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Analysis of the Association Between Running Distances and Match Outcomes in Professional Football During the 2022–2023 Season

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Abstract

In this study, it was aimed to evaluate the relationship between the total and different speed running distances travelled by professional football players during the competition and the results of the competition. Twenty-nine official competitions of a team competing in the Turkish professional football third division were evaluated. High intensity running, sprint and total running distances were evaluated from the running distances travelled in the competition, while the competition results were obtained from the official website of TFF. The distances travelled in the competitions were recorded through GPS technologies. Pearson correlation analysis was applied to evaluate the relationship between running distances travelled by football players in competitions and competition results. Our study revealed that the running distances travelled in the competition may be helpful in determining the level of players and the needs of football, but it is not sufficient alone to determine the result of the competition ($p>0.05$). We believe that these results will support to future studies on the similar subject.

Keywords: High Intensity Running, Match Result, Soccer, Sprint, Total Distance.

INTRODUCTION

Football is one of the most popular sports worldwide and is followed with great enthusiasm by a wide audience (Milanović et al., 2015). Modern football has undergone rapid evolution in technical, tactical, and physical aspects, creating the necessity to maximize players' performance. As the pace of the game increases, players' high physical capacity, which relies on transitions between aerobic and anaerobic energy systems, has become critically important. In particular, the distances covered by players during matches, along with the intensity and duration of these efforts, are regarded as key parameters for assessing performance and analyzing match outcomes (Castagna et al., 2006; Bayraktar, 2023).

The integration of technology into sports science—particularly the use of tools such as the Global Positioning System (GPS)—has facilitated in-game performance monitoring for coaches and sports scientists, allowing for a detailed examination of players' movement profiles (Cummins et al., 2013). Through GPS technology, running distances, speed distributions, and physical loads of players during training and matches can be analyzed, thereby guiding training planning and tactical decision-making processes (Zhou et al., 2020).

**This study was derived from the Master's thesis entitled 'Evaluation of the Relationship Between Running Distances and Match Outcomes in Professional Football Matches Played in the 2022–2023 Season', conducted by Seyid Ahmet Hafiz at the Graduate School of Health Sciences, Doku Eylül University.*

Previous research has demonstrated significant associations between the distances covered by football players at different intensities and match outcomes (Di Salvo et al., 2009; Lago et al., 2010; Faude et al., 2012). However, studies on this subject in Turkey remain limited, and performance analyses in lower leagues have been particularly underexplored. The aim of the present study is to analyze the running distances covered by players of Karşıyaka Sports Club's first team in different speed zones during official matches of the 2022–2023 Turkish Football Federation (TFF) Third League season, and to evaluate their relationship with match outcomes.

This study is expected to contribute to the scientific foundation of performance analysis in third-division football matches, providing valuable insights for coaches and sports scientists in their strategic decision-making processes. Furthermore, it is anticipated to guide the development of training programs designed to optimize players' physical performance. By serving as an important reference for the advancement of both professional and amateur football in Turkey, this study also aims to establish a basis for future research.

METHOD

Research Group (Population and Sample)

The population of the study consisted of football players competing in the Turkish Football Federation (TFF) Third League, while the sample comprised professional players of Karşıyaka Sports Club during the 2022–2023 season. This study was approved by the Ethics Committee for Non-Interventional Research at Dokuz Eylül University on October 25, 2023 (decision no: 2023/34-22).

Data Collection Tools

To determine the running speeds and distances covered by the players during official matches, the club-owned GPS system (Fitogether, Korea), capable of transmitting data at 10 Hz, was utilized (Figure 1) (Varley et al., 2012). For the use of GPS, players were equipped with vests (Figure 2), and the GPS units were positioned on the back section of the vests (Figure 3). Immediately after each match, the data were uploaded to an online cloud system (Figure 4). These procedures were performed consistently for all matches.

As previous studies have employed the same speed zones (Modric et al., 2022), the analyses in the present study adopted the five commonly accepted speed zones of the Fitogether GPS system. These zones are as follows:

Table 1. Speed Zones

Zones	Speed Range (km/h)	Description
Zone 1	0 - 7,2	Walking
Zone 2	7,2 - 14,4	Low-speed running
Zone 3	14,4 – 19,8	Moderate-speed running
Zone 4	19,8 – 25,2	High-speed running
Zone 5	> 25,2	Sprint

In this study, the total distance (m), which represents the sum of the five designated zones, as well as Zone 4 high-speed running distance (HSR: 19.8–25.2 km/h) and Zone 5 sprint distance (>25.2 km/h), were utilized. All matches started with 11 versus 11 players, and GPS devices were not used for goalkeepers. Match outcomes were obtained from the official website of the Turkish Football Federation (TFF). GPS match data were provided by the Athletic Performance Unit of Karşıyaka Sports Club. All analyses were performed using a MacBook Air M1 (2020) computer.

Data Collection / Procedure

This study was conducted using a retrospective archival research design. The purpose of the study was to examine the relationship between the running distances covered by professional football players competing in the Turkish Football Federation (TFF) Third League during the 2022–2023 season and the match outcomes (win, draw, loss). The study employed a correlational research model.

The research was carried out between November 2023 and August 2024 at the Necat Hepkon Faculty of Sport Sciences, Dokuz Eylül University. Archival research was conducted, and the data were obtained from the archives of Karşıyaka Sports Club.

Data Analysis

The statistical analyses of this study were performed using SPSS version 29.0. The relationships between the running distances covered by players during matches and the match outcomes (win, draw, loss) were examined using Pearson's correlation analysis. The correlation coefficient was expressed with the letter "r," and values ranging between +1 and -1 indicated the presence of either a positive or a negative relationship.

FINDINGS

Table 2. Zones Average Running Distances Obtained Across All Matches

			Total Distance (m)	High-Intensity Running Distance (m)	Sprint Distance (m)
Match Outcome (N = 29)	Loss (N = 8)	Ortalama ± SS	9906,52±418.67	457,60±64.12	101,89±26.30
		Minimum	9179,60	382,21	62,49
		Maksimum	10463,35	581,66	139,95
	Draw (N = 8)	Ortalama ± SS	9937,56±685,87	485,97±43,28	120,82±11,40
		Minimum	8774,58	429,76	99,93
		Maksimum	10571,39	558,33	136,03
	Win (N = 13)	Ortalama ± SS	10130,96±426,90	499,53±57,51	120,76±20,48
		Minimum	9467,34	415,58	84,15
		Maksimum	11020,19	645,41	149,69

This data table presents the physical performance variables of players (total distance, high-intensity running distance, and sprint distance) according to match outcomes (loss, draw, win). First, regarding total distance, it was observed that players covered the highest average distance in matches won (10,130.96 m), while the lowest was recorded in matches lost (9,906.52 m). A similar trend was identified for high-intensity running distance, with the highest average value reached in winning matches (499.53 m) and the lowest in losing matches (457.60 m). In terms of sprint distance, the highest average was observed in draws (120.82 m), whereas the lowest was recorded in defeats (101.89 m). These findings may reflect strategic behaviors and playing styles that vary depending on match outcomes. For instance, teams striving to secure victory or protect the scoreline may have exerted greater physical effort. Conversely, in matches that ended in defeat, the average values for total distance, high-intensity running, and sprint distances were lower compared to draws and wins. Overall, this table provides a detailed view of the relationship between match outcomes and physical performance, and it may serve as a useful reference for developing team strategies

Table 3. Association Between Total Running Distance and Match Outcomes in Professional Football Players

Correlation			
	Pearson Correlation Coefficient (r)	Significance (p)	N
Correlation Analysis of Total Running Distance and Match Outcomes in Professional Football Players	,199	190	29

Pearson correlation analysis was performed to evaluate the relationship between the total distance covered by players during matches and match outcomes. The correlation

coefficient was r = 0.199 with a significance value of p = 0.300 (> 0.05), indicating a weak positive but non-significant relationship between the two variables.

Table 4. Association Between High-Intensity Running Distance and Match Outcomes in Professional Football Players

Correlation			
	Pearson Correlation Coefficient (r)	**Significance (p)**	**N**
Correlation Analysis of High-Intensity Running Distance and Match Outcomes in Professional Football Players	,305	,107	29

Pearson correlation analysis was conducted to evaluate the relationship between the total distance covered by players during matches and match outcomes. The correlation coefficient was r = 0.199 with a significance value of p = 0.300 (> 0.05), indicating a weak positive but non-significant relationship between the two variables.

Table 5. Association Between Sprint Distance and Match Outcomes in Professional Football Players

Correlation			
	Pearson Correlation Coefficient (r)	**Significance (p)**	**N**
Correlation Analysis of High-Intensity Running Distances and Match Outcomes in Professional Football Players	,348	,065	29

Pearson correlation analysis was conducted to evaluate the relationship between sprint distances covered by players during matches and match outcomes. The correlation coefficient was r = 0.348 with a significance value of p = 0.065 (> 0.05), indicating a positive but non-significant relationship between the two variables.

DISCUSSION AND CONCLUSION

In this study, the relationship between the total and speed-specific running distances covered by professional football players competing in the Turkish Football Federation (TFF) 3rd League and match outcomes (win, draw, loss) was investigated. The findings revealed that total running distance, high-intensity running distance, and sprint distance did not have a statistically significant effect on match outcomes (p > 0.05). However, the near-significant association between total sprint distance and victory supports the frequently emphasized notion in the literature regarding the importance of high-intensity actions for success. Our findings partially overlap with previous studies. For example, Aquino et al. (2017) reported that winning teams in the Brazilian 3rd League covered greater total and high-intensity distances compared to losing teams. Similarly, Castellano et al. (2011) found that losing teams accumulated more high-intensity running and sprint distances than winning teams, which may be explained by the effort of trailing teams to regain dominance in the game.

Conversely, other studies such as Hoppe et al. (2015) and Jerkovic et al. (2022) emphasized the limited impact of running distances on match outcomes. Hoppe et al. (2015) reported that in the German Bundesliga, running performance was related to ball possession time but insufficient to determine victory. Jerkovic et al. (2022) observed that in the Croatian League, winning teams covered less total distance than losing teams, with high-speed running distances showing no significant differences.

Technical and tactical performance appears to play a more decisive role in determining match outcomes than physical performance. Rumpf et al. (2017) demonstrated that during the 2014 FIFA World Cup, technical performance was the most critical determinant of match results. Similarly, Bilgin and Müniroğlu (2022) highlighted that in the 2018 FIFA World Cup, total and high-intensity running distances did not differentiate winners from losers, underscoring the decisive role of technical and systemic approaches.

Studies conducted in Turkish football also support this perspective. Polat and Gürkan (2020) reported that the championship-winning team in the Turkish Super League covered the lowest distances in the high-speed running category, suggesting that running performance alone does not determine success. Likewise, Klemp et al. (2022) emphasized the absence of a strong relationship between running performance and team success.

The findings of this study indicate that while running performance is an important parameter in evaluating match performance, it is not a stand-alone determinant of outcomes. Technical, tactical, and strategic factors appear to be more critical in influencing football performance. Therefore, it is suggested that coaches and sports scientists evaluate running distances in conjunction with technical and tactical analyses to adopt a more holistic approach for optimizing on-field success.

Taken together, the results of the present and previous studies suggest that running distances alone are insufficient as indicators of match outcomes, which further supports the findings of our research. Although running performance may not directly determine results, it does represent physical capacity, highlighting the necessity for players and teams to maintain a certain running ability. Moreover, tactical and technical competencies also influence match outcomes. Importantly, our study is among the few to evaluate running distances on a team-based level, thus contributing to the literature and providing additional support for studies that argued against the decisive role of running performance in determining match results.

In conclusion, the present study found no significant relationship between total running distances and match outcomes ($p > 0.05$), no independent effect of high-intensity running distances on match outcomes ($p > 0.05$), and no independent effect of sprint distances on match outcomes ($p > 0.05$). Based on these findings, it can be suggested that while running distances at different intensities can be useful in determining player levels and the physical demands of football, they should not be considered as stand-alone determinants of match outcomes.

RECOMMENDATIONS

- It is considered that running performance alone is not a definitive indicator of overall performance, but rather should be evaluated in conjunction with technical, tactical, and psychological factors as a whole.
- A review of previous studies indicates that technical and tactical components are more decisive than running performance. Therefore, it is recommended that greater emphasis be placed on technical and tactical training during the planning of training programs.
- Additionally, based on the findings and results, it was observed that teams covered greater distances in matches that were won. Integrating conditioning parameters with technical and tactical components in training plans may therefore enhance overall team performance.
- For future research, it is suggested that multiple teams be examined and comparative analyses be conducted with opposing teams.

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CONTRIBUTION RATE	***EXPLANATION***	***CONTRIBUTORS***
Idea or Notion	*Form the research hypothesis or idea*	Seyid Ahmet HAFIZ, Senol YANAR, Cansu COBAN
Design	*To design the method and research design.*	Seyid Ahmet HAFIZ, Cansu COBAN
Literature Review	*Review the literature required for the study*	Seyid Ahmet HAFIZ, Senol YANAR, Cansu COBAN
Data Collecting and Processing	*Collecting, organizing and reporting data*	Seyid Ahmet HAFIZ, Cansu COBAN
Discussion and Commentary	*Evaluation of the obtained finding*	Seyid Ahmet HAFIZ, Senol YANAR, Cansu COBAN

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Statement of Conflict

Researchers do not have any personal or financial conflicts of interest with other people and institutions related to the research.

Statement of Ethics Committee

This research was conducted with the decision of Dokuz Eylul University Ethics Committee numbered 2023/3422