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Assessing relational, emotional, and physical dimensions of young players during the tag game

Evaluación de las dimensiones relacional, emocional y física de jóvenes jugadores durante el juego de pillar

Avaliação das dimensões relacional, emocional e física de jovens jogadores durante o jogo de pega-pega

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ABSTRACT

Many tag games present unstable motor communications between players, that is, the motor communication varies during the play due to role-changing. A holistic point of view provides a more complete assessment of the experience of the players during the traditional 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 a traditional motor game in young players. Twenty-two young players took part in the study. The participants played a modification of the classic *it* motor game for ten minutes. The relational dimension was assessed by observational methodology analysing counter-communications between the tagger and the runner who experienced the counter-communication. The emotional dimension was assessed by the BECS scale of perceived enjoyment and competence. Physical dimension was assessed by differentiating the tagger, the runner, and the target-player measuring the Total Distance covered per second. The relational analysis provided 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 traditional tag game during physical education lessons and sport training. The tagger performed significantly greater total distance than the rest of the players ($p < .001$; Effect Size = 1.53 – 2.76), suggesting that the assessment of the physical dimension during motor games should be carried out differentiating the motor roles. The assessment of the experience of the players during the motor games differentiating by roles and from a holistic point of view could help to optimise the pedagogical plan.
Keywords: game; communication; socioemotional role; affectivity; physical education.

RESUMEN

Gran parte de los juegos *de pillar* presentan comunicaciones motrices inestables entre los jugadores, es decir, la comunicación motriz (i.e. interacciones de cooperación, oposición o neutras) varía durante el juego debido al cambio de rol. El punto de vista holístico posibilita una valoración más completa de la experiencia de los jugadores durante

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el juego tradicional *de pillar*. Por lo tanto, los objetivos del estudio fueron presentar y emplear una propuesta para valorar las dimensiones relacional, emocional y física de jóvenes jugadores durante un juego motor. Veintidós jóvenes jugadores participaron en el estudio. Los jugadores jugaron a una modificación del juego *de pillar* durante diez minutos. La dimensión relacional fue evaluada mediante la metodología observacional, analizando las contra-comunicaciones entre el *pillador* y el jugador contra-comunicado, la dimensión emocional mediante la escala BECS de disfrute y competencia percibida, y el análisis de la dimensión física (i.e. Distancia Total recorrida por segundo) diferenciando los roles motrices durante el juego. El análisis relacional aportó pistas sobre las relaciones sociales del conjunto de participantes. Los altos niveles de disfrute (4.4 ± 0.6) y competencia percibida (4.0 ± 0.6) declarados por los jugadores sugieren el uso del juego tradicional *de pillar* durante las sesiones de educación física y de entrenamiento deportivo. El *pillador* recorrió una distancia significativamente mayor que el resto de los jugadores (p < .001; Tamaño del Efecto = 1.53 – 2.76), sugiriendo que la valoración de la dimensión física debería ser llevada a cabo diferenciando los roles motrices. La evaluación de la experiencia de los jóvenes jugadores durante los juegos motores desde un punto de vista holístico y diferenciando por roles podría ayudar a optimizar la intervención pedagógica.
Palabras clave: juego; comunicación; rol socioemocional; afectividad; educación física.

RESUMO

Grande parte dos jogos de pega-pega apresenta comunicações motoras instáveis entre os jogadores, ou seja, a comunicação motora (i.e. interações cooperativas, opostas ou neutras) varia durante o jogo devido à câmbio de papel. O ponto de vista holístico permite uma avaliação mais completa da experiência dos jogadores durante o jogo tradicional de pega-pega. Portanto, os objetivos do estudo foram apresentar e utilizar uma proposta para avaliar as dimensões relacional, emocional e física de jovens jogadores durante um jogo motriz. Vinte e dois jovens jogadores participaram do estudo. Os jogadores jogaram um jogo de pega-pega modificado por 10 minutos. A dimensão relacional foi avaliada por meio da metodologia observacional, analisando as contracomunicações entre o apanhador e o jogador contracomunicado. A dimensão emocional foi avaliada por meio da escala BECS de prazer e competência percebida. A avaliação da dimensão física foi realizada diferenciando os papéis motrices através da medição da Distância Total percorrida por segundo. A análise relacional forneceu pistas sobre as relações sociais do grupo de participantes. Os altos níveis de prazer (4.4 ± 0.6) e competência percebida (4.0 ± 0.6) declarados pelos jogadores sugerem a utilização do tradicional jogo de pega-pega durante as sessões de educação física e treinamento esportivo. *Aquele que o apanha* percorreu uma distância significativamente maior (p < .001; Tamanho do Efeito = 1.53 – 2.76) do que o restante dos jogadores, sugerindo que a avaliação da dimensão física deve ser realizada diferenciando os papéis motrices. A avaliação da experiência de jovens jogadores durante os jogos motrices de um ponto de vista holístico e diferenciado por papéis pode ajudar a otimizar a intervenção pedagógica.
Palavras chave jogo; comunicaçao; papel socioemocional; afetividade; educação física.

INTRODUCTION

Traditional motor 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, 2020; Pellegrini et al., 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; 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, many pedagogical frameworks such as Teaching Games for Understanding (Bunker & Thorpe, 1982; Thorpe & Bunker, 1989), Play Practice (Launder, 2001), or Game Sense (Light, 2004, 2012) supported their use (Forrest, 2015) while several studies have assessed their educational and training effects in young players (Oboeuf et al., 2020; Parlebas, 2020; Puente-Maxera et al., 2021; Trajkovik et al., 2018).

Assessing the tag game from a holistic point of view

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; Parlebas, 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. 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.

To analyse players' response during different traditional games, a holistic perspective (Mahmoudi et al., 2012; Miller, 2000; Tirri, 2011; Yorks & Kasl, 2002) would enrich the assessment of their practical applications in PE lessons and sport training. It has been suggested that education and sport training aim to support the development of the whole person– that is, the different dimensions of each individual (i.e. the whole child; Black et al., 2015; Dyson et al., 2021; Lavega-Burgués et al., 2020; Maaranen et al., 2016; Miller, 2000). This pedagogical approach acknowledges the importance of social and affective domains in student growth (Miller, 2000; Tirri, 2011) because their optimal development has a positive effect on students' social and emotional skills, attitudes, behaviour, academic performance and other indicators of well-being (Durlak et al., 2011; Graesser, 2020; Taylor et al., 2017). Focusing the interventions on improving students' social and emotional development has also been found to be key in increasing their effectiveness (Gasser et al., 2018; Korpershoek et al., 2016). Similarly, the social and affective domains have become crucial elements in PE guidelines, and PE and sport training can provide fundamental tools to develop these dimensions among students (Dyson et al., 2021) along with the physical dimension (Chen & Darst, 2001; García López & Kirk, 2021; Theodoulides & Armour, 2001). Thus, the response of the players during traditional games should be assessed from a holistic perspective to avoid a reductionist, simplistic and disjunctive point of view. In this way, the teacher and trainer can choose to use traditional games by assessing the expected consequences and effects (i.e. negative, neutral or positive) for several dimensions among young players (Lavega-Burgués et al., 2020).

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 (Koh, 2005; Lawson, 1988). On the other hand, if the intention is to experience diverse social relationships, the implementation of traditional games from different regions (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 (Lavega-Burgués et al., 2020; Parlebas, 2013). For example, many tag games present *unstable* motor communications between players, that is, motor communication (i.e. cooperation [+], opposition [-] or neutral [Ø] interaction) varies during the play due to role-changing (Martínez-Santos et al., 2020; Parlebas, 2013, 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 & 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* (Lavega-Burgués et al., 2018; Obœuf et al., 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 (Lavega-Burgués et al., 2018; Obœuf et al., 2008). However, to our knowledge, no study has assessed the relational dimension during an unstable traditional game as in the tag game of young players.

Together with the relational dimension (Casey & Goodyear, 2015; Dyson et al., 2021), an emotional dimension is an implicit aspect in the scope of PE (Lavega-Burgués et al., 2011) and sport pedagogy (Andersen et al., 2018). 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 et al., 2005; Jacobs & Wright, 2018; Taub et al., 2018). In addition, among other factors, physical enjoyment (Peris-Delcampo, 2020) and perceived competence (Cantón & Checa, 2012) influence the intrinsic motivation (Deci & Ryan, 1985; Schrader & Nett, 2018) and this conditions the adherence to the physical activity (McAuley & 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, 2014; Serna et al., 2017) and the presence/absence of competition the system of rules allows for (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 et al., 2014). 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) (Lavega-Burgués et al., 2020; Parlebas, 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 the tag game 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. All procedures had been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki, 2013) and the standards of the Bioethics Commission of the University of the Basque Country (Reg. Code 132 / 2018).

Procedure

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. *one, two, and three*). 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). 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 whole session was recorded with a GoPro Victure 4K video camera located four metres above the playing field to ensure that all twenty-two players on the pitch were visible. 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 & Hernández-Mendo, 2015), 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), P refers to *point* (a single session with all the participants), and M refers to *multidimensional* (assessment of multiple levels of response) (Anguera et al., 2011). An observation instrument was created *ad hoc* (Tag-Game) and combined category systems and field format, including exhaustive and mutually exclusive categories (Anguera et al., 2011). The data were concurrent and time-based (i.e. type IV) (Bakeman, 1978). 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 PLUS Research Software for Behaviour Video Analysis (Soto et al., 2019), 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 was made by a graphic carried out with the yEd Graph Editor (yWorks GmbH, version 3.21.1 for Windows, Tübingen, Germany).

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).

Reliability of the data

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. 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 PLUS Research Software for Behaviour Video Analysis (Soto et al., 2019) and the calculations were performed by the free software program GSEQ5.1 (Bakeman et al., 2009; Quera et al., 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 (Fleiss et al., 2003).

Emotional dimension

Players assessed the intensity of their emotional experience using the BECS scale of perceived enjoyment and competence (Arias-Estero et al., 2013). This scale has been validated in and used for young team sports' players (Arias-Estero et al., 2013). 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 games 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 PRO^{TM}, 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 and different places (Bastida-Castillo et al., 2018). This equipment is valid and reliable for measuring external load (Rico-González 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 attached to the players' upper back that are in their coverage area, while the device receives the calculation using the difference in time of arrival (Alarifi et al., 2016). 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. After the session, raw data were downloaded and processed by S PRO^{TM} software (RealTrack Systems, Almeria, Spain).

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 players of the same subgroup according to the subgroups (i.e. subgroup-A and subgroup-B independently). Perceived enjoyment and 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, independent samples t-tests were used to compare players' perceived enjoyment and competence values between subgroup-A and subgroup-B; and one-way analysis of variance (ANOVA) with Bonferroni's post-hoc 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. 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). 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. perceived enjoyment and competence levels), and the physical response (i.e. TD_{second}). The following scale of magnitudes was used to interpret the correlation coefficients: < .1 (trivial), .1–.3 (small), .3–.5 (moderate), .5–.7 (large), .7–.9 (very large), and > .9 (nearly perfect) (Hopkins et al., 2009). The statistical analysis was performed by the Statistical Package for Social Sciences (SPSS 22.0, Chicago, IL, USA).

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 = .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). Two players of the subgroup-B did not experience any counter-communication, with a range of counter-communications experienced of between 1–6 (3 ± 2) and 0–6 (3 ± 2) times in the subgroup-A and subgroup-B, respectively (Figure 1). 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 ten and six both for subgroup-A and subgroup-B, respectively. The mean consecutive counter-communications between players of the same group was substantially lower ($p = .08$; ES = 1.00) for subgroup-A (1.7 ± 0.8) in comparison to subgroup-B (3.2 ± 1.8) (Figure 2).

Emotional dimension

The perceived enjoyment and competence levels 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 3), with trivial practical differences (perceived enjoyment: ES = 0.16; perceived competence: ES = 0.18).

Physical dimension

Considering all the players together, the whole duration (i.e. the ten 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 ($p < .001$; ES = 1.53, large) and the rest of the players ($p < .001$; 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.

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%	

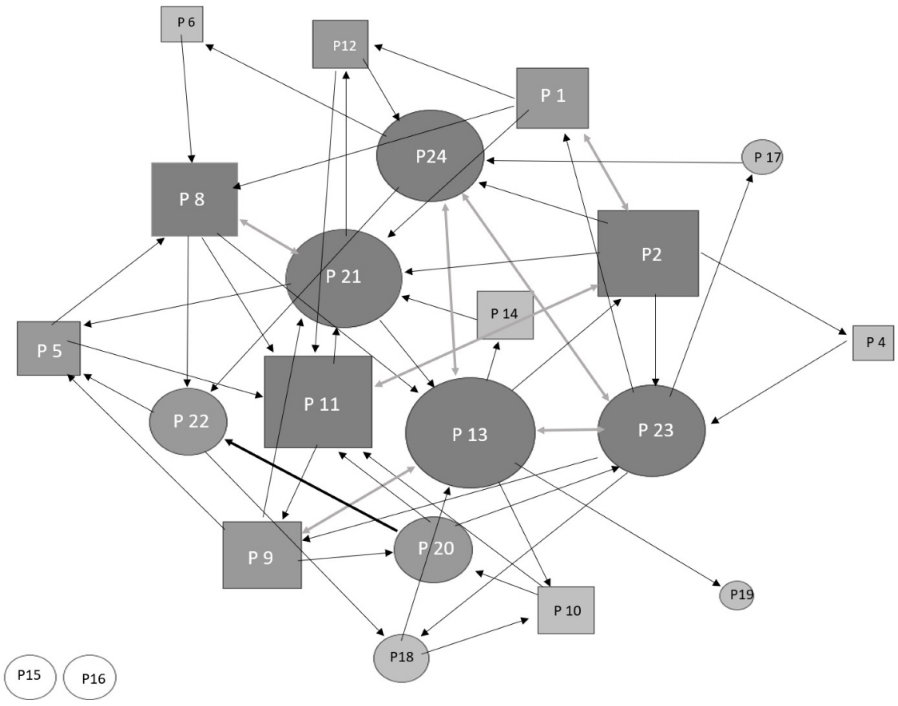

Figure 1. Representation of the counter-communications between players during the tag game. Rectangles: players from subgroup-A. Circles: players from subgroup-B. The sizes of the rectangles and the circles vary according to the number of counter-communications performed and experienced: the biggest 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.

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.

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
Perceived 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

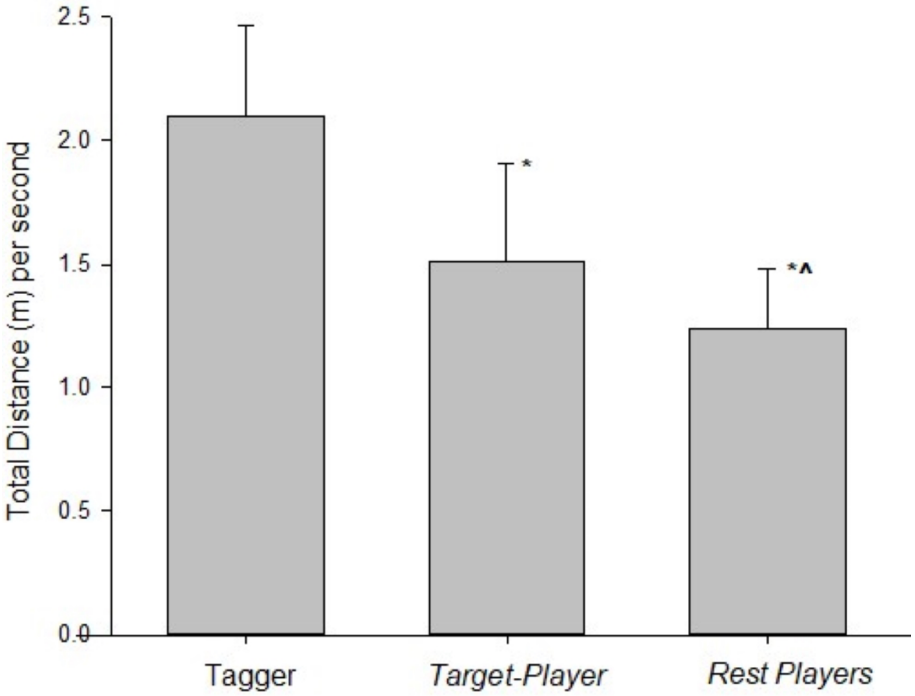

Figure 3. Comparison of the total distance (metres) per second between the Taggers, the Target-Player and the Rest of the Players. *Significant difference with Tagger ($p < .001$); ^Significant difference with Target-Player ($p = .04$).

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 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 perceived enjoyment and competence levels. The sociomotor 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 & Levine, 1982) that unstable traditional games 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, PE teachers and trainers 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) 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 (Obœuf et al., 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. Similarly, several studies found that young girls and boys responded (e.g. contra-communicated) differently during the sitting ball (i.e. *pelota sentada*) game (Pic et al., 2019; Pic & Lavega-Burgués, 2019). Thus, in addition to quantitative data (i.e. frequencies), qualitative assessment could help to determine the relational dimension during unstable tag games (Lavega-Burgués et al., 2018).

Emotional dimension

Several studies have found that the social motor relationship determines the young players' enjoyment level (Gao et al., 2011, 2014). However, few studies have assessed students' enjoyment level due to young players' practice in tag games (Gao et al., 2014). 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 years-old students (Gao et al., 2014). 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 perceived enjoyment and competence of young soccer players was as high as those declared by young people who participated in basketball and mini-basket (age: 10 – 12 years; perceived enjoyment and competence: 4.4–4.5) at school level (Arias-Estero et al., 2013), considerable

variability (more than 10% according to Atkinson & Nevill, 1998) was found between young players after the traditional game. Since a high perceived enjoyment and 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 perceived enjoyment and competence levels question this assumption. The reasons for the enjoyment and 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 (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 ($p < .001$) 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 & Nevill, 1998) during the tag 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. gender; Gao et al., 2014) and also the structural traits or 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 tag games 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 et al., 2020; Gonzalez-Artetxe & Los Arcos, 2021) dimensions to improve the holistic assessment of the whole person during traditional motor games.

CONCLUSIONS AND PRACTICAL APPLICATIONS

The assessment of the experience of the players during unstable motor games differentiating by roles and from a holistic point of view provides to teachers and coaches a broad knowledge about the consequences of these 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 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 tag games 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 perceived enjoyment and 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.

Further studies could use mixed methods and multimethods (Anguera et al., 2018) (e.g. T-Patterns employed by Pic et al., 2018, 2021) to optimize the holistic analyses of the motor response of the young players during tag games.

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