Original Article

Positioning and displacement patterns of young players during 5v5, 7v7, 9v9, and 11v11 soccer matches

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ABSTRACT

This study aimed to analyse the effect of game format and age-group on positioning and displacement of soccer players (age ranging from 6.94 ± 0.7 to 13.46 ± 0.5 years; height ranging from 125.36 ± 6.04 to 159.16 ± 7.78 cm; weight ranging from 27.16 ± 5.75 to 49.89 ± 8.89 kg). Linear and non-linear analyses were used to capture the spatial distribution variability and relative positioning of the players during soccer matches. Variables were assessed using global positioning system technology. Results suggest significant effect of the game formats in spatial distribution variability (η^2 = .142, $p < .001$) and relative positioning (η^2 = .926; $p < .001$) of the players. The variability decreased and mean covered area increased as game format increased. There also was a significant effect of the age-group in spatial distribution variability (η^2 = .120, $p < .001$) and relative positioning (η^2 = .405; $p < .001$). The U10 age-group presented significantly higher values than other age-groups ($p < .001$). These findings can provide an opportunity for coaches and governmental bodies to maximise the efficiency of the soccer matches conditions.

Keywords: Movement variability; Spatial distribution maps; Performance analysis; Tactical demands; Team sport.

Cite this article as:
Brito, Â., Roriz, P., & Garganta, J. (2020). Positioning and displacement patterns of young players during 5v5, 7v7, 9v9, and 11v11 soccer matches. *Journal of Human Sport and Exercise*, *15*(4), 904-917. doi:https://doi.org/10.14198/jhse.2020.154.17

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Submitted for publication September 2019
Accepted for publication December 2019
Published *December 2020 (in press* December 2019)
JOURNAL OF HUMAN SPORT & EXERCISE ISSN 1988-5202

doi:10.14198/jhse.2020.154.17

INTRODUCTION

Most European countries are seeking to optimize the use of game formats to perform the official youth leagues soccer matches along the development stages of players. These stages express the process of maturation, learning, training and practice of the young players through the development of specific skills either during the training units or soccer matches (Gagné, 2000; Vaeyens, Lenoir, Williams, & Philippaerts, 2008). To provide suitable conditions of practice during official soccer matches, variables such as pitch size, number of players and duration of the match must be adapted to the age and characteristics of the participants (Ajamil, Idiakez, Urray, & Echevarría, 2009; Capranica, Tessitore, Guidetti, & Figura, 2001). The strategy which is being used by most European countries is to progressively increase the number of players and the pitch size up to the 11v11 game format. For instance, from Under-8 (U8) up to Under-14 (U14) age-groups, the most widely used game formats are being the 5v5, 7v7, 9v9 and 11v11 respectively (Brito, Duarte, Diniz, Maia, & Garganta, 2017). Further, it´s also common to find (e.g. in Portugal) young players 12 and 13 years old to perform official soccer matches upon a 11v11 game format with pitch dimensions of maximum of length and width, which are not suitable from pedagogical point of view for the age and ability of the players (Ajamil et al., 2009; Capranica et al., 2001).

A previous study conducted on the early stages of the developmental process of the players proposed the use of 3v3 instead of 5v5 condition for the U8 age-group, because in the 5v5 condition, the U8 used little playing space; showed little variability of movement; and presented a low number of contacts with the ball (Lapresa, Arana, Garzón, Egüén, & Amatria, 2010). However, when analysing and comparing the characteristics of the attack process during soccer matches performed in the 7v7 and 8v8 condition with players under the age of 8-10 (Ajamil et al., 2009) was not found a significant difference between both conditions. Another study (Capranica et al., 2001) with 11-year-old players suggested advantages in the 7v7 compared to the 11v11 game condition. The authors concluded that in the game 7v7 the total number of passes was superior, and the total number of ball losses was lower compared to 11v11 condition. With the purpose to analyse and compare the characteristics of the attack process during soccer matches performed in the 9v9 and 11v11 condition Ajamil, Idiakez, and Echevarría (2006) suggested that 9v9 is a valuable alternative for the under 10-12 age-groups because it reduces the difficulties of adapting to the 11v11 condition. More recently, Lapresa, Arana, Anguera, and Garzón (2013) analysed the ball circulation patterns in games 7v7, 9v9 and 11v11 condition concluding that the game of 7v7 and 9v9 facilitate the development of gaming space management skills, compared with 11v11 condition. Despite this information, authors such as Ajamil et al. (2006) states that the transition from the 7v7 to 11v11 condition can create a mismatch between the game occurrences and the real possibilities of young soccer players, especially in the transition from the U12 to U14 age-group. Accordingly, it is necessary to improve the knowledge upon the type of adaptations and/or constraints induced by the game formats that are being used in competition at the different age-groups (Casamichana & Castellano, 2010; Castellano, Puente, Echeazarra, Usabiaga, & Casamichana, 2016). This knowledge, on one hand is a step forward for the coaches to promote the acquisition of individual and collective behaviours of the players and on the other hand contributes to the governmental bodies to provide suitable practice conditions for the development of young players.

The nature of a soccer match is a dynamic and complex reflecting the players´ efforts to adapt and overcome to structural, environmental and functional game variables, such as pitch size, number of players, climate, ball trajectories, positioning and displacement of teammates (Bangsbo, 1994; Bradley et al., 2011; Gréhaigne, Godbout, & Zerai, 2011). In this complex environment, players express behavioural variability, inherent to the actions, positioning and displacement promoted to respond to the game requirements (Garganta, 2008). Such behaviours are susceptible to display relevant information that can contribute to

describe the tactical performance of players and teams (Ric et al., 2017; Sampaio & Maçãs, 2012). For instance, Aguiar, Gonçalves, Botelho, Lemmink, and Sampaio (2015) demonstrated that the addition of players to the team induces a higher level of collective organization and optimizes the space occupation of the players. A study conducted by Silva et al. (2015) also suggested that when increasing the relative space per player by reducing the number of players, the players´ positioning tends to be more irregular whereas when the field dimension increases the players´ positioning becomes more regular. In this context, analysis of positional data in soccer allows to describe the spatial distribution of the players during the matches improving therefore the understanding of tactical-related constraints on the behavioural dynamics of players (Ric et al., 2017). Thus, one of the main challenges for researchers is to find suitable tools that allows to analyse the movement and displacements patterns of the players during soccer matches with the purpose to characterize the game profile from a tactical perspective (Aguiar et al., 2015).

Global positioning systems (GPS) are an important tool to collect data that contribute for relevant insights on the analysis of soccer player´s performance either in training or soccer match (Cummins, Orr, O'Connor, & West, 2013). Portable GPS devices provide spatial-temporal data with the reasonable accuracy to tracking movement variability indicators, such as the positioning, displacements and trajectories of the players in the pitch (Coutts & Duffield, 2010; Gray, Jenkins, Andrews, Taaffe, & Glover, 2010). The movement variability of the players is omnipresent and unavoidable during a soccer match due to the distinct constraints that shape each individual´s behaviour during the game (Davids, Glazier, Araújo, & Bartlett, 2003). Therefore, the measurement of this variability through positional data of the players can be used to access performance indicators that allow to understand and describe the dynamic and situational character of the game events reflected in the pitch from a tactical point of view (Couceiro, Clemente, Martins, & Machado, 2014; Memmert, Lemmink, & Sampaio, 2017; Silva, Aguiar, et al., 2014). For a better understanding of game styles see (Fernandez-Navarro, Fradua, Zubillaga, Ford, & McRobert, 2016).

To quantify the variability of spatial-temporal data, the range, the standard deviation or the coefficient of variation can be used together with measures of central tendency (mean, median and mode). However, these linear measures has being complemented with more sophisticated analysis, such as the one based on entropy values obtained from the player´s spatial distribution maps (Couceiro et al., 2014; Siegle et al., 2008; Silva, Aguiar, et al., 2014; Silva et al., 2015). The entropy, originally described by Shannon (1948), is a non-linear measure that can be used to represent the uncertainty of locating the player in a specific region of the soccer pitch (Silva, Aguiar, et al., 2014). Normalized entropy ranges from 0 to 1, where values near to 0 express highly predicted positions of the players on the pitch while values near to 1 reflect highly variable or unpredicted positions (Silva, Aguiar, et al., 2014). Thus, variability can be interpreted as a result of the player´s effort to adapt to unexpected events and specific game constraints as well as the player´s versatility on the performance of his tactical playing positioning. In addition, the heat maps also reflect the spatial distribution of the players over the pitch, considering the time spent by each player at a certain position. This last variable is an interesting framework to analyse the variability of players´ movement (Couceiro et al., 2014). Another sophisticated method that is used is the relative positioning of the players in the pitch, centred on their average positional coordinates, with axes corresponding to the displacements´ standard deviations in the longitudinal and lateral directions of the soccer pitch. This variable provides additional information concerning the tactical behaviour of the players and teams (Silva, Travassos, et al., 2014; Yue, Broich, Seifriz, & Mester, 2008). For instance, a study by Silva, Travassos, et al. (2014) analysed the distribution of the movement coordinates of young soccer players (under-19), divided into two groups according to skill level (national-level and regional-level). The results suggest that the players of national-level express differentiated distributions on longitudinal direction while the players of regional-level present very similar longitudinal coordinates on the pitch, only varying their positioning along the lateral direction. Additionally, a study

conducted by (Yue et al., 2008) demonstrated that players which play in the more advanced areas of the pitch (forwards and wings) present movements of greater amplitude in comparison with players who play in the lower back (midfielders, and central-defenders and fullbacks).

Despite the aforementioned studies, we don´t know any work which explored the effect of game format and age-group upon variability of positioning and displacement of young soccer players during match play. The lack of scientific evidence about the effect of these variables on performance of young players, reflects many doubts about whether the game formats that are being used in the youth championships are suitable to the characteristics and capacity of the participants (Idiakez, Ajamil, Echevarría, & Marín, 2004; Tessitore et al., 2012). Therefore, the purpose of this study is: (1) to examine the positioning and displacements of young players associated with four game formats (5v5, 7v7, 9v9, and 11v11) when the relative space per player was kept constant; (2) to assess the positioning and displacement of youth soccer players in the U8 to U14 age-groups. It was hypothesized that the game formats and the age-group induce differences in positioning and displacement of the players during soccer matches.

METHODS

Participants

One hundred and ninety-seven non-elite young soccer players of 4 different age-groups participated in this study (Table 1). The selected participants (teams and players) were of the same league and had the same competitive level.

Table 1. Description of player subsamples.

	U8 (*n* = 53)	U10 (*n* = 44)	U12 (*n* = 41)	U14 (*n* = 59)	*F*	*p*	Post hoc (Bonferroni)
Age (Y)	6.94 ± 0.72	8.52 ± 0.66	11.24 ± 0.44	13.46 ± 0.50	1282.65	< .001	a.b.c.d
Height (cm)	125.36 ± 6.04	134.57 ± 6.85	146.80 ± 6.49	159.16±7.78	250.13	< .001	a.b.c.d
Weight (Kg)	27.16 ± 5.75	34.70 ± 7.49	41.57 ± 7.47	49.89 ± 8.89	91.02	< .001	a.b.c.d
Body-mass (Kg/m^2)	17.37 ± 3.92	18.93 ± 2.87	19.11 ± 1.78	19.51 ± 1.68	6.33	< .001	a
Experience (y)	2.06 ± 0.86	3.04 ± 0.91	3.58 ± 1.46	3.68 ± 1.19	23.01	< .001	a.e

Significant differences are identified as (a) U8 vs U10; U8 vs U12; U8 vs U14, (b) U10 vs U8; U10 vs U12; U10 vs U14, (c) U12 vs U8; U12 vs U10; U12 vs U14, (d) U14 vs U8; U14 vs U10; U14 vs U12, (e) U10 vs U14. Abbreviations: U8, under 8; U10, under 10; U12, under 12; U14, under 14; a.u., arbitrary unit.

Players participated on average in ~ 5h of combined soccer-specific training and competitive soccer match per week, 3 soccer training sessions and 1 domestic soccer match per week. All players and their tutors were informed about the research procedures, requirements, benefits and risks, and written informed consent was obtained from parents. The study protocol followed the guidelines stated in the Declaration of Helsinki and was approved by the Ethics Committee of the Faculty of Sport of Porto University.

Data collection

A Global Positioning System (GPS) that captured the spatial-temporal data with a sampling frequency of 10 Hz (Qstarz, model: BT-Q1000eX) was used. The GPS was placed on the upper back of the player (using an appropriate harness). The reliability of similar type of devices has been well documented in the literature (Nicolella, Torres-Ronda, Saylor, & Schelling, 2018; Silva et al., 2016; Silva et al., 2015). Each game format was calibrated with the coordinates of four GPS devices stationed in each corner of the pitch for approximately 4 min. The absolute coordinates of each corner were calculated as the median of the recorded time series, providing robust measurements to typical fluctuations of the GPS signals. These absolute

positions were also used to define the Cartesian reference coordinate systems for each game format, with its origin placed at the pitch centre. GPS Longitudinal and latitudinal (spherical) coordinates were converted into Cartesian coordinates with the Haversine formula (Sinnott, 1984). Fluctuations in players positions were reduced using a moving average filter with a time scale of (.2 s) and data resampling was employed to synchronise the time series of all players within each match condition (Silva et al., 2015). MatLab software (R2014a, Mathworks Inc., USA) was used to process and analyse the data.

Experimental design

A longitudinal study was conducted over a period of 16 weeks (November – March) in the 2014/2015 competitive season. During this period 3 soccer matches per week were performed, for a total of 48 matches. This 3 matches a week were performed always on Sunday in a triangular tournament format (i.e. match 1: team A vs. team B; match 2: A vs. C; match 3: B vs. C), in accordance with the football rules, except match duration (30min, without breaks) and players´ substitution (not allowed). Each age-group (Under-8, Under-10, Under-12, and Under-14) performed 3 matches per game format (i.e. 3 matches in 5v5, 3 matches in 7v7, 3 matches in 9v9, and 3 matches in 11v11). This sequence was maintained for all age-groups. All matches were conducted in the same artificial third-generation pitch surface and, with official dimension (length: 100 m, width: 64 m). The pitch size of the other game formats was adjusted using the relative space per player, i.e. reducing the length and width to the number of players proportionally (Silva, Aguiar, et al., 2014). The detailed description of the match conditions is presented in Table 2. Matches were proceeded by a planned, standardised warm up of fifteen minutes comprising running activities, small-sided games and stretching. Following this period, the players simulated a match during two periods of two minutes, interspersed by one minute of passive recovery. The coaches used a subjective skill assessment of each player to distribute the players in the respective teams in a balanced shape. The goalkeepers participated in the matches but were excluded from the analysis. All soccer matches were performed between 9 and 11 a.m., under similar environmental conditions (temperature 10–16°C, relative humidity 49–62%). This protocol was previously sent to the teams. The players were previously informed about the procedures they should adopt.

Table 2. Description of match conditions.

	Match Configuration			
Game formats	5v5	7v7	9v9	11v11
Game duration (min)	30 min	30 min	30 min	30 min
Pitch size (length x width)	45.5 x 29 m	64 x 41 m	82 x 52 m	100 x 64 m
Pitch ratio per player (m2)	1:132	1:187	1:237	1:291
Tactical structure	1-1-2-1	1-2-3-1	1-3-4-1	1-4-3-3
Playing positions	1GK+1DF+ 2MD+1FW	1GK+2DF+ 3MD+1FW	1GK+3DF+ 4MD+1FW	1GK+4DF+ 3MD+3FW
Goals size (height x width)	2 x 6 m	2 x 6 m	2 x 6 m	2.44 x 7.32 m

Note: Playing positions categories: GK = Goalkeeper; DF = Defender; MD = Midfielder; FW = Forward.

Data analysis

The positional data were used to calculate: (1) players´ spatial distribution variability, assessed by measuring the entropy of individual spatial distribution maps (Shannon, 1948; Silva et al., 2015). These maps were obtained from discretization of the pitch into sectors of 1 m2, allowing to calculate the amount of time spent in each sector, normalized to total match duration to produce a spatial probability distribution. In this way, a normalized value of entropy, ranging from 0 to 1, was calculated to quantify the uncertainty of locating each player in a specific location of the pitch. A low entropy value (near zero) indicating a sharply peaked

distribution, suggests the player's position can be easily predicted. On the other hand, a high entropy value (near 1) corresponds to an uniform distribution and suggests the player exhibits high spatial distribution variability or that its position is highly variable and unpredictable (Silva et al., 2015). Taking into consideration the participant´s experience, the entropy was also related with team tactical performance. Thus, teams with players with high entropy values were interpreted as using a game style that promoted positional exchanges between players and more diversified tactical functions. On the other hand, teams with players with low entropy values were interpreted as using a game style based on more consistent displacement and more specific tactical functions; (2) the covered area by players in the pitch surface, assessed by measuring the area of ellipses representative of players´ pitch displacement, centred on the average positional coordinates of the players, with axes corresponding to the standard deviation of displacement in the longitudinal and lateral directions of the pitch (Zengyuan, Broich, Seifriz, & Mester, 2008). Through elliptic forms we evaluated qualitatively the main directions of the players movements and their distribution and relative positioning on the pitch (Silva, Travassos, et al., 2014). The ellipse areas were also calculated to provide quantitative information of the space predominantly used by each player during soccer matches.

Statistical analysis

Results are expressed as means ± standard deviations. A two-way analysis of variance (ANOVA) with repeated measures was employed to evaluate the differences in the described variables between each pitch surface. The Mauchly´s test of sphericity was performed on all data to verify any violations of sphericity that were corrected through the Greenhouse-Geisser adjustment (Bathke, Schabenberger, Tobias, & Madden, 2009). Effect sizes were reported as partial eta squared (η^2) obtained with the ANOVAs, following Cohen´s guidelines (Cohen, 1988): (i) $.01 \leq \eta^2 < .06$ – small effect; (ii) $.06 \leq \eta^2 < .14$ – moderate effect; and (iii) $\eta^2 \geq .14$ – large effect. Post hoc analysis was performed using the Bonferroni adjustment. All statistical analyses were carried out using SPSS Statistical Analysis Software (SPSS Inc., Chicago, USA) version 22.0 for Windows.

RESULTS

Spatial distribution

The entropy values decrease as game format increase (Figure 1). ANOVAs yielded a main effect for game format $F(9.453) = 8.357$; $p < .001$, $\eta^2 = .142$; $\pi = .863$.

Post-hoc analysis revealed significant differences between all game formats ($p < .001$ in all comparisons).

In relation to the age-group the entropy values were higher on the U10 age-group compared to the other age-groups (Figure 1). ANOVAs yielded a main effect for age-group $F(3.453) = 20.647$; $p < .001$, $\eta^2 = .120$; $\pi = 1.000$.

Post-hoc analysis revealed significant differences between U10 age-group and all other age-groups ($p < .001$).

Figure 2 presents an example of spatial distribution maps of players for each game format, highlighting higher variability in spatial distribution on the 5v5 and 7v7 game formats.

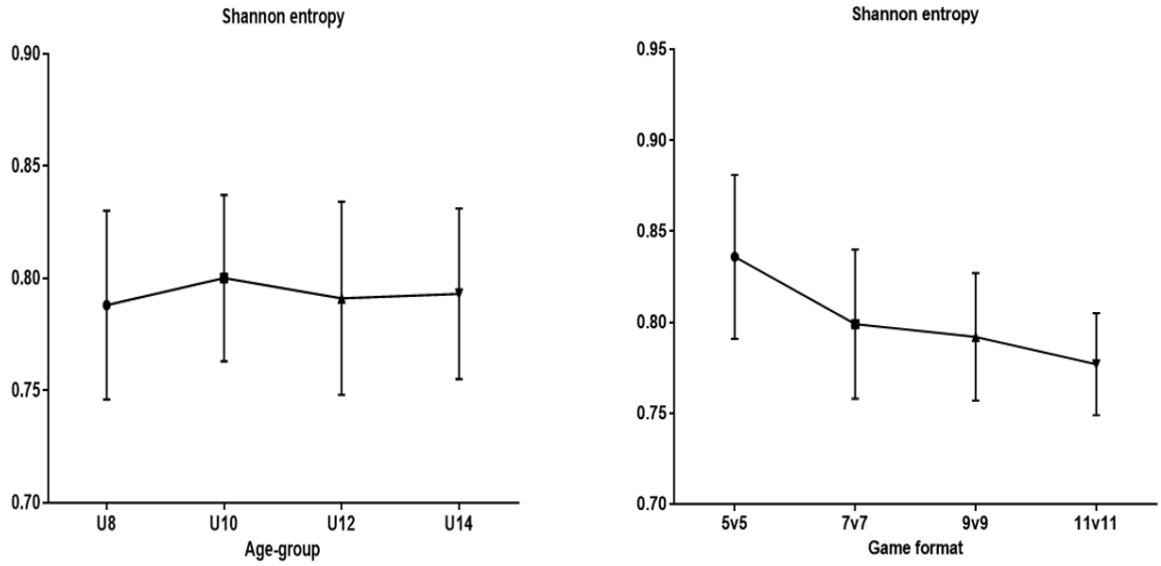

Figure 1. Mean values for Shannon entropy of the players on each age-group and game format. Error bars represent standard deviation.

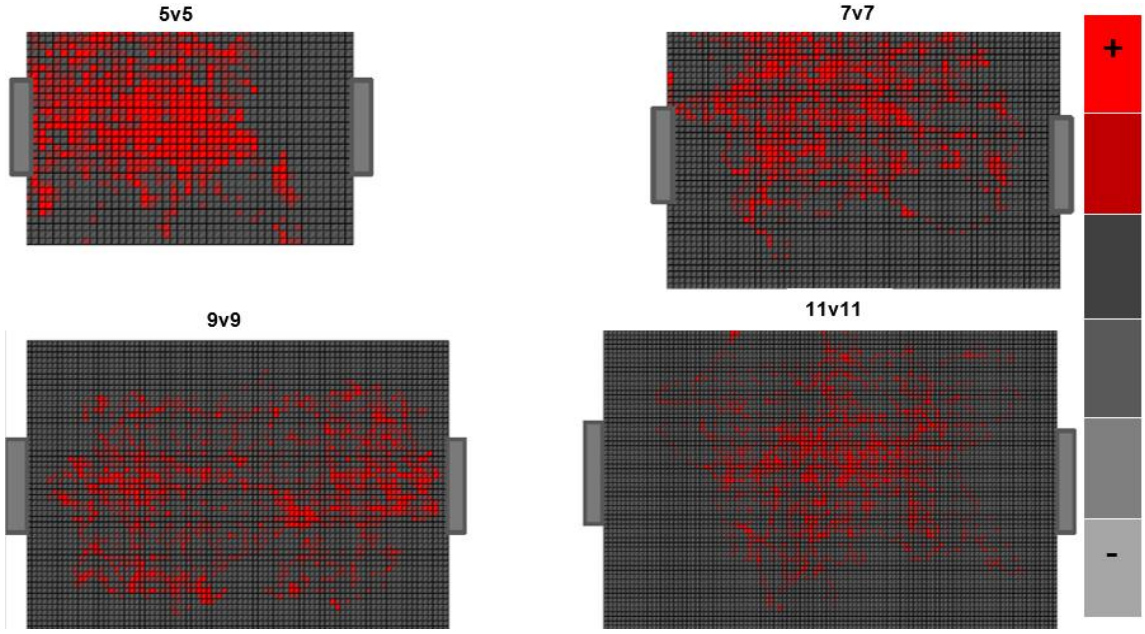

Figure 2. Exemplar spatial distribution maps of players from each game format.

Relative positioning

Figure 3 illustrates the ellipse areas, centred on the average of players´ positional coordinates, with semi-axes that correspond to the standard deviation of displacement in the longitudinal and lateral directions on each game format. The elliptic forms show less eccentricity and/or greater overlap in the following configurations (U8 <> 5v5; U10 <> 7v7; U12 <> 9v9; and U14 <> 11v11).

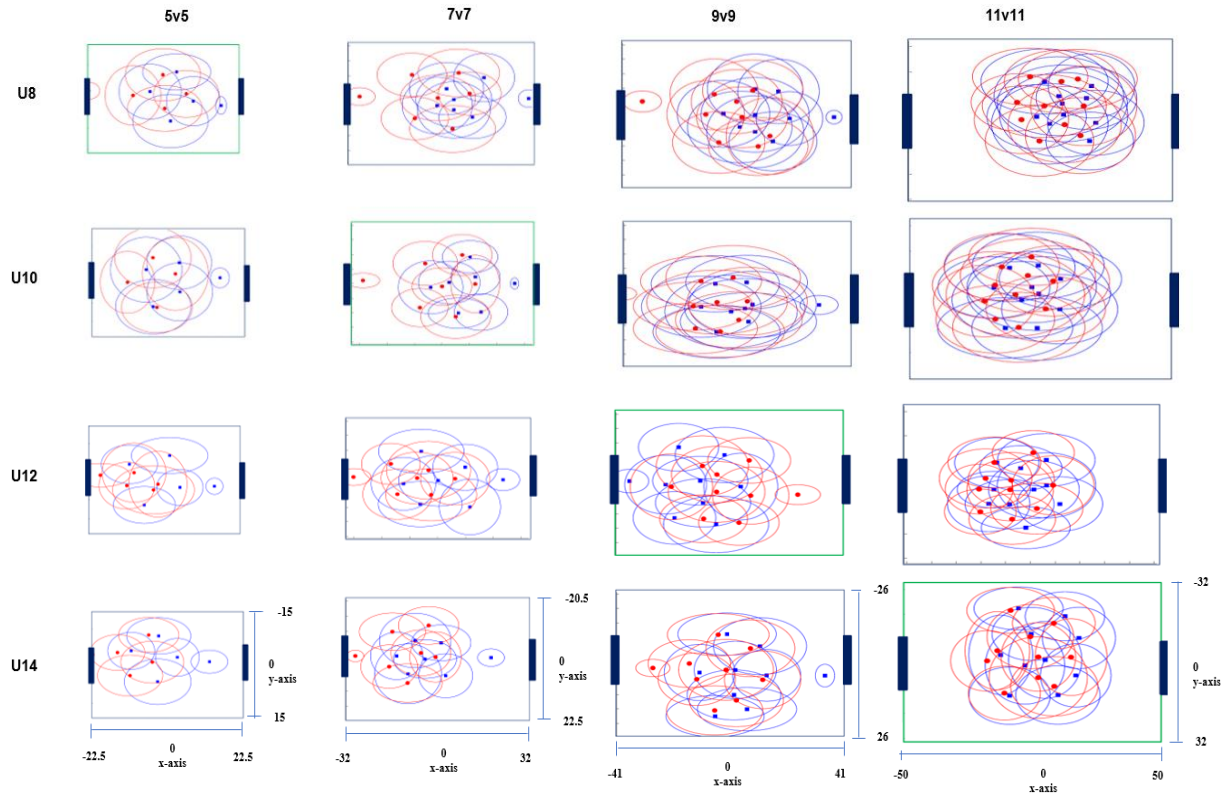

Figure 3. Players' elliptical areas for each age-group on each game format. Blue and red ellipses depict the players' major displacement of each team, respectively. Lateral (y-axis) and longitudinal (x-axis) axes depict pitch coordinates.

The mean covered area increase as game format increase (Figure 1). ANOVAs yielded a main effect for game format $F(3.151) = 625.72$; $p < .001$, $\eta^2 = .926$; $\pi = .863$.

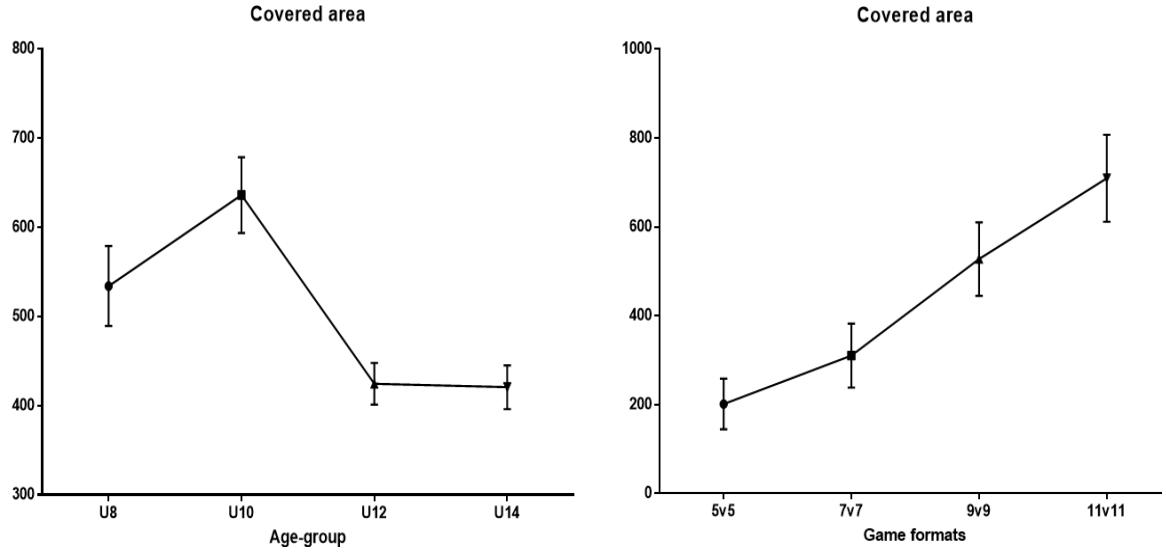

Figure 4. Mean values for covered area of the players on each age-group and game format. Error bars represent standard deviation.

Post-hoc analysis revealed significant differences between all game formats ($p < .001$ in all comparisons).

ANOVAs yielded a main effect for age-group $F(3.405) = 102.6$; $p < .001$, $\eta^2 = .405$; $\pi = 1.000$.

Post-hoc analysis revealed significant differences between the U8 and all other age-groups as well as between U10 and all other groups ($p < .001$). No differences were found between U12 and U14.

DISCUSSION

The aim of this study was to analyse the positioning and displacement of non-elite young soccer players (U8 to U14) during soccer matches performed in 5v5, 7v7, 9v9, and 11v11 game formats.

To assess the respective variables, linear and non-linear tools were used to analyse the spatial distribution variability and covered area by the players. These measures provide relevant information from the tactical point of view (Silva et al., 2015).

The results confirmed the hypothesis that the game formats and age-group induce differences in positioning and displacement of the players during soccer matches.

Spatial distribution variability

The Shannon entropy values showed that players´ spatial distribution variability was significantly different in the four game formats. In general, as the game format increased, players show more restricted action zones. Specifically, the action zones of the players were more restricted on 11v11 game format compared to the 5v5 and 7v7 formats, suggesting that the game formats with greater number of players induces behaviours of greater stability in which the players express movements of less variability and more predictable (Silva et al., 2015). Additionally, the addition of players to the context of the soccer match as well as the increase of the pitch dimensions promotes a higher level of collective organization, expressed in the optimization of the spatial distribution variability and behaviour of the players in the pitch (Aguiar et al., 2015).

In this context, it becomes clear that the smaller game formats induce greater amount of unintentional movements or actions that probably were not previously defined (i.e. non-systematic variability). Such characteristics of the movement may result from the systematic alternation between the defensive and attack mode that the players adopt during soccer match as well as the greater probability of the players being requested by their teammates through technical-tactical actions such as passing, game profile, tactical positioning, etc.

The Shannon entropy values also showed that the players´ spatial distribution variability is influenced by the age of the players. The spatial distribution of U10 age-group revealed significantly greater variability than the other groups, which suggests that players of different ages respond differently under the same game conditions. A possible explanation may be the inability of younger players to assimilate the tactical information that coaches give them, namely about the tactical positioning that they must adopt during the game. Another explanation may be the trend that players of U10 age-group manifest to chase the ball across all the pitch, which in turn induces a more anarchic style of play. Therefore, we can argue that, from the tactical point of view, the profile of the soccer match is more structured as the game format increased, in other words, the specificity of the tactical roles and the positioning of the players expresses a more balanced occupation of the pitch in the 9v9 and 11v11 game formats (Silva, Aguiar, et al., 2014). On the other hand, the 5v5 and 7v7 game formats seem to promote a faster style of play and in which players express more contacts with the

ball, which in turn contributes to improve its technical and cognitive performance (Brito, Roriz, Duarte, & Garganta, 2018).

Relative positioning

The mean area covered by the players increase as the game format increase. Since we are not aware of any comparable data in the literature, we can consider that it is expected that the average area covered by players is higher on soccer pitches of larger dimensions. A soccer match performed in pitch with larger dimension induces longitudinal and lateral movements of greater amplitude.

However, our results demonstrated that the U8 but mainly U10 age-group express longitudinal and lateral movements of amplitude significantly higher than the U12 and U14 age-groups. These data suggest that the players of 8-10 years-old are still unable to respond to the tactical demands imposed by the game. Moreover, it seems that the players of 8-10 years-old still do not have the capacity to respond to the tactical demands imposed by the soccer match. Consequently, the young players develop regular movements and of great amplitude but that nevertheless do not have correspondence in a greater intervention in the game, which induces a game less balanced from the tactical point of view.

Finally, analysis of ellipse forms also supported the assumption that the performance of players and teams is influenced by the format-age relationship. Specifically, we found that the relationship between longitudinal and lateral movements was more balanced in the following configurations: age-group U8 <> 5v5 game format; U10 <> 7v7; U12 <> 9v9; and U14 <> 11v11, respectively. The more rounded shapes in the mentioned configurations reflect the similarity of movement amplitudes in the longitudinal and lateral direction, suggesting that the profile of the game in the respective configurations was more structured and collective from a tactical point of view (Bartlett, Button, Robins, Dutt-Mazumder, & Kennedy, 2012; Silva, Travassos, et al., 2014; Stiles, James, Dixon, & Guisasola, 2009). The relationship between longitudinal and lateral movements was not as balanced in the other configurations whose ellipse forms reflected a less balanced player-space relationship as well as a poorer player-function relationship according to specific areas of the pitch (Duarte, Araújo, Correia, & Davids, 2012).

Future investigations may assess the effect of structural and functional constraints on the physiological and psychological performance of players. In addition, we suggest that it may be relevant to assess the physiological and psychological performance of the players under the effect of the variables mentioned.

CONCLUSIONS

The most accurate knowledge about the effect of the game format and age-group on the players´ tactical performance can help the coaches to use the most appropriate tools in the training process of young players and optimize their performance. Moreover, it can also help governmental bodies to implement the most appropriate playing conditions in youth leagues soccer matches.

The main practical applications of this study are that the spatial distribution and displacements of the players is influenced significantly by the game format and age-group. Specifically, the 11v11 game format promotes greater stability and behaviour of spatial distribution of players in the pitch, suggesting that the specific positioning of players and their positional roles are more predictable. On the other hand, the small game formats, such as the 5v5, induce a greater amount of unintentional movements or actions, which can contribute to increase the tactical and technical participation of the players during the game.

In this study we also identified that at an early age (8-10 years), players tend to perform longitudinal and lateral movements of greater amplitude than the age groups U12 and U14, suggesting that at lower ages the players still have difficulty establishing a proficient relationship with the space.

ACKNOWLEDGMENTS

We thank all the players and managers of the soccer teams for their collaboration. The authors have no conflict of interest directly relevant to the content of this article. No external financial support was declared for this investigation. This study was supported by Centre for Innovation and Intervention Training in Sport of the faculty of sport of the University of Porto.

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