

Original Article (short paper)

The game variants in Europe. Trends and perspectives in youth competitive stages

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Abstract — Aims: The aim of this study was to verify how European countries manage the type of game variants and their frequency along youth competitive stages. **Methods:** Data were collected from the official rules of youth football championships. To identify countries homogenous groups according to their game variants, Two Step Cluster Analysis procedure was used while a nonparametric Kruskal-Wallis test was used to compare the game variants distribution in each Cluster. In order to correlate the game variants with age groups, a Chi-Square independence test and a Spearman ordinal correlation coefficient were used. **Results:** The results showed there were five clusters with significant differences in their game variants distribution ($X^2_{kw} (4) = 22.149; p < 0.001; n = 30$) and a significant correlation between age group and game variant ($\chi^2(63) = 477.724; p < 0.001; n = 30$). Specifically, the most used game variants in each age group were the five-a-side (F5) in Under-8; the nine-a-side (F9) in Under-12; the seven-a-side (F7) in Under-9 and Under10; and the eleven-a-side (F11) in and above Under-13. **Conclusion:** These results may contribute to understand the different country perspectives about the competitive game variants of youth football within the European space and its relation with diverse learning philosophies and pathways.

Keyword: youth soccer, game variants, team sport, development pathways, association football

Introduction

Football is a cultural phenomenon of high impact on a global scale. This phenomenon has enhanced the attractiveness of the sport as a professional occupation for performers at the highest level, where the financial rewards for success are considerable¹. Thus, it is not surprising that the development of youths into expert or professional soccer players in adulthood is being the goal of professional clubs and national governing bodies². Moreover, most soccer academies are seeking to optimize the development of their young players and helping them acquire the skills necessary to perform successfully in formal competition along their developmental pathway³. This pathway can last for 14 years before the child achieve adulthood⁴ and along mentioned period a significant investment of practice time and effort is required to reach an elite level of performance⁵. In this context, the practice conditions may be a decisive factor to long-term success in soccer¹, where the game variants used in the formal soccer matches can assume a determinant role during formative years of the players.

In previous decade, the Union of European Football Associations (UEFA) increased the pressures so that each Association member (i.e., each country) to organize soccer matches adapted to the physical, cognitive, and maturational level of young players with purpose to provide them adjusted developmental conditions⁶. Despite these pressures, it is still recurring to find young players competing in game conditions

unsuitable to skill level and age of the players, in particular the 11-a-side soccer game⁷. Therefore, an important question to consider is whether the 11-a-side game variant should be used in the early stages of the young players' learning process^{8,9}. Previous studies suggested that soccer matches played in variants with these characteristics, limit the number of contacts the players have with the ball^{10,11} as well as improve tactical complexity by increasing the variability of actions and the possibilities of play¹². In addition, Capranica, Tessitore¹³ suggested that there are advantages in 7-a-side game variant compared to 11-a-side for players of 11 years old. These authors concluded the 7-a-side variant induces an increase in the number of passes and a decrease in the number of ball losses, compared to the 11-a-side. Another study by Lapresa, Arana¹⁴ analyzed the ball circulation patterns in 7-a-side, 9-a-side, and 11-a-side variants, concluding the 7-a-side and 9-a-side promotes the development of game space management skills, compared to the 11-a-side. Recently, Randers, Andersen¹⁵ suggested that playing with fewer players on smaller pitches results in minor changes to the physical loading but increases technical involvement (stimulus) of players. In general, it can be considered that determined game conditions can constraint the skills improvement of the players along their developmental process¹⁶. Accordingly, the aforementioned studies highlighted the need to adapt the game variant to the players' capabilities, in order to provide the appropriate conditions to their technical and tactical development.

Despite there has been progress in our understanding of the types of practice activities that best develop expert athletes^{5,17}, to the best of our knowledge, there is no scientific information about the type of game variants used by European countries across the different age groups. This information can reveal how the different European Football Associations conceive and adapt the game structure to the performance level of young players along their developmental pathway. On the other hand, it can contribute to base youth development policies and practices upon scientific evidence^{3,5}.

In this sense, this study aims: (1) to verify the type of game variants and their frequency across the different age groups of youth football competitions implemented by the European national Football Associations; (2) to examine whether there is some relationship between the game variant used and the respective age group. We hypothesized a significant relationship between age group and game variant used by European countries along their developmental pathways.

Methods

Sample

Thirty European countries (See Table 1), which correspond to fifty-six percent of the UEFA members¹⁸, were used as sample. The member countries were selected according to the following criteria: (1) world ranking of *Fédération Internationale de Football Association* - (FIFA) for national teams - this ranking, is a system that allows to classify all national football teams from 1st to 209th, based on the results of matches¹⁹; (2) ranking of the UEFA coefficients - the UEFA coefficients are statistics used to classify the clubs of each European country from 1st to 454th, which participate in international competitions, such as the *Champions League* and *Europe League*. This classification is assigned based on the results obtained by each team who participated in matches played in European competitions over the last five years and aims to define the teams that will participate in the European competitions of the following year²⁰.

Table 1. Frequency and type of game variants used by European countries along youth competition stages

European regions	Countries	Number of game variants use	Game variants used								
			F3	F4	F5	F6	F7	F8	F9	F11	
Western Europe	Germany	3						×		×	×
	Austria	4			×			×		×	×
	Belgium	3			×				×		×
	Scotland	4		×	×			×			×
	France	4			×			×		×	×
	Netherlands	4		×				×		×	×
	England	4			×			×		×	×
	Northern Ireland	4			×			×		×	×
	Republic Ireland	5		×		×		×		×	×
Switzerland	5			×	×			×	×	×	
	Frequency		10%	30%	80%			90%	10%	80%	100%
Northern Europe	Denmark	4	×		×				×		×
	Finland	5		×	×			×		×	×
	Norway	5	×		×			×		×	×
	Sweden	5	×		×			×		×	×
	Frequency		75%	25%	100%			75%	25%	75%	100%
Central Eastern Europe	Bulgaria	4			×			×		×	×
	Croatia	2								×	×
	Slovakia	3				×			×		×
	Slovenia	2						×			×
	Poland	3				×			×		×
	Hungary	4		×				×		×	×
	Czech Republic	4			×	×			×		×
	Romania	2							×		×
Central Eastern Europe	Russia	7	×		×	×		×	×	×	×
	Serbia	7	×	×	×	×		×	×		×
	Ukraine	4	×		×			×			×

	Frequency		27%	18%	45%	45%	54%	54%	36%	100%
Southern Europe	Spain	3					×	×		×
	Greece	2							×	×
	Italy	5			×	×	×		×	×
	Portugal	2					×			×
	Turkey	5				×	×	×	×	×
	Frequency			17%	40%	80%	40%	60%	100%	
Total of game variants used			7	6	18	7	22	10	18	30

Note: Game variants description: F3 = three-a-side; F4 = four-a-side; F5 = five-a-side; F6 = six-a-side; F7 = seven-a-side; F8 = eight-a-side; F9 = nine-a-side; F11 = eleven-a-side.

The member countries that did not participate in the study were excluded according to the following criteria: (1) ranked below the fifty percent in the International Football Federation (FIFA) world ranking; (2) ranked below the fifty percent in the UEFA coefficients ranking; (3) without information about the used game variants during youth competitions. Using these criteria we obtained a sample of the 30 more representative European countries/Football Associations in terms of European football. The study followed the guidelines stated in the Declaration

of Helsinki and was approved by the local Ethics Committee (FADEUP006366/2017).

Data collection procedures

The information about the game variants used in the European countries was obtained according to a flow diagram (Figure 1), adapted from PRISMA protocol²¹ used in systematic reviews.

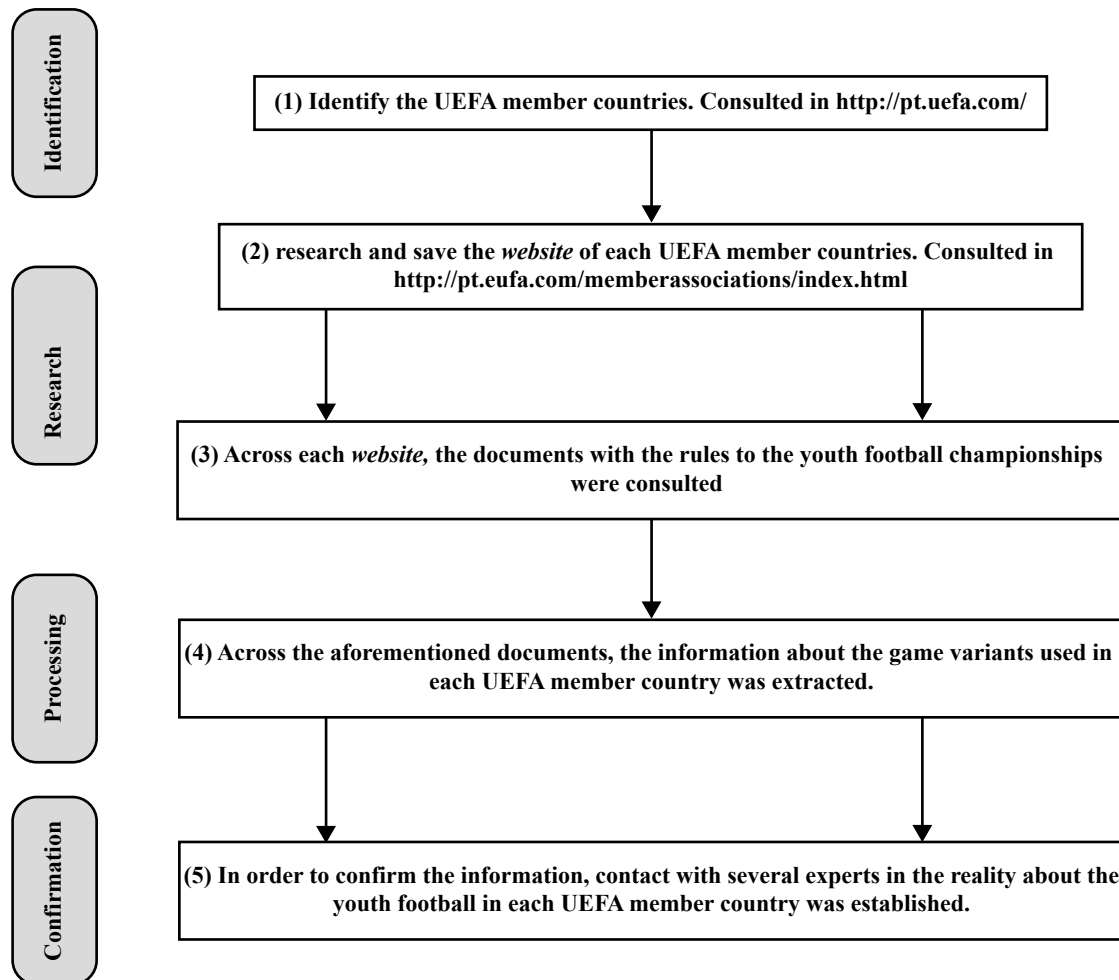


Figure 1. Diagram concerning to data collection.

Statistical Procedures

Descriptive analyses were carried out to quantify the frequency of game variants used. A Two Step Cluster Analysis procedure was performed to identify homogenous (groups or *clusters*) of member countries according to the type of the game variants used. An exclusion criterion was defined, consisting in removing the game variants with relative frequencies smaller than 0.15, to improve the overall model quality. A Correspondence Analysis was performed with symmetrical normalization in a two-dimensional axis system, representing the countries in respective Clusters. Then, a nonparametric Kruskal-Wallis test was performed to compare the distribution of game variants in each Cluster. Finally, a Chi-Square test of independence and an ordinal correlation coefficient of Spearman were used in order

to correlate the age group with the game variants used. All statistical analyses were performed using SPSS Statistics, version 22.0 (SPSS Inc., Chicago, USA). For all analyses, statistical significance was set at $P < 0.05$.

Results

Concerning the frequency of game variants, there was a clear predominance of game variants involving an odd number of players, such as the 11-a-side (F11) variant (see Figure 2). More precisely, the game variants with higher expression in the Europe are the 11-a-side, 7-a-side (F7), 5-a-side (F5), and 9-a-side (F9) respectively, presenting relative frequencies above 50%.

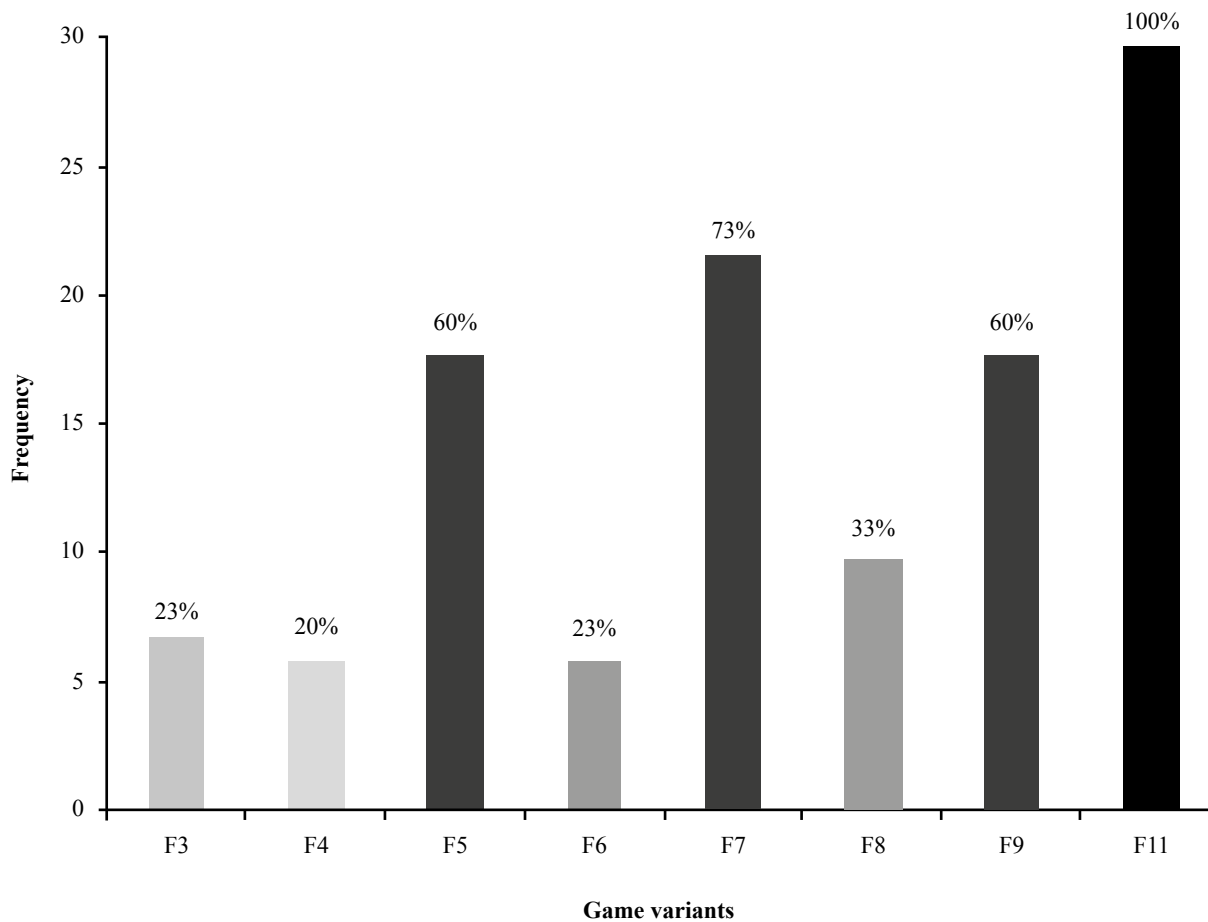


Figure 2: Overall frequency (%) of game variants used in UEFA member countries. Note: F3 = 3-a-side variant; F4 = 4-a-side variant; (.....); F11 = 11-a-side variant

As shown in Table 2, five different clusters were created, with an adjustment measure of cohesion and separation of “Good”. It can be seen that the largest cluster - cluster three - comprises eight (26.7%) of the UEFA member countries, while the smallest - cluster one - aggregates four (13.3%). Concerning the clusters’

profiles, cluster one contains the F7 and F11 game variants; cluster two the F7, F9, and F11; cluster three the F5, F7, F9, and F11; cluster four the F11; and cluster five the F5 and F11 game variants. The F7 game variant has a predictor importance of 0.80, the F5 an importance of 0.88, and the F9 an importance of 1.00.

Table 2. Cluster Distribution.

	N	% of Total	Variants
Cluster	1	13.3%	F7, F11
	2	20.0%	F7, F9, F11
	3	26.7%	F5, F7, F9, F11
	4	23.3%	F11
	5	16.7%	F5, F11
Total	30	100,0%	

In addition, the Correspondence Analysis provided a clear view of the countries distribution in each of the five clusters (Figure 3). For instance, cluster one associated to the F7 and F11 game variants includes Portugal, Spain, France, and Slovenia, while cluster five linked to the F5 and F11 variants incorporates Belgium, Switzerland, Scotland, Serbia, and Denmark. The Kruskal-Wallis test showed there are significant differences in the distribution of game variants used in each cluster ($X^2_{kw} = 22.149; p < 0.001; n = 30$).

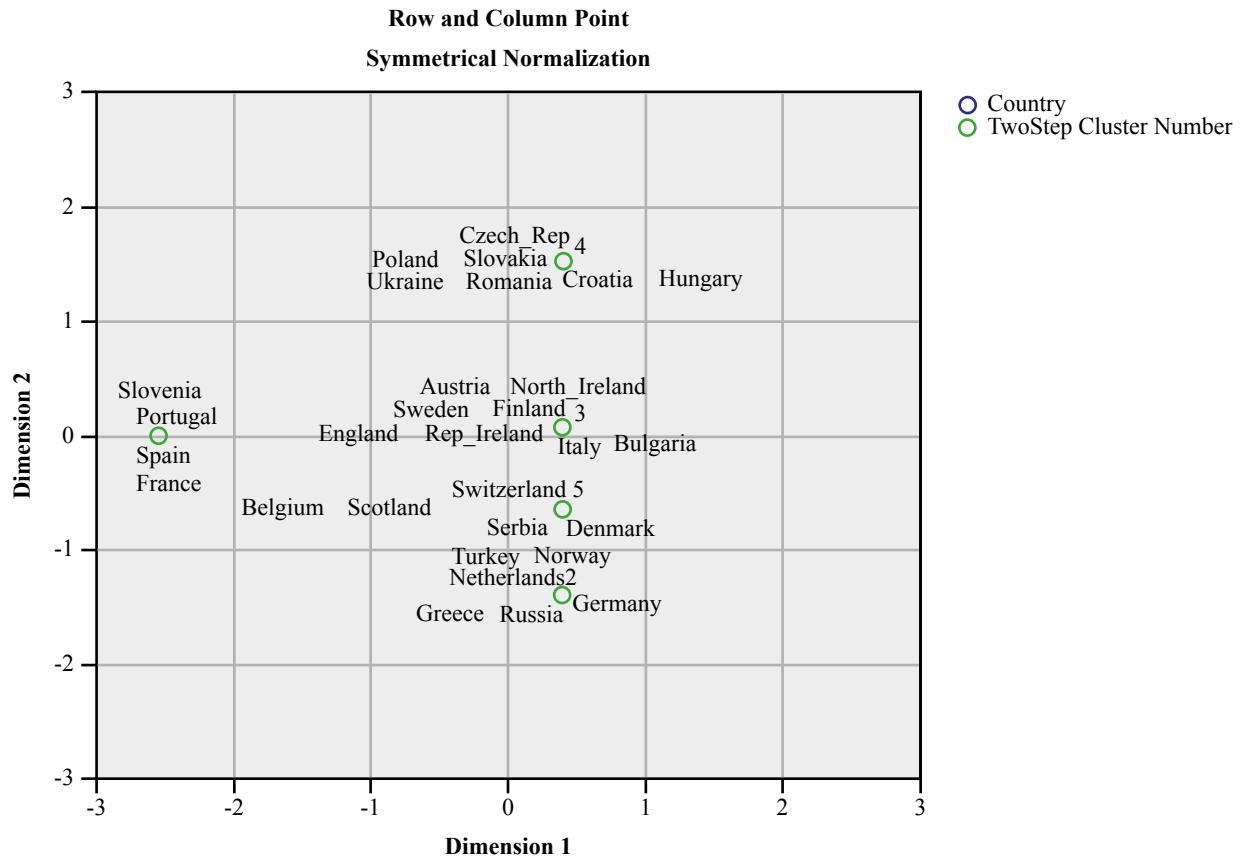


Figure 3: Countries representation in each Cluster using Correspondence Analysis.

Table 3 displays the relationship between game variant versus age group. The Chi-Square test yielded a significant correlation between age group and game variant ($\chi^2(63) = 477.724; p < 0.001; n = 30$), with a Spearman correlation coefficient of 0.852. More

precisely, there is a trend toward an increase in the players' number along the different age groups of youth competition (i.e., the increase of the players' age is associated to the increase the number of players and overall space of the game variants).

Table 3. Frequency of the game variants used across the different age groups of the youth competitions.

		Game Variants							
		F3	F4	F5	F6	F7	F8	F9	F11
Age Group	U-5	10%	3,3%						
	U-6	20%	10%	20%	3,3%	3,3%		3,3%	
	U-7	6,7%	16,7%	46,7%	6,7%	6,7%	3,3%	3,3%	
	U-8		3,3%	50%	10%	30%	6,7%	6,7%	

Age Group	U-9	16,7%	13,3%	56,7%	10%	6,7%	
	U-10	3,3%	10%	63,3%	16,7%	10%	
	U-11		10%	46,7%	20%	33,3%	3,3%
	U-12			23,3%	23,3%	53,3%	20%
	U-13			6,7%	13,3%	16,7%	73,3%
	U-14						100%

Note: Game variants description: F3 = three-a-side; F4 = four-a-side; F5 = five-a-side; F6 = six-a-side; F7 = seven-a-side; F8 = eight-a-side; F9 = nine-a-side; F11 = eleven-a-side.

Despite the predominant use in Under-7 and Under-8, the F5 game variant is only present in five age groups. On the other hand, the F7 and F9 are the most used game variants until Under-14. Specifically, the F7 shows greatest expression in Under-10, while the F9 predominates in Under-12. The F11, until the Under-14, is present in four age groups. However, the use of this game variant is more frequent in and above the age of 13.

Discussion

The aim of the present study was to examine how the European countries conceive and implement the different game variants along the youth developmental pathway toward the 11v11 variant. Our results showed that in Europe the type and frequency of game variants used vary progressively along youth competition stages (age). The majority of countries (sixty percent) privilege the progressive use of four or five game variants, which denotes some care to adjust the game variants to the most appropriate youth competition stage⁸. Interestingly, the FIFA and UEFA ranking does not reveal indicators that these eighteen countries are in the best positions when compared with others. We argue that presumably these countries prescribe conditions of sport practice with a “formative guidelines” (i.e., the main focus is to develop the physical and motor skills of young athletes) instead of a “result orientation” (i.e., achieving results is more important than players development). From learning viewpoint these variable practice conditions can be advisable to develop a more effective learning, contributing decisively to the players’ developmental⁵. Therefore, it can be hypothesized that these eighteen countries demonstrate a high degree of pedagogical concern in structuring progressively the process of learning soccer. This may suggest the learning process established on these eighteen countries is the most effective, as previous literature indicated⁸.

On the other hand, the results revealed that ten countries only use two or three game variants, which can compromise the development of fundamental technical and tactical skills such as the relation with the ball and game space management¹⁴. Therefore, it is symptomatic that in countries such as Croatia, Slovenia, Romania, Greece and Portugal, the type of game variants used and their respective frequency across different age groups seems to suggest a maladjustment to the needs and characteristics of young soccer players^{6,7}, as well as to the transfer of learning from small to more complex game variants. Consequently, we

can hypothesise the youth football policies of the mentioned countries are neglecting the importance that the game formal structure can assume in the soccer players’ learning process. The cultural influences and national governing bodies of each country may explain the options taken in the respective process¹⁶, which suggests that the nature of the formal soccer activities of competition engaged in during childhood seems to be dependent on the country and its respective youth development system². Therefore, the challenge for coaches and national governing bodies is to find how best to recreate match-play conditions as well as ensuring that the game requirements are appropriate relative to the age and characteristics of the young soccer player³. In this perspective, it would be advisable to carry out some modifications in the competition rules in order to adjust the formal game structure to the players’ characteristics, rather than forcing them to play in inappropriate game environments to their age level. According these latter positions, it is suggested that the description of the youth development systems and pathways that players engage during competition soccer games may contribute to identifying what factors may require change, as previously reported by Ford, Carling².

Another interesting finding of our study is that the most used game variants involve an odd number of players. Since we are not aware of comparable data in the literature that have addressed the issue of the main game variants in Europe to use an odd number of players, we assume that the cultural factor can induce this trend, reflected in the expressive use of 11-a-side. In the history of football, whose rules of 1863 are still the basis of this sport currently, it was defined that this game was played between two teams and that each team had 11 players. Another potential reason, it may be due to the influence of the 3-a-side game variant (also odd number) which is the variant recommended in the first stage of developmental process of the players. Finally, it may result from a logical principle with the purpose to standardizing the rules of youth competition in the European countries.

Our results also pointed out the three-a-side game variant presents higher expression in Under-6, the five-a-side is the most frequent in Under-8, the seven-a-side reveals the highest use in Under-10, and the nine-a-side emerges as the most selected game variant in Under-12. Moreover, in and above the Under-13, the eleven-a-side is the most used game variant, which is in accordance with previous studies⁴. From the pedagogical point of view, this pattern seems balanced, since can contribute to improve the player’s technique and fitness¹⁰ as well as sustain that the

transition to the next stage is supported by an appropriate enlargement of the number of players and the overall available space of the corresponding competitive game variant⁸. Furthermore, this incremental strategy permits to preserve a greater involvement in the game which stimulates individual technical and tactical abilities, increase the players' motion¹⁵ and, thus, enhances the overall learning experience of young players.

In relative terms, it can be hypothesised the game variants with lowest number of players as well as smaller dimensions are more suitable for children, especially in early stages of their developmental. As suggested by Clemente, Wong^{12,13}, such hypothesis might be attributed to a higher individual participation, as the increasing of the time individual players are in possession of the ball, contributes decisively to their development of the tactical and technical skills. Since the dimensions of the variant can influence the development of tactical and technical skills, we argued that decision-making bodies of the UEFA or FIFA should define the size of the fields for all variants of the game, which unfortunately does not happen. The International Football Association (FIFA) only recommends official dimensions for 11-a-side and 5-a-side soccer pitches. Despite this recommendation, it is still possible to identify differences between the maximum dimensions (90m x 120m) and minimum dimensions (45m x 90m) of pitch size recommended to the 11-a-side game. For 5-a-side game, FIFA establishes a minimum of 18m x 38m up to maximum 25m x 42m. Regarding other football pitch sizes, FIFA has not published any official dimensions. Therefore, we suggest that the pitch size must be defined using proportionate and standardized measures to enable a comfortable and adequate game to the player's requirements.

Future analytical research should examine the technical and tactical impact of a step-by-step incremental strategy compared to the use of few game variants along the players' developmental pathway. This kind of information is vital to improve the knowledge about the official game variants implemented within the UEFA region, which seems relevant to support adequate players' long-term development programs.

Conclusion

The current findings confirm that there is a trend in the type and frequency of the game variants used by European countries toward a progressive increase of the game area and players' number along the developmental pathway. The most commonly used game variants on each age group (with relative frequencies greater than or equal to 50%) are the 5-a-side in Under-8; the 7-a-side in Under-9 and Under-10; the 9-a-side in Under-12; and the 11-a-side in and above Under-13, respectively. However, the statistical analyses showed there are significant differences in the used game variants across the different countries. It was shown that 33% of the countries use between two to three game variants, while 60% use between four to five variants. However, according to the literature⁸, the progressive use of four or five game variants seems to deliver a more effective long-term development of the players' attributes. Thus, the challenge football organizations (e.g., UEFA) face is to determine whether there is an advantage to create a standard

learning pathway, specifying which game variants must be used in each age group toward the 11v11 variant. According to Newbery⁴, this is no small task but it is essential for football organizations seeking to raise coaching and playing standards.

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