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Match performance of elite soccer players in ratio to contextual variables and game structure in the attack and defense phases using InStat Kinematic System. A longitudinal study

Rendimiento de los partidos de futbolistas de élite en relación a variables contextuales y estructura de juego en las fases de ataque y defensa utilizando el sistema cinemático InStat. Un estudio longitudinal

*Kosta Goranović, *Jovica Petković , *Marko Joksimović, **Dana Badau, **Razvan S. Enoiu
* University of Montenegro (Montenegro), ** Transilvania University of Brasov (Romania)

Abstract. The practical value of using the wearable devices for monitoring running performance and contextual variables is that well-chosen performance indicators can help coaches identify good and bad performances of individuals or teams. The aim of the article was to investigate running trends in the ratio to the structure of the game in the offensive and defensive phases of professional soccer players on home and away pitches in Montenegro in three competitive matches of different seasons. The research included 82 professional soccer players. The first sub-sample included 44 professional soccer players, height 185.89 ± 6.29 cm, mass 81.06 ± 5.47 kg, BMI 23.47 ± 0.96 kg/m^2, age 28.86 ± 3.85 years. The second sub-sample includes 38 professional football players, height 181.88 ± 6.35 cm, mass 77.28 ± 6.78 kg, BMI 23.32 ± 1.08 kg/m^2, age 29.43 ± 5.68 years old. The InStat kinematic system recorded field players using six cameras placed around the perimeter of the field at a minimum height of 12 m, 25 frames per second. Our study indicated some contrasting findings. Statistically significant differences were obtained in all three years in running performance and contextual variables. Our results indicate a decreasing trend in high speed runs distance both in the attack phase and in the defense phase for both teams. The conclusion of this study provided information on performance in soccer, which could consequently improve the applicability of running performance in training and competitions
Keywords: performance analysis, match location, sprint, run distance, kinematic monitoring.

Resumen. El valor práctico de usar los dispositivos portátiles para monitorear el rendimiento de carrera y las variables contextuales es que los indicadores de rendimiento bien elegidos pueden ayudar a los entrenadores a identificar el buen y el mal desempeño de individuos o equipos. El objetivo del artículo fue investigar las tendencias de carrera en relación con la estructura del juego en las fases ofensiva y defensiva de los jugadores de fútbol profesionales en canchas de local y visitante en Montenegro en tres partidos competitivos de diferentes temporadas. La investigación incluyó a 82 futbolistas profesionales. La primera submuestra incluyó a 44 futbolistas profesionales, altura 185,89 ± 6,29 cm, masa 81,06 ± 5,47 kg, IMC 23,47 ± 0,96 kg/m2, edad 28,86 ± 3,85 años. La segunda submuestra incluye 38 futbolistas profesionales, altura 181,88 ± 6,35 cm, masa 77,28 ± 6,78 kg, IMC 23,32 ± 1,08 kg/m2, edad 29,43 ± 5,68 años. El sistema cinemático InStat grabó a los jugadores de campo utilizando seis cámaras colocadas alrededor del perímetro del campo a una altura mínima de 12 m, 25 fotogramas por segundo. Nuestro estudio indicó algunos hallazgos contrastantes. Se obtuvieron diferencias estadísticamente significativas en los tres años en el rendimiento de carrera y las variables contextuales. Nuestros resultados indican una tendencia decreciente en la distancia de las carreras de alta velocidad tanto en la fase de ataque como en la fase de defensa para ambos equipos. La conclusión de este estudio proporcionó información sobre el rendimiento en el fútbol, lo que en consecuencia podría mejorar la aplicabilidad del rendimiento de la carrera en el entrenamiento y las competiciones.
Palabras clave: análisis de rendimiento, ubicación del partido, sprint, distancia recorrida, seguimiento cinemático.

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Dana Badau
dana.badau@unitbv.com

Introduction

Football is the most popular sport in the world, played in almost every nation at a professional level. Over the past decade, running performance (RP) monitoring has become common practice among professional football players. A detailed analysis of running activities during the game is important to provide an assessment of the competitive physical demands of elite football players and to profile individual physical demands that can be used to define and adapt training in relation to the playing position (Al Haddad et al., 2018). Since coaches tend to make subjective decisions and are unable to reliably recall events during a match, they increasingly turn to match analysis (performance and running levels in the first and second half) to optimize the training process of their players and teams (Hughes et al, 2004). The use of information technologies in the analysis of factors conditioning the performances of football players and teams has facilitated the expansion of knowledge regarding physical, functional, technical and tactical parameters by providing real-time and reliable information and data (Han et al., 2022; Paraskevas et al., 2020; Miguel et al., 2021; Jones et al., 2019; Castellano et al., 2012; Diaz-Ochoa et l., 2023).

The main goal of analyzing the running performance in the first and second half is to identify the strengths and weaknesses of one's team, which allows to make a technical-tactical plan for the next game (Han et al., 2022). Knowing the structure of the game means understanding the different phases and subphases of the game and the positions of individual players, is the basis for recognizing specific situations in the game. The course of the game consists of numerous phases and transitions from the phase of attack to the phase of defense, and the players are obliged to see them, understand them and solve the tasks in the game using appropriate technical-tactical programs (Sporis et al., 2012). These relationships are also influenced by contextual variables (CV)

such as match location, opponent level and match outcome (Barrera et al., 2021).

The efficiency in the football game depends on a various number of factors: the location and time of the game, the technical and performance level of the opposing team, the status and ranking of the teams (Jones et al., 2019; Castellano et al., 2012; Sporis et al., 2012). A number of studies have focused on the comparison and analysis of some technical and physical parameters between the environments developed on home ground or away, highlighting a superiority regarding the number of passes, possession and the number of actions in the case of home matches (Liu et al., 2016; Teixeira et al., 2021; Torres-Ronda et al, 2015).

Within the match analysis area, the investigation of the influence of contextual factors on players' and teams' performance has been largely adopted in the literature (Barrera et al., 2021; Fernandez-Navaro et al., 2018). Indeed, factors such as match outcome, venue, and game period have strongly impacted sports performance (Sarmento et al., 2022). For example, it has been shown that away matches led to higher in-width tactical positioning than home matches (Praca et al., 2021; Martín-Moya, 2022). Teams playing home also regained the ball further on the pitch (near the opposing goal) in comparison to away teams (Santos et al., 2017). As teams tend to have higher ball possession when playing at home, (Lago & Martin, 2007) higher values of the team's length in the offensive phase might be expected when playing at home than playing away

Lago-Penas (2012) states in his study that the home field in football has advantages, while the scientific literature points to concrete findings between running performance and match location. The running performance of Spanish and Brazilian players in relation to the location of the match indicates that the total distance covered is significantly greater in away matches compared to matches played at home (García-Unanue et al., 2018; Aquino et al., 2020). On the other hand, Barrera et al. (2021) in their research recorded a greater total distance ran in matches played at home compared to matches played away (10,208 and 9,470 m, respectively). In contrast, studies conducted by (García-Unanue et al., 2018; Aquino et al., 2020) reported similar high-intensity distance covered values regardless of match location.

The monitoring of the physical and technical performances of football players through modern and specialized informational technologies should be carried out in correlation with the sports contextual factors, with those of the environment and the situational variables. The present study aims to identify the impact that the location of the matches can have it on the motor capacity focusing on the running distance of football players.

This is the first study that monitors running performance during a match in the first Telekom Montenegrin League. In this study, we assumed that examining the differences in the mentioned variables in different matches could provide a useful and practical report to coaches in Montenegro.

Therefore, this study aimed to investigate the trends of running in relation to the structure of the game in the offensive and defensive phases of professional football players on home and away grounds in Montenegro in three competitive matches of different seasons.

Materials and Methods

Participants

The research included a sample of 82 professional football players. The first subsample included 44 professional football players of the football club Budućnost from Podgorica, height 185.89 ± 6.29 cm, mass 81.06 ± 5.47 kg, BMI 23.47 ± 0.96 kg/m², age 28.86 ± 3.85 yrs. The second subsample included 38 professional football players from the Sutjeska football club from Nikšić, height 181.88 ± 6.35 cm, mass 77.28 ± 6.78 kg, BMI 23.32 ± 1.08 kg/m², age 29.43 ± 5.68 yrs. All football players compete in the first Telekom Montenegrin league, the highest competitive rank in Montenegro. The study is longitudinal in nature, and testing was done in three seasons: 2014/2015, 2016/2017, and 2019/2020, where derby matches between Budućnost and Sutjeska were observed each season.

The criteria for inclusion were that the first team's players had been team members for at least six months, that all the players went through the preparation period with the team, were without injuries in the previous six months, and that they played one half-season before testing. Exclusion criteria were athletes in the recovery phase from some form of acute or chronic injury and athletes who did not complete the entire preparation period. All respondents were first informed about the study and the purpose and goal of the research; the possible consequences were explained to them. Also, the procedure and the course of the testing itself were explained to the respondents.

Prior to the survey, each respondent signed a consent form to participate. The research was in accordance with the Declaration of Helsinki (World Medical Associations, 2013), and approved no 07 / February 22, 2022, by the Review Board of the Sport Performance, Transilvania University of Brasov, Romania. For this research, the consent and approval of the head coach and the club president were obtained, and testing was started.

Research Design

InStat Kinematic System – Currently, various video-based systems track performance indicators of football players (InStat, Optasport, Wyscout). Such platforms quickly and accurately provide a large range of match-related performance measures, allowing the simultaneous analysis of the physical efforts, movement patterns, and technical actions of players, both with and without the ball (Modric et al., 2019). The match performance indicators for each player were determined by the position-specific InStat system. The InStat tracking system was previously employed to analyze the association between running performance

and game performance indicators in professional football players (Liu et al., 2016). The InStat kinematic system captured the outfield players using six cameras placed around the perimeter of the field at the minimal height of 12 m. The frame frequency was 25 frames per second; data were centralized for further analysis. InStat Autocrop allows filming matches without a cameraman. The footage covered every player on the field. There is minimum human involvement in the process; a person is only needed to set up a panoramic camera at the required height, connect it to a computer, and check the Internet connection before the start of the match. An Autocrop camera is set at a height of 8–10 meters and 23–24 meters away from the sideline. A special algorithm allows the camera to cover the entire field. The program analyzes every frame and centers the image depending on the players' positions, without any sudden zooming. The following parameters of running performance were selected to estimate the match performance of players: total distance covered per match and during each half (m), the average speed per match and during each half (km/h), maximal speed (km/h); the total distance covered at high-intensity (m) (speed range 19.8–25.2 km/h) per match and for each half, the total distance covered sprinting (m) (speed above 25.2 km/h) per match and for each half, and the number of sprints.

The speed thresholds for each category are similar to those reported previously (Modric et al., 2019) and have been universally accepted. CV includes:

(i) the outcome of the match;
(ii) the opponent's level;
(iii) match location.

The outcome of the match was evaluated by victory, draw or defeat. The opponent level included the division of teams into higher-ranked teams versus lower-ranked teams. Opponents were considered "higher ranked" when the observed team played against teams that were positioned from 1st to 5th place in the table at the time of the match. On the other hand, the opponents were considered "lower ranked" when the observed team played against teams that were positioned from 6th to 10th place in the table at the time of the match (let's note that the Telekom division of the Montenegrin League consists of a total of 10 teams). The match location was coded as "home" when the team played at home and "away" when the team played away (Jerkovic et al., 2022).

In the 2014/15 season, FC Budućnost played in the 1-4-2-3-1 system. In the 2016/17 and 2019/2020 seasons, FC Budućnost had different coaches, but the game system remained the same in both seasons. On the other hand, FC Sutjeska had different coaches in all three analyzed seasons. In the 2014/15 season they played in a 1-4-4-2 system, while in the 2016/17 and 2019/2020 seasons they played in a 1-4-2-3-1 system. What is important to state is that most of the coaches in the first Telekom Montenegrin League play in the 1-4-2-3-1 system.

The first analyzed game in the 2014/15 season was played in the 7th round. Budućnost was ranked 4th in the table, while the Sutjeska team took 5th place in the table. In the 2016/17 season, the analyzed match was played in the 8th round. Budućnost was first in the table, while Sutjeska team was ranked 4th. The third analyzed game in the 2019/20 season was played in the 8th round. Buducnost team was ranked 1st in the table, while Sutjeska team took 2nd place in the table. The goal difference, the number of goals scored and conceded for both teams, is shown in table 1. Also, the total number of points won for each season played before the implementation of the test is shown.

Table 1.
Gol difference between football club

Seasons	Team	GF	GA	GD	PTS
2014/15	Budućnost	8	6	2	7
	Sutjeska	8	9	-1	7
2016/17	Budućnost	12	4	8	19
	Sutjeska	6	5	1	10
2019/20	Budućnost	16	7	9	16
	Sutjeska	14	5	9	14

Statistical Analysis. All data collected through research were processed with descriptive and comparative statistics. Regarding descriptive statistics, mean and standard deviation were calculated for each variable. The normality of the distribution of the variables was derived through two procedures: the asymmetries of the skewness results and the homogeneity of the kurtosis results. Regarding comparative statistics, a discriminant parametric procedure was used: analysis of variance with one-factor Anova and PostHoc, which determined the differences in running performance every year separately. The statistical program for personal computers SPSS for Windows version 26.0 was used for data processing.

Results

Table 2 shows the descriptive parameters in relation to the structure of the game in the attack and defense phases for three different time periods in which the tests were carried out. The results of skewness and kurtosis showed that there is symmetry and homogeneity of the results. The distribution of the results was normal (Tabel 2).

Table 2.
Descriptive parameters in relation to the structure of the game in the attack and defense phases for three different time periods

Variables	Team	Game phase	2015 Mean±SD	2017 Mean±SD	2020 Mean±SD
TD (m)	Sutjeska	In defense	2562.25±906.24	2606.57±1112.57	1886.31±1017.7
		In attack	3468.08±1295.52	2248.21±923.56	2396.19±1231.05
	Budućnost	In defense	3195.64±1566.08	2365.5±1021.22	3351.58±985.65
		In attack	2128.21±990.87	2548.86±1152.28	2272.92±612.02
	Sutjeska	In defense	605.75±227.71	665.71±273.31	446.31±247.30

WD (m)		In attack	961.5±324.84	606.57±244.5	663.06±350.55
	Budućnost	In defense	795.57±383.97	571.57±272.13	838.33±239.43
		In attack	569.07±311.72	688.14±334.28	682.58±194.52
	Sutjeska	In defense	1064.58±427.72	1110.86±546.4	815.31±496.77
JD (m)		In attack	1563.25±606.88	972.93±446.08	1067.56±591.97
	Budućnost	In defense	1445.43±747.95	1018.21±468.47	1494.25±550.33
		In attack	863.07±427.72	1081.5±504.2	939.67±324
	Sutjeska	In defense	537±290.52	533.21±286.5	402.75±264.16
RD (m)		In attack	641.67±356.35	453.57±239.84	462.94±274.77
	Budućnost	In defense	628.50±363.73	498.57±308.35	680.67±305.08
		In attack	413.86±268.08	479.71±293.43	413.25±166.81
	Sutjeska	In defense	334.08±192.16	237.50±116.37	193.81±137.14
HSRD		In attack	340.73±156.69	179.21±133.71	181.38±116.06
(m)	Budućnost	In defense	301.14±199.06	237.86±146.65	301.67±140.04
		In attack	247.5±225.38	224.71±166.73	193.17±101.76
	Sutjeska	In defense	49.56±42.50	63.17±60.31	34.62±22.99
SD (m)		In attack	57.63±33.28	41.67±46.17	31.27±23.41
	Budućnost	In defense	38.89±20.121	45.83±30.17	44.10±39.56
		In attack	60.89±67.65	105.10±92.22	58.22±47.56

TD-total distance; WD-walk distance; JD-jog distance; RD-run distance; HSRD-high speed runs distance; SD-sprint distance.

Anova shows a statistically significant difference ($p<0.05$) in certain variables for all three years in which testing was carried out (Table 3). The analysis of the results showed that in 2015 Sutjeska players achieved higher values in the Total distance variable (3468.08±1295.52) on the home field compared to Budućnosti players (F=3.218, $p<0.31$) in the attack phase, while no statistically significant difference was recorded in the defense phase. Also, Sutjeska players achieved higher values in the Walk distance variable (961.5±324.84, F=4.076, $p<.012$) as well as in the Jog distance variable in the attack phase (1563.25±606.88, F=4.055, $p<.012$) at home field. Compared to 2015, in 2017 a statistically significant difference was recorded in the Sprint distance variable (105.10±92.22, F=2.491, $p<.053$) in favor of the Buducnost footballers in the attack phase at home field (Tabel 3).

Unlike the previous two years, in 2020, differences were recorded in almost all variables. It is interesting to point out that the differences were recorded in the defense phase at home, while no statistically significant differences were recorded in the attack phase. Thus, the value of (3351.58±985.65, F=4.976, $p<.004$) was recorded in the Total distance variable in the defense phase for the players of Budućnost, in the Walk distance variable (838.33±239.43, F=5.017,

$p<.004$), in variables Jog distance (1494.25±550.33, F=4.378, $p<.008$). In the Run distance variable, a value of (680.67±305.08, F=3.145, $p<.033$) was recorded, while in the High-speed runs distance variable, a value of (301.67±140.04, F=2.576, $p<.054$) was recorded (Tabel 3).

Table 3.
Differences of performance running in defense and attack in match location

	Team	Game phase	2015 Mean±SD	2017 Mean±SD	2020 Mean±SD	Anova (F) 2015	Anova (F) 2017	Anova (F) 2020	Sig 2015	Sig 2017	Sig 2020
TD (m)	Sutjeska	Defense	H 2562.25±906.24	A 2606.57±1112.57	A 1886.31±1017.7	3.218	.343	4.976	.03	.79	.004
		Attack	H 3468.08±1295.52†	A 2248.21±923.56	A 2396.19±1231.0						
	Budućnost	Defense	A 3195.64±1566.08	H 2365.58±1021.22	H 3351.58±985.6‡						
		Attack	A 2128.21±990.87	H 2548.86±1152.28	H 2272.92±612.02						
WD (m)	Sutjeska	Defense	H 605.75±227.71	A 665.71±273.31	A 446.31±247.30	4.076	.500	5.017	.012	.684	.004
		Attack	H 961.5±324.84†	A 606.57±244.5	A 663.06±350.55						
		Defense	A	H	H						

	Budućnost		795.57±383.97	571.57±272.13‡	838.33±239.43‡						
		Attack	A	H	H						
			569.07±311.72	688.14±334.28	682.58±194.52						
JD (m)	Sutjeska	Defense	H	A	A						
			1064.58±427.72†	1110.86±546.4	815.31±496.77						
		Attack	H	A	A						
			1563.25±606.88†	972.93±446.08	1067.56±591.97	4.05	.223	4.37	.01	.88	.008
	Budućnost	Defense	A	H	H						
			1445.43±747.95	1018.21±468.47	1494.25±550.3‡						
		Attack	A	H	H						
			863.07±427.72	1081.5±504.2	939.67±324						
RD (m)	Sutjeska	Defense	H	A	A						
			537±290.52	533.21±286.5	402.75±264.16						
		Attack	H	A	A						
			641.67±356.35	453.57±239.84	462.94±274.77	1.440	.196	3.145	.24	.89	.033
	Budućnost	Defense	A	H	H						
			628.50±363.73	498.57±308.35	680.67±305.08‡						
		Attack	A	H	H						
			413.86±268.08	479.71±293.43	413.25±166.81						
HSRD (m)	Sutjeska	Defense	H	A	A						
			334.08±192.16	237.50±116.37	193.81±137.14						
		Attack	H	A	A						
			340.73±156.69	179.21±133.71	181.38±116.06	.604	.535	2.576	.61	.66	.054
	Budućnost	Defense	A	H	H						
			301.14±199.06	237.86±146.65	301.67±140.04‡						
		Attack	A	H	H						
			247.5±225.38	224.71±166.73	193.17±101.76						
SD (m)	Sutjeska	Defense	H	A	A						
			49.56±42.50	63.17±60.31	34.62±22.99						
		Attack	H	A	A						
			57.63±33.28	41.67±46.17	31.27±23.41	.426	2.491	1.281	.73	.05	.293
	Budućnost	Defense	A	H	H						
			38.89±20.121	45.83±30.17	44.10±39.56						
		Attack	A	H	H						
			60.89±67.65	105.10±92.22‡	58.22±47.56						

TD-total distance; WD-walk distance; JD-jog distance; RD-run distance; HSRD-high speed runs distance; SD-sprint distance. †Sutjeska; ‡Budućnost. Match location: H-home; A-away.

Discussion

The goal of the research was to investigate the trends of running in relation to the structure of the game in the attack and defense phases of professional football players on home and away fields in Montenegro in three competitive matches of different seasons. The advantages of the home field in football have been discussed in detail (Barrera et al., 2021; García-Unanue et al., 2018; Lago et al., 2010; Konefał et al., 2020; Chmura et al., 2021). However, these studies do not provide consistent evidence on running performance and match location. Our study indicated some contrasting findings compared to previously cited studies. Specifically, we recorded a significantly higher total distance, walk distance and jog distance in the attacking phase on the home field in 2015 in favor of Sutjeska players. Previous studies have demonstrated greater total running distance on home field, which is consistent with the results of our study, but did not analyze the differences between submaximal and maximal intensities (Barrera et al., 2021; Aquino at al., 2020; Lago et al., 2010). Compared to 2015, in 2017, a statistically significant difference was recorded in the Sprint distance variable in favor of Budućnosti footballers in the attack phase on the home field. These results indicate that better quality football players achieve a greater number of sprints compared to lower quality football players. Therefore, players of higher quality have superior technical-tactical qualities (Yang et al., 2018; Collect, 2013), on the other hand, defensive players of quality teams are constantly involved in offensive actions. Such actions require their deeper positioning in the opponent's half of the field (Modrić et al., 2020), where defenders consequently leave larger spaces behind. Taking into account that after losing the ball in the attack phase, a rapid offensive transformation of the opposing team immediately follows (Hewitt et al., 2016), and this is the reason why defenders use higher running speeds - sprints, in order to surpass opposing players and successfully defend their proctor (Modrić et al., 2020). It is these statements that explain the greater number of sprints.

In 2020, there were differences in the variables Total distance, Walk distance, Jog distance, Run distance, and High speed runs distance on the home field in favor of Buducnosti players in the defensive phase of the game. One of the strongest findings in the current study comes from the analysis of RP in the defensive phase of the game (ie, when the opponent has the ball). Specifically, our results show that players in the defensive phase of the game achieved higher RP in all analyzed variables. According to the study (Lago, 2009), players like to use ball possession strategies, because such increased activity of most soccer players in the defensive phase of the game is a consequence of their collective attempts to regain possession of the ball (Bradley et al., 2013). The strategy of having more possession of the ball enables better performance of technical-tactical performances (Bradley et al., 2013), which are considered crucial for success in professional soccer (Lago-Penas et al., 2011).

In relation to the results in our study, the study that implemented parameters of submaximal and maximal intensity (Jerkovic et al., 2022) with Croatian football players did not find significant differences in High- speed runs distance and sprint distance between away and home fields. Unlike them, Oliva-Lozano et al. (2021), in their study conducted with professional players competing in LaLiga state that the values of High-speed runs distance are higher in matches played at home, which is in agreement with our results. On the other hand, the results of our study are justified by researches (Chmura et al., 2021; Zhou et al., 2019) which state that the influence of the advantage in matches played at home mainly occurs in technical activities and not in physical ones.

The amount of high-speed running is what distinguishes top-class players from those at a lower level. Computerized time-motion analysis has demonstrated that international top-class players perform 28% more high-intensity running (2.43 vs. 1.90 km) and 58% more sprinting (650 vs. 410 m) than professional players at a lower level (Mohr et al., 2003). The results of our study indicate a deficiency in the most significant running performance (high speed run distance and sprint). In 2017 alone, there was a slight increase in the number of sprints in the attack phase by the players of Budućnost on the home field (105.10±92.22). Also, our results indicate a decreasing trend in high speed runs distance both in the attack phase and in the defense phase for both teams. In relation to our results, Ingebrigtsen et al. (2012), found that top teams in the Danish League covered 30–40% more high-speed running distance compared to the middle and bottom teams. In contrast, Di Salvo et al. (2013), observed that Championship players did more high-speed running and sprinting than players in the Premier League, even though the differences were small. Along the same lines, a study comparing the match performance of players in the top three competitive standards of English football found that players in the second (Championship) and third (League 1) categories performed more high-speed running (>19 km/h) than those in the Premier League (803, 881, and 681 m, respectively), which was also the case for sprinting (308, 360, and 248 m). In contrast, football players perform significantly less high-intensity activities when they win than when they lose or when the result is a draw. Also, if the players score a goal in the early phase of the match, they do not use the maximum of their capacities during the match. Since winning is a pleasant situation for the team, it is possible that the players have set a strategy of keeping the ball, which results in fewer sprints (Goranović et al., 2022).

This study analyzed running performance and contextual variables in the offensive and defensive phases of the game, which provides insight into the assessment of teams' tactical behavior. The researchers investigated the place of the matches (playing at home and away) on the tactical behavior of the teams. Some of the previous research shows that away teams return the ball and position their defensive

line close to their goal (Santos et al., 2017) which increases their running performance in the defensive phase and decreases it in the attacking phase compared to home games (Taylor et al., 2008) which is consistent with the results of our study. These statements are confirmed by the research carried out by Almeida et al. (2014), in which it is stated that the location of the match is one of the contextual variables that also influence tactical behavior in football. Match outcome was the contextual variable that show the highest impact on players' tactical behavior. Winning teams tend to present higher frequencies of shots, ball touches, passes, and accurate passes. At this point, a previous study showed tendencies of a more offensive playing style when winning, characterized by a more in-length and wider tactical positioning (Santos & Lago-Penas, 2019). For example, losing teams tend to defend in attacking zones increasing possession and distance covered compared to winning teams. Covering large distances during football matches requires a special level of physical fitness from the players to facilitate the numerous accelerations, decelerations, changes of rhythm and direction specific to the game and the current dynamics in professional football (Martín Barrero et al., 2022; Enes et al., 2021; Tuo et al., 2019). The studies revealed the quantitative and qualitative aspects concerning the distances covered by the players corroborated with the other physical, functional, technical and tactical parameters represent important indicators in the efficiency of football training (Morina et al., 2021; Gonçalves et al., 2018; Manescu, 2013; Manolache , 2019; Soyal et al., 2023).

The limitations of this study are that only two football clubs from the first Telekom Montenegrin league were analyzed. Nevertheless, these two clubs are the most trophy-winning in the Montenegrin league, so they are included in the analysis. A relatively small number of matches were analyzed, with a limited sample of players without certain playing positions. However, this is a very common obstacle in studies involving players who compete in high-level soccer. Future studies are recommended to enlarge the database. Such studies might be more suitable for detecting evolutionary trends in match-related variables. On the other hand, this is the first study which analyzed RP and CV in Montenegrian football players. Additionally, the data were collected during official games, among professional players, and at the highest national competitive level. Despite the evident limitations, the authors believe that this study may contribute for understanding RP in Montenegrian football players and initiate further research.

Sports scientists and performance analysts use data on match running performance to mainly aid coaches and practitioners in decision making processes for structuring the elements of training and subsequent match preparation (Modrić et al., 2023; Garcia Ramos et al., 2023; Jerez Mayorga et al., 2023). This research suggests two main practical applications. Firstly, reaching the most elite soccer match play require increased efforts when opponent have the ball in possession (i.e., defensive phase of game) for all players. Therefore, physical conditioning programs need to be adapted accordingly, with special emphasize on training drills based on re possession of the ball. Secondly, as that overall physical performance in highest-level soccer is not related to the playing standard, while highest-level soccer is physically highly demanding, optimal physical preparation should be ensured for all players competing in soccer irrespective playing in higher- or lower-standard teams.

Conclusions

The conclusion of this study provided information on performance in Montenegrin soccer, which could consequently improve the applicability of running performance in training and competitions. Statistically significant differences were obtained in all three years in running performance and contextual variables. Our results indicate a decreasing trend in high speed runs distance both in the attack phase and in the defense phase for both teams. Based on the obtained results, the coaches will be advised in which direction the training process should go in order to increase the performance of Montenegrin elite football players.

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Conflict of interest

The authors declare no conflict of interest.

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