Analysis of Differences of Running Perfomances of Elite European and Latin American Football Players

Analiza razlika trkačkih performansi vrhunskih evropskih i latinoameričkih nogometaša

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Abstract: *This research is aimed to determine the differences in the racing performances of elite European and Latin American footballers. The research was conducted on a sample of N = 157 top football players, aged 19 to 35, who played all 90 minutes in the first round of the group stage of the competition at the 2018 World Cup. Respondents were classified into two groups, where group I (N = 103) consisted of football teams from Europe, and group II (N = 54), consisted of teams from Latin America. The obtained data showed that 8 out of 13 variables have the characteristic of heterogeneity with a higher value of variance than the arithmetic mean. The results of the T-test showed that only 4 of 13 variables had statistically significant differences. Footballers from European national teams are on average taller than Latin American footballers by just over 3 cm. European footballers had a 4% greater (p> 0.05) total distance traveled, distance in the first and second half of the game than Latin American footballers.*
Keywords: *Football, performance, World Cup.*

Sažetak: *Ovo istraživanje imalo je za cilj da se utvrde razlike u trkačkim performansama vrhunskih evropskih i latinoameričkih nogometaša. Istraživanje je sprovedeno na uzorku od N=157 vrhunskih nogometaša, uzrasta 19 do 35 godina koji su odigrali svih 90 minuta u I kolu grupne faze takmičenja na Svjetskom nogometnom prvenstvu 2018 godine. Ispitanici su svrstani u dvije grupe, gdje su I grupu (N=103), činile nogometne reprezentacije iz Evrope, a II grupu (N=54), činile su reprezentacije iz Latinske Amerike. Dobijeni podaci nam pokazuju da 8 od ukupno 13 varijabli ima karakteristiku heterogenosti sa većom vrijednošću varijance od aritmetičke sredine. Rezultati T-testa su pokazali da je samo kod 4 od 13 varijabli došlo do statistički značajnih razlika. Nogometaši iz europskih reprezentacija u prosjeku su viši od latinoameričkih nogometaša za nešto više od 3 cm. Europski nogometaši su imali 4 % veću (p>0,05) ukupnu pređenu udaljenost u prvom i drugom poluvremenu od latinoameričkih nogometaša.*
Ključne riječi: *Nogomet, performanse, Svjetsko prvenstvo.*

Introduction

Football is one of the most complex sports in which achieving good results depends on multiple, interrelated factors (Stølen T., Chamari K., Castagna C., Wisløff U., 2005; Bangsbo, 2008). Top players progress over the years in the amount and intensity of movement, which requires experts to determine what characterizes footballers who play at a high level (Čolakhodžić et al., 2017). Considering the total number of players in the match, as well as the dimensions of the field, it is not surprising that the activities of individual players without the ball account for an average of over 95% of the effective time in the game. Although a large number of different activities are included in the total physical work per-

Uvod

Nogomet predstavlja jedan od najsloženijih sportova u kojem postizanje dobrih rezultata ovisi o višestruko, međusobno povezanim faktorima (Stølen T., Chamari K., Castagna C., Wisløff U., 2005; Bangsbo, 2008). Vrhunski igrači godinama napreduju u količini i intenzitetu pokreta, što zahtijeva od stručnjaka da utvrde šta karakterizira nogometaše koji igraju na visokom nivou (Čolakhodžić i sar., 2017). Uzevši u obzir ukupan broj igrača na utakmici, kao i dimenzije terena, ne iznenađuje činjenica da na aktivnosti pojedinih igrača bez lopte otpada u prosjeku preko 95% efektivnog vremena u igri. Iako se u ukupan obavljeni fizički rad nogometaša ubraja

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formed by football players, most of this work falls on walking and running at different paces and different directions (Moher et al., 2003; Krusturp et al., 2005). When it comes to world football styles the fact is that there are big differences around the world. The styles are usually in line with the characteristics of the players, and over the years several styles have been defined. Of importance for this work are the Latin and Central American-style on the one hand and the European style of football on the other. The Latin style of the game is very recognizable, primarily due to its oriental characteristics. It should also be noted that in this style, attacks are performed with a lot of individual activities, with a lot of dribbling and nice moves. As for the characteristics that the players have, first of all, it should be emphasized: that they control the ball extremely well, that they are great dribblers and that they are capable of performing creative actions. European football styles include: British, Northern, Continental and Italian style. The British style is characterized by a game with a smaller number of touches of the ball, passes are performed directly, very often through the opponent's defense. The players are well physically prepared, very fast with and without the ball and are phenomenally technically and tactically trained. Northern style is characterized by direct attacks, very often ending successfully. Individual players have very specific tasks in the game, which rarely or almost never improvise their activities. As for the characteristics that players possess, first of all it should be emphasized: that they are extremely aggressive, fast, as well as that they are good in the organization of the game. The continental style of play is characterized by a mixture of Latin and northern style of play, and exudes a great deal of creativity and coordination. The players are very good in the "dog" game and the collective game is very pronounced. The Italian style is the only one that represents the area of one country, and it is adorned with the caution of players who join the attack and is focused on defensive activities. The players are extremely tactically educated, very skilled and careful. Dujmović, (2000) states that many studies show that out of 90 minutes of a professional football match, the effective playing time is between 60 and 65 minutes. The other 25-30 minutes go to breaks. From the effective time of the game, only 2-3 minutes go to activities with the ball of each individual player. The rest of the time the player performs activities without the ball. Based on the above, the aim of this paper is to determine the differences between footballers coming from Europe and Latin America in the physical performance of players when the team is not in possession of the ball. This research aimed to determine the differences in the racing performance of the top footballers of the European and South American national teams at the 2018 World Cup.

veliki broj različitih aktivnosti, najveći dio tog rada otpada na hodanja i trčanja različitim tempom i različitim smjerovima (Moher i sar., 2003; Krusturp i sar., 2005). Kada su u pitanju svjetski nogometni stilovi činjenica je da postoje velike razlike širom svijeta. Stilovi su obično u skladu sa karakteristikama igrača, a tokom godina izdefinisalo se nekoliko stilova. Od važnosti za ovaj rad su latinski i centralnoamerički-stil sa jedne strane i evropski stil nogometa sa druge strane. Latinski stil igre je veoma prepoznatljiv, prije svega zbog svojih orijentalnih karakteristika. Takođe bi trebalo navesti da se kod ovoga stila napadi izvode sa mnogo individualnih aktivnosti, sa dosta driblinga i lijepih poteza. Što se tiče karakteristika koje posjeduju igrači, prije svega bi trebalo naglasiti: da izuzetno dobro kontrolišu loptu, da su sjajni dribleri i da su sposobni da izvode kreativne akcije. U evropske nogometne stilove spadaju: britanski, svjeverni, kontinentalni i italijanski stil. Britanski stil karakteriše igra sa manjim brojem dodira lopte, pasovi se izvode direktno, vrlo često preko protivničke odbrane. Igrači su dobro fizički pripremljeni, veoma brzi sa loptom i bez nje i da su fenomenalno tehnički i taktički obučeni. Sjeverni stil se karakteriše direktnim napadima, veoma često završavaju uspješno. Pojedinačni igrači imaju veoma specifične zadatke u igri, koji rijetko ili skoro nikako ne improvizuju svoje aktivnosti. Što se tiče karakteristika koje posjeduju igrači, prije svega bi trebalo naglasiti: da su izuzetno agresivni, brzi, kao i da su dobri u organizaciji igre. Kontinentalni stil igre karakteriše mješavina latinskog i sjevernog stila igre, a odiše velikom dozom kreativnosti i koordinacije. Igrači su veoma dobri u „pas" igri i veoma je izražena kolektivna igra. Italijanski stil je jedini koji predstavlja oblast jedne zemlje, a krase ga opreznost igrača koji se priključuju napadu i usmjeren je na odbranbene aktvnosti. Igrači su izuzetno taktički obrazovani, veoma vješti i oprezni. Dujmović, (2000) navodi kako mnoga istraživanja pokazuju da od 90 minuta utakmice profesionalnog nogometa efektivno vrijeme igre iznosi između 60 i 65 minuta. Ostalih 25-30 minuta odlazi na prekide. Od efektivnog vremena igre samo 2-3 minute odlaze na aktivnosti s loptom svakog pojedinog igrača. Ostatak vremena igrač izvodi aktivnosti bez lopte. Na osnovu prethodno navedenog, cilj ovog rada jeste da se utvrde razlike nogometaša koji dolaze iz Evrope i Latinske Amerike u fizičkim preformansama igrača kada ekipa nije u posjedu lopte. Ovo istraživanje je imalo za cilj da se utvrde razlike u trkačkim performansama vrhunskih nogometaša evropskih i južnoameričkih reprezentacija na Svjetskom nogometnom prvenstvu 2018 godine.

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Methods of work

Sample of respondents

The research was conducted on a sample of N = 157 top football players, aged 19 to 35, who played all 90 minutes in the first round of the group stage of the competition at the 2018 World Cup. Respondents were classified into two groups, where the first group (N = 103) consisted of football teams from Europe, with an average age of 28.3 ± 3.7 years and an average height of 183.9 ± 6.2 cm. The representative selections that make up the first group are: Belgium, Denmark, England, Iceland, Germany, Poland, Portugal, Russia, Serbia, France, Croatia, Switzerland, Sweden and Spain, and the second group (N = 54) consisted of representative selections from Latin American mean age 28.8 ± 3.7 years and mean height 180.2 ± 5.7 cm. The national teams that make up the second group are: Costa Rica, Mexico, Panama, Argentina, Brazil, Colombia, Peru and Uruguay. Goalkeepers were not taken into the final analysis due to the specificity of their position in the team.

Variable sample

The data were taken from the official website of the World Football Association (www.fifa.com), which presents all the parameters of the team's success, as well as data on the situational efficiency of football players. The basic variables used in the paper are: AGE - age (years), AVIS - body height (cm), SEPRD - distance traveled (m), SEPRDPP- distance traveled in the first half (m), SEPRDDP - length traveled distance in the first half (m), SEPRDPL - length of distance covered in possession of the ball (m), SEPRDBPL - length of distance traveled without possession of the ball (m), SEBRSP - number of sprints (No), SEBRSPPP - number of sprints in the first half (No) , SEBRSPDP - number of sprints in the second half (No), SEBRSP- number of sprints (No), SEMAXBPP - maximum speed in the first half (km / h), SEMAXBDP - maximum speed in the second half (km / h), SEMAXB - maximum achieved speed (km / h),

Methods of data processing

The data were entered into the software package for social sciences (Statistical Package for Social Sciences - SPSS, Version 26.0) in which statistical data processing was performed. Central and dispersion parameters were calculated for all variables, all with the aim of ascertaining the basic indicators of the distribution of the normality of the results. In order to examine the differences between

Metode rada

Uzorak ispitanika

Istraživanje je sprovedeno na uzorku od N= 157 vrhunskih nogometaša, uzrasta 19 do 35 godina koji su odigrali svih 90 minuta u prvom kolu grupne faze takmičenja na Svjetskom nogometnom prvenstvu 2018 godine. Ispitanici su svrstani u dvije grupe, gdje su prvu grupu (N=103), činile nogometne reprezentacije iz Evrope, prosječne starosti 28,3 ± 3,7 godina i prosječne visine 183,9 ± 6,2 cm. Reprezentativne selekcije koje čine prvu grupu su: Belgija, Danska, Engleska, Island, Njemačka, Poljska, Portugal, Rusija, Srbija, Francuska, Hrvatska, Švicarska, Švedska i Španija, a drugu grupu (N=54), **činile su reprezentativne selekcije iz Latinske Amerike** prosječne starosti 28,8 ± 3,7 godina i prosječne visine 180,2 ± 5,7 cm. Reprezentativne selekcije koje čine drugu grupu su: Kostarika, Meksiko, Panama, Argentina, Brazil, Kolumbija, Peru i Urugvaj. Golmani nisu uzeti u konačnu analizu zbog specifičnosti pozicije koju imaju u timu.

Uzorak varijabli

Podaci su preuzeti sa oficijalne stranice Svjetske nogometne asocijacije (www.fifa.com) na kojoj su predstavljeni svi parametri uspješnosti ekipe, kao i podaci o situacionoj efikasnosti nogometaša. Osnovne varijable koje su korištene u radu su: AGE – starosna dob (godine), AVIS – tjelesna visina (cm), SEPRD – dužina pređene distance (m), SEPRDPP- dužina pređene distance u prvom poluvremenu (m), SEPRDDP - dužina pređene distance u drugom poluvremenu (m), SEPRDPL – dužina pređene distance u posjedu lopte (m), SEPRDBPL – dužina pređene distance bez posjeda lopte (m), SEBRSP – broj sprinteva (No), SEBRSPPP – broj srinteva u prvom poluvremenu (No), SEBRSPDP – broj srinteva u drugom poluvremenu (No), SEBRSP- broj sprinteva (No), SEMAXBPP – maksimalna ostvarena brzina u prvom poluvremenu (km/h), SEMAXBDP – maksimalna ostvarena brzina u drugom poluvremenu (km/h), SEMAXB – maksimalna ostvarena brzina (km/h).

Metode obrade podataka

Podaci su uneseni u softverski programski paket za društvene nauke (Statistical Package for Social Sciences − SPSS, Version 26.0) u kojem je izvršena statistička obrada podataka. Za sve varijable su izračunati centralni i disperzioni parametri, a sve sa ciljem konstatiranja osnovnih pokazatelja distribucije normaliteta rezultata. Kako bi se ispitale razlike između dva nezavisna uzorka

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Results and discussion

By looking at Table 1, which shows the descriptive parameters of European and Latin American footballers, we can see that all variables have a normal distribution of results. The values of skewnes and kurtosis belong to reference values that are lower than skew ± 1.96 and kur. ± 2.05. If we compare the column of variance with the arithmetic mean, in order to conclude whether these are homogeneous or heterogeneous results, we can conclude that 8 out of 13 variables have the characteristic of heterogeneity with a higher value of variance than the arithmetic mean. The variables that belong to the homogeneous results are: age, height of the subjects, maximum speed achieved, maximum speed in the first half and maximum speed achieved in the second half.

Table 2 talks about the differences in arithmetic means between European and Latin American footballers at the last 2018 World Cup. From the table we can conclude that only four of the thirteen variables had a statistically significant difference. The mentioned difference was observed in the following variables: height of the examinees, distance traveled, distance traveled in the first half, distance traveled in the second half. In all four mentioned variables, a statistically significant difference occurred in favor of footballers from Europe. Footballers from European national teams are on average a little more than 3 cm taller than Latin American footballers. Also, European footballers covered an average of 4% more (p> 0.05) distance in the first half (European footballers 5058.1 ± 492.9 m; Latin American footballers 4869.1 ± 435.7 m) and the second half 4994.0 ± 552.8 m, Latin American footballers 4806.8 ± 472.6 m). The total average distance covered is 4% higher for footballers coming from Europe than footballers from Latin America (10056.7 ± 1004.6 m vs 9661.5 ± 843.0 m). These results show us that the European national teams, and the team itself and the players in their style/way of playing pay more attention to the amount of movement and coverage of the field in all lines of the team. We can certainly look for the reason for that in the training technology and development of young players, which is represented in the leading European nations. The variables that achieved the least differences, ie that are largely similar in the examined subsamples, are: maximum sprint speed, distance traveled without possession of the ball and number of sprints. Also with these variables, the existing difference that is not statistically

Rezultati i diskusija

Uvidom u tabelu 1. koja prikazuje deskriptivne parametre europskih i latinoameričkih nogometaša možemo vidjeti da sve varijable imaju normalnu distribuciju rezultata. Vrijednosti skewnesa i kurtosisa pripadaju referentnim vrijednostima koje su niže od skew ±1,96 i kur. ± 2,05. Ukoliko napravimo poređenje kolone varijanse sa aritimetičkom sredinom, kako bi došli do zaključka da li se radi o homogenim ili heterogenim rezultatima, možemo zaključiti da 8 od ukupno 13 varijabli ima karakteristiku heterogenosti sa većom vrijednošću varijance od aritimetičke sredine. Varijable koje pripadaju homogenim rezultatima su: godine starosti, visina ispitanika, maksimalna ostvarena brzina, maksimalna brzina u prvom poluvremenu i maksimalna ostvarena brzina u drugom poluvremenu.

Iz tabele 2. koja govori o razlikama aritimetičkih sredina između nogometaša Europe i Latinske Amerike na posljednjem Svjetskom prvenstvu 2018. godine, može se zaključiti da je samo kod četiri od trinaest varijabli došlo do statistički značajne razlike. Spomenuta razlika uočena je kod sljedećih varijabli: visina ispitanika, pređena udaljenost, pređena udaljenost u prvom poluvremenu, pređena udaljenost u drugom poluvremenu. Kod sve četiri spomenute varijable statistički značajna razlika se desila u korist nogometaša iz Europe. Nogometaši iz europskih reprezentacija u prosjeku su viši od latinoameričkih nogometaša za nešto više od 3 cm. Također europski nogometaši su u prosjeku prešli 4 % veću (p>0,05) udaljenost u prvom poluvremenu (evropski nogometaši 5058,1 ± 492,9 m; latinoamerički nogometaši 4869,1 ± 435,7 m) i drugom poluvremenu (evropski nogometaši 4994,0 ± 552,8 m) latinoamerički nogometaši 4806,8 ± 472,6 m). Ukupna prosječna pređena udaljenost je 4% veća kod nogometaša koji dolaze iz Evrope od nogometaša iz Latinske Amerike (10056,7 ± 1004,6 m vs 9661,5 ± *843,0 m*). Ovakvi rezultati nam pokazuju da evropske reprezentacije, a sami tim i igrači u svom stilu/ načinu igre veću pažnju pridaju količini kretanja i pokrivanja terena u svim linijama ekipe. Uzrok tome sigurno možemo tražiti u trenažnoj tehnologiji i razvoju mladih igrača koja je zastupljena u vodećim evropskim nacijama. Varijable koje su ostvarile najmanje razlike, odnosno koje su u velikome slične kod ispitivanih subuzoraka su: maksimalna brzina sprinta, pređena udaljenost bez posjeda lopte i broj sprinteva. Također kod ovih varijabli postojeća razlika koja

significant was realized in favor of European footballers. Such results tell us that there is no statistically significant difference in the intensity of performance and the number of performances of explosive football activities between European and Latin American national teams. If we compare the results of this study with previous research, we can see that top footballers on average cover a total distance of 9 - 12 km during the game, in the first half the distance was greater (P> 0.05) than in the second half for top class players + 0.10 vs 5.35 + 0.09 km), (Mohra et al. 2003). Hennig and Briehle (2000) in their research state that footballers have covered an average distance of 10600 m, this distance is 4% higher in the first half, compared to the second half. South American players averaged significantly less distance (p <0.05) than Premier League players (South American footballers, 8638 ± 1031 m; English Premier League 10104m), (Rienzi et al. 2000). The average distance covered in competitive competitions was 10.80 km, in the first half (5.52 km), and in the second half (5,250 km) (Bangsbo, 1991). In a study by Di Salvo et al. (2006), footballers covered an average distance of 11393 m, 5709 m in the first half and 5684 m in the second half. Barros et al. (2007) state in their research that the average mean distance was 10,012 m, the mean distance in the first half was 5,173 m, highly significantly higher (p> 0.001) than the mean value of 4,808 m, in the second half. Jozak et al. (2011) by comparing individual types of players found that the most run by defensive midfielders (10.50 km) and offensive midfielders (10.39 km), defensive midfielders (4.2 km) and attackers (4.0 km) have the highest average values of distance run when the team is in possession of the ball, and defensive midfielders (4.45 km) when the team is not in possession of the ball, while during the time the ball is out of play there is no statistically significant difference in the distance run between individual types of players. Ademović et al. (2012) researching the model of a top footballer found that midfielders (10952m), defensive players (10273m) and attackers (9093m) pass the most, midfielders and players have the greatest distance traveled when the team has possession of the ball, and when the team is not in possession of the ball. Čolakhodžić et al. (2017). found that there was no statistically significant difference between the 2010 and 2014 World Cups in relation to the amount of distance traveled, while there was a difference in the amount of distance traveled. The difference in the amount of distance covered when the team does not own the ball and when the team is in possession of the ball was in favor of the 2010 World Cup, while the maximum speed was in favor of the 2014 World Cup.

nije statistički značajna je ostvarena u korist nogometaša Europe. Takvi rezultati nam govore da nema statistički značajne razlike u intenzitetu izvođenja i broju izvođenja eksplozivnih nogometnih radnji između evropskih i latinoameričkih reprezentacija. Ako usporedimo rezultate ove studije sa dosadašnjim istraživanjima možemo vidjeti da vrhunski nogometaši u prosjeku pokrivaju ukupnu udaljenost od 9 – 12 km tokom igre, u prvom poluvremenu udaljenost je bila veća (P>0.05) nego u drugom poluvremenu za igrače vrhunske klase (5,51 + 0,10 vs 5,35 + 0,09 km), (Mohra i sar. 2003). Hennig and Briehle (2000) u svom istraživanju navode da su nogometaši prosječno prešli udaljenost od 10600 m, ova udaljenost je 4% veća u prvog poluvremena, u odnosu na drugo poluvrijeme. Južnoamerički igrači su tokom igranja utakmica prosječno prešli značajno manje udaljenosti (p<0,05) od igrača Premijer lige (južnoamerički nogometaši, 8638 ± *1031 m; engleska Premijer liga* 10104m), (Rienzi i sar. 2000[1]). Srednja udaljenost pređenih takmičarskih utakmica bila je 10,80 km, u prvom poluvremenu (5,52 km), a u drugom poluvremenu (5,250 km) (Bangsbo, 1991). U studiji Di Salvo i sar. (2006), nogometaši su prosječno prešli udaljenost 11393 m, u prvom poluvremenu 5709 m, a u drugom poluvremenu 5684 m. Barros i sar. (2007) navode u svom istraživanju da je prosječna srednja udaljenost iznosila 10.012 m, srednja udaljenost u prvom poluvremenu bila je 5.173 m, visoko značajna veća (p>0,001) od srednje vrijednosti 4.808 m, u drugom poluvremenu. Jozak i sar. (2011) su usporedbom pojedinih tipova igrača utvrdili da najviše pretrče defanzivni vezni igrači (10.50 km) i ofanzivni vezni igrači (10.39 km), defanzivni vezni igrači (4.2 km) i napadači (4.0 km) imaju najviše prosječne vrijednosti pretrčane udaljnosti kad je ekipa u posjedu lopte, a defanzivni vezni igrači (4.45 km) kad ekipa nije u posjedu lopte, dok za vrijeme kada je lopta izvan igre nema statistički značajne razlike u pretrčanoj udaljenosti između pojedinih tipova igrača. Ademović i sar. (2012) istražujući model vrhunskog nogometaša utvrdili su da najviše pređu vezni igrači (10952m), defanzivni igrači (10273m) i najmanje napadači (9093m), vezni defanzivni i igrači imaju najveće vrijednosti pređene distance kada ekipa ima posjed lopte, i kada ekipa nije u posjedu lopte. Čolakhodžića i sar. (2017). su utvrdili da nema statistički značajne razlike između Svjetskog nogometnog prvenstva 2010 i 2014. godine u odnosu na količinu prijeđene udaljenosti, dok je razlike bilo u količini pređene distance. Razlika u količini pređene distance kada je ekipa nema posjed lopte i kada je ekipa u posjedu lopte bio je u korist SP 2010 godine, dok je maksimalna ostvarena brzina bila u korist SP 2014 godine. Utvr-

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Determining the structure of football through indicators of situational efficiency at the 2014 World Cup in Brazil, it was found that footballers run an average of 9396m, 4746m in the first half, and 4505m in the second half (Čolakhodžić, 2019). Running at maximum speed (sprint) occurs on average every 90 seconds of a match (Reilly and Thomas, 1976) and does not last longer than 2–4 s (Reilly and Thomas, 1976[2]; Bangsbo, 1991; O 'Donoghue, 2001). Valquer et al. (1998) prove that 96% of all sprints are shorter than 30 m, and 49% of them are shorter than 10 m. The sprint represents only 1–11% of the total distance covered during the match (Bangsbo, 1991; Reilly and Thomas, 1976) which accounts for 0.5–3% of the total duration of the match (Bangsbo, 1991; Reilly and Thomas, 1976). The attackers had the highest maximum speed at the 2010 World Cup, and the players from the midfield, Ademović et al., Had the highest number of sprints. (2012). Distances sprinted depend on the player's positon in the team, and most sprints are made up of attackers (Rienzi, 2000). During one match, each player sprints an average of 6–12 times (Helgerud et al., 2001).

đivanje strukture nogometa kroz pokazatelje situacione efikasnosti na Svjetskom nogometnom prvenstvu 2014. u Brazilu , utvrđeno je da nogometaši u prosjeku pretrče 9396m, u prvom poluvremenu 4746m, a u drugom poluvremenu 4505m (Čolakhodžić, 2019). Trčanje maksimalnom brzinom (sprint) u prosjeku se pojavljuje svakih 90 sekundi utakmice (Reilly i Thomas, 1976) i ne traje duže od 2–4 s (Reilly i Thomas, 1976; Bangsbo, 1991; O' Donoghue, 2001). Valquer i sar. (1998) dokazuju da je 96% svih sprintova kraće od 30 m, a 49% ih je kraće od 10 m. Sprint predstavlja samo 1–11% ukupno pretrčane udaljenosti za vrijeme utakmice (Bangsbo, 1991.; Reilly i Thomas, 1976) što čini 0.5–3% ukupnog trajanja utakmice (Bangsbo, 1991[4].; Reilly i Thomas, 1976). Najveću maksimalnu ostvarenu brzinu na SP 2010 godine imali su napadači, a najveći broj ostvarenih sprinteva igrači vezne linije Ademović i sar. (2012). Udaljenosti pretrčane sprintom ovise o igračevom mjestu u ekipi, a najviše sprintova čine napadači (Rienzi, 2000). Za vrijeme trajanja jedne utakmice svaki igrač sprintom trči prosječno 6–12 puta (Helgerud i sur., 2001).

Table 1. *Descriptive indicators of variables for European and Latin American football players*

Tabela 1. *Deskriptivni pokazatelji varijabli za evropske i latinoameričke nogometaše*

	European football players / Evropski nogometaši			Latino America football player / Latinoamerički nogometaši		
Variables / **Varijable**	*N*	*M*/ **AS**	*SD*	*N*	*M*/ **AS**	*SD*
Age (years) / Godine	103	28.3	3.7	54	28.8	3.7
Body height (cm) / Visina (cm)	103	183.9	6.2	54	180.2	5.7
Distance covered (m) / Dužina pređene distance (m)	103	10056.7	1004.6	54	9661.5	843.0
Distance covered in the first half (m) / Dužina pređene distance u prvom poluvremenu (m)	103	5058.1	492.9	54	4869.1	435.7
Distance covered in the second half (m) / Dužina pređene distance u drugom poluvremenu (m)	103	4994.0	552.8	54	4806.8	472.6
Distance covered in possession of the ball (m) / Dužina pređene distance u posjedu lopte (m)	103	3845.9	885.3	54	3694.4	800.2
Distance covered without possession of the ball (m) / Dužina pređene distance bez posjeda lopte (m)	103	4093.4	933.3	54	4061.9	872.5
Number of sprints (No) / Broj sprinteva (No)	103	29.6	11.4	54	29.1	9.0
Number of sprints in the first half (No) / Broj sprinteva u prvom poluvremenu (No)	103	15.0	6.5	54	15.5	5.4
Number of sprints in the second half (No) / Broj sprinteva u drugom poluvremenu (No)	103	14.5	6.0	54	13.8	5.1
Maximum speed in the first half (km/h) / Maksimalna ostvarena brzina u drugom poluvremenu (km/h)	103	27.42	2.7	54	27.1	2.4
Maximum speed in the second half (km/h) / Maksimalna ostvarena brzina u prvom poluvremenu (km/h)	103	27.1	2.7	54	27.4	2.5
Maximum speed (km/h) / Maksimalna ostvarena brzina (km/h)	103	28.5	2.3	54	28.4	2.0

Legend: *N - number of respondents, M - mean, SD - standard deviation*

Legenda: *N – broj ispitanika, AS – aritmetička sredina, SD – standardna devijacija*

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Table 2. Analysis of differences in arithmetic means among European and Latin American football players.

Tabela 2. Analiza razlika aritimetičkih sredina kod nogometaša europljana i latinoamerikanaca

Variables / Varijable	t	df	Sig.	Mean Dif.
AGE	-.704	155	.483	-.445
AVIS	3.642	155	.000	3.728
SEPRD	2.469	155	.015	395.145
SEPRDPP	2.372	155	.019	188.987
SEPRDDP	2.115	155	.036	187.168
SEPRDPL	1.052	155	.294	151.544
SEPRDBPL	.205	155	.838	31.485
SEBRSP	.253	155	.800	.455
SEBRSPPP	-.416	155	.678	-.432
SEBRSPDP	.729	155	.467	.702
SEMAXBPP	.589	155	.556	.2611
SEMAXBDP	-.824	155	.411	-.3673
SEMAXB	.091	155	.928	.0342

Legend: t– value, df – degree of freedom, sig – significance, MD – difference of means

Legenda: t-vrijednost T testa, df-stepen slobode, Sig-značajnost, MD-razlika aritmetičkih sredina

CONCLUSION

The obtained data show that football players from European national teams are on average slightly more than 3 cm taller than Latin American football players. European footballers had a 4% greater statistically significant difference in total distance traveled, distance in the first half and second half than Latin American footballers. There were no statistically significant differences in the other variables, which shows great similarity in the examined subsamples. These results show us that there are certain differences in the style of play and the way certain football actions are performed between European and Latin American national teams. During the game, and thus in the training technology of the selected younger age categories of the European nation, they pay more attention to the amount of movement and performance of football activities, while the quantity of explosive football activities between European and Latin American national teams is at the same level. Further research in this area should go in the direction of comparing other national teams from other continents in order to get a clearer picture of the differences or similarities of the way of playing, and thus training technologies and selection of individual continental national teams. We can also conclude that the results, for most of the examined

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dobijeni podaci pokazuju da nogometaši iz europskih reprezentacija u prosjeku su viši od latinoameričkih nogometaša za nešto više od 3 cm. Evropski nogometaši su imali 4 % veću statistički značajnu razliku u ukupnoj pređenoj udaljenosti, udaljenost u prvom poluvremenu i drugom poluvremenu od latinoameričkih nogometaša. U drugim varijablama nije došlo do statistički značajnih razlik što pokazuje veliku sličnost kod ispitivanih subuzoraka. Ovakvi rezultati nam pokazuju da postoje određene razlike u stilu igre i načinu izvođenja određenih nogometnih radnji između evropskih i latinoameričkih reprezentacija. U toku igre, a samim tim i u trenažnoj tehnologiji selektiranih mlađih uzrasnih kategorija evropske nacije veću pažnju pridaju količini kretanja i izvođenja nogometnih radnji, dok je kvantitet izvođenja eksplozivnih nogometnih radnji između evropskih i latinoameričkih reprezentacija na istom nivou. Dalja istraživanja u ovoj oblasti trebala bi ići u smjeru komparacije ostalih reprezentacija, sa drugih kontinenata da bi se dobila jasnija slika razlika ili sličnosti načina igre, a samim tim i trenažne tehnologije i selekcije pojedinih kontinetalnih reperezentacija. Također, možemo zaključiti i da rezultati, kod većine ispitivanih

variables, support the fact that the physical requirements of the football game are increasing regardless of the area in which it is played and where the players come from.

varijabli, idu u prilog činjenici da fizički zahtjevi nogometne igre sve veći neovisno na kojem području se igra i odakle igrači dolaze.

References:

Ademović, A., Čolakhodžić, E., Talović, M., Kajmović, H. (2012). *Top footballer model based on indicators of situational efficiency in round of 16 at the 2010 FIFA World Cup*. Sarajevo: Homosporticus, vol.14., No.2.

Bangsbo J., Krustrup P. (2008). *Physical demands and training of top-class soccer players*. In T. Reilly, F. Korkusuz (eds), Scien

Bangsbo, J., Norregaard, L. and Thorso, F. (1991) *Activity profile of competition soccer. Canadian Journal of Sport Sciences 16(2), 110-116.*

Barros R., Misuta., M., Menezes, R., Figueroa, P., Moura, F., Cunha, S., Anido, R., Leite, N. (2007). *Analysis of the distances covered by first division Brazilian soccer players obtained with an automatic tracking method.* Journal of Sports Science and Medicine, Vol. 6, 233-242.

Čolakhodžić, E. (2019). *Factor analysis of football structure through indicators of the situation of football players during the matches of World Championships in 2014.* 3. International Social Science Conference (Education – Sport Science – Culture). At: Bangkok; Thailand.

Čolakhodžić, E., Đedović, D., Skender, N., Popo, A. (2017). *Differences in Distance And Intensity Of The Movement Of World Soccer Championship Participants 2010 And 2014.* Conference: 15 th International Sport Sciences Congress. At: Antalija; Turkiye

Di Salvo, V., Collins, A., Mc Neill, B. and Cardinale, M. (2006). Validation *of Prozone ®: A new video-based performance analysis system. International Journal of Performance Analysis in Sport* (serial online) 6 (1), (12 screens/inclusive page), June.

Dujmović, P. (2000). Škola nogometa. Zagreb: Zagrebački nogometni savez. [in Croatian]

E. Rienzi, B. Drust, T. Reilly, J. E. L. Carter, and A. Martin. (2000). *Investigation of anthropometric and work-rate profiles of elite South American International Soccer Players.* Journal of Sports Medicine & Physical Fitness 40, 162-169.

Helgerud, J., Engen, L.C., Wisloff, U., Hoff, J. (2001). *Aerobic endurance training improves soccer performance.* Med. Sci. Sports Exerc. 33: 1925-1931

Hennig, E. and Briehle,R. (2000) *Game analysis by GPS satellite tracking of soccer players*. XI Congress of the Canadian Society for Biomechanics, Montreal-Canada. Book of Abstract. 44.

Jozak, R., Perić, A., Bradić, A., Dizdar, D. (2011). *Position-related differences in the amount, intensity and speed of movement in elite football players.* Sarajevo: Homosporticus, vol. 12., 14 – 21.

Krustrup, P., Mohr, M., Ellingsgaard, H. and Bangsbo, J. (2005). *Physical demands during an elite female soccer game: importance of training status.* Medicine and Science in Sports and Exercise 37 (7): 1242-1248. Lago, C., Casais, L., Dominguez, E., Sampaio, J. (2010). *The effects of situational variables on distance covered at various speeds in elite soccer.* European Jurnal of Sport Science, 10 (2): 103-109.

Mohr, M., Krustrup, P., Bangsbo, J. (2003). *Match performance of highstandard soccer players with special reference to development of fatigue*. Journal of Sports Sciences, 21, 519-528.

O' Donoghue, P. (2001). *Time-motion analysis of work rate in elite soccer*. Notational analysis of sport IV. Porto: Faculty of Sport Sciences and Physical Education, University of Porto, 65-70

Reilly, T., Thomas, V. (1976). *A motion analysis of work rate in different positional roles in professional football match-play*. J. Hum. Mov. Stud., 87-97.

Stølen T., Chamari K., Castagna C. (2005). *Physiology of soccer: An update*. Sports Medicine 35, 501-536.

Valquer, W., Barros, TL., & Santánna, M. (1998). High *intensity motion pattern analyses of Brazilian elite soccer players*. In F. Tavares (Ed.), Proceedings of IV World Congress of Notational Analysis of Sport, 23-27. Porto, Portugal.