Data report about comparisons of distance, endurance, speed, strength, and training volume in soccer among Brazil, Saudi Arabia, and Portugal

Informe de datos sobre comparaciones de distancia, resistencia, velocidad, fuerza y volumen de entrenamiento en el fútbol entre Brasil, Arabia Saudita y Portugal

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Abstract

Introduction: Considering the sociocultural and economic background of each nation, the technical-tactical and physical demands of soccer may vary. Effective training methods and performance optimization depend on an awareness of these contextual differences.
Objective: This study aimed to compare match running performance metrics (i.e. total distance covered, endurance, speed, strength, and training load) among professional soccer players from Brazil, Saudi Arabia, and Portugal.
Methods: 8,914 competitive matches from first-division male players aged 18–35 were analyzed [Brazil (n = 2,534), Saudi Arabia (n = 3,889), and Portugal (n = 2,491)]. Physical performance data were collected using Catapult GPS devices, which tracked total distance covered, endurance, maximum speed, explosive strength, and training load. Statistical significance was set at $p < 0.05$.
Results: Portuguese players covered the greatest total distance (5859.52 ± 1916.35 m), followed by Saudi players (5341.03 ± 1879.44 m), and Brazilian players (4467.48 ± 2505.83 m). Endurance was also highest in Portugal (7.80 ± 2.17), followed by Saudi Arabia (7.05 ± 1.78) and Brazil (5.18 ± 2.43). Maximum speed was greatest among Portuguese players (4.93 ± 4.34 m/s), compared to Saudi (4.77 ± 5.54 m/s) and Brazilian players (4.46 ± 5.14 m/s). Brazilian players demonstrated the highest strength values (7.84 ± 5.28), while Portuguese players had the lowest (5.84 ± 2.54). Training load was highest in Saudi Arabia (6.42 ± 3.01), slightly above Portugal (6.19 ± 2.30) and Brazil (5.82 ± 3.45).
Conclusion: These findings suggest differences in match running performance across Brazilian, Saudi and Portuguese soccer players. Portuguese and Saudi player's demonstrated longer total distance covered compared to Brazilian athletes. These findings are crucial for designing training programs to specific contexts to improve competitive performance.

Keywords

Athletic metrics; football; GPS tracking; physical performance; physical fitness.

Resumen

Introducción: Considerando el contexto sociocultural y económico de cada nación, las exigencias técnico-tácticas y físicas del fútbol pueden variar. Los métodos de entrenamiento eficaces y la optimización del rendimiento dependen de la conciencia de estas diferencias contextuales.
Objetivo: Este estudio tuvo como objetivo comparar los parámetros de rendimiento físico durante partidos oficiales (es decir, distancia total recorrida, resistencia, velocidad, fuerza y carga de entrenamiento) entre jugadores profesionales de fútbol de Brasil, Arabia Saudita y Portugal.
Métodos: Se analizaron un total de 8.914 partidos competitivos de jugadores masculinos de primera división, de entre 18 y 35 años [Brasil (n = 2.534), Arabia Saudita (n = 3.889) y Portugal (n = 2.491)]. Los datos de rendimiento físico se recopilaron mediante dispositivos GPS Catapult, que registraron la distancia total recorrida, la resistencia, la velocidad máxima, la fuerza explosiva y la carga de entrenamiento. El nivel de significación estadística se estableció en $p < 0,05$.
Resultados: Los jugadores portugueses recorrieron la mayor distancia total (5859,52 ± 1916,35 m), seguidos por los jugadores saudíes (5341,03 ± 1879,44 m) y los brasileños (4467,48 ± 2505,83 m). La resistencia también fue mayor en Portugal (7,80 ± 2,17), seguida por Arabia Saudita (7,05 ± 1,78) y Brasil (5,18 ± 2,43). La velocidad máxima fue más alta entre los jugadores portugueses (4,93 ± 4,34 m/s), en comparación con los saudíes (4,77 ± 5,54 m/s) y los brasileños (4,46 ± 5,14 m/s). Los jugadores brasileños presentaron los mayores valores de fuerza (7,84 ± 5,28), mientras que los portugueses registraron los más bajos (5,84 ± 2,54). La carga de entrenamiento fue más alta en Arabia Saudita (6,42 ± 3,01), ligeramente superior a Portugal (6,19 ± 2,30) y Brasil (5,82 ± 3,45).
Conclusión: Estos hallazgos destacan diferencias en el rendimiento físico durante partidos entre jugadores de fútbol de Brasil, Arabia Saudita y Portugal. Los jugadores portugueses y saudíes recorrieron distancias mayores que los brasileños. Estos resultados son fundamentales para diseñar programas de entrenamiento adaptados a contextos específicos con el fin de mejorar el rendimiento competitivo.

Palabras clave

Condición física; desempeño físico; fútbol; métricas atléticas; seguimiento por GPS.

Introduction

Complex interaction among cultural, tactical, and physiological elements impacts the physical demands of soccer, which differ significantly across countries (García-Calvo et al., 2025). These differences are seen not only in match running performance (MRP) but also in the composition of weekly training microcycles; they last all whole competitive season (Apriantano et al., 2024). Often, the design and intensity of training programs reflect each nation's sociocultural background and competitive structure, which then influence the physical and tactical expectations set on athletes (Malone et al., 2015; Clemente et al., 2019).

Scientific studies in soccer have increasingly concentrated on assessing total distance (TD) covered, endurance, maximum speed, explosive strength, and training load, core variables used to evaluate MRP in match play (Malone et al., 2015; Clemente et al., 2019). However, synthesizing data from 50 research including 2,615 young male players, Vieira et al. (2019)'s comprehensive review highlighted that physical output differs by age, area, and match setting. Reflecting organized growth paths, players in Qatar (Buchheit et al., 2010; Mendez-Villanueva et al., 2011) showed incremental rises in TD and high-speed running from U13 to U18. While South American studies, including Brazilian youth (Pereira da Silva et al., 2007), often stressed explosive actions and had more TD variability owing to contextual factors like pitch size and tactical approaches, studies across continents showed that European players (e.g., in Italy and England) usually had higher match loads and reached more peak speeds (Castagna et al., 2003; Harley et al., 2010). Studies from Qatar and Australia also often used GPS tracking to assess training load and endurance, hence allowing exact evaluations of performance drop over match halves (Buchheit & Mendez-Villanueva, 2013).

Additional comparisons further emphasize international disparities in MRP. Dellal et al. (2011) found that professional players performed more sprinting and high-intensity running (HIR), and had better technical efficiency during small-sided games than amateurs, despite similar heart rate responses. Hands and Janse de Jonge (2020), in a systematic review of top-tier leagues, reported average TD values from 10,274 m (Australia) to 11,389 m (Italy), with wide midfielders consistently covering the most distance and performing the most sprints (>21 km/h). In addition, Ponce-Bordón et al. (2024) reinforced the importance of external load monitoring by highlighting the elevated sprinting, acceleration, and deceleration demands among Brazilian players with high match exposure during congested weeks.

The observed variation in physical demands across leagues is also significantly influenced by the availability and use of tools and techniques to measure training loads. Technological developments in recent years have enabled exact monitoring of external stress factors placed on athletes (Barrett et al., 2017; Hennessy et al., 2018). Although conventional workload measures like training volume and session frequency were formerly the main indicators, sensor-based data gathered via integrated GPS systems, accelerometers, and gyroscopes have now supplemented these (Barrett et al., 2017). These tools enable ongoing monitoring of physical demands during both matches and training sessions throughout the season.Especially when comparing teams from different continents, understanding these differences could be crucial since it guides the evolution of training plans and improves competitive performance.

There is, however, no direct comparison study on these MRP measures between countries, using consistent indicators such as TD, endurance, velocity, strength, and training load. Therefore, the present study aims to verify and compare the MRP of professional soccer players from Brazil, Saudi Arabia, and Portugal.

Method

The present study investigated differences in MRP among professional soccer players from Brazil, Saudi Arabia, and Portugal using a cross-sectional, observational design. Players used Catapult GPS technology throughout games to monitor MRP. These devices tracked five important facets of physical output: the total distance players ran, their endurance throughout sessions, their top speed, how often they performed powerful, explosive actions (i.e., sprints or jumps), and their overall load. Using the

same equipment and data gathering techniques across all three nations helps to guarantee the consistency of the findings. Ethical bodies in every nation approved the study and all participants gave their informed permission. Comparisons were made across countries (Brazil vs. Saudi Arabia vs. Portugal).

Sample

A total of 8,914 matches from professional soccer players were collected, divided among the three countries: Brazil (n = 2,534 matches), Saudi Arabia (n = 3,889 matches), and Portugal (n = 2,491 matches). Each country contributed data from one full competitive season. All players were actively involved in competitive play during the study period, ensuring consistent exposure to the physical demands typical of their respective leagues.

The inclusion criteria required participants to be professional male soccer players from first-division clubs in Brazil, Saudi Arabia, and Portugal, aged between 18 and 35, with a minimum of three years of professional experience, actively participating in games and training sessions, and consenting to wear GPS tracking devices. Goalkeepers were excluded from the analysis to maintain consistency in MRP metrics across field positions.

Players were excluded if they participated in less than 75 minutes of match play, had recent injuries or medical conditions affecting performance, missed more than 20% of sessions, had contraindications for GPS use, or withdrew consent during the study. The final sample included only outfield players meeting these criteria. These criteria ensured a consistent sample of actively competing, healthy players to yield reliable data across the study's performance metrics.

All participants provided informed consent prior to data collection, in accordance with ethical guidelines for research involving human subjects. Ethical approval was obtained from the relevant institutional review boards in each country, ensuring compliance with international standards, including the Declaration of Helsinki.

Data Collection

Data were collected using Catapult GPS devices, which monitored five primary performance metrics: total distance covered, endurance (measured by sustained activity over time), maximum speed, explosive strength (measured through the number of high-force movements), and overall training load. The Catapult devices used were from the 2023–2024 generation (Vector S7), which operate at a sampling frequency of 10 Hz for positional tracking and 100 Hz for tri-axial accelerometry, gyroscope, and magnetometer sensors. These devices have demonstrated strong reliability (intra-class correlation coefficients, ICC > 0.90) and validity (r > 0.95 when compared to criterion systems like radar guns and motion capture) for measuring distance, velocity, and acceleration in elite team sports (Varley et al., 2017; Buchheit et al., 2014).

Catapult devices were fitted in a specialized vest worn by each player and activated at the start of each training session and game. Monitoring included both competitive matches and standardized training sessions, and data collection began with warm-up activities and extended through the entire session duration. This ensured standardized and comparable data collection across all three regions. Data from each session were uploaded to a secure server immediately afterward and processed for analysis.

Variables

The variables assessed in this study included total distance covered, endurance, velocity, strength, and training load.
These variables were selected based on previous literature identifying them as key indicators of MRP, commonly used to characterize the physical demands of elite-level soccer (Malone et al., 2015;).

All data analyzed in this study were derived from match performance only.

Total Distance Covered (TD): Measured in meters (m), this variable represents the cumulative distance each player covered during a session, serving as a general indicator of physical activity volume (Mohr, Krustrup, & Bangsbo, 2020).

Endurance: Operationalized as the ability to sustain high-intensity efforts over time, endurance was assessed by the duration (minutes) and frequency of high-speed running or repeated high-intensity

efforts, as recorded throughout each session (Kvas-Cabral et al., 2022). High-intensity running was defined using thresholds of >18 km/h, >21 km/h, and >24 km/h, following conventions used in recent time-motion literature (Hands & Janse de Jonge, 2020).

Velocity: Recorded as the maximum speed reached by each player in meters per second (m/s), this variable reflects top-end sprint capacity, which is particularly relevant for offensive transitions and counterattacks (Buchheit et al., 2010; Al Haddad et al.,2015).

Strength: Reflected through explosive efforts, strength was indirectly assessed via the number and intensity of high-acceleration and high-deceleration actions, measured in meters per second squared (m/s^2), which are commonly associated with anaerobic power and force production (Mendez-Villanueva & Buchheit, 2013; Buchheit & Mendez-Villanueva, 2013). Explosive actions were defined using thresholds of ≥ +2.5 m/s^2 for accelerations and ≤ −2.5 m/s^2 for decelerations.

Training Load: Quantified using arbitrary units (AU) provided by the Catapult system (e.g., PlayerLoad™), this variable represents the cumulative physical stress of a session by integrating the rate of change in acceleration across three axes (vertical, mediolateral, and anteroposterior) (Barrett, 2017; Malone et al., 2015). If the proprietary algorithm for Training Load is unavailable, the PlayerLoad™ metric was used and recommended as a validated alternative to compare external load across athletes.

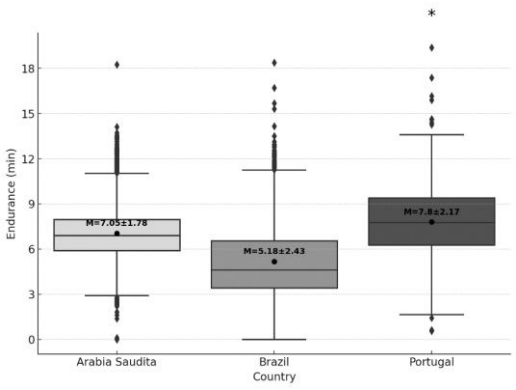
Statistical Analysis

Descriptive statistics, including mean and standard deviation, were calculated for each physical performance variable. To assess differences between groups, one-way analysis of variance (ANOVA) was performed for each variable, followed by Bonferroni post hoc tests. The statistical significance was set at $p < .05$. In addition to significance testing, Cohen's d effect sizes were calculated for all pairwise comparisons to estimate the magnitude of the differences between groups. Effect sizes were interpreted as small ($d \approx 0.2$), moderate ($d \approx 0.5$), and large ($d \geq 0.8$) (Cohen, 1988). A linear mixed-effects model (MLM) was also performed for each outcome. In these models, country was treated as a fixed effect, and group-level variance was modeled as a random intercept to control for between-group variability. Accordingly, ANOVA results should be interpreted as unadjusted comparisons, whereas MLM results provide a more conservative estimation of country-level effects. All statistical analyses were conducted using SPSS software (version 25.0, USA).

Results

Descriptive statistics, unadjusted ANOVA comparisons and MLM were applied to verify the effects on the MRP variables (endurance, strength, total distance, training load, and velocity) among athletes from Saudi Arabia, Brazil, and Portugal (see Figures 1, 2, 3, 4, and 5). The MLM revealed no statistically significant differences between countries for any of the MRP indicators ($p > .05$ for all models).

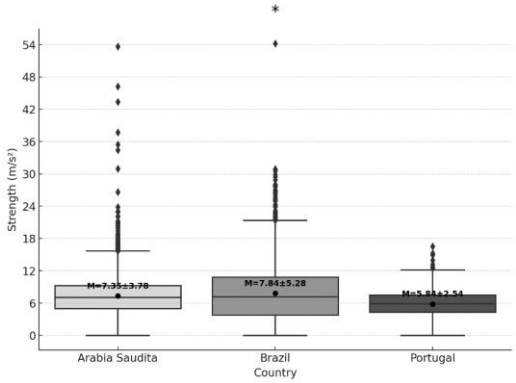
Figure 1. Comparison of endurance (min) between Saudi Arabia, Brazil, and Portugal with significance annotations.



Note. * = significant difference when compared with Brazil; ns = no effects, p≤0.05.

While unadjusted ANOVA comparisons indicated that Portuguese athletes demonstrated higher endurance levels compared to Brazilian players ($p < .05$, $d = 1.17$, large effect), and Saudi players also showed greater endurance than Brazilians ($p < .05$, $d = 0.87$, large effect), no significant difference was found between Saudi Arabia and Portugal ($p > .05$, $d = 0.36$, small to moderate effect).

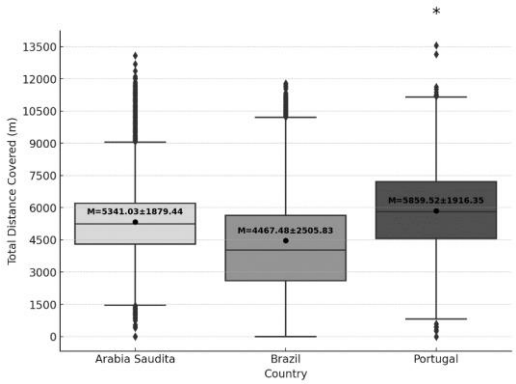
Figure 2. Comparison of strength (m/s^2) between Saudi Arabia, Brazil, and Portugal with significance annotations.



Note. * = significant difference when compared with Portugal; ns = no effects, p≤0.05.

Although ANOVA indicated significantly higher strength in Saudi and Brazilian players compared to Portugal ($p < .05$, $d = 0.78$, moderate effect, and 0.92, large effect), these differences were not confirmed by the MLM which revealed no significant differences between countries ($p = 0.932$ for Brazil; $p = 0.792$ for Portugal).

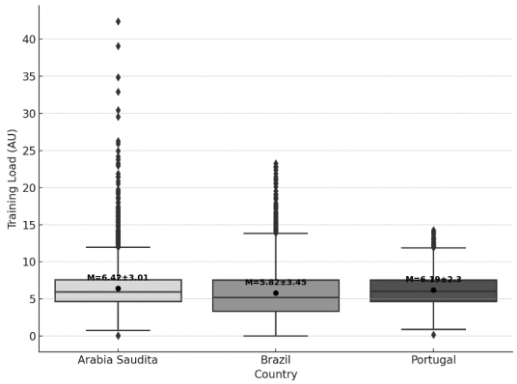
Figure 3. Comparison of total distance (m) between Saudi Arabia, Brazil, and Portugal with significance annotations.



Note. * = significant difference when compared with Brazil; ns = no effects, p≤0.05.

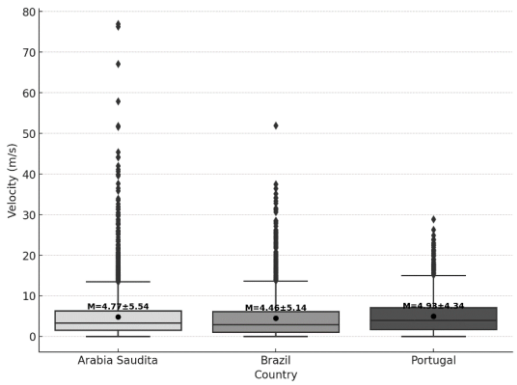
Portuguese athletes covered significantly more distance than Brazilian players ($p < .05$, $d = 0.63$, moderate to large effect). Saudi players also covered more distance than Brazilians ($p < .05$, $d = 0.53$, moderate effect). No significant difference was found between Portugal and Saudi Arabia ($p > .05$, $d = 0.29$, small effect). MLM outcomes indicated no statistically significant differences across countries ($p = 0.766$ for Brazil; $p = 0.773$ for Portugal), and a high random effect variance was observed.

Figure 4. Comparison of training load (au) between Saudi Arabia, Brazil, and Portugal with significance annotations.



No significant differences were found by ANOVA or MLM ($p = 0.887$ for Brazil; $p = 0.956$ for Portugal), with trivial to small effect sizes, reinforcing homogeneity in perceived external load across national groups.

Figure 5. Comparison of velocity (m/s) between Saudi Arabia, Brazil, and Portugal with significance annotations.



Portuguese players reached significantly higher maximum velocities than Brazilian players ($p < .05$, $d = 0.68$, moderate effect). No significant differences were observed between Saudi Arabia and either of the other two groups (Saudi Arabia vs. Brazil: $p > .05$, $d = 0.08$; Saudi Arabia vs. Portugal: $p > .05$, $d = 0.31$; both small effects). The MLM analysis showed no significant country-level effects ($p = 0.967$ for Brazil; $p = 0.981$ for Portugal).

Discussion

The main objective of this study was to compare GPS-derived MRP (i.e. endurance, strength, total distance (TD), velocity, and training load) among professional soccer players from Brazil, Saudi Arabia, and Portugal. The results of this study suggest differences in key GPS-derived performance metrics among professional soccer players from Brazil, Saudi Arabia, and Portugal. Portuguese players tended to show higher values in endurance, total distance covered, and maximum velocity, while Brazilian players consistently showed lower values across these variables. In contrast, Saudi Arabian and Brazilian players outperformed Portuguese athletes in strength, and no significant differences were found among the three countries in training load. These findings suggest region-specific physical profiles and support prior evidence that performance metrics can vary across countries due to distinct playing styles, tactical demands, and training methodologies (Bangsbo, Mohr, & Krustrup, 2006; Cabral et al., 2022). However, comparisons with other studies should be made with caution, especially considering that no detailed filtering by time played was performed beyond the minimum threshold of 75 minutes.

This methodological limitation may have influenced the internal load and movement variability across players.

When comparing our findings to previous research on running performance in soccer, consistent patterns emerge regarding regional differences. European players have frequently been shown to engage in higher endurance activities due to a more continuous style of play and tactical emphasis on ball possession and expansive field coverage (Mohr et al., 2020; Kvas-Cabral et al., 2022). This is supported by recent systematic reviews and longitudinal analyses such as Hands and Janse de Jonge (2020) and Ponce-Bordón et al. (2024), which demonstrated higher TD and high-speed running distances among players in European domestic leagues. This is supported by our results, in which Portuguese players demonstrated superior endurance and covered significantly greater total distances than their Brazilian and Saudi Arabian counterparts. In addition, Portuguese athletes also achieved the highest maximum velocities, suggesting a well-developed aerobic and sprint capacity. Our findings demonstrated: Brazilian and Saudi players both outperformed Portuguese athletes in strength, indicating that anaerobic power may be more developed in these regions.

Cultural and contextual factors in soccer training likely explain many of these observed differences. While no significant differences in training load were detected among the three groups in our study, the relative balance in total session intensity may underlie differences in how that load is accumulated. For example, Djaoui et al. (2017) described how variations in environmental and tactical contexts, such as those present in Middle Eastern soccer, can influence physiological responses to similar external workloads. These context-specific adaptations, driven by factors like climate, match rhythm, and cultural training norms, may help explain the comparable training loads observed despite differing endurance and strength outputs. The interplay between tactical demands, environmental conditions, and training culture across regions continues to shape the physical profiles of elite soccer players, as also highlighted in comparative studies across diverse climates and competitive contexts (Nobari et al., 2022).

A limitation of the present study is the exclusive reliance on GPS-based data collection, which, although widely validated for tracking player movement and workload (Al Haddad et al., 2015), can still be influenced by external factors such as weather conditions, satellite signal variability, and the placement of devices on players. These technical considerations may introduce small inconsistencies in data capture, particularly in high-speed or high-density actions. Additionally, this study did not stratify analyses by player position, a variable known to significantly impact physical performance metrics such as distance covered, sprint frequency, and endurance demands (Mohr et al., 2020Ignoring positional roles limits the ability to detect intra-team or role-specific patterns, which could provide deeper tactical insights. Furthermore, the lack of consideration for match congestion and seasonal workload variation, as pointed out by Guimarães et al. (2025), could have influenced player fatigue levels and performance variability. Future research should aim to integrate positional data and examine seasonal or climatic variations, especially in regions with extreme environmental conditions, to better understand how tactical models, environmental stress, and training adaptations interact to influence physical performance across time (Nobari et al., 2022).

The findings of this study offer important implications for coaches, physical trainers, and sports scientists aiming to optimize athlete development for international competition or transitions between leagues with differing physical demands. Given the lower endurance, total distance, and sprint performance observed among Brazilian players, training programs in Brazil could benefit from incorporating aerobic conditioning and high-intensity running drills, particularly for athletes seeking to transition to European leagues where continuous play and field coverage are prioritized (Mohr et al., 2020; Kvas-Cabral et al., 2022).

For Saudi Arabian players, who showed high strength and moderate endurance, a balanced training approach could be prioritized to better prepare them for international contexts that demand both aerobic and anaerobic capabilities. This is particularly relevant considering the environmental and cultural factors influencing training load and match demands in Middle Eastern contexts (Al Haddad et al.,2015; Nobari et al., 2022).

This study reinforces the idea that regional training philosophies and environmental contexts shape physical performance profiles in soccer. Understanding these distinctions enables practitioners to develop targeted, region-specific conditioning strategies, enhancing not only individual adaptability but also collective team performance when competing across diverse tactical and climatic scenarios. Future research should explore positional demands, seasonal variation, and cultural influences to deepen our understanding of how to tailor physical preparation for athletes in an increasingly globalized soccer landscape (Nobari et al., 2022).

Conclusions

This study suggests differences in key physical performance variables (i.e. endurance, strength, total distance, velocity, and training load) among professional soccer players from Brazil, Saudi Arabia, and Portugal. Portuguese players demonstrated superior endurance, distance covered, and sprint capacity, while Brazilian and Saudi athletes outperformed in strength-related metrics. These findings highlight how regional training methodologies, tactical priorities, and environmental conditions shape the physical profiles of elite soccer players. Understanding these variations is essential for training programs, enhancing player adaptability in international contexts, and optimizing performance across diverse competitive environments.

References

Al Haddad, M., Simpson, B. M., Buchheit, M., Di Salvo, V., & Mendez-Villanueva, A. (2015). Peak match speed and maximal sprinting speed in young soccer players: Effect of age and playing position. *International Journal of Sports Physiology and Performance, 10*(7), 888–896. https://doi.org/10.1123/ijspp.2014-0539

Apriantono, T., Hasan, M. F., Ramania, N. S., Syafriani, R., Kusnaedi, K., Sunadi, D., Bahri, S., Juniarsyah, A. D., Latief, G. R. G., Elhaque, Q. M., Festiawan, R., & Pambudi, Y. T. (2024). Mapeo y tendencias de la investigación sobre la carga de trabajo en el fútbol: análisis bibliométrico [Soccer training load research mapping and trends: A bibliometric analysis]. *Retos*, *60*, 990–1001. https://doi.org/10.47197/retos.v60.108324

Bangsbo, J., Mohr, M., & Krustrup, P. (2006). Physical and metabolic demands of training and match-play in the elite football player. *Journal of Sports Sciences*, 24(7), 665–674. https://doi.org/10.1080/02640414.2006.1003174

Barrett, S. (2017). Monitoring elite soccer players' external loads using real-time data. International *Journal of Sports Physiology and Performance*, 12(10), 1285–1287. https://doi.org/10.1123/ijspp.2016-0516

Buchheit, M., Gray, A., & Morin, J.-B. (2015). Assessing stride variables and vertical stiffness with GPS-embedded accelerometers: Preliminary insights for the monitoring of neuromuscular fatigue on the field. J*ournal of Sports Science and Medicine*, 14(4), 698–701. https://pmc.ncbi.nlm.nih.gov/articles/PMC4657410/pdf/jssm-14-698.pdf

Buchheit, M., & Mendez-Villanueva, A. (2013). Reliability and stability of anthropometric and performance measures in highly-trained young soccer players: Effect of age and maturation. *Journal of Sports Sciences*, 31(12), 1332–1343. https://doi.org/10.1080/02640414.2013.781662

Buchheit, M., Mendez-Villanueva, A., Simpson, B. M., & Bourdon, P. C. (2010). Repeated-sprint sequences during youth soccer matches. *International Journal of Sports Medicine*, 31(10), 709–716. https://doi.org/10.1055/s-0030-1261897

Castagna, C., D'Ottavio, S., & Abt, G. (2003). Activity profile of young soccer players during actual match play. *Journal of Strength and Conditioning Research*, 17(4), 775–780.

Clemente, F. M., Owen, A., Serra-Olivares, J., Nikolaidis, P. T., Van Der Linden, C. M., & Mendes, B. (2019). Characterization of the weekly external load profile of professional soccer teams from Portugal and the Netherlands. *Journal of Human Kinetics*, 66, 155–164. https://doi.org/10.2478/hukin-2018-0054

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Djaoui, L., Haddad, M., Chamari, K., & Dellal, A. (2017). Monitoring training load and fatigue in soccer players with physiological markers. *Physiology & Behavior*, 181, 86–94. https://doi.org/10.1016/j.physbeh.2017.09.004

Guimarães, R. d. S., García-Calvo, T., Raya-González, J., Ponce-Bordón, J. C., Fatela, P., & Lobo-Triviño, D. (2024). Effects of contextual variables on match load in a professional soccer team attending to the different season periods. *Sensors,* 24(2), 679. https://doi.org/10.3390/s24020679

Hands, D. E., & Janse de Jonge, X. A. K. (2020). Current time-motion analyses of professional football matches in top-level domestic leagues: A systematic review. International *Journal of Performance Analysis in Sport,* 20(5), 747–765. https://doi.org/10.1080/24748668.2020.1780872

Harley, J. A., Barnes, C. A., Portas, M., Lovell, R., Barrett, S., Paul, D., et al. (2010). Motion analysis of match-play in elite U12 to U16 age group soccer players. *Journal of Sports Sciences*, 28(13), 1391–1397. https://doi.org/10.1080/02640414.2010.510142

Hennessy, L., & Jeffreys, I. (2018). The current use of GPS, its potential, and limitations in soccer. *Strength & Conditioning Journal,* 40(3), 83–94. https://doi.org/10.1519/SSC.0000000000000386

Kvas-Cabral, V. C., Martins, H., Oneda, G., Enes, A., Moraes, I. F., & Leonel, D. F. (2022). Physical, technical, and tactical differences between continental soccer teams participating in the 2018 FIFA World Cup. *Journal of Physical Education and Sport*, 22(6), 1507–1515. https://doi.org/10.7752/jpes.2022.06190

García-Calvo, T., Lobo-Triviño, D., Polo-Tejada, J., Sanabria-Pino, B., López del Campo, R., Nevado-Garrosa, F., & Raya-González, J. (2025). *Analyzing positional and temporal variations in worst-case scenario demands in professional Spanish soccer*. *Journal of Functional Morphology and Kinesiology, 10*(2), 172. https://doi.org/10.3390/jfmk10020172

Malone, J. J., Di Michele, R., Morgans, R., Burgess, D., Morton, J. P., & Drust, B. (2015). Seasonal training-load quantification in elite English Premier League soccer players. *International Journal of Sports Physiology and Performance*, 10(4), 489–497. https://doi.org/10.1123/ijspp.2014-0352

Mendez-Villanueva, A., & Buchheit, M. (2013). Football-specific fitness testing: Adding value or confirming the evidence? *Journal of Sports Sciences*, 31(13), 1503–1508. https://doi.org/10.1080/02640414.2013.823231

Mohr, M., Krustrup, P., & Bangsbo, J. (2020). Match performance of high-standard soccer players: Effect of fatigue development on repeated sprints and distance covered. *Journal of Sports Sciences,* 38(5), 518–526. https://doi.org/10.1080/02640414.2020.1713810

Nobari, H., Oliveira, R., Clemente, F. M., Pérez-Gómez, J., Carlos-Vivas, J., & Nastasi, S. (2022). Repeated sprint ability and physical match demands in youth soccer players. *Journal of Men's Health,* 18(3), 1–12. https://doi.org/10.31083/jomh.2021.082

Pereira da Silva, N., Kirkendall, D. T., & De Barros Leite Neto, T. (2007). Movement patterns in elite Brazilian youth soccer. *Journal of Sports Medicine and Physical Fitness*, 47(3), 270–275.

Ponce-Bordón, J. C., López-Gajardo, M. A., Lobo-Triviño, D., Pulido, J. J., & García-Calvo, T. (2024). Longitudinal match running performance analysis of soccer in professional European leagues: A systematic review. *International Journal of Performance Analysis in Sport,* 24(6), 601–625. https://doi.org/10.1080/24748668.2024.2343579

Varley, M. C., Jaspers, A., Helsen, W. F., & Malone, J. J. (2017). Methodological considerations when quantifying high-intensity efforts in team sport using global positioning system technology. *International Journal of Sports Physiology and Performance*, 12(8), 1059–1068. https://doi.org/10.1123/ijspp.2016-0534

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