




Please cite the Published Version

Sarmiento, Hugo , Martinho, Diogo V , Rúbio, Élvio, Afonso, Jose, Chmura, Paweł, Field, Adam , Ordoñez-Saavedra, Néstor, Oliveira, Rafael, Praça, Gibson, Silva, Rui, Barrera-Díaz, Joel and Clemente, Filipe Manuel (2024) The Influence of Playing Position on Physical, Physiological, and Technical Demands in Adult Male Soccer Matches: A Systematic Scoping Review with evidence gap map. *Sports Medicine*, 54. pp. 2841-2864. ISSN 0112-1642

DOI: <https://doi.org/10.1007/s40279-024-02088-z>

Publisher: Springer

Version: Published Version

Downloaded from: <https://e-space.mmu.ac.uk/635278/>

Usage rights:  [Creative Commons: Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Additional Information: This is an open access article that was published in *Sports Medicine*, by Springer.

Data Access Statement: The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

Enquiries:

If you have questions about this document, contact openresearch@mmu.ac.uk. Please include the URL of the record in e-space. If you believe that your, or a third party's rights have been compromised through this document please see our Take Down policy (available from <https://www.mmu.ac.uk/library/using-the-library/policies-and-guidelines>)



The Influence of Playing Position on Physical, Physiological, and Technical Demands in Adult Male Soccer Matches: A Systematic Scoping Review with Evidence Gap Map

Hugo Sarmiento¹ · Diogo V. Martinho^{1,2} · Élvio R. Gouveia^{2,3,4} · José Afonso⁵ · Paweł Chmura⁶ · Adam Field⁷ · Nestor Ordoñez Savedra⁸ · Rafael Oliveira^{9,10} · Gibson Praça¹¹ · Rui Silva^{12,13} · Joel Barrera-Díaz¹ · Filipe Manuel Clemente^{12,13,14}

Accepted: 27 July 2024
© The Author(s) 2024

Abstract

Background There has been an increase in studies examining the demands of soccer relative to each playing position in recent years. Understanding the physical, physiological, and technical demands on soccer players according to their positional role during competitive matches is necessary to understand match requirements and develop position-specific training practices. Thereby, there is a clear need to synthesize the information on the different profiles of each playing position.

Objective This review aimed to organize the literature investigating physical, physiological, and technical demands according to playing positions and provide a framework to identify gaps and suggestions for future studies.

Methods A systematic search was conducted in October 2023 using four electronic databases: Web of Science, SPORT-Discus, PubMed and Scopus. The review followed PRISMA 2020 guidelines and the PRISMA-ScR extension for Scoping Reviews. The studies were included if the sample comprised adult male soccer players categorized from Tier 3 to Tier 5 (i.e., highly trained/national level, elite/international level, or world class) and compared the physical, physiological, or technical parameters across playing positions.

Results A total of 178 studies met the inclusion criteria and were included in the review. The number of teams, players, and matches analyzed per study varied considerably. Although a range of classifications were reported across studies, 59% of studies classified players as central defenders, full-backs, central midfielders, wide midfielders, and forwards. The findings suggest that central and external midfielders, and external defenders cover greater total and high-speed distance than forwards or central defenders. Sprint distance was higher in external midfielders versus all other positions. Defenders and central midfielders perform more passes than external midfielders and forwards. Heart rate was the most commonly reported physiological variable across playing positions. When expressed as a percentage of maximal heart rate, midfielders presented higher mean values than all other playing positions.

Conclusion This scoping review demonstrates that there are differences in the demands on players across playing positions in soccer. Training practices in soccer should be based on the specific requirements of each positional role to ensure players can fulfill their tactical responsibilities during the game.

1 Introduction

Following modern developments in technology, studies of match activity profiles and physiological characteristics have increased over the last 2 decades [1–7]. However, although a high proportion of match-analysis data are provided for an entire team or group of players, there are some studies which have distinguished between different playing positions. To

the best of the authors' knowledge, though, there is currently no high-quality review article synthesizing match performance outputs with a specific emphasis on playing positions. Therefore, despite the rapidly evolving knowledge of soccer and the influx of research articles in the area, there is an existing uncertainty as to whether and how the demands differ between positional roles [8–11]. Given that a high-quality central resource summarizing information in this area fails to exist, the impact of playing positions on the demands of soccer might be overlooked by practitioners. This might

Extended author information available on the last page of the article

Key Points

Central midfielders, and external midfielders and defenders cover greater total and high-speed distance than forwards or central defenders.

External midfielders cover greater sprint distances versus all other positions.

Defenders and central midfielders perform more passes than external midfielders and forwards.

Practitioners might individualize training practices where appropriate for each playing position to optimize performance.

result in the prescription of generalized training practices that lack specificity rather than implementing protocols for individual positions.

There is currently a lack of consensus surrounding the grouping of positions and the differences in terminology adopted across studies. For instance, there are studies that group players into three categories: defenders, midfielders, and forwards [12]. Some studies have used four position classification systems that grouped players into defenders, central midfielders, wing midfielders, and forwards [13]. Separate classifications have included six-player systems, dividing players into wide defenders, central defenders, central midfielders, attacking midfielders, wing midfielders, and forwards [14]. However, the most used classification system includes a breakdown of five positions into wide defenders, central defenders, wide midfielders, central midfielders, and forwards/attackers [15–17]. This might be problematic for data accuracy as the distinct classification systems adopted in each study might affect the interpretation of the results [18–21]. Critics have also argued that systems of classification may not be effective in capturing the differences between

positions as tactical approaches are manipulated by modern day coaches, and as such, there are a greater number of playing positions than previous studies suggest. For instance, a recent investigation reported a larger quantity of positions, depending on whether teams play a more attacking or defensive system [22]. With the contrasting interpretations and methodological approaches, clarity on precisely which conclusions can be drawn would support scientific development and assurances around applied practice.

Considering the need to enhance understanding of position-specific roles, it appears necessary to systematically review and synthesize the available information concerning physical, physiological, and technical assessments in soccer players, according to specific playing positions. Therefore, the present scoping review aimed to map (1) the impacts of playing position on physical, physiological, and technical demands in adult male soccer matches; (2) understand existing analyses that explain players' activity profiles in different contexts; and (3) identify literature gaps and make suggestions for further research.

2 Methods

This scoping review was developed according to the PRISMA 2020 guidelines [23] and the PRISMA-ScR extension for Scoping Reviews [24].

2.1 Protocol and Registration

The scoping review was registered on the Open Science Framework (<https://osf.io/6gkaw/>) on 24 October, 2023.

2.2 Eligibility Criteria

This systematic review included all original studies that had been published or were available ahead of print, without imposing any language or date restrictions. The inclusion

Table 1 Full search strategy for each database

PubMed	((football*[Title] OR soccer[Title]) AND ("match*" [Title/Abstract] OR "game*" [Title/Abstract] OR "competit*" [Title/Abstract] OR "match-play" [Title/Abstract])) AND ("time-motion" OR "demand*" OR "running*" OR locomotor OR "mechanic*" OR "technic*" OR "tactic*" OR "performance*" OR physical OR Physiologic* or Neuromuscular)) AND ("formation*" OR "position*")
Scopus	(TITLE (football* OR soccer) AND TITLE-ABS-KEY (match* OR game* OR competit* OR "match-play")) AND ALL ("time-motion" OR demand* OR running* OR locomotor OR mechanic* OR technic* OR tactic* OR performance* OR physical OR physiologic* OR neuromuscular) AND ALL (formation* OR position*)
SPORTDiscus	TI (football* OR soccer) AND AB (match* OR game* OR competit* OR "match-play") AND TX ("time-motion" OR demand* OR running* OR locomotor OR mechanic* OR technic* OR tactic* OR performance* OR physical OR Physiologic* or Neuromuscular) AND TX (formation* OR position*)
Web of Science	football* OR soccer (Title) AND "match*" OR "game*" OR "competit*" OR "match-play" (Abstract) AND "time-motion" OR "demand*" OR "running*" OR locomotor OR "mechanic*" OR "technic*" OR "tactic*" OR "performance*" OR physical OR Physiologic* or Neuromuscular (All Fields) AND "formation*" OR "position*" (All Fields)

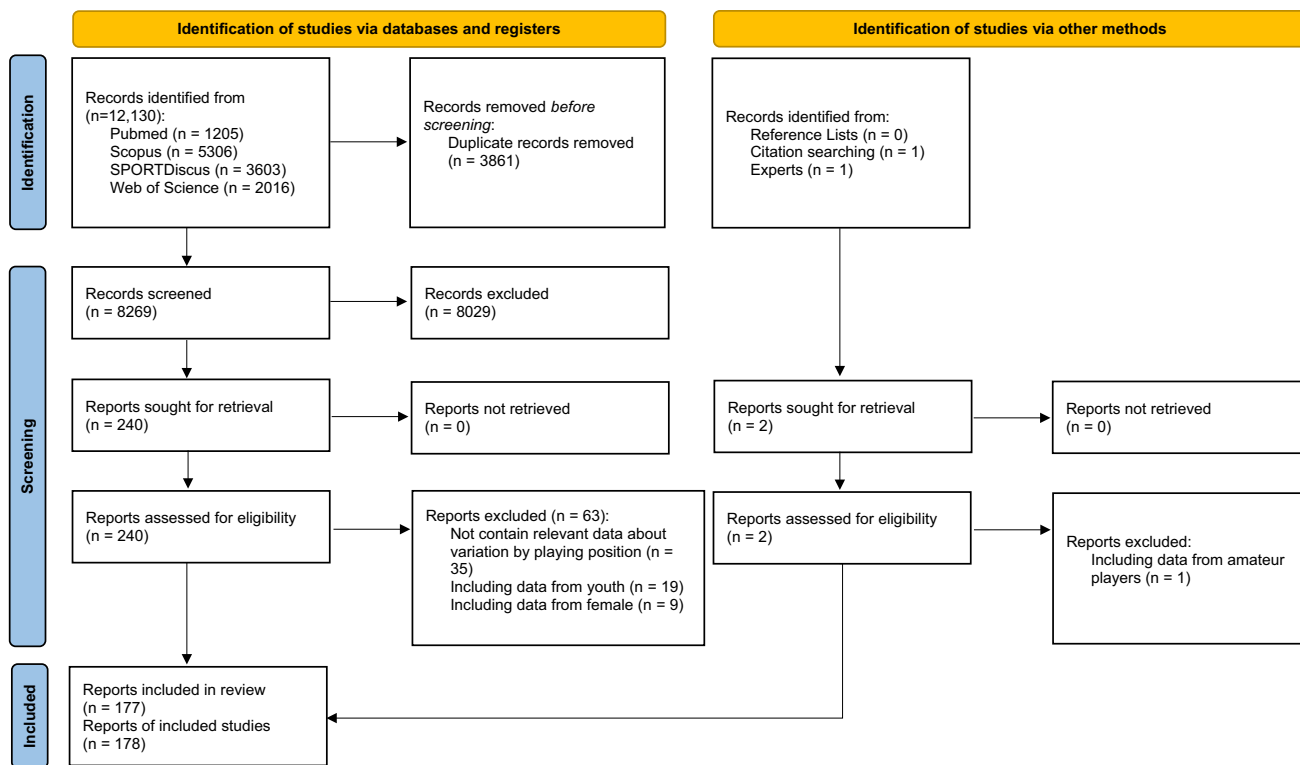


Fig. 1 Flow chart of the study selection procedures used in the present review article (n = 178)

criteria were guided by the Participants, Intervention/Exposure, Comparators, Outcomes, and Study Design (PICOS/PECOS) framework as follows: (1) Participants—healthy adult male soccer players categorized from Tier 3 to 5 based on the Participation Classification Framework [25]; (2) Intervention/Exposure—any intervention or exposure relevant to the demands experienced during matches; (3) Comparators – optional; (4) Outcomes—physical measures (such as locomotor demands at different intensity thresholds and mechanical demands at different intensities), physiological measures (such as heart rate responses, blood lactate levels, and oxygen uptake), and technical assessments (such as the frequency of defensive or attacking actions); (5) Study Design—no restrictions on the types of study designs eligible for inclusion.

2.3 Information Sources and Search Strategy

The following databases were searched: PubMed, Scopus, SPORTDiscus and Web of Science (all databases). These searches encompassed relevant publications available up to 25 October 2023. In addition, manual searches were conducted on the reference lists of the included studies to identify potentially relevant studies. Snowballing citation tracking in Web of Science was also conducted, in addition

to consultation with two externals with knowledge in the current area to determine whether any studies had not been identified.

The search strategy was as follows:

[Title]: football* OR soccer
AND
[Title/abstract] match* OR game* OR competit* OR “match-play”
AND
[Full text]: “time-motion” OR demand* OR running* OR locomotor OR mechanic* OR technic* OR tactic* OR performance* OR physical OR Physiologic* or Neuromuscular
AND
[Full text] formation* OR position*

The search strategy is detailed in Table 1.

2.4 Selection Process

An automated procedure was executed utilizing EndNote™ 20.6 for Mac (Clarivate™) to remove duplicate records. Manual screenings were also carried out to ensure duplicates were omitted for precision. Two independent reviewers (HS and DM) then examined the titles, abstracts, and reference lists of each study to identify the relevant studies. Full studies were subsequently screened to determine

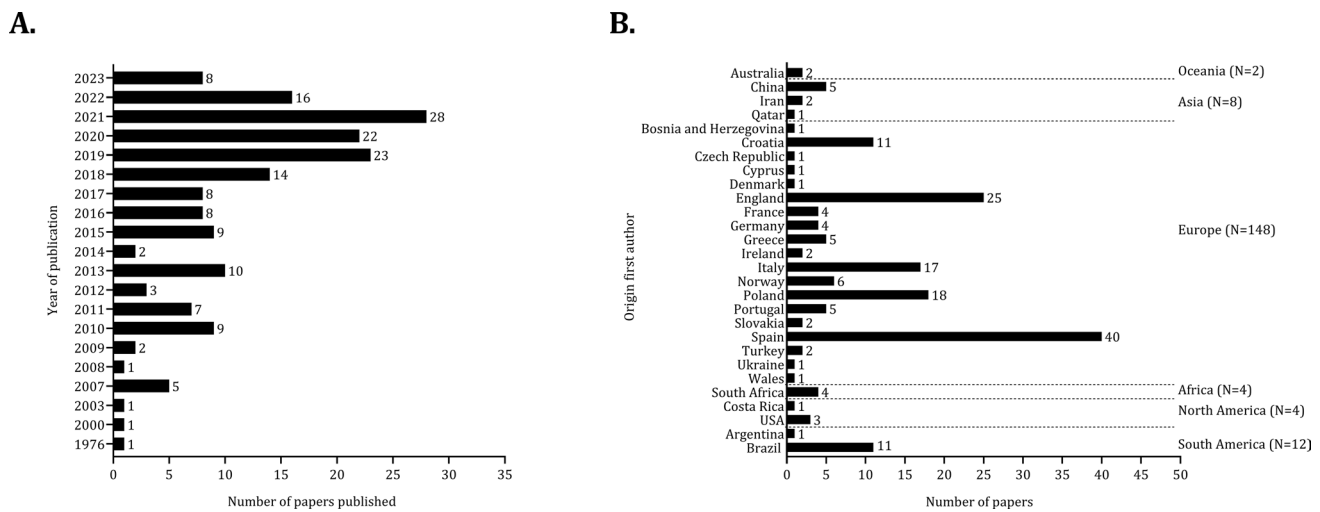


Fig. 2 Number of papers published by year (A) and according to the origin of the first author (B)

their relevance to the selection criteria. Where discrepancies occurred, a third external reviewer (FMC) was consulted to ensure agreement by consensus.

2.5 Data Extraction

Two investigators (HS and JB) conducted the data extraction process, systematically collecting information according to a predefined template. A third investigator (FC) cross-verified the extracted data to ensure accuracy and reliability. This structured approach to data extraction was facilitated through a comprehensive datasheet that encompassed all pertinent details and essential information.

2.6 Data Items

For each study, a comprehensive set of data was gathered, encompassing various aspects related to the participants, their competitive level, match details, competition type, time of year the study was undertaken, competition location, and country. Regarding playing formation, the collected information encompassed playing positions, their classification, and the methodology employed for classification. For the physical data, a wide range of parameters was considered, including but not limited to distances covered at various speed thresholds, accelerations, and decelerations. These measures were recorded irrespective of whether they were presented as absolute values, per-match figures, or standardized relative to time or designated periods. The tools and systems used for data collection, including specific measurement instruments, were also integrated into the analysis.

Physiological outcomes (e.g. maximal oxygen uptake, heart rate, ratings of perceived exertion) were retrieved when reported as mean \pm standard deviation. Technical analysis

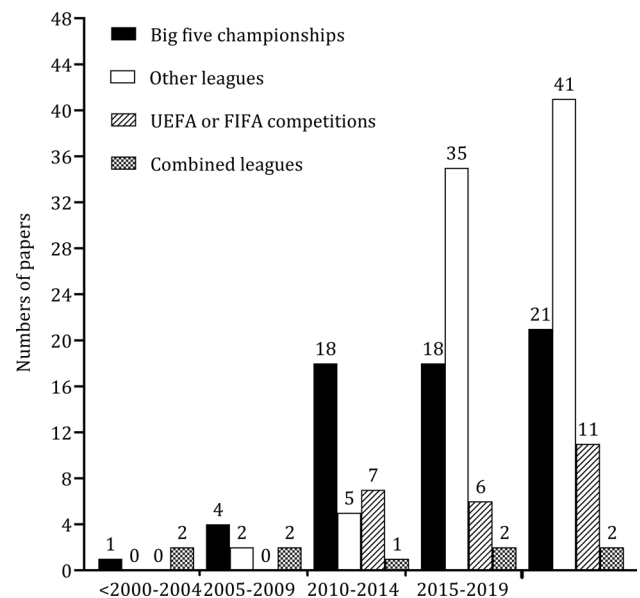


Fig. 3 Number of studies grouped by competitive league. *FIFA* Federation Internationale de Football Association, *UEFA* Union of European Football Associations

involved the comprehensive inclusion of both offensive and defensive events, irrespective of their presentation in absolute terms or standardized formats. Detailed information about the data collection instruments employed was also incorporated, along with the validity assessments if manual observations were employed. The characterization of competitive level followed the Participant Classification Framework [25].

2.7 Study Risk of Bias Assessment

The risk of bias was independently assessed by two authors (RO and RS). In the case of disagreements, a third author (HS) made the final decision. The Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies [26] was used to assess the risk of bias in each individual study (Electronic Supplementary Material [ESM] 1). The tool includes questions related to the research question, study population, groups recruited from the same population and uniform eligibility criteria, sample size justification, exposure assessed prior to outcome of measurement, sufficient timeframe to observe an effect, different levels of the exposure effect, exposures measurement, repeated exposure assessment, outcome measurement(s), blinding of outcomes assessors, follow-up rate, and statistical analyses.

3 Results

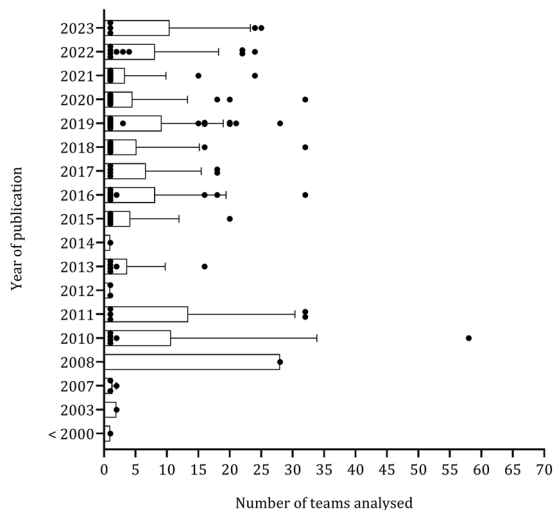
3.1 Study Identification and Selection

The initial searches returned 12,130 studies. Duplicates were then removed (3861 studies) automatically using Reference Manager software (EndNote™, version 20.6, Clarivate Analytics, Philadelphia, PA, USA). The titles and abstracts of each study (8269 studies) were then screened for their relevance, which resulted in the rejection of 8029 studies. The full texts of the remaining 240 studies were analyzed considering the eligibility criteria, and 63 papers were removed for the following reasons: data about playing position variation were not present ($n=35$), samples used youth ($n=19$) or combined male and female adult soccer players ($n=9$). One further eligible reference was identified by other methods. In total, 178 papers met the criteria and were included in the final scoping review [2, 6, 8–15, 18–22, 27–189] (see Fig. 1).

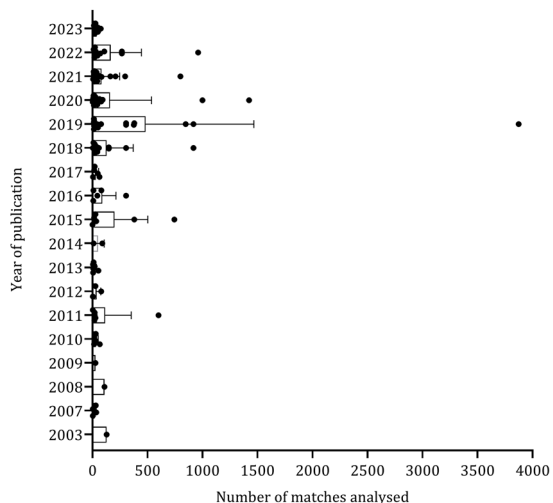
3.2 Study Characteristics

Figure 2 presents the frequencies of the studies by year of publication (A). Of the 178 papers, 54% ($n=96$) were published in the last 5 years (2019–2023). The examination of physical, physiological, and technical characteristics according to playing position was prevalent after 2018, whilst a negligible number of papers were published between 1976 and 2007. In the years 2001, 2002, 2004, 2005, and 2006, no studies were published on this topic. Figure 2 (B) shows the distribution of studies per country of origin of the first author. The affiliation of the first author was in Europe in more than 80% of papers ($n=148$). The most frequent countries that the first authors were affiliated with were Spain ($n=41$; 27%) and England ($n=25$; 15%). The percentages

A.



B.



C.

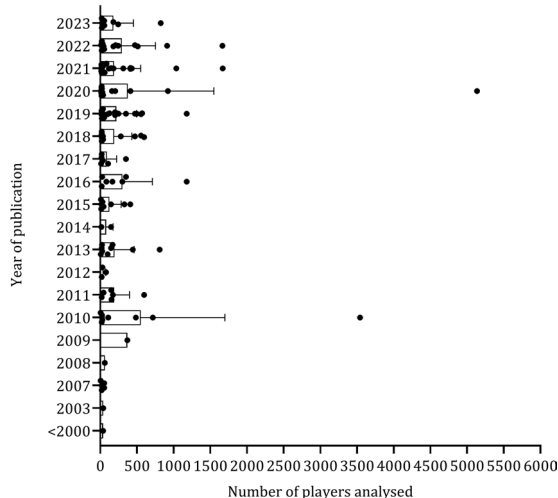


Fig. 4 Number of teams (A), matches (B), and players (C) for each study

Fig. 5 Frequency of papers considering different positional groups. *CD* central defender, *CM* central midfielder, *D* defender, *F* forward, *FB* full-back, *M* midfielder, *WM* wide midfielder

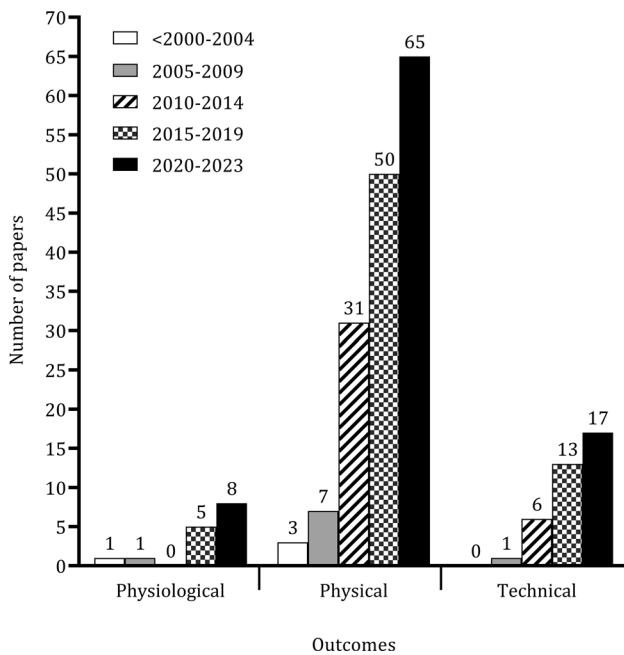
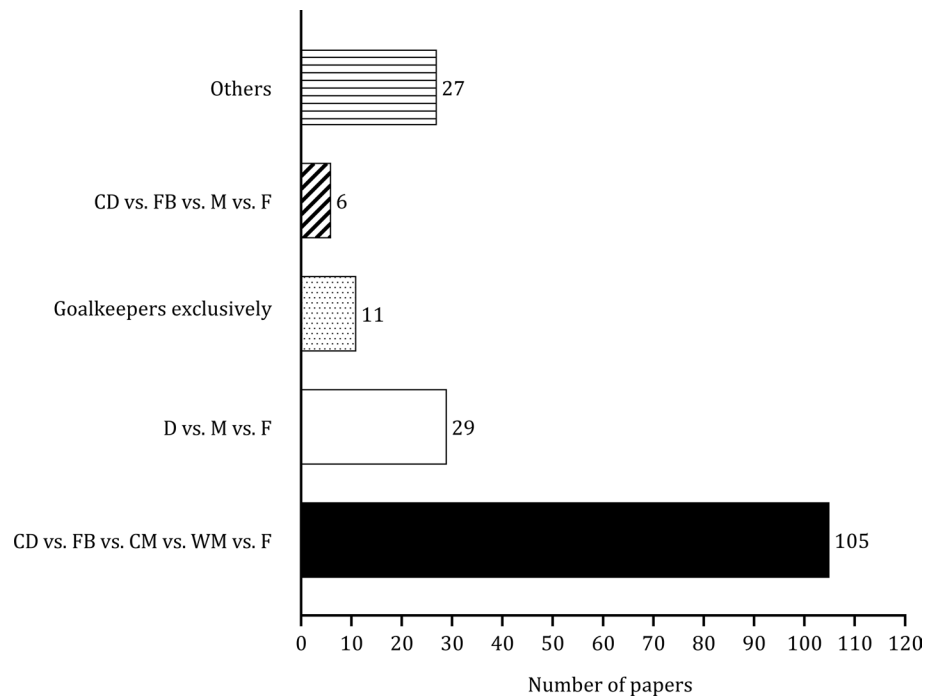


Fig. 6 Number of papers (grouped in 5-year periods) about physiological, physical, and tactical/technical parameters

of first authors affiliated with other continents were trivial: South America ($n=12$; 6%), North America ($n=4$; 2%), Africa ($n=4$; 2%), Asia ($n=8$, 4%), and Oceania ($n=2$; 1%). The number of studies published according to the

type of competition analyzed by 5-year periods presented in Fig. 3. There was an exponential increase in publications after 2010 in all competitions. The number of publications in the most popular soccer competitions (Spain, France, Germany, Italy, England) was stable from 2010, while, in other leagues from 2010 to 2023, the rate of studies considering variation by playing position increased by ~75%.

The characteristics of the studies (number of teams, matches, and players) are summarized in Fig. 4 (A, B, and C). This information was not reported in all studies included in the current review. The number of teams analyzed has increased since 2010, but a substantial variation exists across studies (A). The maximum number of teams analyzed was found in a paper that included data from 20 countries and 58 teams [10]. The number of matches analyzed was comparable between studies (B). A comparison of the Spanish and English elite competitions was conducted in 600 matches played in the 2006–2007 season [67]. The description of the total distance covered, and distance covered at different intensities in the Bundesliga from 2014 until 2016 was examined in 918 matches [15]. A longitudinal study of goalkeepers from the Spanish La Liga observed 3874 matches across six consecutive sessions [161]. The number of players examined was consistent between before 2000–2023 (C). Two studies investigated a substantial number of players, 3540 [68] and 5136 [182].

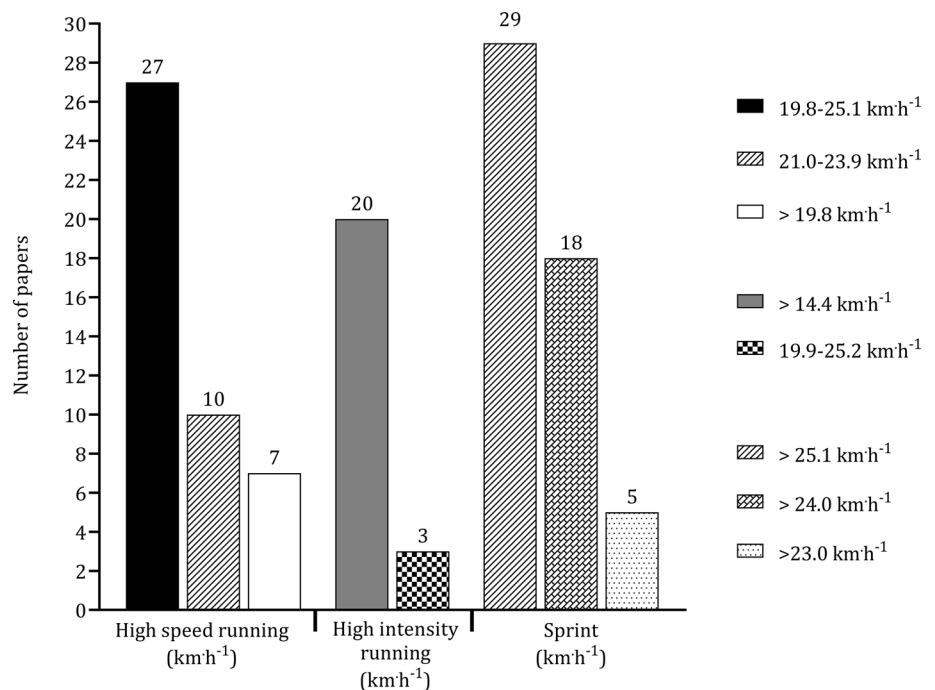
Table 2 Measurement of the main physical, physiological, technical, and tactical variables in adult male soccer matches

Main outcome	Physical	Physiological	Technical	Tactical
Instruments	MEMS (<i>n</i> = 66) VBTS (<i>n</i> = 78) NS (<i>n</i> = 6)	PBI (<i>n</i> = 9)	VBTS (<i>n</i> = 18) NS (<i>n</i> = 12)	VBTS (<i>n</i> = 2) NS (<i>n</i> = 12)
Measures	Total distance (<i>n</i> = 109) High-speed running (<i>n</i> = 62) Sprinting (<i>n</i> = 73)	Mean heart rate (<i>n</i> = 7) RPE (<i>n</i> = 2)	^a	^a

MEMS microelectromechanical systems, NS notational system, PBI physiological-based instruments, RPE rate of perceived exertion, VBTS video-based tracking systems

^aDifferent variables were analyzed

Fig. 7 Number of papers that examined high-speed running, high-intensity running, and sprinting. The frequency of papers was organized according to the most reported thresholds



3.3 Methodological Characteristics

Figure 5 describes the classifications used when players are grouped by playing position. Of the 178 studies, 59% (*n* = 105) classified players as central defenders, full-backs, central midfielders, wide midfielders and forwards, while 16% (*n* = 29) ignored full-back and external midfielder groups. The main topics of the papers were grouped into three categories (physiological, physical, technical), as illustrated in Fig. 6. Some studies aimed to examine variation by playing position in multiple topics. Although there was an increase in the number of studies on different topics from before 2000, the number of studies investigating physiological parameters was negligible. Physical parameters associated with match performance were frequently examined after 2010. Automatic or semi-automatic

video-based systems and microelectromechanical systems were used in 78 and 66 studies, respectively, to measure activity during soccer matches. Total distance covered (*n* = 109), high-speed running (*n* = 62), and sprinting (*n* = 73) were the most reported variables. Few studies (*n* = 9) focused on physiological parameters when players were examined by playing position. Seven studies measured mean heart rate. Video-based systems and notational analyses were the most frequent methods to investigate technical actions (see Table 2).

ESM 2 presents the running thresholds collected from the studies in the present review. Multiple running speed thresholds have been used in soccer players. Figure 7 presents the most frequent thresholds in the literature, which include ‘high-speed running’ (19.8 km/h⁻¹–25.1 km/h⁻¹),

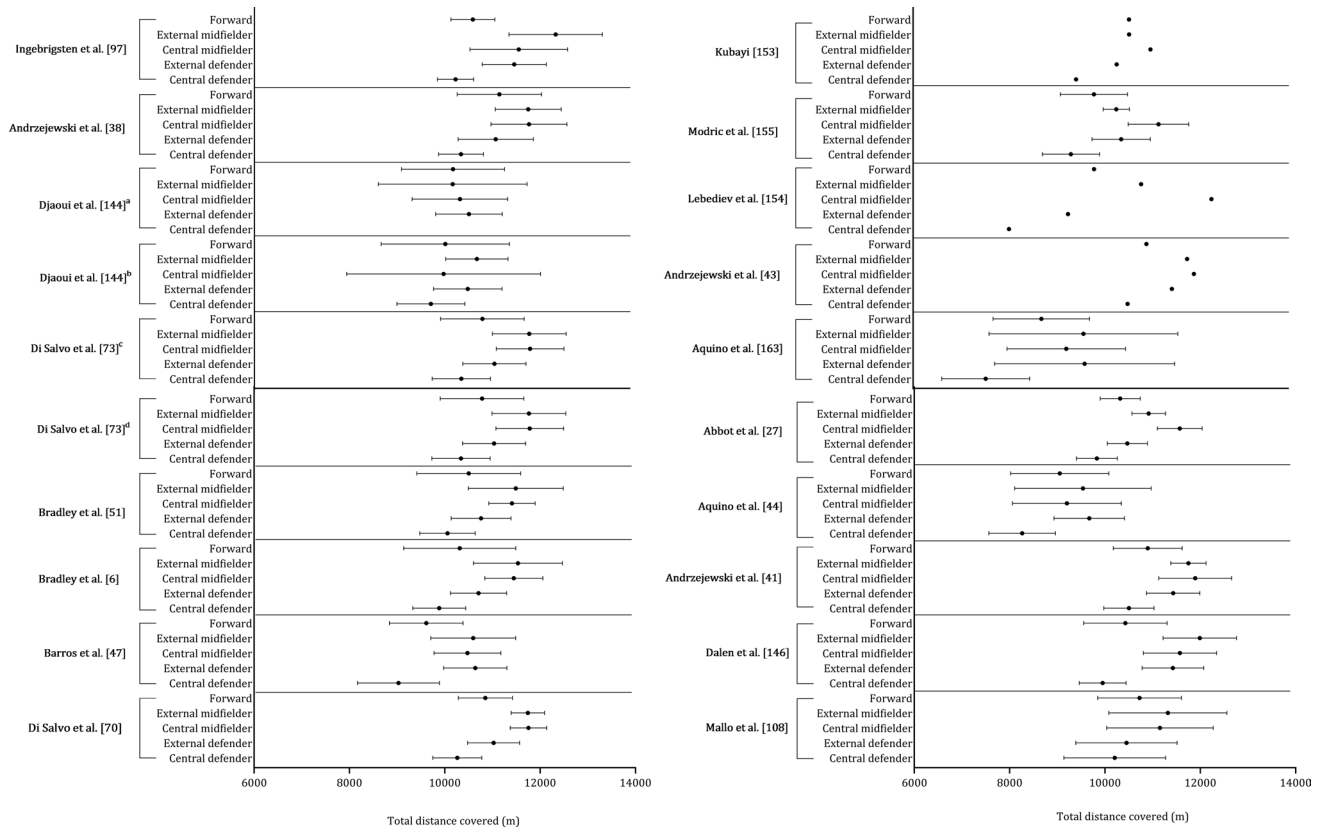


Fig. 8 Descriptive statistics (mean \pm standard deviation) of total distance covered by playing position (central defender, external defender, central midfielder, external midfielder, forward). ^anon-congested fixture, ^bcongested fixture, ^cChampionship League, ^dPremiership

‘high-intensity running’ ($> 14.4 \text{ km}\cdot\text{h}^{-1}$) and ‘sprinting’ ($> 25.1 \text{ km}\cdot\text{h}^{-1}$).

3.4 Results of Included Studies

Figure 8 shows the mean \pm standard deviation distance covered per playing position for each study. Figure 9 combines the studies where players were grouped as central defenders, external defenders, central midfielders, external midfielders, and forwards. Central midfielders (11,012 m), external midfielders (10,894 m) and external defenders (10,457 m) covered similar distances. Forwards (10,068 m) and central defenders (9598 m) covered substantially less distance than other positions.

Figure 10 shows the high-speed running distance covered by central defenders, external defenders, central midfielders, external midfielders, and forwards. Central defenders and forwards covered less distance at high-speed running than central midfielders, external defenders, and midfielders. In the seven studies included, external midfielders covered, on average, +106 m and +191 m more in high-speed running than external defenders and central midfielders, respectively (see Fig. 11). External defenders and midfielders cover more distance than central

defenders, central midfielders, and forwards, as shown in Fig. 12. Sprint distance was higher in external midfielders (330 m) compared with external defenders (273 m), forwards (280 m), central midfielders (224 m), and central defenders (180 m), as illustrated in Fig. 13.

Mean heart rate, expressed in beats per minute or as a percentage of maximal heart rate, was obtained from three studies. These studies did not use the same classification to group players by playing position (Fig. 14, A and B). Although the playing position classification in studies that included the number of passes varied, defenders and midfielders appear to perform more passes than external midfielders and forwards (Fig. 15).

3.5 Risk of Bias Assessment

The tool to examine the risk of bias and associated with Fig. 16 is presented in ESM 1. Questions 3, 6, 12, and 13 were not analyzed since they did not correspond with the studies of the present review. In 60 studies (33%), the sample was not clearly defined, and only one study clearly stated the power sampling (question 5). The description of independent variables was not evident in 19 studies (10%).

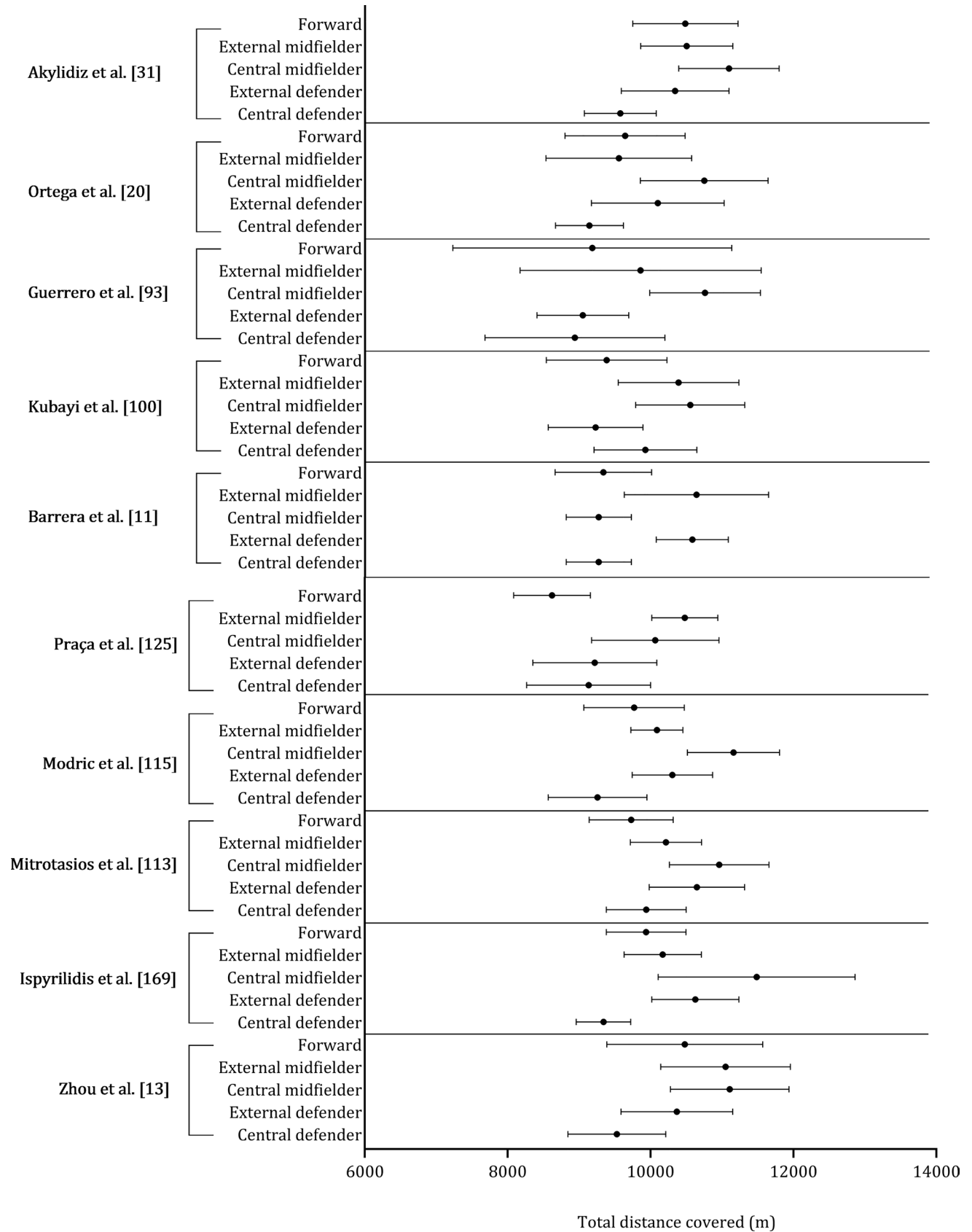
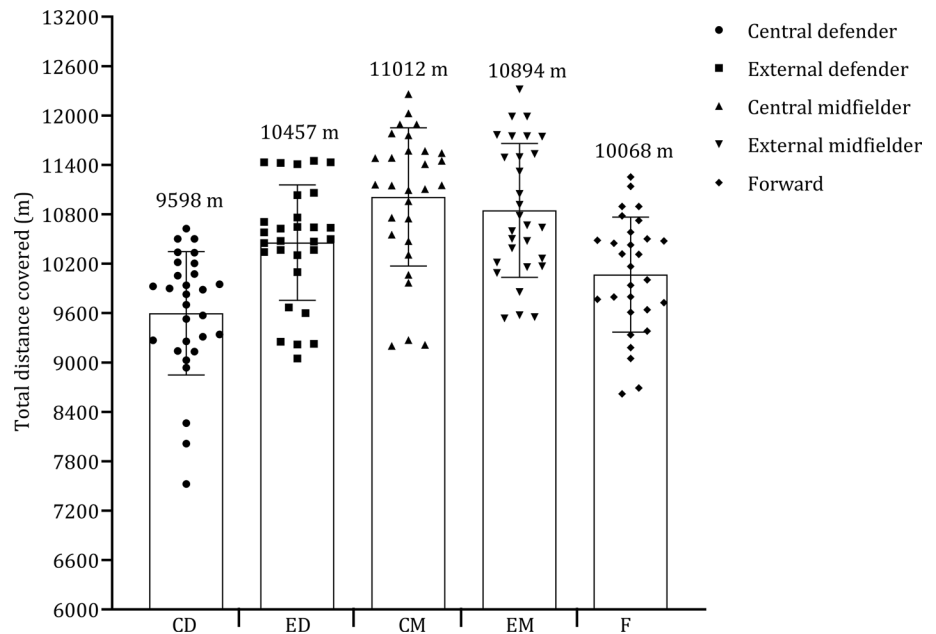


Fig. 8 (continued)

Fig. 9 Pooled mean and standard deviation of studies that examined total distance covered by playing position. Each symbol represents the mean of individual studies



The eligibility criteria comprised elite and professional soccer players; however, some studies combined samples from different competitive leagues and divisions, making it difficult to determine exact playing level. Twenty-seven studies (15%) did not consider these confounding factors.

4 Discussion

The results of this systematic scoping review reveal a significant increase in playing positions over recent years, with more than half of the studies published after 2019. The majority of this research was conducted in Europe, mostly in Spain and England, with less representation from other continents. The findings suggest that central and external midfielders, and external defenders cover greater total and high-speed distance than forwards or central defenders. Another key finding was that sprint distance was higher in external midfielders versus all other positions. It was also reported that defenders and central midfielders appear to perform more passes than external midfielders and forwards. Although heart rate was the most reported physiological variable, there are few studies that characterize the physiological profiles of each positional role. The present findings provide a detailed description of the demands placed on elite soccer players, according to their positional role, which may be helpful in the development of individual training practices.

4.1 Investigating Physical Performance Across Playing Positions

The observed disparities in distance covered by different playing positions, as depicted in Figs. 8 and 9, provide valuable insights into the distinct physical demands associated with each positional role. Central and external midfielders exhibited similar distances covered [38, 42, 44, 47, 50, 70, 73, 108, 144], with central midfielders averaging a distance of 11,012 m (range: 9202–12,261 m), and external midfielders averaging a distance of 10,894 m (range: 9538–12,320 m) when considered across all the relevant studies included in the current review. This similarity in distance can be attributed to their shared responsibilities in both offensive and defensive play, which requires that larger distances are covered [190]. These key positions are also key in the transition, effectively bridging the gap between defense and attack [166].

The data reveals that external defenders covered an average distance of 10,457 m, which is slightly less than the distances covered by central and external midfielders. Modern-day fullbacks are no longer confined to defensive duties but are also actively involved in the attack, resulting in them covering a considerable distance during a match [191]. This adaptation can depend on the specific formation

employed by the team and the tactical choices made by the coach during both defensive and offensive phases [190]. In contrast, forwards and central defenders covered substantially less distance [6, 42, 44, 47, 70, 73, 97, 146, 155], with forwards averaging 10,068 m (range: 8621–11,254 m) and central defenders covering 9598 m (range: 7525–10,627 m). This difference can be associated with the roles on the field, in that forwards primarily have the responsibility of leading attacks and creating goal-scoring opportunities, involving shorter but more explosive bursts of high-intensity accelerations [192]. Central defenders, on the other hand, are required to maintain a compact defensive structure, which involves less ground coverage and more positional play.

The data provided on high-speed running and sprinting distances across different playing positions sheds light on the varied physical demands of soccer roles [6, 73, 92, 115]. External midfielders complete more high-speed running than all other positions [73, 92, 97, 108, 115, 146], with a further 106 m and 191 m covered versus external defenders and central midfielders, respectively. External midfielders are often tasked with covering extensive ground at fast speeds during both defensive and offensive phases. Their ability to engage in high-speed running may also be crucial in their capacity to transition effectively and support both ends of the pitch [193]. Central defenders and forwards covered the least high-speed running distance compared with all other positions [73, 92, 97, 108, 146]. Central defenders typically adhere to positional roles focused on maintaining their position in the center of the field. Forwards aim to create space through frequent movements, often relying on shorter, more dynamic actions [91]. Midfielders and external defenders are tasked with establishing connections between different sectors of the field [194]. They do so by exploring various depths of the field and attempt to exploit spatial gaps in the opposition's defensive line, which requires that they achieve higher speeds and cover longer distances [195]. This rationale could account for the greater distances at higher speed thresholds [193].

External midfielders perform the greatest sprint distance (330 m), followed by external defenders (273 m), forwards (280 m), central midfielders (224 m), and central defenders (180 m). This might be attributed to the notion that external players are often isolated in wide positions in one-on-one scenarios, which requires maximal sprints to 'out compete' the opponent. Another explanation is that wide midfielders are responsible for both defensive and offensive duties [73, 92, 97, 108, 115, 146] and sprints might be crucial to the success of this position as straight line sprints often precede goals [196].

The data presented in this scoping review highlight the distinctive physical demands associated with different soccer playing positions. Central and external midfielders, along with external defenders, covered substantial

distances during matches. Forwards and central defenders covered less ground, given their tactical discipline and more specialized responsibilities. However, it is essential to consider that performance can vary depending on factors such as tactical formation, competitive level, playing style, and the team's adopted model. These insights offer valuable information for tailoring position-specific training and enhancing player performance. Future research should further enrich these findings by incorporating combined tactical information to elucidate how behavior influences team performance [197], addressing a gap in the literature that warrants attention.

4.2 Methodological Trends in Exploring Differences Between Playing Positions

In this scoping review of 178 studies, the classification of players according to their playing positions reveals some interesting trends and discrepancies. Over half of the studies in the current review ($n = 105$, ~59%) employed a categorization system that encompassed central defenders, full-backs, central midfielders, wide midfielders, and forwards. This approach represents a consistent methodological approach to categorizing player roles, allowing for an accurate examination of various playing positions [99]. However, approximately 16% of the studies ($n = 29$) omitted the inclusion of full-backs and external midfielders in their classification systems. This omission has potential ramifications for the analytical sensitivity of the research, primarily because it is consistently observed that central defenders cover significantly shorter distances than fullbacks [36, 42, 70]. Discrepancies are also observed between the playing styles of external midfielders and central midfield players. The classification methodologies employed by a significant subset of studies ($n = 27$, ~15%) demonstrated substantial variability in playing position [55, 61, 120, 148], highlighting the lack of consensus or standardization in categorizing playing positions within the soccer research community. These findings explain the need for improved consistency in the classification of playing positions in soccer research.

Goalkeepers are consistently excluded from research analyses, a trend that may be attributed to the unique nature of their position. Due to the nature of their role, goalkeepers experience fewer physical, physiological, and technical demands. This exclusion from research raises questions about the adequacy of our understanding of goalkeepers' contributions and challenges within the broader context of the game. Investigations into the profiles of this unique position would enhance the understanding and training practices of goalkeepers.

The technologies employed for the measurement of activity during matches have evolved over recent years. The use of automatic or semi-automatic video-based systems was

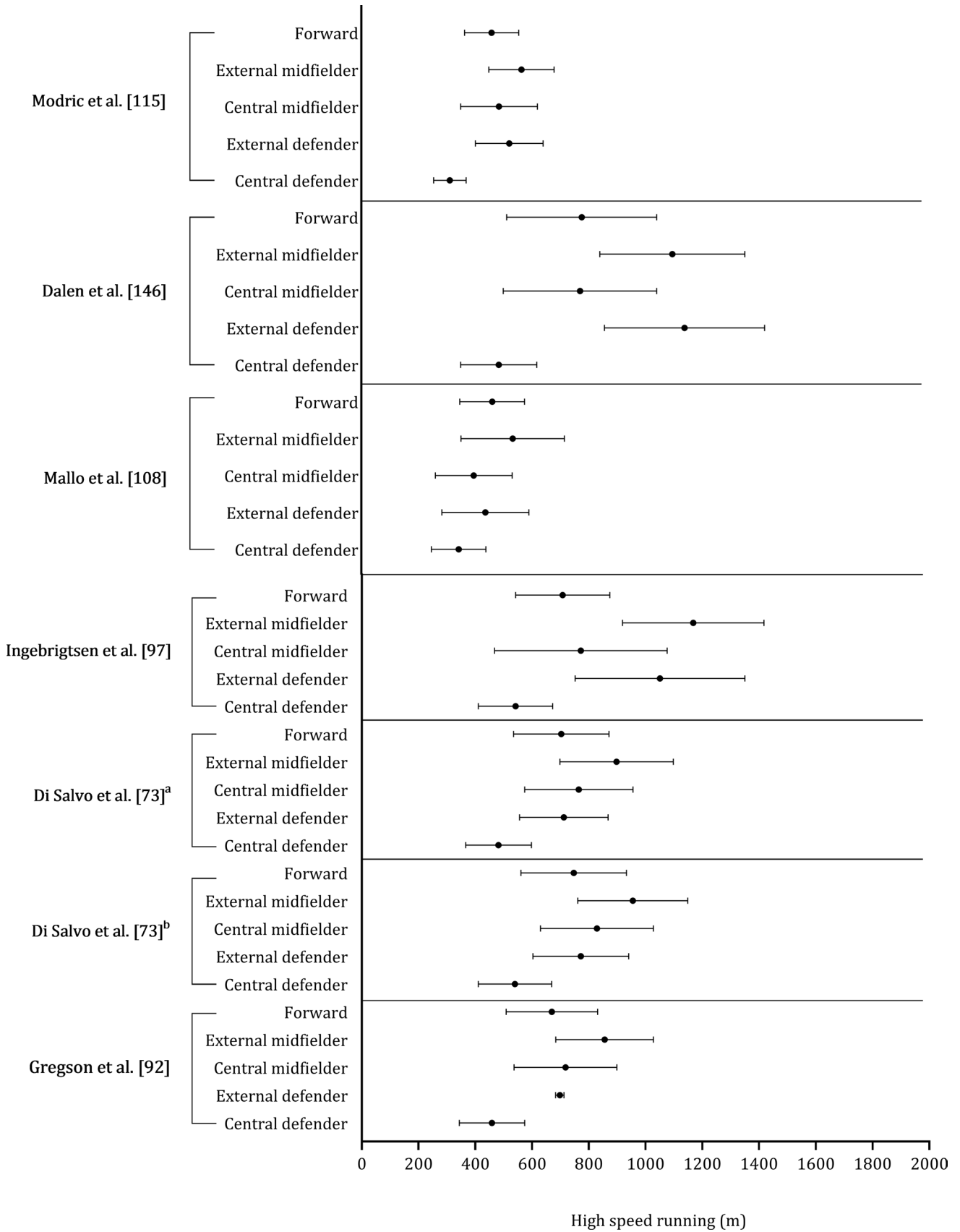


Fig. 10 Descriptive statistics (mean \pm standard deviation) of distance in high-speed running covered by playing position (central defender, external defender, central midfielder, external midfielder, forward). ^aChampionship League, ^bPremiership

particularly prevalent [21, 82, 99, 130], with 78 papers (52%) adopting these technologies. Microelectromechanical systems (MEMS) were utilized in 66 papers [40, 43, 44], highlighting the increasing integration of modern technologies, attributed to a change in FIFA rulesets. The focus on specific metrics was evident in the studies reviewed, with significant attention directed towards parameters such as total distance covered (109 papers; 45%), high-speed running (62 papers; 25%), and sprinting (73 papers; 30%). The prevalence of video-based systems and notational analysis has increased in the investigation of technical and tactical aspects of soccer [22, 128, 161]. However, it is important to note that despite these advancements in technology, there is a noticeable lack of integrated research that combines physical, physiological, technical, and tactical analyses, particularly across playing positions [197]. Addressing this gap by working collaboratively and in an inter-disciplinary manner would enhance our understanding of how positional profiles influence match outcomes.

Two studies assessed the physiological differences in playing positions [52, 85]. The discrepancy in quantity of studies assessing physical performance and physiological characteristics might be attributed to the difficulties associated with collecting physiological data during matches. This might have potential implications for practice given that internal physiological load does not appear to correlate with external load [198]. The nuanced relationship between

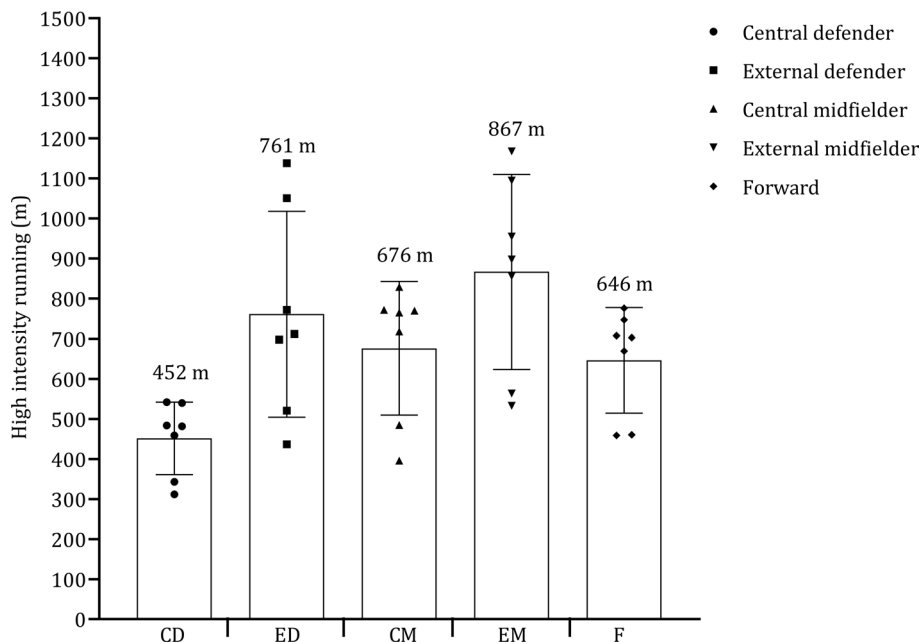
external and internal loads involves complex and multifaceted factors influencing player performance and wellbeing that extend beyond locomotion activities. Assessing physiological load can offer valuable insights into player management and training strategies, ultimately advancing our understanding of the physiological profiles of different playing positions.

4.3 Evolving Trends in Analyzing Soccer Playing Positions

The present review article highlights a marked increase in research output specific to player positions over the past 5 years (2019–2023), with 54% of the studies being published during this time frame. This trend might be attributed to the well-established practice of monitoring the demands of match play in applied soccer clubs [199, 200]. It appears that there is an increasing trend of practitioners and researchers collaborating in an attempt to better use applied data to enhance understanding of various elements of soccer, including the demands of each positional role.

The location of soccer research on the topic of playing positions has mainly originated from Europe, specifically from Spain ($n=41$; 27%) and England ($n=25$; 15%). One potential explanation could be the strong tradition of soccer in Europe, where the sport is deeply ingrained in the culture [201]. This long-standing soccer heritage might naturally lead to a greater interest and investment in research in these countries. The presence of top-tier soccer leagues (e.g., United Kingdom, Spain, Italy, Germany, France) [202] in these nations could provide further opportunities for research collaboration and funding, which may in turn perpetuate the

Fig. 11 Pooled mean and standard deviation of studies that examined distance in high-speed running covered by playing position. Each symbol represents the mean of individual studies



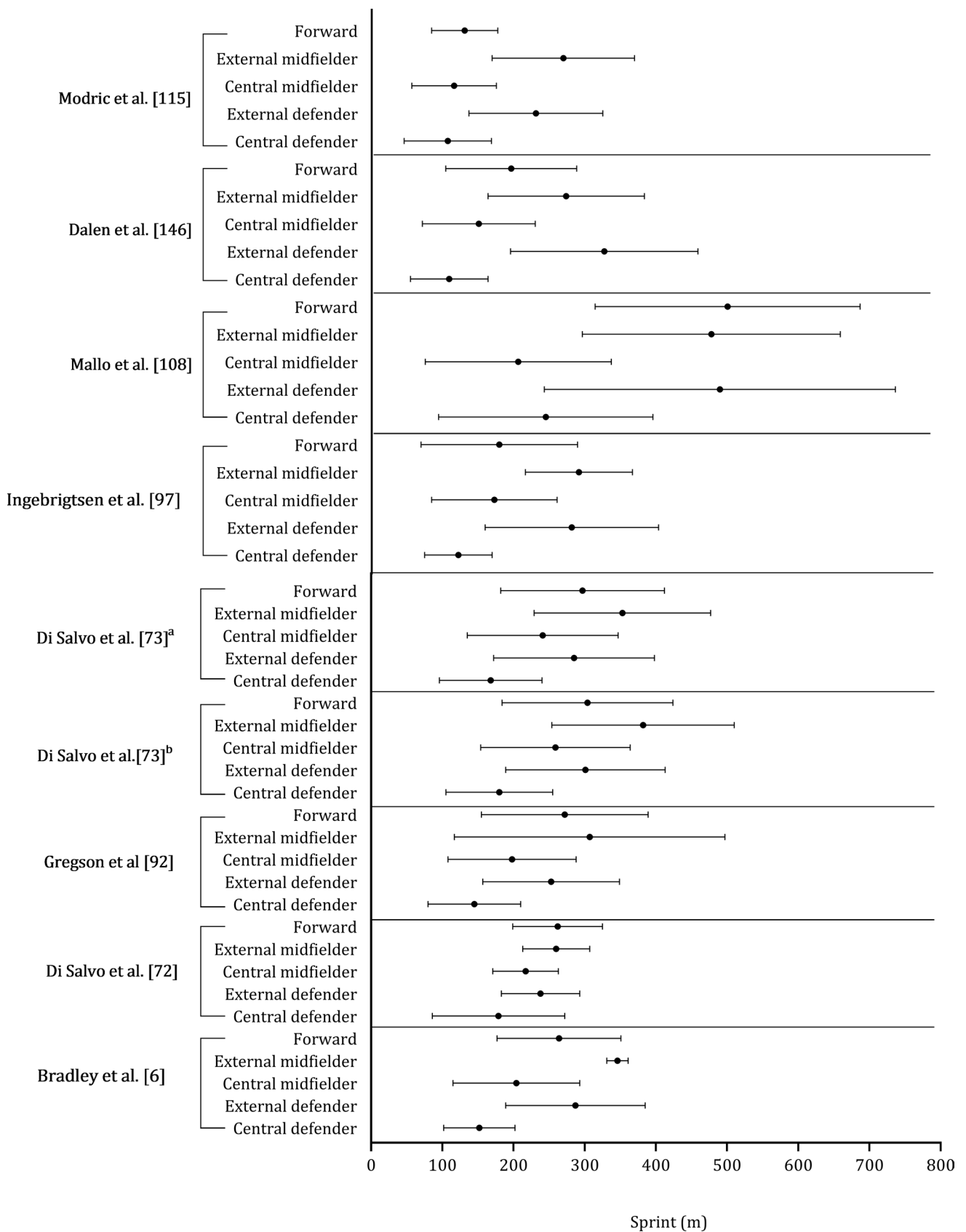
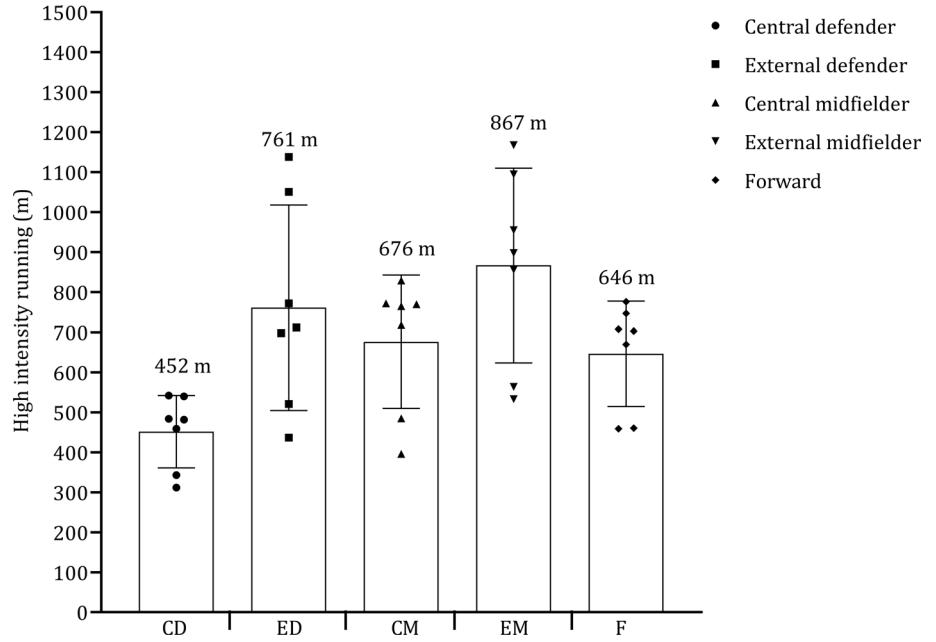
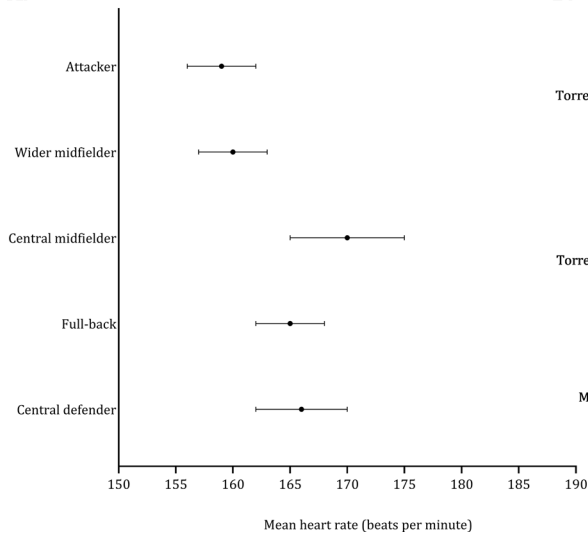


Fig. 12 Descriptive statistics (mean ± standard deviation) of distance covered in sprint by playing position (central defender, external defender, central midfielder, external midfielder, forward).^aChampionship League, ^bPremiership

Fig. 13 Pooled mean and standard deviation of studies that examined distance covered in sprint by playing position. Each symbol represents the mean of individual studies



A.



B.

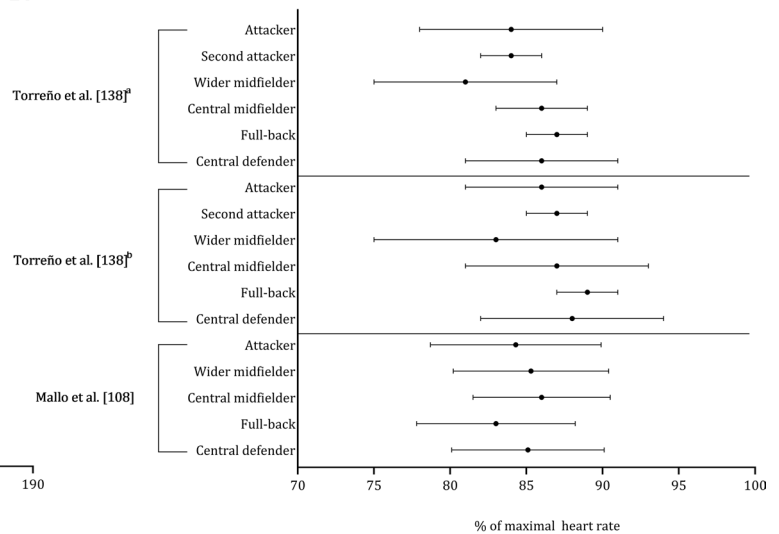


Fig. 14 Descriptive statistics (mean \pm standard deviation) of heart rate (absolute values: **A** (Bujnovsky et al. [52]) and relative heart rate (% of maximal heart rate: **B**). ^aFirst half, ^bSecond half

wealth of research in Europe. However, although Spain and England possess some of the highest-level soccer teams and sport science institutions in Europe, the current data and understanding surrounding playing positions in soccer might be solely reflective of the practices and cultures within these specific countries. Determining the positional differences from an array of continents might enhance understanding of playing positions in soccer on a greater scale.

4.4 Methodological Limitations and Future Directions

There are several methodological limitations present within the literature. There is a lack of clear sample definitions, limited reporting of power analyses, insufficient descriptions of independent variables and ambiguity surrounding the playing levels of participants across studies. This leads to confusion, a lack of consensus of surrounding data interpretation, and makes it difficult to draw conclusions that

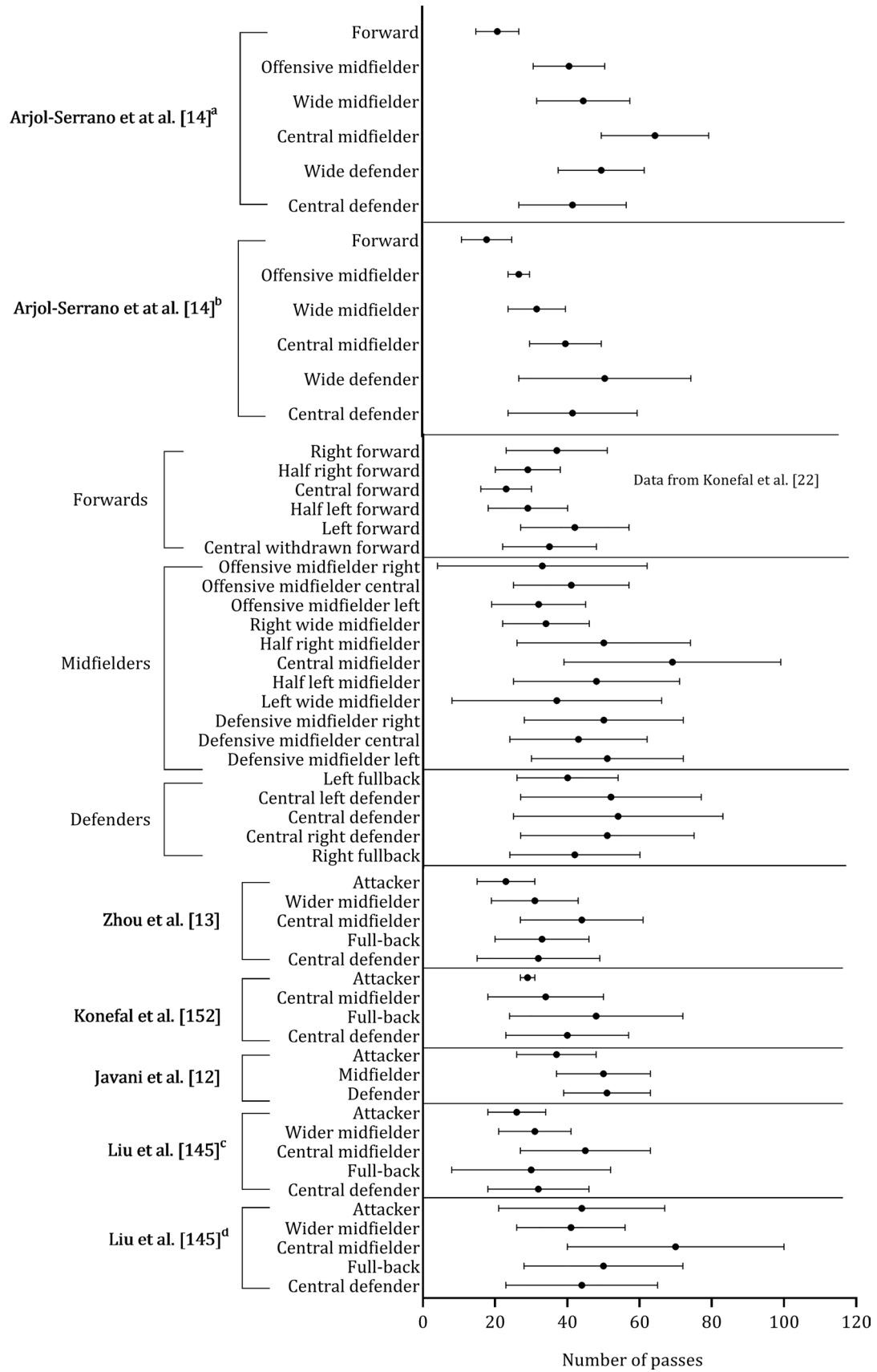


Fig. 15 Descriptive statistics (mean ± standard deviation) of number of passes in each study. ^aConsidering the following tactical scheme: 1-4-4-2; ^bConsidering the following tactical scheme: 1-4-2-3-1; ^cbottom three teams; ^dtop three teams

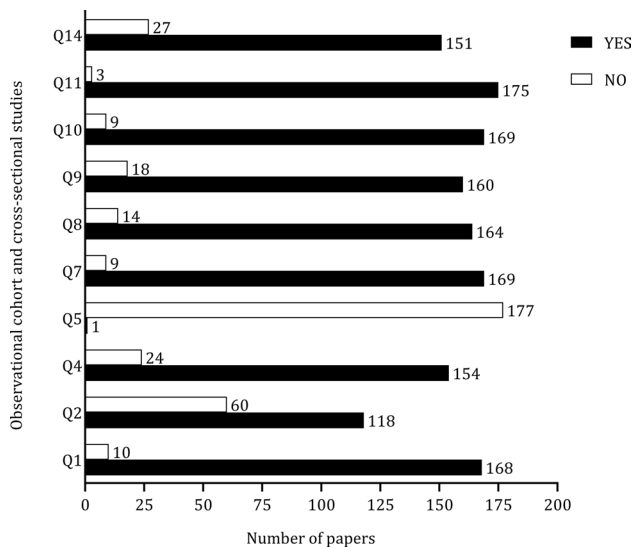


Fig. 16 Summary of the quality of studies included in the present review. Q1: Was the research question or objective in this paper clearly stated? Q2: Was the study population clearly specified and defined? Q3: Was the participation rate of eligible persons at least 50%? Q4: Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants? Q5: Was a sample size justification, power description, or variance and effect estimates provided? Q6: For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured? Q7: Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed? Q8: For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)? Q9: Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? Q10: Was the exposure(s) assessed more than once over time? Q11: Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? Q12: Were the outcome assessors blinded to the exposure status of participants? Q13: Was loss to follow-up after baseline 20% or less? Q14: Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?

are representative, as players in certain positions at the elite level are likely to demonstrate divergent activity profiles versus a lower-level soccer player. The failure to address contextual factors in a substantial portion of the reviewed studies highlights the need for a greater understanding of applied practices in soccer. For instance, it remains unclear as to what extent positional roles are influenced by substitution strategies, as none of the included studies separated the analyses to account for partial match players. It is likely that if players enter or leave the field part way through a match, these profiles are likely to differ from those of players that play an entire soccer match [203]. It might also need to be considered how the requirements of each playing position are influenced by fixture congested scenarios [204]. Fixture congested periods are a major contemporary challenge faced by soccer teams and must be considered in future work characterizing position differences to ensure coaches are better informed as to which positions should be managed due to higher propensities of underperformance and injury [205].

5 Conclusion

The scoping review aimed to compare the impacts of playing position on physical, physiological, and technical demands in soccer matches. The findings demonstrate that central and external midfielders, and external defenders, cover greater total and high-speed distance than forwards or central defenders. Sprint distance was higher in external midfielders versus all other positions. Defenders and central midfielders perform more passes than external midfielders and forwards. These data might support coaches and practitioners in preparing players for competition demands through the development of individualized training practices that allow athletes to better handle specific positional demands.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40279-024-02088-z>.

Funding Open access funding provided by FCTIFCCN (b-on).

Declarations

Ethics Approval and Consent to Participate Not applicable.

Consent for Publication Not applicable.

Availability Data and Material The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

Competing of Interests The authors declare no conflict of interest.

Author Contributions HS, DVM, JA, PC, and FC conceptualized the manuscript; DVM, JA, PC, AF, FMC, and HS wrote the original draft; ER, NOS, RO, GP, RS, and JBD organized the data; AF reviewed and

edited the manuscript. All authors have read and agreed to the published version of the manuscript.

Funding Rafael Oliveira is a research member of the Research Centre in Sports Sciences, Health and Human Development which was funded by National Funds by FCT - Foundation for Science and Technology under the following project UIDB/04045/2020 (<https://doi.org/10.54499/UIDB/04045/2020>). The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

1. Stølen T, Chamari K, Castagna C, Wisløff U. Physiology of soccer: an update. *Sports Med.* 2005;35:501–36.
2. Modrić T, Sattler T, Morgans R, Pavlinovic V, Mandić A. Physical performance in highest-level soccer: comparison between FIFA World Cup and UEFA Champions League Matches. *Sport Mont.* 2023;21:3–7.
3. Sarmento H, Clemente FM, Afonso J, Araújo D, Fachada M, Nobre P, Davids K. Match analysis in team ball sports: an umbrella review of systematic reviews and meta-analyses. *Sports Med Open.* 2022;8:66.
4. Dolci F, Hart N, Kilding A, Chivers P, Piggot B, Spiteri T. Physical and energetic demand of soccer: a brief review. *Strength Cond J.* 2020;42:70–7.
5. Hands DE, Jonge XJ. Current time-motion analyses of professional football matches in top-level domestic leagues: a systematic review. *Int J Perf Anal Sport.* 2020;20:747–65.
6. Bradley PS, Sheldon W, Wooster B, Olsen P, Boanas P, Krstrup P. High-intensity running in English FA Premier League soccer matches. *J Sports Sci.* 2009;27:159–68.
7. Rampinini E, Sassi A, Morelli A, Mazzoni S, Fanchini M, Coutts AJ. Repeated-sprint ability in professional and amateur soccer players. *Appl Physiol Nutr Metab.* 2009;34:1048–54.
8. Asian-Clemente J, Suarez-Arrones L, Requena B, Santalla A. Influence of tactical behaviour on running performance in the three most successful soccer teams during the competitive season of the Spanish First Division. *J Hum Kinet.* 2022;82:135–44.
9. Bradley PS, Carling C, Archer D, Roberts J, Dodds A, Di Mascio M, Paul D, Diaz AG, Peart D, Krstrup P. The effect of playing formation on high-intensity running and technical profiles in English FA Premier League soccer matches. *J Sports Sci.* 2011;29:821–30.
10. Di Salvo V, Baron R, González-Haro C, Gormasz C, Pigozzi F, Bachl N. Sprinting analysis of elite soccer players during European Champions League and UEFA Cup matches. *J Sports Sci.* 2010;28:1489–94.
11. Barrera J, Sarmento H, Clemente FM, Field A, Figueiredo AJ. The effect of contextual variables on match performance across different playing positions in professional Portuguese Soccer Players. *Int J Environ Res Public Health.* 2021;18:5175.
12. Javani M, Hamedinia M, Khodaei K. Technical performance analysis of Iran Premier League Soccer Players in 2012–023 Season. *Pedagog Psychol Med Biol Probl Phys Train Sports.* 2015;19:77–81.
13. Zhou C, Lorenzo A, Gómez M-Á, Palao JM. Players' match demands according to age and playing position in professional male soccer players. *Int J Perf Anal Sport.* 2020;20:389–405.
14. Arjol-Serrano JL, Lampre M, Díez A, Castillo D, Sanz-López F, Lozano D. The influence of playing formation on physical demands and technical-tactical actions according to playing positions in an elite soccer team. *Int J Environ Res Public Health.* 2021;18:4148.
15. Chmura P, Konefał M, Chmura J, Kowalczyk E, Zając T, Rokita A, Andrzejewski M. Match outcome and running performance in different intensity ranges among elite soccer players. *Biol Sport.* 2018;35:197–203.
16. Altmann S, Forcher L, Woll A, Härtel S. Effective playing time affects physical match performance in soccer: an analysis according to playing position. *Biol Sport.* 2023;40:967–73.
17. Modrić T, Versić S, Morgans R, Sekulić D. Match running performance characterizing the most elite soccer match-play. *Biol Sport.* 2023;40:949–58.
18. Araújo EL, Maior AS. Match load during competitive matches and difference among players positions in elite soccer players. *Medicina Sportiva.* 2021;17:3274–9.
19. Castillo-Rodríguez A, González-Téllez JL, Figueiredo A, Chinchilla-Minguet JL, Onetti-Onetti W. Starters and non-starters soccer players in competition: is physical performance increased by the substitutions? *BMC Sports Sci Med Rehabil.* 2023;15:33.
20. Ortega DR, Martín Simón MÁ. High-intensity physical performance parameters in soccer. *Trends Sport Sci.* 2022;29:51–6.
21. Modrić T, Versić S, Alexe DI, Gilic B, Mihai I, Drid P, Radulovic N, Saavedra JM, Menjibar RB. Decline in running performance in highest-level soccer: analysis of the UEFA Champions League Matches. *Biology (Basel).* 2022;11:1441.
22. Konefał M, Chmura P, Zając T, Chmura J, Kowalczyk E, Andrzejewski M. A new approach to the analysis of pitch-positions in professional soccer. *J Hum Kinet.* 2019;66:143–53.
23. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hofmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ.* 2021;372:n71.
24. Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med.* 2018;169:467–73.
25. McKay AKA, Stellingwerff T, Smith ES, et al. Defining training and performance caliber: a participant classification framework. *Int J Sports Physiol Perform.* 2022;17:317–31.
26. National Heart, Lung, and Blood Institute. Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies; 2019.
27. Abbott W, Brickley G, Smeeton NJ. Positional Differences in GPS outputs and perceived exertion during soccer training games and competition. *J Strength Cond Res.* 2018;32:3222–31.
28. Ade J, Fitzpatrick J, Bradley PS. High-intensity efforts in elite soccer matches and associated movement patterns, technical skills and tactical actions. Information for position-specific training drills. *J Sports Sci.* 2016;34:2205–14.
29. Ademović AJHS. Differences in the quantity and intensity of playing in elite soccer players of different position in the game. *J Sports Sci Med.* 2016;18:26–31.
30. Akyıldız Z, Çene E, Parim C, Çetin O, Turan Ç, Yüksel Y, Silva R, Silva AF, Nobari H. Classified metabolic power-based measures in professional football players: comparison between playing positions and match period. *BMC Sports Sci Med Rehabil.* 2022;14:146.

31. Akyildiz Z, Yüksel Y, Çene E, Parim C, Silva R, Isik A, Yildiz M, Silva AF, Badicu G, Clement F. Locomotor demands in professional male football players: differences and variability according to halves and playing positions. *J Mens Health*. 2022;18:153.
32. Al Haddad H, Méndez-Villanueva A, Torreño N, Munguía-Izquierdo D, Suárez-Arrones L. Variability of GPS-derived running performance during official matches in elite professional soccer players. *J Sports Med Phys Fitness*. 2018;58:1439–45.
33. Mazzeo GF, D'Elia F, Raiola G. Physical commitment and specific work for each role in an elite soccer team. *J Phys Educ Sport*. 2018;18:570–4.
34. Altavilla G, Riel L, Di Tore AP, Raiola G. The physical effort required from professional football players in different playing positions. *J Phys Educ Sport*. 2017;17:2007–12.
35. Amani AR. Distance covered and activity analysis of football players during World Cup 2014. *Arch Med Deporte*. 2018;35:376–9.
36. Andrzejewski M, Chmura J, Pluta B. Analysis of motor and technical activities of professional soccer players of the UEFA Europa League. *Int J Perf Anal Sport*. 2014;14:504–23.
37. Andrzejewski M, Chmura J, Pluta B, Kasprzak A. Analysis of motor activities of professional soccer players. *J Strength Cond Res*. 2012;26:1481–8.
38. Andrzejewski M, Chmura J, Pluta B, Konarski JM. Sprinting activities and distance covered by top level Europa league soccer players. *Int J Sports Sci Coach*. 2015;10(1):39–50.
39. Andrzejewski M, Chmura J, Pluta B, Strzelczyk R, Kasprzak A. Analysis of sprinting activities of professional soccer players. *J Strength Cond Res*. 2013;27:2134–40.
40. Andrzejewski M, Chmura P, Konefał M, Kowalczyk E, Chmura J. Match outcome and sprinting activities in match play by elite German soccer players. *J Sports Med Phys Fitness*. 2018;58:785–92.
41. Andrzejewski M, Konefał M, Chmura P, Kowalczyk E, Chmura J. Match outcome and distances covered at various speeds in match play by elite German soccer players. *Int J Perf Anal Sport*. 2016;16:817–28.
42. Andrzejewski M, Pluta B, Konefał M, Chmura P, Chmura JAN. Analysis of the motor activities of professional Polish soccer players. *Pol J Sport Tour*. 2016;23:196–201.
43. Andrzejewski M, Pluta B, Konefał M, Konarski J, Chmura J, Chmura P. Activity profile in elite Polish soccer players. *Res Sports Med*. 2019;27:473–84.
44. Aquino R, Vieira LHP, Carling C, Martins GH, Alves IS, Puggina EF. Effects of competitive standard, team formation and playing position on match running performance of Brazilian professional soccer players. *Int J Perf Anal Sport*. 2017;17:695–705.
45. Baptista I, Johansen D, Figueiredo P, Rebelo A, Pettersen SA. Positional differences in peak- and accumulated- training load relative to match load in elite football. *Sports (Basel)*. 2019;8(1):1.
46. Baptista I, Johansen D, Seabra A, Pettersen SA. Position specific player load during match-play in a professional football club. *PLoS ONE*. 2018;13: e0198115.
47. Barros RM, Misuta MS, Menezes RP, Figueroa PJ, Moura FA, Cunha SA, Anido R, Leite NJ. Analysis of the distances covered by first division Brazilian soccer players obtained with an automatic tracking method. *J Sports Sci Med*. 2007;6:233–42.
48. Bloomfield J, Polman R, O'Donoghue P. physical demands of different positions in FA Premier League Soccer. *J Sports Sci Med*. 2007;6:63–70.
49. Bradley PS, Noakes TD. Match running performance fluctuations in elite soccer: indicative of fatigue, pacing or situational influences? *J Sports Sci*. 2013;31:1627–38.
50. Bradley PS, Di Mascio M, Peart D, Olsen P, Sheldon B. High-intensity activity profiles of elite soccer players at different performance levels. *J Strength Cond Res*. 2010;24(9):2343–51.
51. Bradley PS, Lago-Peñas C, Rey E, Gomez DA. The effect of high and low percentage ball possession on physical and technical profiles in English FA Premier League soccer matches. *J Sports Sci*. 2013;31:1261–70.
52. Bujnovsky D, Maly T, Zahalka F, Mala L. Analysis of physical load among professional soccer players during matches with respect to field position. *J Phys Educ Sport*. 2015;15:569.
53. Caldbeck P, Dos'Santos T. How do soccer players sprint from a tactical context? Observations of an English Premier League soccer team. *J Sports Sci*. 2022;40:2669–80.
54. Carling C. Analysis of physical activity profiles when running with the ball in a professional soccer team. *J Sports Sci*. 2010;28:319–26.
55. Carling C. Influence of opposition team formation on physical and skill-related performance in a professional soccer team. *Eur J Sport Sci*. 2011;11:155–64.
56. Carling C, Espié V, Le Gall F, Bloomfield J, Jullien H. Work-rate of substitutes in elite soccer: a preliminary study. *J Sci Med Sport*. 2010;13:253–5.
57. Carling C, Le Gall F, Dupont G. Analysis of repeated high-intensity running performance in professional soccer. *J Sports Sci*. 2012;30:325–36.
58. Casamichana DG, Castellano J, Dellal A. Kinematic profile in fiendly matches of semiprofessional soccer players. *J Sport Health Res*. 2013;5:283–94.
59. Casamichana D, Castellano J, Diaz AG, Gabbett TJ, Martin-Garcia A. The most demanding passages of play in football competition: a comparison between halves. *Biol Sport*. 2019;36:233–40.
60. Clark P. Intermittent high intensity activity in English FA Premier League soccer. *Int J Perf Anal Sport*. 2010;10(2):139–51.
61. Clemente FM, Couceiro MS, Martins FM, Ivanova MO, Mendes R. Activity profiles of soccer players during the 2010 world cup. *J Hum Kinet*. 2013;38:201–11.
62. Clemente FM, José F, Oliveira N, Martins FML, Mendes RS, Figueiredo AJ, Wong DP, Kalamaras D. Network structure and centralization tendencies in professional football teams from Spanish La Liga and English Premier Leagues. *J Hum Sport Exerc*. 2016;11:376–89.
63. Conde JH, Alves DL, Novack LF, Carneiro CF, Cruz R, Osiecki R. Comparisons of recovery, external and internal load by playing position and match outcome in professional soccer. *Motriz*. 2018;24: e1018140.
64. Connor M, Mernagh D, Beato M. Quantifying and modelling the game speed outputs of English Championship soccer players. *Res Sports Med*. 2022;30:169–81.
65. Dalen T, Lorås H, Hjelde GH, Kjøsnes TN, Wisløff U. Accelerations—a new approach to quantify physical performance decline in male elite soccer? *Eur J Sport Sci*. 2019;19:1015–23.
66. De Silva V, Caine M, Skinner J, Dogan S, Kondoz A, Peter T, Axtell E, Birnie M, Smith B. Player tracking data analytics as a tool for physical performance management in football: a case study from Chelsea football club academy. *Sports (Basel)*. 2018;6:130.
67. Dellal A, Chamari K, Wong DP, Ahmaidi S, Keller D, Barros R, Bisciotti GN, Carling C. Comparison of physical and technical performance in European soccer match-play: FA Premier League and La Liga. *Eur J Sport Sci*. 2011;11:51–9.
68. Dellal A, Wong DP, Moalla W, Chamari K. Physical and technical activity of soccer players in the French First League with special reference to their playing position. *Int SportMed J*. 2010;11:278–90.


69. Di Mascio M, Bradley PS. Evaluation of the most intense high-intensity running period in English FA Premier League soccer matches. *J Strength Cond Res.* 2013;27:909–15.
70. Di Salvo V, Baron R, Tschan H, Calderon Montero FJ, Bachl N, Pigozzi F. Performance characteristics according to playing position in elite soccer. *Int J Sports Med.* 2007;28:222–7.
71. Di Salvo V, Benito PJ, Calderón FJ, Di Salvo M, Pigozzi F. Activity profile of elite goalkeepers during football match-play. *J Sports Med Phys Fitness.* 2008;48:443–6.
72. Di Salvo V, Gregson W, Atkinson G, Tordoff P, Drust B. Analysis of high intensity activity in Premier League soccer. *Int J Sports Med.* 2009;30:205–12.
73. Di Salvo V, Pigozzi F, González-Haro C, Laughlin MS, De Witt JK. Match performance comparison in top English soccer leagues. *Int J Sports Med.* 2013;34:526–32.
74. Djaoui L, Owen A, Newton M, Nikolaidis PT, Dellal A, Chamari K. Effects of congested match periods on acceleration and deceleration profiles in professional soccer. *Biol Sport.* 2022;39:307–17.
75. Domene AM. Evaluation of movement and physiological demands of full-back and center-back soccer players using global positioning systems. *J Hum Sport Exerc.* 2013;8:1015–28.
76. Dos Santos T, Cowling I, Challoner M, Barry T, Caldbeck P. What are the significant turning demands of match play of an English Premier League soccer team? *J Sports Sci.* 2022;40:1750–9.
77. Duk OS, Min KS, Kawczyński A, Chmura P, Mroczek D, Chmura J. Endurance and speed capacity of the Korea republic football national team during the world cup of 2010. *J Hum Kinet.* 2011;30:115–21.
78. Eirale C, Bisciotti GN, Fiorella T, Sannicandro I. Performance profile in elite Italian football players. *Med Sport.* 2011;64:243–56.
79. Ermidis G, Randers MB, Krstrup P, Mohr M. Technical demands across playing positions of the Asian Cup in male football. *Int J Perf Anal Sport.* 2019;19:530–42.
80. Fahey JT, Aldred K, Greig M, Rhodes D. Peak running speeds in professional male football: influence of division and playing position. *J Strength Cond Res.* 2023;37:636–40.
81. Filetti C, Ruscello B, Ascenzi G, Di Mascio M, D’ottavio S. Physical performance metrics in elite soccer: do power and acceleration metrics provide insight into positional demands and match-related fatigue in the 4-3-3 system? *J Sports Med Phys Fitness.* 2019;59:1640–50.
82. Forcher L, Forcher L, Haertel S, Jekauc D, Waesche H, Woll A, Gross T, Altmann S. Does technical match performance in professional soccer depend on the positional role or the individuality of the player? *Front Psychol.* 2022;13: 813206.
83. Forcher L, Forcher L, Jekauc D, Woll A, Gross T, Altmann S. Center backs work hardest when playing in a back three: the influence of tactical formation on physical and technical match performance in professional soccer. *PLoS ONE.* 2022;17(3): e0265501.
84. Gai Y, Volossovitch A, Lago C, Gómez MÁ. Technical and tactical performance differences according to player’s nationality and playing position in the Chinese football super league. *Int J Perf Anal Sport.* 2019;19:632–45.
85. García OG, Suarez TA, Boubeta AR, Lago ED. Is different the behaviour of the professional football players heart rate in competition according to the tactical position of the player in the field? *Apunts Educ Fís Deporte.* 2007;90:42–50.
86. García-Aliaga A, Marquina M, Román IR, Solana DM, Madrona JAP, Del Campo RL, Garrosa FN, Món-Lopez D. COVID-19 Confinement effects on game actions during competition restart in professional soccer players. *Int J Environ Res Public Health.* 2022;19(7):4252.
87. García-Calvo T, Ponce-Bordón JC, Pons E, López Del Campo R, Resta R, Raya-González J. High metabolic load distance in professional soccer according to competitive level and playing positions. *PeerJ.* 2022;10: e13318.
88. Garrido D, Antequera DR, Campo RLD, Resta R, Buldú JM. Distance between players during a soccer match: the influence of player position. *Front Psychol.* 2021;12: 723414.
89. Gaudino P, Iaia FM, Alberti G, Strudwick AJ, Atkinson G, Gregson W. Monitoring training in elite soccer players: systematic bias between running speed and metabolic power data. *Int J Sports Med.* 2013;34:963–8.
90. Gómez MÁ, Lago C, Gómez MT, Furley P. Analysis of elite soccer players’ performance before and after signing a new contract. *PLoS ONE.* 2019;14: e0211058.
91. Goncalves LGC, Clemente FM, Vieira LHP, Bedo B, Puggina EF, Moura F, Mesquita F, Santiago PRP, Almeida R, Aquino R. Effects of match location, quality of opposition, match outcome, and playing position on load parameters and players’ prominence during official matches in professional soccer players. *Hum Mov.* 2021;22:35–44.
92. Gregson W, Drust B, Atkinson G, Salvo VD. Match-to-match variability of high-speed activities in premier league soccer. *Int J Sports Med.* 2010;31:237–42.
93. Guerrero-Calderón B, Morcillo JA, Chena M, Castillo-Rodríguez A. Comparison of training and match load between metabolic and running speed metrics of professional Spanish soccer players by playing position. *Biol Sport.* 2022;39:933–41.
94. Hills SP, Barrett S, Thoseby B, Kilduff LP, Barwood MJ, Radcliffe JN, Cooke CB, Russel M. Quantifying the peak physical match-play demands of professional soccer substitutes following pitch-entry: assessing contextual influences. *Res Q Exerc Sport.* 2022;93:270–81.
95. Hongyou L, Gómez MA, Lago-Peñas C, Arias-Estero J, Stefani R. Match performance profiles of goalkeepers of elite football teams. *Int J Sports Sci Coach.* 2015;10:669–82.
96. Hoppe MW, Baumgart C, Slomka M, Polglaze T, Freiwald J. Variability of metabolic power data in elite soccer players during pre-season matches. *J Hum Kinet.* 2017;58:233–45.
97. Ingebrigtsen J, Dalen T, Hjelde GH, Drust B, Wisløff U. Acceleration and sprint profiles of a professional elite football team in match play. *Eur J Sport Sci.* 2015;15(2):101–10.
98. Jozak R, Perić A, Bradić A, Dizdar D. Position-related differences in the amount, intensity and speed of movement in elite football players. *Homo Sporticus.* 2011;3:16–22.
99. Ju W, Doran D, Hawkins R, Evans M, Laws A, Bradley PS. Contextualised high-intensity running profiles of elite football players with reference to general and specialised tactical roles. *Biol Sport.* 2023;40:291–301.
100. Kubayi A. Position-specific physical and technical demands during the 2019 COPA América Football tournament. *S Afr J Sports Med.* 2021;33:v33i1a11955.
101. Kubayi A. Technical demands of the various playing positions in the qualifying matches for the European Football Championship. *Int J Perf Anal Sport.* 2021;21:374–82.
102. Lago-Peñas C, Kalen A, Lorenzo-Martinez M, Lopez-Del Campo R, Resta R, Rey E. Do elite soccer players cover longer distance when losing? Differences between attackers and defenders. *Int J Sports Sci Coach.* 2021;16:840–7.
103. Lago-Peñas C, Rey E, Lago-Ballesteros J, Casás L, Domínguez E. The influence of a congested calendar on physical performance in elite soccer. *J Strength Cond Res.* 2011;25:2111–7.
104. Li Y, Zong S, Shen Y, Pu Z, Gómez MÁ, Cui Y. Characterizing player’s playing styles based on player vectors for each playing position in the Chinese Football Super League. *J Sports Sci.* 2022;40:1629–40.

105. Long GM, Joyce SM, Herrington RT, Fox KB, Mumaugh JE. External workloads vary by position and game result in US-based professional soccer players. *Int J Exerc Sci.* 2023;16:688–99.
106. Lorenzo-Martinez M, Kalén A, Rey E, López-Del Campo R, Resta R, Lago-Peñas C. Do elite soccer players cover less distance when their team spent more time in possession of the ball? *Sci Med Footb.* 2021;5:310–6.
107. Lorenzo-Martínez M, Padrón-Cabo A, Rey E, Memmert D. Analysis of physical and technical performance of substitute players in professional soccer. *Res Q Exerc Sport.* 2021;92:599–606.
108. Mallo J, Mena E, Nevado F, Paredes V. Physical demands of top-class soccer friendly matches in relation to a playing position using global positioning system technology. *J Hum Kinet.* 2015;47:179–88.
109. Martín-Fuentes I, Oliva-Lozano JM, Fortes V, Muyor JM. Effect of playing position, passage duration and starting status on the most demanding passages of match play in professional football. *Res Sports Med.* 2021;29:417–26.
110. Martín-García A, Casamichana D, Díaz AG, Cos F, Gabbett TJ. Positional differences in the most demanding passages of play in football competition. *J Sports Sci Med.* 2018;17:563–70.
111. Metaxas TI. Match running performance of elite soccer players: VO_{2max} and player position influences. *J Strength Cond Res.* 2021;35:162–8.
112. Miñano-Espin J, Casáis L, Lago-Peñas C, Gómez-Ruano MÁ. High speed running and sprinting profiles of elite soccer players. *J Hum Kinet.* 2017;58:169–76.
113. Mitrotasios M, Ioannis Ispyrilidis I, Mantzouranis N, Vassiliades E, Armatas V. Season physical performance of professional soccer players. Match-play evaluation of a Greek Super League team. *J Phys Educ Sport.* 2021;21:743–7.
114. Modric T, Gabrilo G, Peric M. match outcome and running performance among UEFA Champions League Soccer players. *Stud Sport.* 2022;16:24–31.
115. Modric T, Versic S, Sekulic D. Does aerobic performance define match running performance among professional soccer players? A position-specific analysis. *Res Sports Med.* 2021;29:336–48.
116. Mohr M, Krstrup P, Bangsbo J. Match performance of high-standard soccer players with special reference to development of fatigue. *J Sports Sci.* 2003;21:519–28.
117. Morera-Barrantes R, Calderon-Chaverri C, Gutierrez-Vargas R, Rojas-Valverde D, Gutierrez-Vargas JC, Ugalde-Ramirez JA. Physical demands of costa rican professional soccer players: influence of the playing position and the competitive level. *MhSalud.* 2021. <https://doi.org/10.15359/mhs.18-2.1>.
118. Moura FA, Marche A, Caetano F, Torres R, Martins L, Cunha S. Analysis of high-intensity efforts in Brazilian professional soccer players. *Hum Mov.* 2017;18:52–4.
119. Obetko M, Peráček P, Mikulič M, Babic M. Technical–tactical profile of an elite soccer goalkeeper. *J Phys Educ Sport.* 2022;22:38–46.
120. Oliva-Lozano JM, Cuenca-López J, Suárez J, Granero-Gil P, Muyor JM. When and how do soccer players from a semi-professional club sprint in match play? *J Hum Kinet.* 2023;86:195–204.
121. Orendurff MS, Walker JD, Jovanovic M, Tulchin KL, Levy M, Hoffmann DK. Intensity and duration of intermittent exercise and recovery during a soccer match. *J Strength Cond Res.* 2010;24:2683–92.
122. Padrón-Cabo A, Rey E, Vidal B, García-Nuñez J. Work-rate analysis of substitute players in professional soccer: analysis of seasonal variations. *J Hum Kinet.* 2018;65:165–74.
123. Padulo J, Haddad M, Ardigò LP, Chamari K, Pizzolato F. High frequency performance analysis of professional soccer goalkeepers: a pilot study. *J Sports Med Phys Fitness.* 2015;55:557–62.
124. Ponce-Bordón JC, Díaz-García J, López-Gajardo MA, Triviño-Lobo D, Del Campo RL, Resta R, García-Calvo T. The influence of time winning and time losing on position-specific match physical demands in the top one Spanish Soccer League. *Sensors (Basel).* 2021;21:6843.
125. Praça G, Diniz LBF, Clemente FM, Breidt SGT, Couto B, Andrade AGP, Owen AL. The influence of playing position on the physical, technical, and network variables of sub-elite professional soccer athletes. *Hum Mov.* 2021;22(2):22–31.
126. Radzimiński Ł, Lorenzo-Martinez M, Konefał M, Chmura P, Andrzejewski M, Jastrzębski Z, Padrón-Cabo A. Changes of physical match performance after the COVID-19 lockdown in professional soccer players according to their playing position. *Biol Sport.* 2022;39:1087–93.
127. Rampinini E, Coutts AJ, Castagna C, Sassi R, Impellizzeri FM. Variation in top level soccer match performance. *Int J Sports Med.* 2007;28:1018–24.
128. Redwood-Brown A, O'Donoghue P, Robinson G, Neilson P. The effect of score-line on work-rate in English FA Premier League soccer. *Int J Perf Anal Sport.* 2012;12(2):258–71.
129. Reilly T, Thomas V. A motion analysis of work-rate in different positional roles in professional football match-play. *J Human Mov Stud.* 1976;2:87–97.
130. Riboli A, Esposito F, Coratella G. The distribution of match activities relative to the maximal intensities in elite soccer players: implications for practice. *Res Sports Med.* 2022;30:463–74.
131. Rienzi E, Drust B, Reilly T, Carter JE, Martin A. Investigation of anthropometric and work-rate profiles of elite South American international soccer players. *J Sports Med Phys Fitness.* 2000;40:162–9.
132. Sekulic D, Versic S, Decelis A, Castro-Piñero J, Javorac D, Dimitric G, Idrizovic K, Jukic I, Modric T. The effect of the COVID-19 lockdown on the position-specific match running performance of professional football players; preliminary observational study. *Int J Environ Res Public Health.* 2021;18:12221.
133. Soroka A. The locomotor activity of soccer players based on playing positions during the 2010 World Cup. *J Sports Med Phys Fitness.* 2018;58:837–42.
134. Soroka A, Lago-Peñas C. The effect of a succession of matches on the physical performance of elite football players during the World Cup Brazil 2014. *Int J Perf Anal Spor.* 2016;16:434–41.
135. Suarez-Arrones L, Torreño N, Requena B, De Villareal ES, Casamichana D, Barbero-Alvarez JC, Munguía-Izquierdo D. Match-play activity profile in professional soccer players during official games and the relationship between external and internal load. *J Sports Med Phys Fitness.* 2015;55:1417–22.
136. Szwarc A, Chamera M, Duda H, Memmert D, Radziminski L. Characteristics of the efficiency of actions of top-level goalkeepers in soccer. *Balt J Health Phys Act.* 2023;15:4.
137. Teixeira JE, Leal M, Ferraz R, Ribeiro J, Cachada JM, Barbosa TM, Monteiro AM, Forte P. Effects of match location, quality of opposition and match outcome on match running performance in a Portuguese professional football team. *Entropy (Basel).* 2021;23:973.
138. Torreño N, Munguía-Izquierdo D, Coutts A, de Villarreal ES, Asian-Clemente J, Suarez-Arrones L. Relationship between external and internal loads of professional soccer players during full matches in official games using global positioning systems and heart-rate technology. *Int J Sports Physiol Perform.* 2016;11:940–6.
139. Varley MC, Di Salvo V, Modonutti M, Gregson W, Mendez-Villanueva A. The influence of successive matches on match-running performance during an under-23 international soccer tournament: the necessity of individual analysis. *J Sports Sci.* 2018;36:585–91.
140. Palucci Vieira LH, Aquino R, Lago-Peñas C, Munhoz Martins GH, Puggina EF, Barbieri FA. Running performance in Brazilian professional football players during a congested match schedule. *J Strength Cond Res.* 2018;32:313–25.

141. Vigne G, Dellal A, Gaudino C, Chamari K, Rogowski I, Alloati G, Wong PD, Owen A, Hautier C. Physical outcome in a successful Italian Serie A soccer team over three consecutive seasons. *J Strength Cond Res.* 2013;27:1400–6.
142. Vigne G, Gaudino C, Rogowski I, Alloati G, Hautier C. Activity profile in elite Italian soccer team. *Int J Sports Med.* 2010;31:304–10.
143. Vilamitjana JJ, Heinze G, Verde P, Calleja-González J. High-intensity activity according to playing position with different team formations in soccer. *Acta Gymnica.* 2021;51:e2021.003.
144. Djaoui L, del Wong P, Pialoux V, Hautier CD, Da Silva CD, Chamari K, Dellal A. Physical activity during a prolonged congested period in a top-class European Football Team. *Asian J Sports Med.* 2014;5:47–53.
145. Liu H, Gómez MA, Gonçalves B, Sampaio J. Technical performance and match-to-match variation in elite football teams. *J Sports Sci.* 2016;34:509–18.
146. Dalen T, Ingebrigtsen J, Ettema G, Hjelde GH, Wisløff U. Player load, acceleration, and deceleration during forty-five competitive matches of elite soccer. *J Strength Cond Res.* 2016;30:351–9.
147. Modric T, Versic S, Stojanovic M, Chmura P, Andrzejewski M, Konefał M, Sekulic D. Factors affecting match running performance in elite soccer: analysis of UEFA Champions League matches. *Biol Sport.* 2023;40:409–16.
148. Hills SP, Barrett S, Feltbower RG. A match-day analysis of the movement profiles of substitutes from a professional soccer club before and after pitch-entry. *PLoS ONE.* 2019;14: e0211563.
149. Honz O, Cepkova A. Analysis of the frequency of a goalkeeper's individual playing activities without the ball in top level football. *J Phys Educ Sport.* 2019;19:1556–9.
150. Jones RN, Greig M, Mawéné Y, Barrow J, Page RM. The influence of short-term fixture congestion on position specific match running performance and external loading patterns in English professional soccer. *J Sports Sci.* 2019;37:1338–46.
151. Konefał M, Chmura P, Kowalczyk E, Figueiredo AJ, Sarmento H, Rokita A, Chmura A, Chmura J, Andrzejewski M. Modeling of relationships between physical and technical activities and match outcome in elite German soccer players. *J Sports Med Phys Fitness.* 2019;59:752–9.
152. Konefał M, Chmura P, Zajac T, Chmura J, Kowalczyk E, Andrzejewski M. Evolution of technical activity in various playing positions, in relation to match outcomes in professional soccer. *Biol Sport.* 2019;36:181–9.
153. Kubayi A. Evaluation of match-running distances covered by soccer players during the UEFA EURO 2016. *S Afr J Sports Med.* 2019;31:v31i1a6127.
154. Lebediev S, Beziazychnyi B, Bulgakov O, Stadnik S, Khudjakova V, Zhurid AYS, Petrusenko N. Analysis of motor activity of professional football team players in the Ukrainian first league. *J Phys Educ Sport.* 2019;19:87–91.
155. Modric T, Versic S, Sekulic D, Liposek S. Analysis of the association between running performance and game performance indicators in professional soccer players. *Int J Environ Res Public Health.* 2019;16:4032.
156. Núñez FJ, Toscano Bendala FJ, Suárez Arrones L, Martínez Cabrera FI, Hoyo Lora MD. Individualized thresholds to analyze acceleration demands in soccer players using GPS. *Retos.* 2018;58:1774–80.
157. Reche-Soto P, Cardona-Nieto D, Diaz-Suarez A, Bastida-Castillo A, Gomez-Carmona C, Garcia-Rubio J, Pino-Ortega J. Player load and metabolic power dynamics as load quantifiers in soccer. *J Hum Kinet.* 2019;69:259–69.
158. Redwood-Brown AJ, O'Donoghue PG, Nevill AM, Seward C, Sunderland C. Effects of playing position, pitch location, opposition ability and team ability on the technical performance of elite soccer players in different score line states. *PLoS ONE.* 2019;14: e0211707.
159. Rivilla-García J, Calvo LC, Jiménez-Rubio S, Paredes-Hernández V, Muñoz A, van del Tillar R, Navandar A. Characteristics of very high intensity runs of soccer players in relation to their playing position and playing half in the 2013–14 Spanish La Liga Season. *J Hum Kinet.* 2019;66:213–22.
160. Sæterbakken A, Haug V, Fransson D, Grendstad HN, Gundersen HS, Moe VF, Ylvisaker E, Shaw M, Riiser A, Anderson V. Match running performance on three different competitive standards in Norwegian soccer. *Sports Med Int Open.* 2019;3:E82–8.
161. Serrano C, Paredes-Hernández V, Sánchez-Sánchez J, Gallardo-Pérez J, Da Silva R, Porcel D, Colino E, García-Unaua J, Gallardo L. The team's influence on physical and technical demands of elite goalkeepers in LaLiga: a longitudinal study in professional soccer. *Res Sports Med.* 2019;27:424–38.
162. Szwarc A, Jaszczur-Nowicki J, Aschenbrenner P, Zasada M, Padulo J, Lipinska P. Motion analysis of elite Polish soccer goalkeepers throughout a season. *Biol Sport.* 2019;36(4):357–63.
163. Aquino R, Carling C, Palucci Vieira LH, Martins G, Jabor G, Machado J, Santiago P, Garganta J, Puggina E. Influence of situational variables, team formation, and playing position on match running performance and social network analysis in Brazilian professional soccer players. *J Strength Cond Res.* 2020;34:808–17.
164. Azcárate U, Yanci J, Los AA. Differentiated perceived match load and its variability according to playing position in professional soccer players during an entire season. *Kinesiology.* 2020;52:103–8.
165. Caetano FG, de Souza NM, Bueno MJDO, Cunha SA, Moura FA. Interpersonal interaction during official soccer matches considering the coupling of different playing positions. *Int J Perf Anal Sport.* 2020;20:646–58.
166. Clemente FM, Sarmento H, Aquino R. Player position relationships with centrality in the passing network of world cup soccer teams: win/loss match comparisons. *Chaos Soliton Fract.* 2020;133: 109625.
167. Dalen T, Aune TK, Hjelde GH, Ettema G, Sandbakk Ø, McGhie D. Player load in male elite soccer: comparisons of patterns between matches and positions. *PLoS ONE.* 2020;15: e0239162.
168. Granero-Gil P, Gómez-Carmona CD, Bastida-Castillo A, Rojas-Valverde D, de la Cruz E, Pino-Ortega J. Influence of playing position and laterality in centripetal force and changes of direction in elite soccer players. *PLoS ONE.* 2020;15: e0232123.
169. Ispyrilidis I, Gourgoulis V, Mantzouranis N, Gioftsidou A, Athanailidis I. Match and training loads of professional soccer players in relation to their tactical position. *J Phys Educ Sport.* 2020;20:2269–76.
170. Kalapotharakos VI, Gkaros A, Gkaros A, Vassiliades E, Manthou E. Influence of contextual factors on match running performance in elite soccer team. *J Phys Educ Sport.* 2020;20:3267–72.
171. López-Gajardo MA, González-Ponce I, Pulido JJ, García-Calvo T, Leo FM. (2020). Analysis of the football goalkeeper's technical-tactical actions in competition. *Rev Int Med Scienc Act Fis Deporte.* 2020;20(80).
172. Lord C, Blazevich AJ, Abbiss CR, Drinkwater EJ, Ma'ayah F. Comparing maximal mean and critical speed and metabolic powers in elite and sub-elite soccer. *Int J Sports Med.* 2020;41:219–26.
173. Modric T, Versic S, Sekulic D. Position specific running performances in professional football (Soccer): influence of different tactical formations. *Sports (Basel).* 2020;8(12):161.
174. Modric T, Versic S, Sekulic D. Playing position specifics of associations between running performance during the training and match in male soccer players. *Acta Gymnica.* 2020;50(2):51–60.

175. Modric T, Versic S, Sekulic D. Aerobic fitness and game performance indicators in professional football players; playing position specifics and associations. *Heliyon*. 2020; 6(11).
176. Moreno-Pérez V, Malone S, Sala-Pérez L, Lapuente-Sagarra M, Campos-Vazquez MA, Del Coso J. Activity monitoring in professional soccer goalkeepers during training and match play. *Int J Perf Anal Sport*. 2020;20(1):19–30.
177. Oliva-Lozano JM, Fortes V, Krusturup P, Muyor JM. Acceleration and sprint profiles of professional male football players in relation to playing position. *PLoS ONE*. 2020;15: e0236959.
178. Oliva-Lozano JM, Rojas-Valverde D, Gómez-Carmona CD, Fortes V, Pino-Ortega J. Worst case scenario match analysis and contextual variables in professional soccer players: a longitudinal study. *Biol Sport*. 2020;37:429–36.
179. Paraskevas G, Smilios I, Hadjicharalambous M. Effect of opposition quality and match location on the positional demands of the 4-2-3-1 formation in elite soccer. *J Exerc Sci Fit*. 2020;18:40–5.
180. Sarajärvi J, Volossovitch A, Almeida CH. Analysis of headers in high-performance football: evidence from the English Premier League. *Int J Perf Anal Sport*. 2020;20:189–205.
181. Vardakis L, Michailidis Y, Mandroukas A, Mavrommatis G, Christoulas K, Metaxas T. Analysis of the running performance of elite soccer players depending on position in the 1-4-3-3 formation. *Ger J Exerc Sport Res*. 2020;50:241–50.
182. Yi Q, Gómez-Ruano MÁ, Liu H, Zhang S, Gao B, Wunderlich F, Memmert D. Evaluation of the technical performance of football players in the UEFA Champions League. *Int J Environ Res Public Health*. 2020;17(2):604.
183. Altmann S, Forcher L, Ruf L, Beaven A, Groß T, Lussi P, Woll A, Härtel S. Match-related physical performance in professional soccer: position or player specific? *PLoS ONE*. 2021;16: e0256695.
184. Aquino R, Gonçalves LG, Galgaro M, Maria TS, Rostaiser E, Pastor A, Nobari H, Garcia GR, Moraes-Neto M, Nakamura FY. Match running performance in Brazilian professional soccer players: comparisons between successful and unsuccessful teams. *BMC Sports Sci Med Rehabil*. 2021;13:93.
185. Díez A, Lozano D, Arjol-Serrano JL, Mainer-Pardos E, Castillo D, Torrentegui-Duarte M, Nobari N, Jaén-Carrillo D, Lampre M. Influence of contextual factors on physical demands and technical-tactical actions regarding playing position in professional soccer players. *BMC Sports Sci Med Rehabil*. 2021;13:157.
186. Freire LA, de Brito MA, Esteves NS, Tannure M, Slimani M, Znazen H, Bragazzi NL, Brito CJ, Soto DAS, Gonçalves D, Miarka B. Running performance of high-level soccer player positions induces significant muscle damage and fatigue up to 24 h postgame. *Front Psychol*. 2021;12: 708725.
187. García-Romero-Pérez Á, Ordonez FJ, Reyes-Gil F, Rodríguez-López ES, Oliva-Pascual-Vaca Á. Muscle damage biomarkers in congestion weeks in English Premier League soccer players: a prospective study for two consecutive seasons. *Int J Environ Res Public Health*. 2021;18:7960.
188. Kubayi A, Larkin P. Match performance profile of goalkeepers during the 2019 COPA America soccer championship. *Med Sport*. 2020;73:453–60.
189. Rey E, Kalén A, Lorenzo-Martínez M, López-Del Campo R, Nevado-Garrosa F, Lago-Peñas C. Elite soccer players do not cover less distance in the second half of the matches when game interruptions are considered. *J Strength Cond Res*. 2024;38:709–13.
190. Low B, Rein R, Schwab S, Memmert D. Defending in 4-4-2 or 5-3-2 formation? small differences in footballers' collective tactical behaviours. *J Sports Sci*. 2022;40:351–63.
191. Bortnik L, Bruce-Low S, Burger J, Alexander J, Harper D, Morgans R, Carling C, McDaid K, Rhodes D. Physical match demands across different playing positions during transitional play and high-pressure activities in elite soccer. *Biol Sport*. 2024;41:73–82.
192. Vigh-Larsen JF, Dalgas U, Andersen TB. Position-specific acceleration and deceleration profiles in elite youth and senior soccer players. *J Strength Cond Res*. 2018;32:1114–22.
193. Filter A, Olivares-Jabalera J, Dos Santos T, Madruga M, Lozano JMO, Molina A, Santalla A, Requena B, Loturco I. High-intensity actions in elite soccer: current status and future perspectives. *Int J Sports Med*. 2023;44:535–44.
194. Low B, Coutinho D, Gonçalves B, Rein R, Memmert D, Sampaio J. A systematic review of collective tactical behaviours in football using positional data. *Sports Med*. 2020;50:343–85.
195. Oliva-Lozano JM, Fortes V, Muyor JM. When and how do elite soccer players sprint in match play? A longitudinal study in a professional soccer league. *Res Sports Med*. 2023;31:1–12.
196. Faude O, Koch T, Meyer T. Straight sprinting is the most frequent action in goal situations in professional football. *J Sports Sci*. 2012;30:625–31.
197. Bradley PS, Ade JD. Are current physical match performance metrics in elite soccer fit for purpose or is the adoption of an integrated approach needed? *Int J Sports Physiol Perform*. 2018;13:656–64.
198. McLaren SJ, Macpherson TW, Coutts AJ, Hurst C, Spears IR, Weston M. The relationships between internal and external measures of training load and intensity in team sports: a meta-analysis. *Sports Med*. 2018;48:641–58.
199. Weston M. Training load monitoring in elite English soccer: a comparison of practices and perceptions between coaches and practitioners. *Sci Med Footb*. 2018;2:216–24.
200. Akenhead R, Nassis GP. Training load and player monitoring in high-level football: current practice and perceptions. *Int J Sports Physiol Perform*. 2016;11:587–93.
201. García B, Llopis-Goig R. Supporters' attitudes towards European football governance: structural dimensions and sociodemographic patterns. *Soccer Soc*. 2020;22:372–87.
202. Zhao Y. Downtrends in offside offenses among “the big five” European football leagues. *Front Psychol*. 2021;12: 719270.
203. Hills SP, Barwood MJ, Radcliffe JN, Cooke CB, Kilduff LP, Cook CJ, Russell M. Profiling the Responses of Soccer Substitutes: A Review of Current Literature. *Sports Med*. 2018;48:2255–69.
204. Julian R, Page RM, Harper LD. The effect of fixture congestion on performance during professional male soccer match-play: a systematic critical review with meta-analysis. *Sports Med*. 2021;51:255–73.
205. Page RM, Field A, Langley B, Harper LD, Julian R. The effects of fixture congestion on injury in professional male soccer: a systematic review. *Sports Med*. 2023;53:667–85.

Authors and Affiliations

Hugo Sarmento¹  · Diogo V. Martinho^{1,2} · Élvio R. Gouveia^{2,3,4} · José Afonso⁵ · Paweł Chmura⁶ · Adam Field⁷ · Nestor Ordoñez Savedra⁸ · Rafael Oliveira^{9,10} · Gibson Praça¹¹ · Rui Silva^{12,13} · Joel Barrera-Díaz¹ · Filipe Manuel Clemente^{12,13,14}

✉ Hugo Sarmento
hugo.sarmento@uc.pt
Élvio R. Gouveia
erubiog@staff.uma.pt

¹ University of Coimbra, Research Unit for Sport and Physical Activity, Faculty of Sport Sciences and Physical Education, Coimbra, Portugal

² LARSYS, Interactive Technologies Institute, Funchal, Portugal

³ Department of Physical Education and Sport, University of Madeira, Funchal, Portugal

⁴ CIPER, Faculdade de Motricidade Humana, Universidade de Lisboa, Lisbon, Portugal

⁵ Faculty of Sport, Centre of Research, Education, Innovation, and Intervention in Sport (CIFID2), University of Porto, Porto, Portugal

⁶ Department of Team Games, Wrocław University of Health and Sport Sciences, 51-612 Wrocław, Poland

⁷ Department of Sport and Exercise Science, Institute of Sport, Manchester Metropolitan University, Manchester, UK

⁸ Research Group in Sports Science and Physical Activity, Faculty of Health Sciences, Sports Science Program, University of Applied and Environmental Sciences, Bogota, Colombia

⁹ Santarém Polytechnic University, School of Sport, Rio Maior, Portugal

¹⁰ Research Center in Sport Sciences, Health Sciences and Human Development (CIDESD), Santarém Polytechnic University, Rio Maior, Portugal

¹¹ Sports Department/UFMG Soccer Science Center/CECA, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil

¹² Escola Superior Desporto e Lazer, Instituto Politécnico de Viana do Castelo, Rua Escola Industrial e Comercial de Nun'Álvares, Viana do Castelo, Portugal

¹³ Sport Physical Activity and Health Research & Innovation Center, 4900-347 Viana do Castelo, Portugal

¹⁴ Gdansk University of Physical Education and Sport, 80-336 Gdańsk, Poland