

# A COMPARATIVE ANALYSIS OF COVERED DISTANCE IN TOP FOOTBALLERS IN FINAL MATCHES ON LAST THREE WORLD CUPS

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Original scientific work

## Abstract:

This research is a transversal study with the goal of determining the covered distances in top footballers in final matches of the last three world cups. The research was conducted with 50 top footballers, aged 19 to 35, who played all ninety minutes of final matches. The respondents are divided into three groups. The first group consists of players of national teams of Spain and the Netherlands, finalists of the 2010 World Cup played in South Africa (n=18). The second group consists of players of national teams of Germany and Argentina, finalists of the 2014 World Cup in Brazil (n=17). The third group consists of players of national teams of Croatia and France, finalists of the 2018 World Cup in Russia (n=15). The acquired results show that the highest total average covered distance and highest covered distance in the first and the second half-time was realized in the final match of the 2014 World Cup. The results of the univariate analysis of the ANOVA variant showed that significant statistical distinction was achieved (on the level of  $P=0.001$ ) in the variable of covered distance in the first half-time (SEPRDPP), whereas other variables did not show significant statistical differences.

**Keywords:** football, covered distances, World Cup

## INTRODUCTION

During the last two decades there has been a significant increase in the analysis of football matches. The practical outcomes of the analyses are best reflected in the fact that selected indicators from the analyses can significantly help coaches to identify good and bad performances of individual players or the entire team. Moreover, analyses of football matches help in identifying the psychological requirements of the football and in examining how individual players "overcome" certain psychological aspects of the sport. In order to devise an adequate training, it is of significant importance to take into account the psychological load that professional players are burdened with depending on their position in the team (activity, covered distance, intensity, energy, muscle activity). Hence, analyses of matches are of particular importance because they enable professionals to devise trainings that stimulate both the psychological and other factors that players face. Football is the most popular sports in the world with higher and more demanding motor abilities and abilities of energy efficiency of players, as well as the use of faster and more effective techniques and tactics (Sporiš et al., 2012). Top players grow in the amount and intensity of movement during the years, which requires experts to determine what it is that makes players who play on the top level (Čolakhodžić et al., 2017). Taking into account the total number of players in a match as well as the dimensions of the pitch, it does not come as a surprise that the activities of players without the ball comprise over 95% of the effective playing time. Even though the total amount of physical activities of a footballer consists of a number of different activities, a majority of the activities consists of walking and running with different speed and directions. Therefore, the covered distance during a match is used as a global indicator of the physical demands of the football game. Contemporary top footballers cover on average between 10 and 13 kilometers during a match, with a

note that midfielders cover most distances whereas goalkeepers cover only 4 km (Moher et al., 2003; Krusturp et al., 2005; Lago et al., 2010; Andrzejewski et al., 2012). Given that footballers constantly change speed during the match, it is crucial to categorize the total distance covered based on the speed (intensity) of movement (Di Salvo et al., 2006; Barros et al., 2007; Lago et al., 2010). Numerous researchers have so far successfully categorized the total distance covered. However, the categories defined differ from author to author which makes it difficult to compare the respective approaches. It is interesting to note that from the total distances covered only about 50% represent straight movement, whereas the rest represents backwards movement, side movement and zigzag movement, moving in circles etc (Marković and Bradić, 2008).

## METHODS

This research attempted to determine the differences in distances covered in top footballers in three final World Cups.

## Subjects

The research was conducted on the sample of 50 top footballers, aged 19 to 35, who played all ninety minutes of final matches in the last three World Cups. Goalkeepers were not considered for analysis due to their position in the team. Respondents were grouped into three groups of which the first group consisted of national teams of Spain and the Netherlands, finalists of the 2010 World Cup played in South Africa (n=18). The second group consists of players of national teams of Germany and Argentina, finalists of the 2014 World Cup in Brazil (n=17). The third group consists of players of national teams of Croatia and France, finalists of the 2018 World Cup in Russia (n=15).

### Variable sample

The data for the research was retrieved from the official webpage of World Cup Federation ([www.fifa.com](http://www.fifa.com)) which shows all parameters of team success along with situational efficacy of footballers in final matches of final three World Cups. The basic variables that are used are:

- AGE
- AVIS – height (cm)
- SEPRD – distance covered (m)
- SEPRDPP – distance covered in first half-time (m)
- SEPRDDP – distance covered in the second half-time (m)

### Methods of data processing

For all variables, the following parameters were calculated: arithmetic mean, standard deviation, minimal and maximal result. The goal of the approach was to determine basic indicators of normal result distribution. In order to determine the differences between three independent samples, a univariate variance analysis (ANOVA) was used.

### RESULTS AND DISCUSSION

Table 1 shows the results of central and dispersion parameters for 50 top footballers who played all ninety minutes of final matches of last three World Cups. For the final match on the 2010 World Cup, eighteen ( $n=18$ ) players were taken for analysis. Their average age is  $27.38 \pm 3.92$ , average height  $179.83 \text{ cm} \pm 6.41$ . Footballers covered  $9543.94 \text{ m} \pm 788.44$  on average – in the first half-time  $4774.50 \text{ m} \pm 413.17$ , and  $4769.44 \text{ m} \pm 450.65$  in the second half-time. For the final match of the 2014 World Cup, seventeen ( $n=17$ ) footballers were taken into consideration. Their average age was  $28 \pm 3.04$ , average height  $181.11 \text{ cm} \pm 7.38$ . The footballers' average covered distance was  $10087.17 \text{ m} \pm 788.44$  – in the first half-time  $5088.05 \pm 423.02$ , and  $4999.11 \text{ m} \pm 575.36$  in the second half-time. The average age of footballers ( $n=15$ ) in the 2018 World Cup was  $26.60 \pm 3.85$  and the average height was  $183.46 \text{ cm} \pm 5.69$ . Footballers in the final match successfully covered a distance of  $9437.73 \pm 940.21$  – in the first half-time  $4470.53 \text{ m} \pm 424.64$ , and  $4967.20 \text{ m} \pm 539.68$  in the second half-time. Table 1 shows that footballers in the final match of the 2014 World Cup had the highest average distance covered. The highest average distance covered in the first and in the second half-time were accomplished in the final match of the 2014 World Cup, whereas somewhat lower average values were achieved in final matches of 2010 and 2014 World Cups. Table 2 (ANOVA) indicates that only one variable (SEPRDPP) of five variables utilized in the research showed statistical difference, on the level of  $p=0.001$ . The variable with the least difference is AGE, with a difference of  $p=0.55$ . A view on the differences between groups, it can be observed that the variable that was isolated as the only one with a statistical significance shows notable difference from  $p=0.00$  to  $p=0.04$ . It is interesting to observe that the variable (SEPRD)

shows significant differences between World Cups of 2014 and 2018. If we compare the results of this study with previous studies, it can be observed that top footballers on average cover a distance of nine to 12 km during a match. Distance in the first half-time was bigger ( $P<0.05$ ) than in the second half-time for top players ( $5.51 \pm 0.10$  vs  $5.35 \pm 0.09$  km) (Mohra et al., 2003). Hennig and Briehele (2000) indicate in their research that footballers on average covered a distance of 10600 m, with four per cent longer distance in the first half-time as compared to the second half-time. South American footballers ( $8638 \pm 1031$  m) on average covered significantly shorter distances ( $p<0.05$ ) than English Premier League players (10104 m) (Rienzi et al., 2000). The average distance covered was 10.80 km – in the first half-time 5.52 km and 5.250 km in the second half-time. Midfielders covered 10% more ( $p<0.05$ ) i.e. 11.4 km as compared to defenders and strikers, without a difference in high intensity runs (Bangsbo, 1991). Female professional footballers on average cover a distance of 10300 m (Krustrup et al., 2005). Di Salvo et al. (2006) indicate that footballers on average covered a distance of 11393 m (5709 m in the first half-time and 5684 m in the second half-time). Barros et al. (2007) indicate that the average distance was 10.012 m, the average distance covered in the first half-time was 5.173 m, significantly higher ( $p<0.001$ ) than the average value of 4.808 m in the second half-time. Ademović et al. (2012), during a study of the model for top footballers, determined that midfielders cover the longest distances (10952 m), defenders less (10273 m), and strikers the least with 9093 meters. Jozak et al. (2011) determined in a comparison of specific types of players that defense midfielders cover longest distances (10.50 km) and offense midfielders (10.39 km). Čolakhodžić et al. (2017) determined that there is no significant difference between the 2010 and 2014 World Cups in relation to the amount of covered distance. Indicators of situational efficacy on the 2014 World Cup in Brazil show that footballers on average cover a distance of 9396 m (in the first half-time 4746 m and 4505 m in the second half-time) (Čolakhodžić, 2019).

### CONCLUSION

This paper presents result of distance covered in 50 top players who played all ninety minutes of final matches on the last three World Cups. The results of the statistical analysis show that the highest average distance covered along with the highest distance covered both in the first and in the second half-time was accomplished in the final match of the 2014 World Cup. The results acquired show that there have not been statistically significant differences in the total distance covered. Only the distance covered in the first half-time show significant statistical differences. Data on the total distance covered in footballers during matches are key in designing football trainings. Such data needs to be taken into account in the process of planning specific training units, as well as during yearly periodization. An analysis of footballers' physical load during matches is very useful for devising individualized trainings.

**Table 1.** Descriptive indicators of variables for assessing distance covered in final matches on three World Cups

Variable	W.C. 2010					W.C. 2014					W.C. 2018				
	N	Min.	Max.	A.S	S.D	N	Min	Max.	A.S	S.D	N	Min	Max.	A.S	S.D
Age	18	21	35	27,38	3,92	17	24	34	28	3,04	15	19	33	26,60	3,85
Avis	18	170	192	179,83	6,41	17	169	192	181,11	7,38	15	172	191	183,46	5,69
SEPRD	18	8312	11196	9543,94	788,44	17	8181	11424	10087,17	939,37	15	8368	11645	9437,73	940,21
SEPRDPP	18	4217	5594	4774,50	413,17	17	4111	5677	5088,05	423,02	15	3946	5569	4470,53	424,64
SEPRDDP	18	3864	5602	4769,44	450,65	17	4046	5756	4999,11	575,36	15	4317	6076	4967,20	539,68

**Table 2.** Univariate analysis variance (ANOVA) – determining the differences in distance covered in final matches on three football World Cups.

		Sum of Squares	df	Mean Square	F	Sig.
Age	Between Groups	15,642	2	7,821	,595	,556
	Within Groups	617,878	47	13,146		
	Total	633,520	49			
Avis	Between Groups	109,522	2	54,761	1,269	,291
	Within Groups	2027,998	47	43,149		
	Total	2137,520	49			
SEPRD	Between Groups	4017994,232	2	2008997,116	2,548	,089
	Within Groups	3,706E7	47	788572,773		
	Total	4,108E7	49			
SEPRDPP	Between Groups	3045472,505	2	1522736,253	8,633	,001
	Within Groups	8289881,175	47	176380,451		
	Total	1,134E7	49			
SEPRDDP	Between Groups	539203,411	2	269601,705	,988	,380
	Within Groups	1,283E7	47	272915,077		
	Total	1,337E7	49			

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