

Trends in the gameplay of European football players

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A – Study Design
 B – Data Collection
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Abstract

Background: *The aim of this study was to compare the effectiveness of footballers who participated in the 2008 and 2012 European Championships. The study was conducted by analysis of basic technical and tactical game.*

Material/Methods: *The observation method in the form of a kinematic game analysis system was used to collect necessary data. The research material was based on analysis of 304 players participating in the 2008 European Championships and 277 players in the 2012 European Championships, with each tournament consisting of 31 matches. Statistica software was used to apply the Student's t-test for the independent groups.*

Results: *Higher values of indicators determining player's efficiency were found in the teams participating in the 2012 tournament; significant differences were found in the total number ($p = 0.048$) and accuracy ($p = 0.034$) of shots taken by the most successful teams, in the number ($p = 0.044$), efficiency ($p = 0.002$) and accuracy ($p < 0.001$) of passes as well as in the length of distance covered ($p < 0.001$).*

Conclusions: *A systematic increase in the efficiency of passes in subsequent tournaments points to an upward trend of this element in the game. An increase was also noted in the number of shots taken, which was accompanied by a decrease in shot accuracy. Modern football has become a fast team game with lots of passes of high reliability. Thus, training of young players should be focused on the development of playing techniques and motor skills.*

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Introduction

While comparing to other sport disciplines, a great advantage of football game is that its players do not need to present outstanding athletic abilities in all aspects of the game; players only need to possess a reasonable skill-set level in order to be able to compete. This is one of the reasons why football is the most popular sport in the world, both in terms of spectatorship and the number of people playing it.

A continuing evolution of football game involves the need for continuous identification, registration and evaluation of players' game actions. A prediction of future trends, based on the current ones, is very important in match analysis. The creation and comparison of game analysis indicators provides an ideal way to define future development trends, which are usually seen in matches played at the highest levels. These indicators create a combination of variables that can be expressed as quantitative and qualitative values [1]. They can determine the specificity of selected aspects of the game, especially in terms of their efficiency [2].

Such data may allow one to precisely assess the behavior of players during the game. Some of the most commonly researched aspects of gameplay include physiological [3], morphological [4] and technical-tactical [5] factors. Researchers have also emphasized the importance of training optimization and players' preparation [6], and the creation of game models that allow one to evaluate factors affecting competitive success [7].

Such analysis frequently focuses on defining game efficiency indicators such as shots taken [8], passes [9], set pieces of gameplay [10], one-on-one play [11] and maintaining possession of the ball [12]. Researchers also define scales of generated physical effort, which is understood as a complex process [13] in which only sporadic moments of similar physical intensity appear throughout a game. These multidimensional sequences are often unpredictable during the game and in many cases are impossible to assess due to the influence of many variables that occur during gameplay.

The aim of this study was to compare the game efficiency of footballers who participated in the 2008 and 2012 European Championships. Analysis was conducted by recording basic technical-tactical elements of the game such as shots, passes and locomotor activity. It was conducted to define players' gameplay and efficiency over the four-year period and to point out any possible differences that could suggest some change in game trends. The study was guided with the following research questions:

1. Did any differences appear in the shot and passing efficiency among the players of teams participating in the 2008 and 2012 European Championships?
2. Were there any differences in players' locomotor activity, expressed as the length of distance covered, among teams participating in the 2008 and 2012 tournaments?
3. Were any of the observed differences in players' efficiency over the past four years strong enough to point to a new trend in football play?

Material and methods

The most fundamental, and therefore the most important technical-tactical elements of the game were quantified by observing players' gameplay in terms of their total number, efficiency and accuracy. In addition, the locomotor activity based on players' movement during a match was also comparatively analyzed.

The original research material was collected via an observation method through the kinematic game analysis system, which gained a wide usage and was found to be a reliable evaluator of player involvement. Many researchers use such a kinematic observation method to describe game structures and define functional characteristics of the world's elite footballers [14]. In this case, data were collected from FIFA's Control Performance Index and were used to produce models that would reflect the efficiency of players' gameplay in both tournaments. The obtained data also provided information on the players' energy expenditure as the total physical activity performed during a match.

The FIFA's Control Performance Index is a system that records player's movements during the game with a use of semi-automatic cameras. It was previously used in studies on physical activity

of Brazilian league players [15], professional players from the Italian Serie A [16], football teams of the Spanish Primera Division [17] and in the English Premier League [18].

During the game, the system is able to analyze up to 1,800 movements made by each player and assess their values in both positive and negative terms. This system allows match analysis to be conducted in real time by collecting data from semi-automatic cameras filming at 25 frames per second. The system is able to measure a) all players, positions at any time of the game, b) the speed of players and the ball, c) the total distance covered and at specific running speeds, d) the team formation on the field by individual players and e) interactions among players [19].

The game analysis system provided data for each of the 304 players who participated in the 2008 European Championships and for 277 players in the 2012 tournament, with each tournament consisting of 31 matches. The total number, efficiency and accuracy of shots taken and passes made as well as the total distance covered by players were analyzed. In addition, the four top teams in each tournament were chosen for additional examination based on the above-mentioned methodology.

The research on players' actions was conducted with the use of Statistica software. This included determining arithmetic means and standard deviations. The Student's *t*-test was used to analyze the independent variables by studying differences in the average values of the total number, efficiency and accuracy of shots and passes. Statistical significance was determined by differences in means with the probability of chance less than $p < 0.05$.

Results

Naturally, a shot that ends with scoring a goal is a technical element that directly influences the match result. During an average football game, there are frequently multiple shot attempts with only few that end with scoring a goal. A comparative analysis of teams participating in the Euro 2008 and Euro 2012 found differences in the number of attempted shots. A slightly larger number of shots per match was taken by players participating in the 2012 tournament than by those participating in 2008 tournament. The analysis of four best teams from both tournaments showed that a significantly larger number of shots ($p = 0.048$) was held by semi-finalists in the 2012 European Championships than by teams which played in the 2008 semi-finals. The shot efficiency was found to be similar in both tournaments.

During the 2008 European Championships the total number of the goals scored was 77, while in the 2012 tournament – 76. In addition, the efficiency of the best teams from both tournaments (in the 2008 and 2012 tournaments) was at a similar level. The shot accuracy of the best teams in the 2008 Championships was significantly higher ($p = 0.034$) than of players participating in the 2012 tournament (Table 1).

Table 1. Characteristics of shots taken in the 2008 and 2012 European Championships

	Shot efficiency	EURO 2008		EURO 2012		Student's <i>t</i> -test values		
		Quantity	$\bar{x} \pm SD$	Quantity	$\bar{x} \pm SD$	N	<i>t</i>	<i>p</i>
Total	number	771	12.5 \pm 4.7	879	14.1 \pm 6.3	62	-1.659	0.099
	efficiency	77	1.25 \pm 1.1	76	1.2 \pm 1.1	62	0.081	0.935
	accuracy	10.0 \pm 8.2%		8.6 \pm 4.6%		62	0.833	0.365
Semi-finals	number	287	13.0 \pm 6.1	357	17.0 \pm 7.9	22	-1.987	0.048*
	efficiency	37	1.7 \pm 1.1	33	1.6 \pm 1.3	22	0.289	0.773
	accuracy	12.9 \pm 6.9%		9.2 \pm 8.0%		22	2.017	0.034*

* significance level of $p < 0.05$

Source: Original research on data available from castrolfootball.com

The fact that passes constitute on average half of all movements performed by players on the field, adds to the importance of this technical element in football game. The comparative analysis showed that the whole number of passes was significantly higher ($p = 0.044$) in the 2012 tournament than in the 2008 tournament. The analysis of the best teams from both tournaments showed that an average number of passes was significantly higher ($p = 0.017$) in the 2012 tournament than among teams playing in 2008. The passing efficiency also showed significant differences between the two tournaments. It was significantly higher ($p = 0.002$) among the teams participating in the 2012 European Championships finals, comparing to passes made by players in the 2008 tournament. Additionally, a significantly higher level ($p = 0.003$) of efficient passes was reached by the best teams participating in 2012 than those playing in the 2008 tournament. The teams playing in the 2012 tournament had a higher level of pass precision, comparing to those playing in the 2008 tournament. In addition, there were also significant differences ($p < 0.001$) in the size of the coefficient of accuracy between the best teams from both tournaments. In the case of teams playing in 2012 the average accuracy coefficient was higher than for those playing in 2008 (Table 2).

Table 2. Characteristics of passes made in the 2008 and 2012 European Championships

Pass efficiency	EURO 2008		EURO 2012		Student's <i>t</i> -test values		
	Quantity	$\bar{x} \pm SD$	Quantity	$\bar{x} \pm SD$	N	<i>t</i>	<i>p</i>
Total	number	417.4 \pm 91.4	456.9 \pm 141.3		62	-1.998	0.044*
	efficiency	313.0 \pm 84.2	380.1 \pm 84.0		62	-3.218	0.002*
	accuracy	74.3 \pm 4.9%	81.7 \pm 5.9%		62	0.833	62
Semi-finals	number	434.2 \pm 99.8	538.2 \pm 169.2		22	-2.466	0.017*
	efficiency	328.9 \pm 94.8	458.0 \pm 168.5		22	-3.113	0.003*
	accuracy	75.0 \pm 5.2%	83.7 \pm 5.6%		22	-5.279	0.001*

* significance level of $p < 0.05$

Source: Original research on data available from castrolfootball.com

Table 3. Characteristics of locomotor activity in the 2008 and 2012 European Championships

Locomotor activity	EURO 2008	EURO 2012	Student's <i>t</i> -test values		
	$\bar{x} \pm SD$	$\bar{x} \pm SD$	N	<i>t</i>	<i>p</i>
Total distance (m) total	9778.5 \pm 324.7	10162.2 \pm 796.2	31	-3.514	0.001*
Total distance (m) semi-finals	9754.6 \pm 326.4	10358.5 \pm 1023.8	31	-2.631	0.011*

* significance level of $p < 0.05$

Source: Original research on data available from castrolfootball.com

Another very important factor in determining player's performance is locomotor activity, determined as the distance covered during the match. A significantly longer distance ($p < 0.001$) was covered by the players of teams participating in 2012 than those in the 2008 tournament. Similar results were obtained when analyzing teams from semi-finals, showing significant differences ($p = 0.011$) in the length of the distance covered. The players from the best teams in the 2008 European Championships covered almost the same distance as other footballers in the tournament. However, in the case of the 2012 European Championships, the average distance covered by the players of the best teams was nearly 300 m longer than the average locomotor activity of all players in the tournament (Table 3).

Discussion

The aim of this paper was to compare the game effectiveness of players performing in the European Championships of 2008 and 2012 through the analysis of technical and tactical elements.

The study showed that a greater average number of shots was taken in the 2012 European Championships than in 2008. This result was higher than the average number of shots taken in the 2006 World Championships in Germany [20] and was comparable to the results of Patridge, Moshera, Frankhe [21] who studied the 1986 and 1990 World Championships, as well as to studies conducted by Luhtanen et al. [22] during the 2000 European Championships. However, the accuracy of shots taken in the 2012 tournament was lower, comparing to the World Championships and European Championships held in 2008 [23].

A systematic increase in the passing efficiency of players was observed starting from the European Championships in 2008, through the 2010 World Championships and to the European Continental Championships in 2012. This was especially found in the top teams of each tournament in terms of the total number of passes as well as their efficiency and accuracy. Undoubtedly, faster and more intensive gameplay featured in these types of tournaments is due to more aggressive opponents; this forces players to perform quicker passes, more often to team players from the nearest positions on the field. In such conditions, the percentage of passes of average and short distances increases [20].

However, the speed of game, especially in terms of making incomplete passes, contributed to the increase in concentration of lactate in the blood and caused the increase in the distance covered by players especially at high and sprint speed intensities [24]. The analysis of the 2008 and 2012 European Championships and the overview of the available literature indicate that football is becoming a faster and more precise sports discipline. Significantly important was the excellent motor preparation of teams in both tournaments. This applied to both the winning and losing teams whose teammates covered on average similar distances during the whole match. [25]. Distances covered by the players were similar in both halves of the match [20].

This study, in a certain sense, pointed to a number of trends in football play. However, the four-year period between the European Championships can be considered too short to provide unequivocal conclusions. Thus, further systematic observation of championships gameplay is necessary to provide better empirical evidence.

Conclusions

The study has shown that modern football is becoming more technical and based more on team game. Such evidence is found in increasing activity and efficiency of ball passing. A model that identifies a talented player includes not only personality traits and temperament, intellectual properties, special motor skills, body built or good health, but most of all perfect technical preparation as well as high motor skills. As conducted studies have shown, these qualities are exposed even more in teams of the highest sports competence. The perfect technique and a high level of motor preparation are the characteristics of a top class player, and the ability to perform technical actions with the ball in a very fast and precise way is the confirmation of his outstanding football skills. Football play patterns, presented in this paper, have an important role in identifying and selecting young football talents. They help to assess the usefulness and, in the long term, player's existence in professional football. Training of young players should be focused on improving ball kicking techniques and motor skills, especially motor coordination capacities, which are crucial to become a perfectionist. The effective use of game models that have been developed in this paper, play an important role in the development of young football talent.

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