated to assess the differences for practical purposes (Cohen 1988). The following criteria were used to infer the magnitude of the difference (ES): < 0.2 (trivial), 0.2–0.5 (small), 0.5–0.8 (moderate) and > 0.8 (large) (Cohen 1988). The coefficient of variation (CV) was calculated to assess inter-player variability. Spearman correlation coefficients (r) were calculated to determine the relationships between the social counter-communication level (i.e. the number of counter-communications performed, experienced, and the sum of both), the emotional experience (i.e. enjoyment and perceived competence levels), and the physical response (i.e. TD_{second}). The following scale of magnitudes was used to interpret the correlation coefficients: < 0.1, trivial; 0.1–0.3, small; 0.3–0.5, moderate; 0.5–0.7, large; 0.7–0.9, very large; >0.9, nearly perfect (25). The statistical analysis was performed by the Statistical Package for Social Sciences (SPSS 22.0, Chicago, IL).

Results

Relational dimension

The tagger role changed a total of 53 times (i.e. 5.3 times per min). It was performed 26 times by players of the subgroup-A (a total of 4 min and 56 s) and 28 times (4 min and 10 s) by players of the subgroup-B. With the exception of three – that is, 19 of the 22 players – all of subgroup-B (P15, P16, P19), were taggers (2.5 ± 1.9 times per players) during the motor game. A player of subgroup-A (P11) and one from subgroup-B (P13) most often performed tagger role (five times).

No significant differences were found for the frequencies of counter-communications according to the subgroup of the tagger and the target-player (Chi-Square: 0.79; p =.38; ES = 0.11; trivial) (Table 2). The counter-communications were unsuccessful 13 times (subgroup-A: 7 out of 31 attempts; subgroup-B: 6 out of 34 attempts).

Table 2. Tagger–Target–Player counter-communication relations according to the subgroup of the players during the *unstable traditional tag game*.

		Target-Player		
		Subgroup-A	**Subgroup-B**	Total
Tagger	**Subgroup-A**			
	Nº of counter-communications	*18*	*16*	*34*
	Within Tagger	*52.9%*	*47.1%*	*100%*
	Within Target-Player	58.1%	47.1%	
	% of the total	27.7%	24.6%	52.3%
	Subgroup-B	24.6%	27.7%	
	Nº of counter-communications	*13*	*18*	*31*
	% Within Tagger	*41.9%*	*58.1%*	*100%*
	% Within Target-Player	41.9%	52.9%	
	% of the total	20.0%	27.7%	47.7%
Total	*Nº of counter-communications*	*31*	*34*	*65*
	% Within Tagger	*47.7%*	*52.3%*	*100%*
	% Within Target-Player	100%	100%	

Two players of the subgroup-B did not experience any counter-communication, with a range of counter-communications experienced of between 1–6 (mean = 3 ± 2) and 0–6 (mean = 3 ± 2) times in the subgroup-A and subgroup-B, respectively (Figure 1).

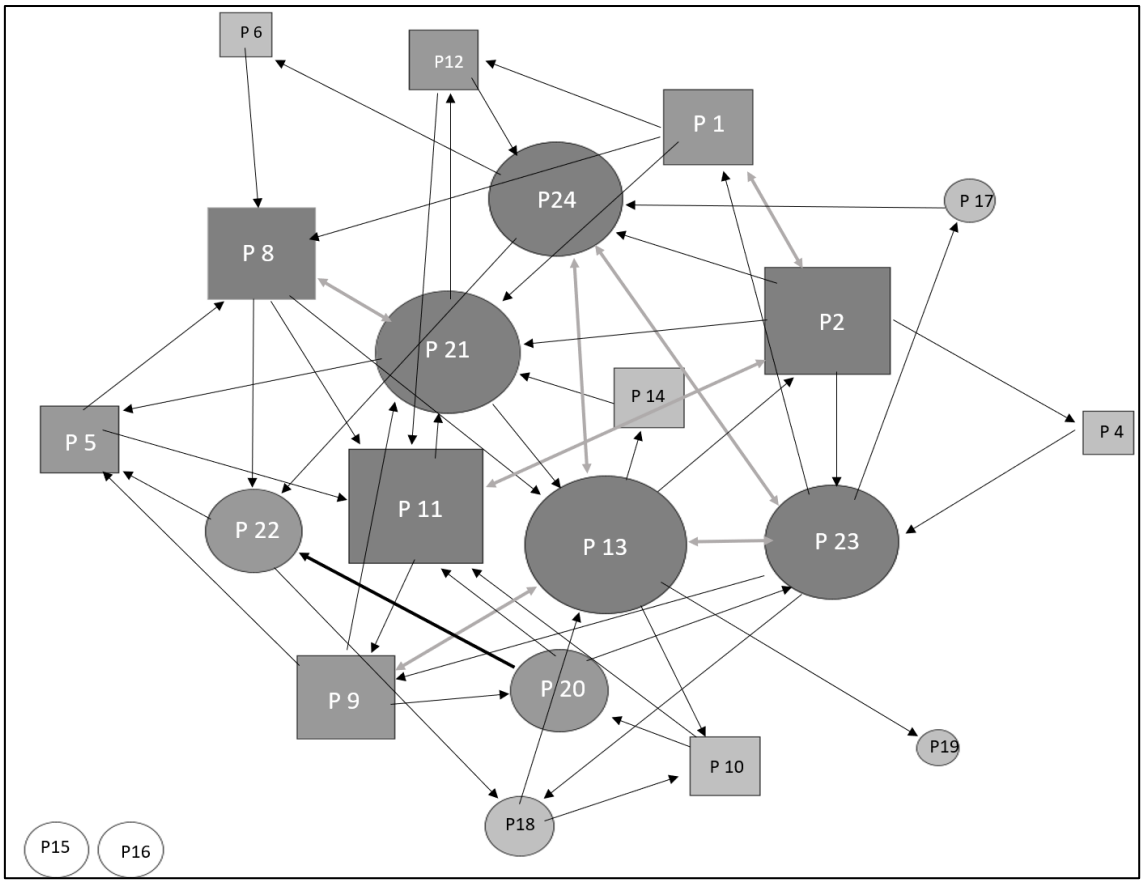

Figure 1. Representation of the counter-communications between players during the tag game. Rectangles: players from subgroup-A. Circles: players from subgroup-B. The sizes of the rectangles and the circles vary according to the number of counter-communications performed and experienced: the biggest figures (i.e. players), rectangles and circles, experienced or performed more counter-communications in comparison with the rest of the players. The biggest arrow: Experiencing counter-communication twice from the same player, grey arrow: both players counter-communicate with each other.

The order of the counter-communications according to the subgroup of the tagger and the subgroup of the target-player showed that the counter-communications between players of the same subgroup were 10 and 6 both for subgroup-A and subgroup-B, respectively. The mean consecutive counter-communications between players of the same group was significantly lower (p = .08; ES = 1.00) for subgroup-A (1.7 ± 0.8) in comparison to subgroup-B (3.2 ± 1.8) (Figure 2).

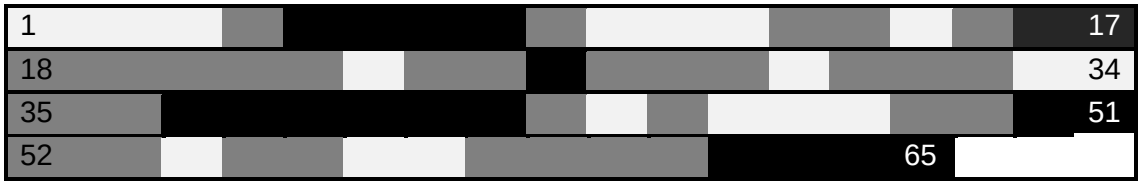

Figure 2. Sequence of the 65 counter-communications during the *unstable* tag game.
White: subgroup-A vs subgroup-A; black: subgroup-B vs subgroup-B; grey: subgroup-A vs subgroup-B and subgroup-B vs subgroup-A.

Emotional dimension

The enjoyment and perceived competence level of the players during the tag game were 4.4 ± 0.6 (CV = 13.6%) and 4.0 ± 0.6 (CV = 15%), respectively. Significant differences were not found between subgroup-A and subgroup-B in both variables (Table 1), with trivial practical differences (enjoyment: ES = 0.16; perceived competence: ES = 0.18).

Table 3. Comparison of enjoyment and perceived competence levels (mean ± *SD*) between subgroups during the *unstable traditional tag game*.

	All players	subgroup-A	subgroup-B
Enjoyment	4.4 ± 0.6	4.4 ± 0.7	4.3 ± 0.5
	CV = 14 %	CV = 16 %	CV = 12 %
Perceived Competence	4.0 ± 0.6	4.0 ± 0.6	3.9 ± 0.5
	CV = 15%	CV = 15%	CV = 13%

CV: coefficient of variation

Physical dimension

Considering all the players together, the whole duration (i.e. the 10 minutes of the game), and without differentiating by sociomotor role, players covered a mean TD of 758 ± 122 metres, that is, the TD_{second} was 1.26 ± 0.20. The inter-players TD_{second} variability (CV) was 16%. The tagger performed significantly greater TD_{second} than the target-player (p =.00; ES = 1.53, large) and the rest of the players (p =.00; ES = 2.76, large) (Figure 3). The target-player also performed greater TD_{second} than the rest of the players (p =.04; ES = 0.82, large) (Figure 3). The inter-player variability (i.e. CV) for the taggers, target-player, and rest of the players were 17, 26, and 19%, respectively.

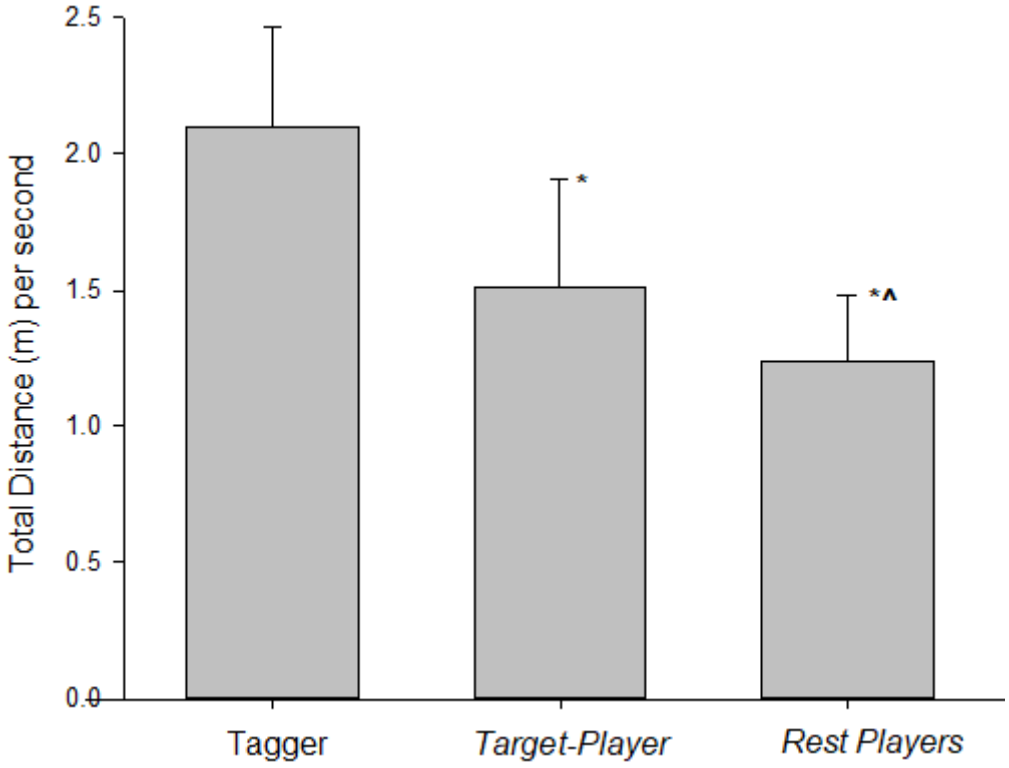

Figure 3. Comparison of the Total distance (metres) per second between the Taggers, the Target-Player and the Rest of the Players.
* Significant difference with Tagger (p =.00); ^ Significant difference with Target-Player (p =.04)

Any significant correlation (p >.05; r = 0.33 – -0.33) was found between the relational counter-communication level (i.e. number of counter-communications performed, experienced, and the sum of both), the emotional experience (i.e. enjoyment and perceived competence levels) and the physical response (i.e. TD covered per second).

Discussion

The study aimed to propose and use a specific guide to assess the *relational*, *emotional*, and *physical* dimensions during an *unstable* motor game – such as a tag game – in young players. The change of the motor relationship between players was frequent but it did not affect all players in the same way. The number of counter-communications did not vary according to the subgroup of the tagger and the target-player, but the target-player and

the tendency of the counter-communication sequences between the players of the same group differ between subgroups. Young players declared high enjoyment and perceived competence levels after playing the tag game, but both varied considerably between players. No association was found between the relational experience (i.e. number of counter-communications performed, experienced, and the sum of both) and the enjoyment and perceived competence levels. The motor role determined the physical effort expended by young players during the *unstable* motor game, and were greatest for the tagger role.

Relational dimension

It has been suggested (Martínez-Santos et al. 2020; Moreland and Levine 1982) that *unstable traditional games* (Parlebas 2013; Martínez-Santos et al. 2020) can be a pedagogic alternative to preparing individuals to respond to unstable social relationships in the real world, because their system of rules allows the modification of motor interaction between the players during the game. In order to choose the most efficient *unstable traditional game* to increase unstable motor experience, the PE teacher and coach should assess the change frequency of the motor relationship between players during the motor game. The frequency of the change of the motor relationship due to role-changing, how many players performed different sociomotor roles, and how many times they did this could be used as indicators to assess the relational response of the *unstable* motor games. It was found that role-changing (i.e. the permutation of roles between two players (Martínez-Santos et al. 2020) occurred 53 times, that is, 5.3 times per minute, most of the players were taggers, and each player was a tagger for a mean of 2.5 ± 1.9 times. Despite the necessity for similar studies, it seems that role-changing is frequent during *unstable* traditional *tag games*, but relational experience can vary considerably

between some players. The assessment of the relational response during other *unstable* motor games would allow the comparison between this type of game and help PE teachers and coaches to choose the most efficient to obtain the desired consequences and effects.

In addition, the assessment of the relational response could help to gain knowledge on the social relationships of a group (Oboeuf, Collard, and Gérard 2008). If the frequency of counter-communications between players of the same and different subgroups is considered, it seems the relational response of the players was not determined by the subgroup to which the player belonged. But the differences in who was counter-communicated with by the tagger according to their subgroup and the different tendency of the counter-communication sequences between subgroups (Figures 1 and 2) suggest that social relationships could determine the interaction between players during *unstable* traditional games of tag. Thus, in addition to quantitative data (i.e. frequencies), qualitative assessment could help to determine the relational dimension during the unstable tag games (Pere Lavega et al. 2018).

Emotional dimension

Several studies have found that the social motor relationship determines the young players' enjoyment level (Gao et al. 2011; Gao, Zhang, and Podlog 2013). However, few studies have assessed students' enjoyment level due to young players' practice in tag games (Gao, Zhang, and Podlog 2013). It was found that several tag games (bridge tag, bean bag tag, apple tag, line tag, etc.) meant as a whole an appropriate enjoyment level for 9 ± 1 year-old students (Gao, Zhang, and Podlog 2013). Similarly, the enjoyment level declared by young soccer players during the *unstable tag game* was very high (4.4 ± 0.6, with the maximum assessment of 5). This suggests that the *unstable tag game* means a

high emotional level for team players of a soccer academy, that is, for a homogenous group with respect to motor competence levels, because players are accustomed to counter-communicate. Although the enjoyment and perceived competence of young soccer players was as high as those declared by young people who participated in basketball, mini-basket players, and sailing (age: 10–12 years; enjoyment and perceived competence: 4.4–4.5) at school level (Arias-Estero, Alonso, and Yuste 2013; Morales-Belando and Arias-Estero 2017), considerable variability (more than 10% according to (Atkinson and Nevill 1998)) was found between young players after the traditional game. Since a high enjoyment and perceived competence level is not expected for all players, PE teachers and coaches should regulate the use of this type of motor game. The similar frequency and directionality of interaction (i.e. counter-communications by the ball between players of the same subgroup and against players of the other subgroup) could explain the similar emotional experience of the players of each subgroup (Table 3). But no significant correlation between the tagging attempts carried out by the tagger and those who experienced counter-communications (i.e. the target-player) and the enjoyment and perceived competence levels question this assumption. The reasons for the enjoyment and perceived competence levels declared by young players could be assessed by interviews during the practice of the activity and the small text where the players expressed how they felt (P. Lavega et al. 2014).

Physical dimension

Even though tag games are part of the principal content of motor games programmes and are used for warm-ups in PE lessons and youth team sports training sessions (Belka 1998; Coledam et al. 2012), few studies have analysed physical-physiological response during tag games (Gonzalez-Artetxe et al. 2020). Mean TD_{second} performed by young soccer

players (age: 13.0 ± 0.4 years) during tail tag (i.e. a *stable* motor game: only a sociomotor role) was of approximately 1.33 $^{m}/_{s}$ (Gonzalez-Artetxe et al. 2020). This value and the one reported during the *unstable* traditional game considering all players together (1.26 ± 0.20 $^{m}/_{s}$), could be used as a reference to compare the physical response in young players during other traditional games. But, as has been found for adult players (Lavega-Burgués et al. 2020) and for young players in this study, if applicable, the sociomotor roles should be differentiated to measure physical response because the tagger performed significantly (p =.00) and substantially (ES = 1.53, large) greater TD_{second} than the rest of the players (Figure 3). In addition, it was found that the players that experienced counter-communication by the tagger were obliged to cover more distance than the rest of the runners, suggesting that physical effort varies for the players involved in special counter-communications, in this case the counter-communication that can mean role-changing. Similarly to tail tag (Gonzalez-Artetxe et al. 2020), inter-player variability was considerable (Atkinson and Nevill 1998) during the *unstable* traditional game, ranging from 17 (Tagger) to 26% (Rest of the Players) according to the sociomotor role. It seems that high inter-player variability is a particular consequence and trait of the opposition in traditional games. In addition, the highest inter-player variability for the rest of the players and the non- significant correlations between the number of counter-communications performed, experienced, and the sum of both and the TD_{second} suggest that players resolve the motor game in a different way.

Because of the characteristics of the participants (e.g. boys vs girls) (Gao, Zhang, and Podlog 2013; Pere Lavega et al. 2014) and also the structural traits (i.e. their own constraints) (Newell 1986; Parlebas 2002) of the motor games – for example the fact that the social structure determined the emotional experience – further studies should assess

the emotional dimension during the *unstable tag game* according to both factors in young players. In addition to social, emotional, and physical dimensions, further studies could include the assessment of *decisional* (e.g. the level of risk that each player assumes during the motor game) (Lavega-Burgués et al. 2020) and *behavioural* (e.g. the total area occupied by the players) (Gonzalez-Artetxe and Los Arcos 2021; Gonzalez-Artetxe et al. 2020) dimensions to improve the holistic assessment of the whole person during the traditional games.

Conclusions and practical applications

The assessment of the experience of the players during the *unstable* motor games differentiating by roles and from an holistic point of view provides to teachers and coaches a broad knowledge about the consequences of the motor games for the young players. This could help to optimise the pedagogical plan of these types of pedagogical strategies.

Even though further studies carried out with different participants should confirm the results, it seems that PE teachers and sport coaches can use the *unstable* traditional tag game to ensure a very variable relational experience in young players, accepting that it will not be similar for all players. The qualitative analysis of the interactions between players (e.g. who is the tagger and the target-player, and the tendency of the counter-communication sequences) during the tag game can provide clues about the social relationships of the group.

The *unstable* traditional tag game meant very high enjoyment and perceived competence levels, suggesting its use during PE lessons and sport training if a positive

emotional experience of the players is desired. The considerable differences between players should be considered by the PE teachers and sport coaches, including identifying the players that declare the lowest enjoyment and perceived competence levels and assessing their reasons to implement, if necessary, modifications. Since the study was carried out in a homogenous group (i.e. one of male soccer players), further studies should analyse the emotional experience during the *unstable* traditional tag game in heterogeneous young groups to assess the impact of the characteristics of the players on this dimension of the players.

The lack of association between the relational experience (i.e. the number of counter-communications performed, experienced, and the sum of both) and the enjoyment and perceived competence levels, suggest that the emotional experience is not determined by these indicators. The use of interviews and small texts where the players express how they feel could help to identify the reasons.

An assessment of the physical dimension during *unstable* motor games should be carried out differentiating the sociomotor roles and the target-player. The lack of association between the relational experience (i.e. number of counter-communications performed, experienced, and the sum of both) and the physical effort, and the high inter-player variability for both sociomotor roles and the target-player suggest that players resolve the motor game differently.

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Declaration of Interest Statement

No potential conflict of interest was reported by the authors.

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