

ORIGINAL SCIENTIFIC PAPER

Differences in Running Performance of Football Players Compared to Higher- and Lower-Ranked Opposing Teams in the Montenegrin First League

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Abstract

Match running performance (MRP) of football players is one of the most frequently analyzed parameters in modern football. However, it remains unclear whether MRP depends on the quality of the opponent. This longitudinal study aimed to determine whether there are differences in the running performance of football players based on the quality of the opposing team. The performance of the FK Buducnost (Podgorica) team was analyzed over ten league matches, five against top-ranked teams and five against teams from the lower half of the Montenegrin First League table during the 2022/23 season. Using Global Positioning System Technology (GPS; K-Sport Universal, Montelabbate, Italy), various movement parameters were examined, including distance at high-intensity speed (14–19 km/h), distance at very high-intensity speed (19–25 km/h), distance at sprinting speed (>25 km/h), total distance, number of sprints, distance at very high acceleration (>3 m/s²), distance at very high deceleration (<-3 m/s²), distance per minute, maximum speed, number of accelerations (>3 m/s²), number of decelerations (<-3 m/s²), average heart rate (HR average), and maximum heart rate (HR max). An independent Student's t-test showed no significant differences between the groups in any parameters, indicating that MRP did not vary based on the quality of the opposing team. The findings suggest that players maintain a similar level of running performance regardless of whether they compete against stronger or weaker teams within the same competition level. Future research should further explore differences in relation to the competition level of football players.

Keywords: match running performance, soccer, opponent ranking, physical fitness, high-speed running

Introduction

The physical demands of modern football have significantly increased in recent years, and this trend continues to rise. Competitive football requires players to perform a variety of actions during a match, such as running, sudden stops, jumping, turning, and changing direction (Drust, Atkinson, & Reilly, 2007). To successfully meet these challenges, players must possess a high level of physical fitness, enabling them to execute different types of movements at high intensity while delaying the onset of fatigue (Dittrich, da Silva, Castagna, de Lucas, & Guglielmo, 2011; Rampinini, Coutts, Castagna, Sassi, & Impellizzeri, 2007).

The physical fitness of football players has been widely studied, often through assessments of motor performance, and more recently through real-match conditions by analyzing match running performance (MRP) (Ehrmann, Duncan, Sindhusake, Franzsen, & Greene, 2016; Kubayi & Toriola, 2020; Morgans, Orme, Bezuglov, & Di Michele, 2023). The application of Global Positioning System (GPS) technology has further advanced performance analysis, al-



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lowing for the precise collection of data on players' movement during matches, including total distance covered, distance covered at various speeds, number of accelerations and decelerations, and more (Aquino et al., 2020).

The running performance of football players has become a focal point of research in recent years (Mohr, Krustrup, & Bangsbo, 2003; Paul, Bradley, & Nassis, 2015). Analyses of match demands reveal that a footballer performs between 1,000 and 1,200 movement changes per match, translating to one change every 5 to 6 seconds. These movements typically include walking (25%), low-speed running (37%), submaximal running (20%), sprinting (11%), and backward running (7%) (Di Salvo et al., 2007; Marković & Bradić, 2008). During a football match, professional players cover a distance of between 9 and 14 kilometers, with 5-15% of that distance involving high-intensity running (Modrić, Veršić, Morgans, & Sekulić, 2023). According to Marković and Bradić (2008), players perform a sprint approximately every 90 seconds, with each sprint lasting between 2 and 4 seconds. Notably, most of these sprints last only 1 to 2 seconds and cover distances of 5 to 10 meters, with a total of 100 to 200 sprints per match. These findings emphasize the importance of the anaerobic alactic (phosphagen) energy system, particularly during initial bursts and accelerations.

Recent studies on MRP have focused on various factors that may influence these indicators. Some key research has examined differences in MRP between teams from top European leagues and those from lower-quality leagues (Modric et al., 2023), while other studies have analyzed how MRP can affect match outcomes (Modrić et al., 2022; Teixeira et al., 2021) or how it is influenced by tactical formations and team setups (Aquino et al., 2017). Additionally, researchers have explored the relationship between MRP and players' aerobic capacity (Metaxas, 2021; Modric, Versic, & Sekulic, 2021).

When it comes to differences among football players of varying ranks, one study investigated disparities in physical fitness between players from leading and average teams (Radaković, Majkić et al., 2025). However, a small number of studies have examined MRP of football players in relation to the quality of the opposing team (Lago, Casais, Dominguez, & Sampaio, 2010; Rampinini et al., 2007; Teixeira et al., 2021). Moreover, no such study has been conducted with professional football players competing in the Montenegrin First League. Therefore, the aim of this study was to determine whether there are differences in football players' running performance based on the quality of the opponent. The findings of this study will contribute to the existing literature on the influence of opponent quality on MRP and provide insight into the current condition of elite Montenegrin football players in this regard.

Methods

Sample and study design

The sample included male football players from the football club FK Budućnost (Podgorica, Montenegro). Data were collected from one team during their 10 group-stage matches—five against top-ranked teams and five against teams from the lower part of the table in the Montenegrin First League during the 2022/23 season. The opposing teams were categorized as top- or low-ranked based on their position in the league standings. Only outfield players were

analyzed, while goalkeepers were excluded from the study (Konefał et al., 2019; Modrić et al., 2021). The players were informed about the aims of the study and provided written consent to participate. The identities of the players and teams were kept anonymous to ensure confidentiality, by the principles of the Declaration of Helsinki. Additionally, this research was approved by the Institutional Board of the Montenegrin Sports Academy.

Procedures

During ten competitive league matches, FK Budućnost players were equipped with portable Global Positioning System (GPS) technology. The GPS devices (K-Sport Universal, Montelabbate, Italy) were securely placed in special vests worn underneath their jerseys and were designed not to interfere with player comfort. This system enables precise tracking of all player activities during the match and has been used similarly in previous research (Rampinini et al., 2015). After each match, all data were extracted using specialized data analysis software (K-Fitness, K-Sport International, Italy).

Variables

Using the described GPS system, numerous movement parameters were analyzed, including high-intensity running distance (14–19 km/h), very high-intensity running distance (19–25 km/h), sprinting distance (>25 km/h), total distance covered, number of long-distance sprints >3 m², very high deceleration (<-3 m/s²), distance per minute, maximum speed, number of accelerations (>3 m/s²), number of decelerations (<-3 m/s²), average heart rate (HR average), and maximum heart rate (HR max). The specified running speed thresholds for football players were determined based on previous research (Katanic et al., 2025; Modrić et al., 2021; Radaković, Katanić, Stanković, Masanovic, & Fišer, 2024).

Statistics

All collected data were subjected to basic descriptive statistical analysis, including the calculation of means and standard deviations. To determine statistically significant differences between groups, an independent samples t-test was applied. Data processing and statistical analyses were performed using IBM SPSS Statistics software, version 26 (SPSS Inc., Chicago, IL, USA). The level of statistical significance was set at p<0.05.

Results

In terms of the distance covered at different speeds (Table 1), there were no significant differences between matches against higher-ranked and lower-ranked teams: for the 14–19 km/h zone (t=-0.009; p=0.993), 19–25 km/h (t=0.100; p=0.923), or sprints >25 km/h (t=0.089; p=0.931). The total distance covered was slightly greater against weaker opponents (10.385.80±627.30 m vs. 10.054.40±537.75 m), but the difference was also not significant (t=-0.897; p=0.396).

Similarly, other parameters such as the number of sprints, distance and number of accelerations and decelerations, maximum speed, as well as average and maximum heart rate values did not differ significantly with respect to the opponent team's ranking.

Variables	Higher-Ranked Opponents	Lower-Ranked Opponents	t	р
14-19 km/h (m)	1489.00±136.98	1489.80±142.03	-0.009	0.993
19-25 km/h (m)	651.20±81.01	657.60±118.65	-0.100	0.923
>25 km/h (m)	159.20±25.98	157.20±42.92	0.089	0.931
Total distance (m)	10054.40±537.75	10385.80±627.30	-0.897	0.396
Num Of Sprints	11.00±1.22	10.40±2.07	0.557	0.593
Dist Accelerations	147.00±9.92	138.00±20.04	0.900	0.394
Dist Decelerations	164.20±12.87	147.40±20.01	1.579	0.153
Dist/min	88.80±5.17	90.80±6.42	-0.543	0.602
Speed Max (km/h)	29.84±0.93	30.20±0.54	-1.623	0.143
Num Accelerations >3	30.60±2.97	28.40±4.67	0.889	0.400
Num Decelerations <-3	49.20±4.44	43.40±5.13	1.912	0.092
HrAverage	136.20±12.56	132.80±10.99	0.456	0.661
HRmax	217.20±4.60	215.00±4.53	0.762	0.468

Table 1. Differences in Movement Performance of FK Budućnost Podgorica Players Compared to Higher- and Lower-Ranked Opposing Teams in the Montenegrin First League.

Discussion

This study investigated whether the running performance of football players varies depending on the competitive level of the opposing team. The main findings of this study indicate that the physical performance of FK Budućnost players did not differ depending on the ranking of the opposing team. These results suggest that the players maintained a consistent level of physical output throughout the matches, regardless of the competitive strength of their opponents.

Our results showed that football players covered approximately the same total distance against higher-ranked opponents as they did against lower-ranked opponents (10,054.40±537.75 m vs. 10,385.80±627.30 m). These data indicate that Montenegrin professional football players covered total distances comparable to those reported in studies of players from Serbia (10,799 m; Radakovic, Katanic, et al., 2025), Croatia (10,298 m; Modric, Versic, Sekulic, & Liposek, 2019), and Spain during the mid-season (10,698 m; Ponce-Bordón, López-Gajardo, Lobo-Triviño, Pulido, & García-Calvo, 2024). This generally corresponds to the well-established fact that football players cover between 9 and 13 km per match (Andrzejewski, Chmura, Pluta, & Konarski, 2015; Gómez Piqueras, González Víllora, Castellano, & Teoldo, 2018) and shows that Montenegrin players competing in the top domestic league are on a similar level to players from other European leagues regarding this parameter.

Furthermore, in high-intensity sprint zones of 19–25 km/h and above 25 km/h, Montenegrin players covered similar distances (651.20±81.01 m vs. 657.60±118.65 m, and 159.20±25.98 m vs. 157.20±42.92 m, respectively). These distances are slightly higher than those recorded among professional footballers in Croatia (461.83 m and 155.89 m; Modric et al., 2019) and slightly lower than those from Serbia (611 m and 488 m; Radakovic, Katanic, et al., 2025), particularly referring to sprinting distances, with Serbian players covering more distance at sprint speed.

The players' maximum running speed averaged 29.84 ± 0.93 km/h against higher-ranked opponents and 30.2 ± 0.54 km/h against lower-ranked opponents. These maximum speeds align with those reported for professional players in the study by Katanic et al. (2025), where

values varied by team position, ranging from 29.34 km/h (8.15 m/s) to 30.53 km/h (8.48 m/s).

When comparing our results with recent studies, we observe that the running performance parameters of Montenegrin players are consistent with those of professional footballers in other European leagues. This indicates that the Montenegrin league is keeping pace with European leagues in this important aspect—player movement performance which provides valuable insight into players' physical fitness.

In our study, HRmax values were slightly higher: 217.20 ± 4.60 bpm in matches against higher-ranked opponents and 215.00 ± 4.53 bpm against lower-ranked teams. Similarly, the average heart rate (HRaverage) was also higher in games against stronger opponents (136.20 ± 12.56 bpm) compared to matches against weaker teams (132.80 ± 10.99 bpm). Although these differences were not significant, certain trends are visible that may suggest that cardiovascular load and match intensity increase with the quality of the opponent. This highlights the importance of cardiovascular endurance in sustaining high-intensity running throughout the match.

The main findings of this study indicate that the physical performance of FK Budućnost players did not differ depending on the quality of the opposing team, meaning that players maintain a similar level of running performance regardless of whether they compete against stronger or weaker teams within the same competition level. Similar to our results, Lago et al. (2010) found no difference in high-intensity running performance in relation to the quality of the opponent. However, they reported that when facing stronger opponents, the reference team covered a greater total distance, as well as greater walking and jogging distances, which were not included in our study. Thus, the only difference compared to our parameters was that their study found a variation in total distance depending on the opponent.

In contrast, our findings differ from those reported by Teixeira et al. (2021), who found that total distance covered, high-intensity running distance, and the number of accelerations/decelerations depended on the quality of the opponent. Additionally, Rampinini et al. (2007) showed that the reference team achieved significantly greater total distance and high-intensity running distance when playing against the strongest teams compared to the weakest ones, although there was no significant difference in very high-intensity running distance.

The findings from these studies indicate a specific physical response of football players depending on the competitive situation and the quality of the opponent. This is particularly important given that high-intensity running plays a crucial role in elite football performance (Krustrup, Zebis, Jensen, & Mohr, 2010; Mohr, Krustrup, Andersson, Kirkendal, & Bangsbo, 2008) and may serve as a discriminating factor between players at higher and lower competition levels (Andersson, Randers, Heiner-Møller, Krustrup, & Mohr, 2010; Nielsen et al., 2004). It is well known that periods of high-intensity exertion during a match place considerable demands on football players, leading to increased activation of the cardiorespiratory system (Krustrup et al., 2006). Therefore, it is essential for players to possess a high level of cardiorespiratory endurance to meet these intense demands.

Nonetheless, the discrepancy between our findings and those of the aforementioned authors may be due to differences in methodology among the studies, as well as the small sample size in our study. This study is limited by the fact that it in-

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Conflict of interest

The authors declare that there is no conflict of interest.

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cluded players from only one club, which may restrict the generalizability of the findings. As such, these results should be interpreted with caution. Additionally, the analysis of movement performance did not take player positions into account. Therefore, a recommendation for future research would be to include a larger sample of football players, preferably from different clubs, and to compare running performance based on playing positions within the team.

Conclusion

This study aimed to determine whether there are differences in football players' running performance based on the quality of the opponent. Based on the analysis of the results, it was determined that there are no differences in movement performance and physical fitness relative to the quality of the opponent. The findings suggest that players maintain a similar level of running performance regardless of whether they compete against stronger or weaker teams within the same competition level. However, future research should further explore differences in relation to the competition level of football players.

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