

# The Effect of Match Running on Team Success in Professional Soccer

## Profesyonel Futbolda Maç Koşu Performansının Takım Başarısına Etkisi

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### ABSTRACT

This study aimed to examine match running performance (RP) in professional soccer teams in terms of success variables. A total of 626 observations obtained via a multicamera tracking system (InStat Ltd.) from a total of 323 matches played by 19 teams in the Turkish Super League (TSL) during a season were analyzed. The success of the teams was examined as two different independent variables: i) according to the end-of-season final table ranking (1st rank: the first five teams that have qualified for the European League; 2nd rank: the second rank five teams; 3rd rank: the third rank five teams; and 4th rank: the four relegated teams). ii) According to the match outcome (win, draw, loss). The RP variables included total distance (TD), covered distance in five speed zones (walking, jogging, running, high-speed running (HSR) and sprinting), high-intensity acceleration (HIA) and maximum acceleration. ANOVA and post hoc tests revealed that 1st-rank teams were significantly more common in running, HSR, sprinting and acceleration ( $p < .05$ ). There was no difference between the TD groups ( $p > .05$ ). The TD, walking sprinting and max. acceleration values of the winning teams were greater ( $p < .05$ ). The short-term success goal for teams is to win a match or score a point, and the long-term goal is to be at the top of the final table in the season. Therefore, the current research revealed that high-intensity RPs and high intensity acceleration in matches are especially decisive in the success of teams.

**Keywords:** Soccer, match analysis, running performance, high-intensity, acceleration, speed zone

### Öz

Bu çalışma, profesyonel futbol takımlarında maç koşu performansını (KP) başarı değişkenleri açısından incelemek amacıyla yapılmıştır. Çalışmada bir sezon boyunca Türkiye Süper Ligi'nde (TSL) 19 takımın oynadığı 323 maçtan çoklu kamera izleme sistemi (InStat Ltd.) ile elde edilen toplam 626 gözlem analiz edilmiştir. Takımların başarısı iki farklı bağımsız değişken olarak incelenmiştir: i) Sezon sonu final tablosu sıralamasına göre (1. sıra: Avrupa Ligi'ne katılmaya hak kazanan ilk 5 takım; 2. sıra: ikinci sıradaki 5 takım; 3. sıra: üçüncü sıradaki 5 takım; ve 4. sıra: küme düşen 4 takım). ii) Maç sonucuna göre (galibiyet, beraberlik, mağlubiyet). KP değişkenleri arasında toplam mesafe (TD), beş hız bölgesinde (yürüyüş, jog, koşu, yüksek hızda koşu (HSR) ve sprint) kat edilen mesafe, yüksek yoğunluklu hızlanma (YYH) ve maksimum hızlanma yer almaktaydı. ANOVA ve post hoc testleri, 1. sıradaki takımların koşu, HSR, sprint ve hızlanma alanlarında önemli ölçüde daha yaygın olduğunu ortaya koydu ( $p < ,05$ ). TD grupları arasında fark bulunmadı ( $p > ,05$ ). Kazanan takımların TD, yürüyüş sprint ve maksimum hızlanma değerleri daha yüksekti ( $p < ,05$ ). Takımlar için kısa vadeli başarı hedefi bir maçı kazanmak veya puan almakken, uzun vadeli hedef ise, sezon sonunda ligin zirvesinde yer almaktır. Bu nedenle, mevcut araştırma, maçlardaki yüksek yoğunluklu koşu ve yüksek yoğunluklu hızlanma performanslarının takımların başarısında özellikle belirleyici olduğunu ortaya koymuştur.

**Anahtar Kelimeler:** Futbol, maç analizi, koşu performansı, yüksek şiddetli, ivmelenme, hız bölgesi



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## Introduction

The success of teams in soccer depends on increasing the match performance of the players. These improvements are important in terms of technical proficiency, tactical sharpness, and running performance (Aquino et al., 2021; Lago-Penas & Lago-Ballesteros, 2011; Soroka, 2014). Examining the locomotor and mechanical performance of soccer players in both training and matches has been the subject of previous studies. With the influence of technological developments, monitoring the performance of players, especially in high-level teams, has become practical and preferable. Determining the locomotor and mechanical loads of players during a game has enabled a more scientific solution to be produced in the planning of training. GPS and semiautomated computerized tracking systems are very important for technical directors, coaches and athletic performance trainers, as they enable reliable data on both the running and acceleration actions of players in the field of play in terms of distance, number and time.

Most studies on the running distances of players in soccer matches have shown that the importance of high intensity running (HIR) is increasing daily (Di Salvo et al., 2020; Reinhardt et al., 2019). Although the total running distance covered by the players during the match seems similar, we see that the more successful teams have more HSR (19-24 km/h) and sprinting (>25 km/h) distances. Research conducted in the English Premier League over seven seasons from 2006/07 to 2012/13 revealed that across all games, there was a large increase in distance covered at the high speed (24-36%) and sprint levels (36-63%) relative to player positions, although there was little change in TD covered (Barnes et al., 2014; Bush et al., 2022). The increase in speed in soccer games is more clearly observed in seasonal comparisons. A similar increasing trend in high intensity match running performance was also observed in the two top professional leagues in Spain. While TDs decreased in La Liga, significant increases in HIR and sprint distances were observed from old to new seasons (Pons et al., 2021). The distance of HSR is important in soccer, but for an athlete to reach high speed or sprint speed, there is an initial running process and a subsequent process of reaching high speed. The energy requirement spent during the starting process of running is also high. Not every run may reach high speed and be monitored, but this does not mean that energy is not spent during the acceleration phase (Osgnach et al., 2010; Reinhardt et al., 2019). Therefore, when evaluating the match performance of players, acceleration and deceleration variables should also be considered in addition to their running performance. While locomotor requirements are evaluated with respect to running performance, mechanical requirements should be evaluated from acceleration data (Buchheit et al., 2015). Although team success is complex and multifactorial, technical indicators (e.g., ball possession, number of shots, shots on target, number of passes and pass completion rates) can predict team success more accurately than physical indicators can. In addition, the direct effect of physical performance on technical proficiency and its contribution to overall performance should not be ignored (Bush et al., 2022).

When we examine changes in physical performance in long-term season analyses conducted in major tournaments and the top-tier leagues of certain countries, we observe that the game is characterised by a faster style of play. These findings indicate that football has evolved towards players with higher levels of physical performance. However, studies in the literature have primarily focused on physical performance parameters such as total running distance, high-intensity running, acceleration, deceleration and sprint distances in top-tier leagues (Aquino et al., 2021; Di Salvo et al., 2009; Ingebrigtsen et al., 2015; Jerkovic et al., 2022; Modric et al., 2019), and some of these studies have included season-to-season comparisons (Barnes et al., 2014; Morgans et al., 2023; Pons et al., 2021). When examining studies on TSL, either a general analysis was conducted or match results and end-of-season league standings were evaluated primarily in terms of technical skills (Bakır & Müniroğlu, 2020; Coşkuner et al., 2020; Güler et al., 2025; Gürkan, 2023; İmamoğlu et al., 2015; Karaman & Karagözoğlu, 2021), whilst only a small number of studies have focused on physical performance (Bayrak et al., 2025; Polat & Gürkan, 2020). In addition, we believe that it is important to reveal the physical performance levels of teams in terms of the success variable at the end of the season or at the end of a match. For this purpose, we examined the physical performance of teams in the TSL in matches played in the 2022-23 season according to final rankings and match outcomes.

## Methods

### Participants and study design

This study was conducted under non-experimental conditions in which the research problem was embedded (Brito et al., 2016). In this study, 626 observations from all matches of 19 teams in the TSL in the 2022-2023 season were used. The match performances of all players in the matches were evaluated as the match data of the teams. The total RP and HIA of the players in the matches were examined in terms of team success. In the final ranking of the teams, the five teams that succeeded in going to the European cups are grouped as 1st rank, the four relegated teams are grouped as 4th rank teams, the second five teams are grouped as 2nd rank, and the 3rd five teams are grouped as 3rd rank (Table 1). Team success was examined in four

groups according to the end-of-season league ranking: 1st rank (n = 170), 2nd rank (n = 172), 3rd rank (n = 173) and 4th rank (n = 111). According to the match results of the teams, the match was grouped as win, draw and loss. The match outcome was analyzed in three groups: win (n = 240), draw (n = 146), and loss (n = 240). Since the study focused on team success, goalkeeper data were also included, and factors such as a team's absence (red cards, etc.) and the number of substitutions were also ignored. Permission to conduct the study was granted by the InStat Company. Players' and teams' identities were anonymized per the principles of the Declaration of Helsinki to ensure confidentiality. The study was approved by the local Human Research Ethics Committee (Gümüşhane University; Date: December 20, 2024, document no. E-95674917-108.99-301488; protocol no. 2024/10). Restrictions apply to the availability of the data analyzed during the current study considering that it is based on data collected in the context of professional soccer matches and allows all clubs of the league to match data analysis, and no informed consent was required by the Ethics Committee.

**Table 1.**  
**Characteristics of the teams according to the final league ranking in the 2022–2023 Turkish Super League**

| P  | Team                         | Pt | W  | D  | L  | PI |   |
|----|------------------------------|----|----|----|----|----|---|
| 1  | Galatasaray A.Ş.             | 88 | 28 | 4  | 4  | 36 | <b>1st rank: the first five teams that have qualified for the European League</b> |
| 2  | Fenerbahçe A.Ş.              | 80 | 25 | 5  | 6  | 36 |   |
| 3  | Beşiktaş A.Ş.                | 78 | 23 | 9  | 4  | 36 |   |
| 4  | Adana Demirspor A.Ş.         | 69 | 20 | 9  | 7  | 36 |   |
| 5  | Medipol Başakşehir FK        | 62 | 18 | 8  | 19 | 36 |   |
| 6  | Trabzonspor A.Ş.             | 57 | 17 | 6  | 13 | 36 | <b>2nd rank: the second rank five teams</b>                                       |
| 7  | Vavacars Fatih Karagümrük    | 51 | 13 | 12 | 11 | 36 |   |
| 8  | Arabam.Com Konyaspor         | 51 | 12 | 15 | 9  | 36 |   |
| 9  | Yukatel Kayserispor          | 47 | 15 | 5  | 16 | 36 |   |
| 10 | Kasımpaşa A.Ş.               | 43 | 12 | 7  | 17 | 36 |   |
| 11 | MKE Ankaragücü               | 42 | 12 | 6  | 18 | 36 | <b>3rd rank: the third rank five teams</b>  |
| 12 | İstanbulspor A.Ş.            | 41 | 12 | 5  | 19 | 36 |   |
| 13 | Fraport Tav Antalyaspor      | 41 | 11 | 8  | 17 | 36 |   |
| 14 | Demir Grup Sivasspor         | 41 | 11 | 8  | 17 | 36 |   |
| 15 | Corendon Alanyaspor          | 41 | 11 | 8  | 17 | 36 |   |
| 16 | Bitexen Giresunspor          | 40 | 10 | 10 | 16 | 36 | <b>4th rank: the four relegated teams</b>   |
| 17 | Hangikredi Ümraniyespor      | 30 | 7  | 9  | 20 | 36 |   |
| 18 | Gaziantep Futbol Kulübü A.Ş. | 25 | 6  | 7  | 23 | 36 |   |
| 19 | Atakaş Hatayspor             | 23 | 6  | 5  | 25 | 36 |   |

P: Position; Pt: Points; W: Matches Won; D: Matches Drawn; L: Matches Lost; PI: Played Matches

### Data collection & Dependent measures

RP and HIA data were collected via a semiautomatic multiple-camera system, InStat Fitness (InStat Limited, Limerick, Republic of Ireland). This optical system has a sampling frequency of 25 Hz and identifies players by their movement, shape, and color information. The reliability of the system has been demonstrated by comparing the data to those of the Vicon system. This procedure included analysis of the mean velocity difference compared with Vicon (m/s) and the mean position difference (m) compared with Vicon, and the system passed the official International Federation of Football Associations (FIFA) test protocol for Electronic and Performance Tracking Systems (EPTS). A detailed report is available on the official FIFA webpage (Modric et al., 2022b). Finally, previous research has shown that this system is very accurate, with high levels of

absolute and relative reliability (Alexeev et al., 2014; Kubayi & Toriola, 2018; Kubayi, 2019; Modric et al., 2021; Modric et al., 2022a; Modric et al., 2022b). Previous studies used similar threshold classifications of running zones (Di Salvo et al., 2009; Rampini et al., 2007). Specifically, since it is generally accepted that walking (0.2–2 m/s) and jogging (2–4 m/s) are not crucial for successful match performance, some studies consider it the lowest zone (low-intensity running). HIR is typically considered a vital element of success in soccer (Di Salvo et al., 2009). The highest zone was subjected to HIR (HSR (5.5–7 m/s) + sprinting ( $\geq 7$  m/s)). In these studies, low-moderate-high intensity was used in the classification of running thresholds (Di Salvo et al., 2009; Modric et al., 2022b; Rampini et al., 2007).

We considered the TD covered (km) and distance (km) of the RP zones in five speed categories: walking (<7.1 km/h), jogging (7.2–14.3 km/h), running (14.4–19.7 km/h), HSR (19.8–25.1 km/h), and sprinting (>25.2 km/h) (Ingebrigsten et al., 2015; Jerkovic et al., 2022; Kubayi & Toriola, 2018; Kubayi, 2019; Modric et al., 2019; Morgans et al., 2023; Paraskevas et al., 2020; Pranjic et al., 2022). The acceleration activity profile included the number of HIAs (peak speed 5.5–7 m/s) and the number of max accelerations (peak speed >7 m/s).

### Statistical analysis

The descriptive statistics were calculated and reported as the means  $\pm$  standard deviations of the means (SD) for each group of teams for each variable. The dependent variables were TD, distance covered running zones (walking, jogging, running, HSR and sprinting) and number of accelerations (high-intensity and max), whereas the independent variables were the final ranking of the teams and the match outcome. The normality of the distributions was checked by the Kolmogorov–Smirnov test, and the statistics included the means and standard deviations. The homoscedasticity of all variables was confirmed by Levene’s test. The differences between the final rankings of teams and match outcomes for all measured variables were examined via one-way ANOVA, followed by a subsequent Tukey’s post hoc test when differences were detected. Statistical significance was set at  $p \leq .05$ . All the statistical analyses were carried out with SPSS 22.0 (IBM SPSS Corp., Armonk, NY, USA). To evaluate the effect sizes (ESs), eta-squared values ( $\eta^2$ ) were presented (small: 0.01; medium: 0.06; large: 0.14) (Cohen, 1988). Data visualization was performed using scatter plots generated with GraphPad Prism version 10 (GraphPad Software, San Diego, CA, USA).

### Results

Table 2 shows the averages of the teams’ running performance variables ( $n = 626$ ) at the end of the season according to the final ranking groups. The TD average ( $116.54 \pm 5.69$  km) and average distance covered in running zones were as follows: walking ( $42.47 \pm 2.30$  km), jogging ( $44.53 \pm 3.22$  km), running ( $19.48 \pm 1.98$  km), HSR ( $8.28 \pm 1.00$  km), and sprinting ( $1.81 \pm 0.38$  km). The average acceleration numbers are as follows: HIA,  $539.67 \pm 62.95$ ; max acceleration,  $106.58 \pm 19.94$ . The maximum average speed is  $8.25 \pm 0.19$  m/s.

**Table 2.**  
*Descriptive statistics for running performance according to the final ranking*

|                        | Final table ranking                           |   |   |   |  |
|------------------------|---|---|---|---|--|
|                        | 1st rank<br>( $n = 170$ )<br>(means $\pm$ sd) | 2nd rank<br>( $n = 172$ )<br>(means $\pm$ sd) | 3rd rank<br>( $n = 173$ )<br>(means $\pm$ sd) | 4th rank<br>( $n = 111$ )<br>(means $\pm$ sd) | Total<br>( $n = 626$ )<br>(means $\pm$ sd) |
| <b>TD (km)</b>         | 117.4 $\pm$ 6.19                              | 116.38 $\pm$ 5.70                             | 116.38 $\pm$ 5.70                             | 115.7 $\pm$ 4.70                              | 116.54 $\pm$ 5.69                          |
| <b>Walking (km)</b>    | 42.42 $\pm$ 2.41                              | 42.68 $\pm$ 2.25                              | 41.96 $\pm$ 2.20                              | 43.00 $\pm$ 2.22                              | 42.47 $\pm$ 2.30                           |
| <b>Jogging (km)</b>    | 44.62 $\pm$ 3.42                              | 44.64 $\pm$ 3.03                              | 44.87 $\pm$ 3.33                              | 43.67 $\pm$ 2.90                              | 44.53 $\pm$ 3.22                           |
| <b>Running (km)</b>    | 20.00 $\pm$ 2.31                              | 19.23 $\pm$ 1.89                              | 19.51 $\pm$ 1.80                              | 19.02 $\pm$ 1.68                              | 19.48 $\pm$ 1.98                           |
| <b>HSR (km)</b>        | 8.48 $\pm$ 1.08                               | 8.13 $\pm$ 0.98                               | 8.26 $\pm$ 0.96                               | 8.23 $\pm$ 0.94                               | 8.28 $\pm$ 1.00                            |
| <b>Sprinting (km)</b>  | 1.91 $\pm$ 0.40                               | 1.72 $\pm$ 0.36                               | 1.81 $\pm$ 0.38                               | 1.80 $\pm$ 0.37                               | 1.81 $\pm$ 0.38                            |
| <b>No. of HIA</b>      | 542.64 $\pm$ 65.77                            | 533.98 $\pm$ 63.77                            | 544.1 $\pm$ 61.39                             | 537.06 $\pm$ 59.61                            | 539.67 $\pm$ 62.95                         |
| <b>No. of Max Acc.</b> | 112.32 $\pm$ 20.43                            | 102.05 $\pm$ 19.09                            | 107.09 $\pm$ 20.11                            | 103.98 $\pm$ 18.14                            | 106.58 $\pm$ 19.94                         |
| <b>Max speed (m/s)</b> | 8.25 $\pm$ 0.18                               | 8.20 $\pm$ 0.19                               | 8.25 $\pm$ 0.17                               | 8.25 $\pm$ 0.19                               | 8.24 $\pm$ 0.18                            |

Note: TD = Total Distance Covered; HSR = High Speed Running; HIA = High Intensity Acceleration; Max Acc. = Maximal Acceleration; No. = Number

The results of the intergroup comparison analyses are presented in Table 3 and Figures 1. The following variables significantly differed between groups according to the ANOVA results: walking ( $F = 5.42$ ;  $p = .001$ ), jogging ( $F = 3.42$ ;  $p = .017$ ), running ( $F = 6.98$ ;  $p = .000$ ), HSR ( $F = 3.71$ ;  $p = .012$ ), sprinting ( $F = 7.17$ ;  $p = .000$ ), max acceleration ( $F = 8.63$ ;  $p = .000$ ) and max speed ( $F = 4.12$ ;  $p = .007$ ). There was no significant difference between the groups in TTD traveled or HIA ( $p > .05$ ).

Multiple comparisons with Tukey's test results revealed that the 2nd- and 3rd-ranked teams had higher scores than the 3rd-ranked teams during walking. In jogging, 3rd-ranked teams were higher than 4th-ranked teams. In running, 1st-rank teams were higher than 2nd-rank and 4th-rank teams. In HSR, the number of 1st-rank teams was greater than that of 2nd-rank teams. In sprinting, 1st rank teams were higher than 2nd rank and 3rd rank teams. In terms of maximum acceleration, the 1st-ranked teams were higher than the 2nd-ranked and 4th-ranked teams. At maximum speed, 1st-rank teams were higher than 2nd-rank teams, and 3rd-rank teams were higher than 2nd-rank teams ( $p < .01$ ). The within-group eta squared effect size was small for all RP variables ( $\eta^2 < 0.06$ ).

Table 3.

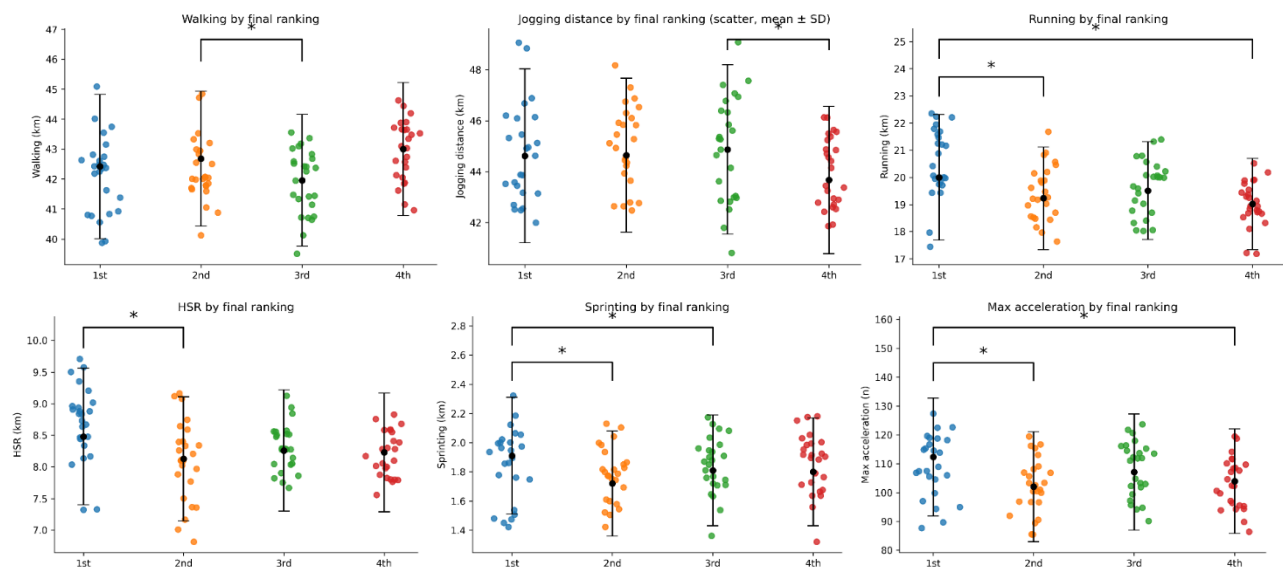
**Differences in running performance according to the final ranking determined via ANOVA**

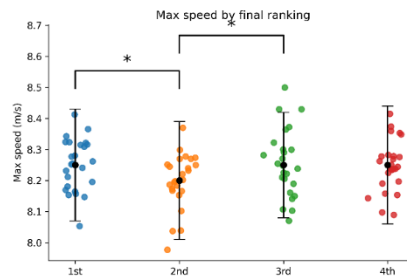
| Variables      | F test       | $p$  | Tukey's (post hoc test) | Effect size $\eta^2$ |
|----------------|--------------|------|-------------------------|----------------------|
| TD             | 2.22         | .085 | -                       | -                    |
| Walking        | <b>5.42*</b> | .001 | 2-4 > 3                 | Small - 0.025        |
| Jogging        | <b>3.42*</b> | .017 | 3 > 4                   | Small - 0.016        |
| Running        | <b>6.98*</b> | .000 | 1 > 2-4                 | Small - 0.033        |
| HSR            | <b>3.71*</b> | .012 | 1 > 2                   | Small - 0.018        |
| Sprinting      | <b>7.17*</b> | .000 | 1 > 2-3                 | Small - 0.033        |
| No. of HIA     | 0.94         | .419 | -                       | -                    |
| No of Max Acc. | <b>8.63*</b> | .000 | 1 > 2-4                 | Small - 0.040        |
| Max speed      | <b>4.12*</b> | .007 | 1 > 2 & 3 > 2           | Small - 0.019        |

\* Statistically significant at  $p < .01$ . 1: 1<sup>st</sup> rank, 2: 2<sup>nd</sup> rank, 3: 3<sup>rd</sup> rank, 4: 4<sup>th</sup> rank

Figures 1.

**Differences in running performance according to the final ranking determined via ANOVA**





In Table 4, the average RP data of the teams grouped according to the match result (win-draw-lose) are shown, and in Table 5, the comparisons between the groups are shown. The ANOVA results revealed that the TD average of the winning team was significantly greater than that of the losing team ( $p < .05$ ). With respect to walking, the number of winning and drawing teams was greater than that of losing teams ( $p < .01$ ). Winning teams were taller than drawings in terms of sprinting and max acceleration ( $p < .05$ ) (Figures 2).

**Table 4.**  
*Descriptive statistics (means  $\pm$  SD) for running performance according to match outcome*

| Variables       | Match outcome                     |                                    |                                    |
|-----------------|-----------------------------------|------------------------------------|------------------------------------|
|                 | Win (n = 240)<br>(means $\pm$ sd) | Draw (n = 146)<br>(means $\pm$ sd) | Loss (n = 240)<br>(means $\pm$ sd) |
| TD (km)         | 117.32 $\pm$ 5.64                 | 116.10 $\pm$ 5.27                  | 116.02 $\pm$ 5.93                  |
| Walking (km)    | 42.78 $\pm$ 2.16                  | 42.75 $\pm$ 2.11                   | 41.98 $\pm$ 2.46                   |
| Jogging (km)    | 44.86 $\pm$ 3.30                  | 44.17 $\pm$ 3.14                   | 44.42 $\pm$ 3.17                   |
| Running (km)    | 19.53 $\pm$ 2.04                  | 19.25 $\pm$ 1.81                   | 19.57 $\pm$ 2.02                   |
| HSR (km)        | 8.30 $\pm$ 1.03                   | 8.20 $\pm$ 0.90                    | 8.29 $\pm$ 1.03                    |
| Sprinting (km)  | 1.86 $\pm$ 0.39                   | 1.76 $\pm$ 0.33                    | 1.79 $\pm$ 0.4                     |
| No. of HIA      | 538.53 $\pm$ 63.62                | 537.05 $\pm$ 61.12                 | 542.41 $\pm$ 63.54                 |
| No of Max Acc.  | 109.35 $\pm$ 20.50                | 104.19 $\pm$ 17.78                 | 105.25 $\pm$ 20.36                 |
| Max speed (m/s) | 8.22 $\pm$ 0.18                   | 8.24 $\pm$ 0.19                    | 8.25 $\pm$ 0.18                    |

The effect bending eta squared value calculated for variables with differences between groups was small ( $\eta^2 < 0.03$ ). There was no significant difference between the match outcome groups in terms of the other RP variables ( $p > .05$ ).

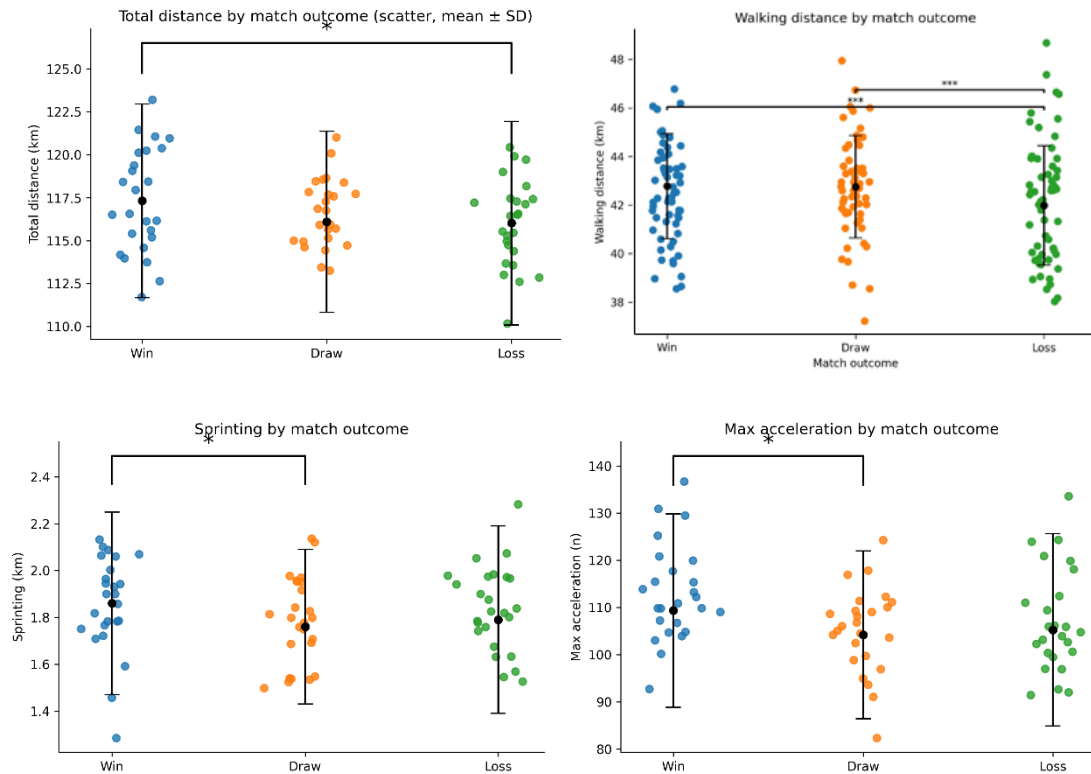
**Table 5.**  
*Differences in running performance according to match outcome determined by ANOVA*

| Variables                | F test        | p    | Tukey's<br>(post hoc test) | Effect size<br>$\eta^2$ |
|--------------------------|---------------|------|----------------------------|-------------------------|
| TD                       | <b>3.69*</b>  | .026 | W > L                      | Small - 0.012           |
| Walking                  | <b>8.96**</b> | .000 | W - D > L                  | Small - 0.028           |
| Jogging                  | 2.31          | .101 | -                          | -                       |
| Running                  | 1.30          | .273 | -                          | -                       |
| HSR                      | 0.54          | .581 | -                          | -                       |
| Sprinting                | <b>3.68*</b>  | .026 | W > D                      | Small - 0.012           |
| No. of HIA               | 0.39          | .675 | -                          | -                       |
| No. of Max accelerations | <b>3.94*</b>  | .020 | W > D                      | Small - 0.012           |
| Max speed                | 1.01          | .366 | -                          | -                       |

\* Statistically significant at  $p < .05$ , \*\* $p < .01$ . W: winner, D: draw, L: loss

**Figures 2.**

*Differences in running performance according to match outcome determined by ANOVA*



## Discussion

In our study, we examined the effect of running performance on success by grouping the teams according to their end-of-match and end-of-season success. i) According to the match outcome, the winners had greater TD and walking than did the losers and greater sprinting and max acceleration than did the drawn winners. ii) According to the end-of-season table rankings, the 1st-ranked teams were higher than the other teams in most RPs (especially in high-intensity activities).

The average TD covered by players in matches is as follows: UEFA EURO 2016 tournament (approx. 10.000 m) (Kubayi, 2019); Spanish La Liga (approx. 10.900 m), and English Premier League (approx. 11.000 m) (Dellal et al., 2011). The average running distances of players in other European major leagues were also similar. However, in previous studies, TD was generally examined according to location because the range between locations is quite wide. For example, Delal et al. (2011) reported the total running distances of players according to their positions in La Liga (approx. 10.500–11.250 m) and the Premier League (approx. 10.600–11.780 m). To obtain more consistent results, in some studies, the RP data of goalkeepers were excluded, whereas in other studies, the players who played throughout the match duration were evaluated. Since the effect of RP on the success of teams was examined in our study, team totals were evaluated. This method was also preferred in some previous studies (Longo et al., 2019; Pranjic et al., 2022; Reinhardt et al., 2019).

Pranjic et al. (2022) reported that the average TD covered by teams that competed in the UEFA Champions League (UCL) was  $116.3 \pm 4.38$  km, whereas the average walking and jogging distances were  $38.88 \pm 1.24$  km and  $47.40 \pm 3.15$  km, respectively. The average UCL of the teams was  $20.40 \pm 1.44$  km in the running zone,  $8.18 \pm 0.92$  km in the HSR zone, and  $1.40 \pm 0.31$  km in the sprinting zone. In our study, the average RP values of the teams were TD:  $116.54 \pm 5.69$  km, Walking:  $42.47 \pm 2.30$  km, Jogging:  $44.53 \pm 3.22$  km, Running:  $19.48 \pm 1.98$  km, HSR:  $8.28 \pm 1.00$  km, Sprinting:  $1.81 \pm 0.38$  km, Number of HIA:  $539.67 \pm 62.95$ , Max number of accelerations:  $106.58 \pm 19.94$  and Max speed:  $8.24 \pm 0.18$  m/s. While these two studies are similar in terms of most RP distances, the sprinting distance in our study was greater. Importantly, the results of these two studies revealed that the teams in the successful group were more prone to sprinting. They reported that the UEFA club coefficient was positively related to the sprint distance covered ( $r = 0.39$ ;  $p = .01$ ). The greater walking distance observed in winning teams may reflect tactical behaviours associated with ball possession and positional organization. Teams controlling the game may maintain structured tactical formations and circulate the ball more effectively, resulting in greater low-intensity locomotor activity while preserving energy for decisive high-intensity actions.

Longo et al. (2019) investigated the relationship between RP and technical activities and the success of Italian Series A teams in the final rankings. They reported that the RP parameter, sprint distance, technical activities, goal attempts, total shots, shots on target and assist statistics were associated with promotion to the top of the final table.

Previous studies in literature reported that there is no discrimination between match-running performance and success. Jerkovic et al. (2022) examined the RP of players in matches of teams in the Croatian 1st League according to the match result and reported that there was no significant difference, especially the lowest RP values of the winners in the matches. They supported these results, with previous studies showing that technical and tactical effects are more effective than RP on match results. Considering both match outcome and end-of-season ranking provides a more holistic understanding of success in professional soccer. Match outcomes reflect short-term competitive performance, whereas final league ranking represents cumulative success across the season. Therefore, analysing both dimensions allows a clearer interpretation of how physical match performance contributes to both immediate and long-term competitive achievements.

The literature regarding the effect of running performance in matches on success is still not clear. However, although TD and low-medium intensity activities do not seem to be discriminatory in running performance, we can make a general assessment that high-level teams are superior in high-intensity activities (such as HSR and sprinting). In addition, we can perform a similar evaluation for HIA. Studies examining high-intensity activities according to player position reported differences in both distance and number. High-intensity locomotor actions may influence match success through several physiological and tactical mechanisms. The metabolic power approach suggests that accelerations and decelerations contribute substantially to the energetic demands of soccer beyond traditional speed thresholds (Osgnach et al., 2010). In addition, repeated sprint ability enables players to perform multiple high-intensity actions during critical phases such as pressing, counterattacks and defensive transitions. These high-intensity actions often occur during decisive tactical moments and may therefore contribute indirectly to match outcomes. Modric et al. (2019) examined the relationship between the game performance indicator (GPI) and RP according to players' positions. They reported that the total GPIs of players on winning teams were greater than those in drawings and losses.

In their study, Varley & Aughey (2013) emphasized that during a match, players exhibit approximately eight times greater max acceleration ( $65 \pm 21$  vs.  $8 \pm 5$ ) than sprints do, so both HSR and max acceleration, which are characteristic of soccer, should not be ignored. In our study, the maximum acceleration numbers were found to be highest for both the winning teams ( $W > D$ ;  $p < .05$ ) and the top-ranked teams (1st rank  $> 2-4$ ;  $p < .01$ ). It should also be acknowledged that contextual match events such as red cards or substitution timing may influence team running performance. Teams playing with fewer players may increase their defensive workload and running intensity to compensate for numerical inferiority, whereas substitutions may alter the physical output of teams by introducing players with lower fatigue levels. Since the present study evaluated team-level seasonal data, these contextual variables were not controlled in the analysis and may partially influence locomotor outputs.

## Conclusion and Recommendation

According to both the match outcome and the final table ranking, the successful teams achieved higher TD, distance covered at speeds above 14.3 km/h (running, HSR and sprinting) and maximum acceleration number. Therefore, the distance covered at HIR speed thresholds and the maximum acceleration number features of the RP provide important success data when the total team is evaluated. Based on this information, coaches and performance coaches should adjust the training load for the entire team, taking into account the team's league level and the risk of injury due to high-intensity training.

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