



## **MORPHOLOGICAL-CONDITIONAL PARAMETERS OF THE FINALIST FIFA WORLD CUP 2018**

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### **Abstract:**

The FIFA World Cup (FWC) is a football (soccer) tournament that happens every four years, gathering 31 national teams world-wide who have secured qualification and the host team. In order to gain more knowledge and information about football, it seemed necessary to analyze the periods of activity during the match. The analysis and characteristics of the effort during the match aims to enable fine modeling of activities in order to assess the specificity of playing positions, to adjust the content of training in order

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to improve the sports preparation of players and to guide and make tactical decisions. The aim of the research was to determine the differences in the morphological and fitness parameters of the finalists of the FWC 2018, as well as to obtain basic data on the character of the physical parameters of the two teams during the match, the final. Statistically significant differences were recorded in the variable distance traveled in ball possession (in poss) with statistical significance of  $p < .001$ , while in other variables no statistical significance was recorded. These results provide information to sports scientists on performance requirements in teams with different percentages of ball possession, which could be used to individualize dual training based on tactical strategy and visual-exploratory action of players during a football game.

**Keywords:** tactics, passing distances during the match, possession of the ball, sprint

## 1. Introduction

The FWC is a football (soccer) tournament that happens every four years, gathering 31 national teams world-wide who have secured qualification and the host team. The tournament starts with a group stage, in which two over four teams qualify for the subsequent knock-out stage. In the event of a draw during the regular 90-min playing time in the knock-out stage, teams may have to dispute an extra time consisting of an additional 30-min period (two 15-min halves separated by a short break), extending the match duration up to 120 min plus additional time. Interestingly, three out of the last four FWC finals required extra time, with the match being decided in that period in two of them. Understandably, practitioners working at the elite level in football perceive the extra-time as an important period for determining success in knock-out football match-play (Rago et al., 2020).

Over the last twenty years, scientific interest in football has grown significantly. In order to gain more knowledge and information about football, it seemed necessary to analyze periods of activity during the match (Bangsbo, Mohr, & Krstrup, 2006; Burgess, Naughton, & Norton, 2006; Di Salvo et al., 2007; Edgecomb, & Norton, 2006; Rampinini, Impellizzeri, Castagna, Coutts, & Wisløff, 2009). The analysis and characteristics of the effort during the match aims to enable fine modeling of activities in order to assess the specificity of playing positions, to adapt the content of training to improve sports preparation of players and guide and make tactical decisions (Krstrup et al., 2006; Mohr, Krstrup, & Bangsbo, 2003). There are a large number of studies that have described the activity profiles of top footballers (Valter, Adam, Barry, & Marco, 2006; Mohr et al., 2003; Rampinini et al., 2007; Rienzi, Drust, Reilly, Carter, & Martin, 2000). Football has been characterized as an occasional activity with short bursts of intense effort (Stjlen, Chamari, Castagna, & Wisløff, 2005). Professional footballers cover a greater total distance and more, have a higher intensity of running more intensely compared to footballers competing in lower leagues (Mohr et al., 2003; Rienz et al., 2000; Reilly, 2003). Other studies have shown that each playing position in top football is characterized by a typical

activity profile (Di Salvo et al., 2007; Mohr et al., 2003; Rienz et al., 2000) and to the players' performance during a match is also affected by the type of competition in which players participate (Rienz et al., 2000). Footballers perform between 150 and 250 short, intense sprints during a match, and that number increases with the level of play and varies throughout the season according to the competition phase (Mohr et al., 2003). This author also showed that the position of the players has a significant impact on the number of sprints performed during the match. Mohr et al. (2003) and Mohr, Krustup, & Bangsbo (2005) obtained results in which it can be seen that defensive players run less than other players, while attackers and defenders have more sprints compared to midfielders and defenders. During the second half, the results indicate that the overall running distance run and high-intensity running decrease as a result of fatigue in the first half (Mohr et al., 2003). In the same study, the authors obtained results showing that measures of match performance of total distance traveled and distance traveled through high-intensity running of professional football players varied throughout the season (Mohr et al., 2003). When it comes to morphological differences in football players in relation to the position in the team in the work (Lilic, Jezdimirovic, Prvulovic, & Joksimovic, 2019) indicate statistically significant differences between midfielders and attackers in the values of muscle mass (kg) and body weight. (kg). Silvestre, West, Maresh, & Kraemer (2006) conclude that midfielders have a lower percentage of body fat and higher values of lean body mass compared to attackers. Also, Lago-Peñas, Rey, Casáis, & Gómez-López (2014) obtain similar results in which it can be seen that midfielders have slightly lower body weight percentage values compared to attackers. Midfield players have a slightly lower level of body fat percentage, but without statistically significant differences compared to other players (Lago-Peñas, Casais, Dellal, Rey, & Domínguez, 2011). There are a large number of researches based on the analysis and characteristics of physical effort during the match in professional football. However, in the field of research, there are a small number of papers aimed at examining whether there are differences in fitness parameters between teams competing in top leagues or competitions. The aim of the research was to determine the differences in the morphological and fitness parameters of the finalists of the FWC 2018, as well as to obtain basic data on the character of the physical parameters of the two teams during the match, the final.

## **2. Material and Methods**

### **2.1 Participants**

For the study of morphological characteristics and fitness parameters, a sample of 27 professional football players was included, namely 14 football players of the national team of the France average age (Mean  $\pm$  Std.Dev)  $28.29 \pm 3.81$ , body height  $184.00 \pm 7.81$  cm, body weight  $76.64 \pm 5.90$  kg, BMI  $22.65 \pm 1.44$  kg / m<sup>2</sup>, and 13 football players of the Croatian national team with an average age of  $30.77 \pm 3.27$ , body height  $183.92 \pm 5.20$  cm, body weight  $77.31 \pm 6.29$  kg, BMI  $22.80 \pm .89$  kg / m<sup>2</sup>. The research analyzed only the

players who played the game (starting lineup and reserve players who came in from the bench).

## 2.2. Data collection

All data used in the research were downloaded from the site (<https://www.fifa.com/fifa-tournaments/archive/>). As all data is available on the official FIFA website, the study did not require ethical approval or consent forms. In this research, the morphological and fitness parameters of the finalists of the FWC in Moscow between the national teams of France and Croatia played on July 15, 2018 were analyzed. Condition parameters that were analyzed are: distance covered during the match (Total distance), distance covered in the first half (1st half), distance covered in the second half (2nd half), distance covered in possession of the ball (In poss), number of sprints during the match (Sprint) and maximum speed during the match (Top speed). The morphological characteristics analyzed in this study are: Body Height, Body Weight and Body Mass Index.

## 2.3. Statistical analysis

Descriptive statistics were presented using the arithmetic mean (Mean) and standard deviation (Std.Dev.), While the T-test was used to determine the differences, where the statistical significance was set to  $p \leq 0.05$ . Data analysis was performed using the statistical package for social science software (IBM SPSS Statistics for Windows, Version 20.0.).

## 3. Results

Table 1 shows the numerical quantitative indicators of the morphological status of football players. The average body height and weight of professional footballers is between 180-185cm and 70-75 kg when all players are taken into account while BMI values range from  $22.8 \pm 1.1 \text{ kg/m}^2$  to  $23.2 \pm 1.1 \text{ kg/m}^2$  (Joksimovic et al. 2019). Guided by the set norms, we can conclude that the football players of both national teams meet the stated norms. No statistically significant differences in morphological characteristics were recorded between the football players of France and Croatia.

**Table 1:** Differences between morphological characteristics

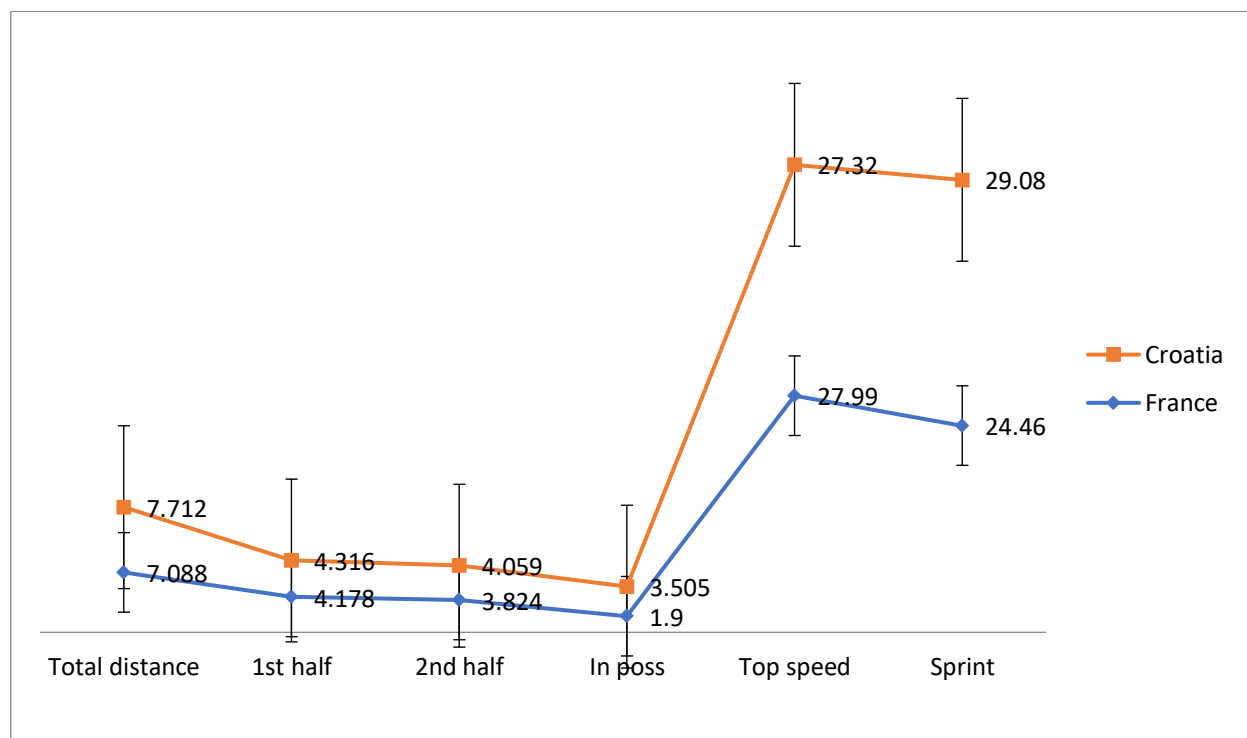
Anthropometry	National Team	N	Mean±Std.Dev.	T-test	
				t	p
Body Height	France	14	184.00 ± 7.81	.030	.976
	Croatia	13	183.92 ± 5.20		
Body Weight	France	14	76.64 ± 5.90	-.283	.779
	Croatia	13	77.31 ± 6.29		
Body Mass Index	France	14	22.65 ± 1.44	-.322	.750
	Croatia	13	22.80 ± .89		

Table 2 shows the descriptive statistics (Mean ± Std.Dev.) as well as the difference between the fitness parameters between the two national teams. Statistically significant differences

were recorded in the variable distance covered with ball in possession (In poss) with a statistical significance of  $p < .001$ . Figure 1 shows the average values of fitness parameters for both teams.

**Table 2:** Differences in conditioning parameters

Variables	National Team	N	Mean±Std.Dev.	T-test	
				t	p
Total distance	France	14	7.088±2.79	-.549	.588
	Croatia	13	7.712±3.10		
1 <sup>st</sup> half	France	11	4.178±.78	-.374	.712
	Croatia	11	4.316±.93		
2 <sup>nd</sup> half	France	14	3.824±1.43	-.423	.676
	Croatia	13	4.059±1.44		
In poss	France	14	1.900±.79	-3.670	.001
	Croatia	13	3.505±1.41		
Top Speed	France	14	27.99±3.62	.434	.668
	Croatia	13	27.32±4.27		
Sprint	France	14	24.46±11.60	-.918	.368
	Croatia	13	29.08±13.55		



**Figure 1:** Average values of conditioning parameters

#### 4. Discussion

Morphological characteristics of football players, based on the obtained results, there are no statistically significant differences between the two national teams in professional

football. BMI values range from  $22.8 \pm 1.1 \text{ kg / m}^2$  to  $23.2 \pm 1.1 \text{ kg / m}^2$  which agrees with the results in the study (Joksimovic et al. 2019). Lago-Peñas et al. (2011) conclude that there is no statistically significant difference in body composition in football players. Nikolaidis, & Karydis, (2011) found that players under the age of 21 have average BMI values (Mean  $23.77 \pm 1.57$ ). A study conducted on professional footballers competing in the Argentine league obtained results in which BMI values (Mean  $24.5 \pm 1.4$ ) (Wittich, et al., 1998). The aim of the research was to determine the differences in the morphological and fitness parameters of the finalists of the FWC 2018, as well as to obtain basic data on the character of the physical parameters of the two teams during the match, the final. The total distance covered, which the players cover in the first and second half with and without the ball, in our research is France ( $7.088 \pm 2.79\text{m}$ ) and Croatia ( $7.712 \pm 3.10\text{m}$ ) without statistically significant differences ( $p = .588$ ). Walter et al. (2006) in a work in which 300 professional footballers competing in European leagues ran an average of ( $11,393\text{m}$ ). The research that was done on 18 top football players, the total distance covered during the match is ( $10,864\text{m}$ ) (Rampinini et al., 2007). Slightly greater distance than the players of the two teams in the FWC final have Premier League players, who run in total ( $10,722 \pm 978\text{m}$ ), Championship players in the match run ( $11,429 \pm 816\text{m}$ ) and League 1 players in run ( $11,607 \pm 737\text{m}$ ) Bradley et al., 2013). Also, the players of the Champions League ( $11,102 \pm 916\text{m}$ ) and Premier League ( $10,746 \pm 964\text{m}$ ), in various forms of movement, have a higher percentage than the players of France and Croatia (Di Salvo, Pigozzi, Gonzalez-Haro, Laughlin, & De Vitt, 2013). Only in the variable of predicting the distance in possession of the ball (In poss) there is a statistically significant difference between the two teams in favor of Croatian footballers.

The most popular technical indicator in football is ball possession due to its strong association with success, but this relationship is extremely complex in the efficiency of passing and the type of offensive strategies that are also important factors associated with success (Bradley et al., 2013). Clemente et al., (2015) indicate that winning teams have a higher percentage of ball possession than teams that have lost, thus showing that success in football is associated with a high percentage of ball possession. However, our research has shown the opposite results. The Croatian team had a higher ball possession of 61% compared to the French team of 39% and lost the final game with the result 4: 2. Justification for such results can be found in the fact that the Croatian team does not have sufficiently developed visual research activity that is important in the analysis of performance actions with the ball, actions in which they move the body, head and eyes to visually observe the game around them (McGuckin et al., 2018). Playing against a better team justifies the fact that our results show that teams of lower quality have to cover longer distances with high intensity in order to achieve greater possession of the ball. Ball possession is also affected by the venue of the match, the resistance of the opponent, cooperation between and within the lines of the opposing team as well as different styles of play (Lago, & Martin, 2007). The players of the Croatian national team ran more than the players of France. When it comes to the differences between the two teams in the total distance covered in the first and second half, there are no statistically significant

differences. From the mean values, we can see that in the first half (France =  $4,178 \pm .78\text{m}$ ; Croatia =  $4,316 \pm .93\text{m}$ ) the players move more than in the second half (France =  $3,824 \pm 1.43\text{m}$ ; Croatia =  $4,059 \pm 1.44\text{m}$ ). Other authors agree with these results because their results show that players move more in the first half than in the second half (Walter et al., 2006). Statistically significant differences between the two halves in the total distance traveled less than  $p < 0.05$  were found by Rivilla-García et al. (2019). and less than  $p < 0.0001$  Borghi et al. (2020). Sprinting is one of the most important activities in football, even though it represents only 1-12% of the total distance covered in the match. Footballers are required to repeatedly make the maximum or nearest maximum sprint of short duration (1–7 s) with short recovery periods. Therefore, the ability to repeat multiple sprints at high speed is important for the physical performance of a football player. Thus, muscle strength is an important prerequisite for sprinting because it requires players to perform activities such as stepping, turning, and jumping (Rampinini et al., 2007). Variables such as the number of sprints during the match (Sprint) and the maximum speed during the match (Top speed) do not show significant differences. Slightly different results are obtained by Bradley et al. (2013) showing a statistically significant difference in favor of League 1 compared to Premier League and Championship in sprints during the match ( $p < 0.01$ ) and between Championship League and Premier League (Di Salvo et al., 2013).

## 5. Conclusion

The data obtained by this research show that the possession of the ball does not affect the overall profile of the team's activities, but affects the composition of high-intensity efforts and some technical elements of performance. These results provide information to sports scientists on performance requirements in teams with different percentages of ball possession, which could be used to individualize dual training based on tactical strategy and visual-exploratory action of players during a football game. Also, these results can be useful to coaches when devising tactics to improve the chances of winning.

## Conflicts of Interest

The authors declare no conflict of interest.

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