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The Most Demanding Match Periods in Youth Male Soccer: Analysis by Age Groups and Playing Position

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Purpose: To quantify and compare most demanding periods (MDPs) of match play in soccer for total distance, high-speed running distance, and sprint distance across 1-, 3-, and 5-minute periods, examining both positional differences and age groups (under 17, under 19, and under 23) in youth male soccer players. ***Methods:*** Sixty-eight outfield players from the same professional academy (under 17: n = 24, under 19: n = 23, and under 23: n = 21) competing in top national divisions were monitored over 50 official matches using 10-Hz global navigation satellite system units (Catapult Vector S7). MDPs were identified using the rolling average method for each period. Linear mixed models compared MDPs among positions and age groups, with Bonferroni-adjusted post hoc tests and effect sizes (Cohen's *d*). ***Results:*** No differences were observed between age groups for any metric or period length ($P > .05$). However, positional differences were found. Center backs consistently exhibited the lowest values across all metrics ($P < .05$; $d = 1.18–2.72$), while midfielders showed similar sprint distance values to center backs. Strikers and wingers presented the highest sprint distance MDPs, whereas midfielders and strikers recorded the highest total distance MDPs. Shorter time windows produced higher relative values (in meters per minute) across all metrics. ***Conclusions:*** From under 17 onward, highly trained male youth players displayed comparable external load demands during the MDPs of match play, irrespective of age group. Conversely, MDPs were strongly position-dependent, reflecting distinct tactical and physical demands. These findings reinforce the importance of position-specific training while ensuring all players are prepared to cope with atypical high-intensity demands during match play.

Keywords: football, load management, GPS, positional differences, high-speed running, sprinting

Soccer is a team sport that alternates between bouts of high-intensity activity with longer phases performed at lower intensity.[1] Given the inherent variability within matches, it is expected that some periods may be more intense than others, depending on the contextual factors associated with a given situation.[2] These most intense periods of play often occur at critical moments of match play[3] and are commonly described in the literature as the most demanding periods (MDPs) of play. From a practical perspective, the use of average match-demand metrics may underestimate the intensity of the MDPs.[4] Therefore, it becomes fundamental to study these moments, which are defined as the most intense physical activities experienced during match play.[5] In the literature, various terms have been used to describe MDPs, such as worst-case scenarios, most demanding scenarios, maximal intensity periods, peak locomotor demands, most demanding passages, or peak match demands.[6] However, these terms have different meanings and implications for interpretation. Indeed, it has been suggested that the maximum values attained for specific locomotor metrics should be categorized as Peak Demands, within the broader framework of the Most Demanding Scenarios in basketball.[7] Following the same structure, in soccer, the MDPs (characterized as Peak Demands) are typically analyzed using running-based metrics such as total distance (TD), high-speed running distance (HSRD), and sprint distance (SpD).[8]

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According to a systematic review, depending on the time window analyzed, between 1 and 10 minutes, male professional soccer players have been reported to cover between 17 and 55 m/min at high speed running (HSR) intensity and between 7 and 29 m/min at sprinting intensity.[8] These ranges across different periods can be explained by the well-established trend that the shorter the time window, the higher the reported values.[8,9] This phenomenon is less likely to be explained by players' inability to physiologically sustain the same intensity over longer periods and is plausibly attributed to contextual factors, such as scoring events, referee stoppages, or the ball going out of play.[3] The main purpose of identifying MDPs is to improve practitioners' understanding of match demands and, consequently, attempt to transfer these insights into training design.[6] A better interpretation and understanding of MDPs associated with competitive match play provides practitioners with valuable information to characterize matches and to help optimize training prescriptions.[9] Methodologically, MDPs are assessed within specific time windows, most frequently 1-, 3-, 5-, or 10-minute periods.[8] MDPs can be analyzed using different methods, such as the fixed-length approach, which divides the match into consecutive segments of a specified duration starting from minute 0 and identifies the segment with the highest values (eg, for 5-min segments: 0–5, 5–10, and 10–15 min).[3] Alternatively, rolling averages allow for a continuous assessment of peak values across the match, providing a more sensitive representation of the MDPs.[10] Irrespective of periods length or playing position, fixed-length methods significantly underestimate MDP values for TD, HSRD, and SpD compared with rolling averages,[10] which have been consistently recommended.[3,9–11]

Previous studies analyzing MDPs across age groups have suggested that TD does not differ significantly between age groups in youth soccer players.[12–14] Duthie et al[12] compared academy players from different youth categories (under 15 [U15], under 16 [U16], and under 17 [U17]) and reported no substantial differences in peak match TD.[12] Similarly, investigations comparing youth players (under 19 [U19] or approximately 17.9 [1.3] y) and professional players have shown consistent findings, with no significant differences in TD during the MDPs.[13,14] Indeed, supporting this trend, English U23 development league players[15] appear to exhibit similar peak TD and HSRD values to professional English Championship footballers,[9] and comparable HSRD values have also been reported between youth and professional players.[14] However, another study observed higher HSRD in U19 players compared with first-team professionals.[13] To date, and to the best of our knowledge, the literature on MDPs of SpD is still limited particularly regarding comparisons between age groups. Therefore, characterizing MDPs across different age groups is highly relevant, as it provides critical insights not only for training design but also for player progression and individualized load management, facilitating smoother transitions between age groups.

Regarding playing position, previous studies have reported that wide midfielders (WM), midfielders (MF), and full backs (FB) are the players who cover the greatest TD during MDPs, followed by strikers (ST) and center back (CB).[8] Regarding high-intensity variables, such as HSRD and SpD, positional differences are less evident and should be interpreted with caution.[8] In fact, no significant differences were reported between positions in HSRD[16] and SpD metrics.[16,17] However, CBs consistently displayed lower values than other positions in both studies.[16,17] Similar findings were observed for CBs and central MFs.[18–20] Conversely, FBs have been identified as the position covering the greatest distances for these metrics in both professional[19] and youth players.[18] Supporting this trend, other studies highlighted FBs together with STs[21] or WMs[17] as the positions covering the greatest HSRD,[21] while others have used CBs as a baseline for comparison and consistently reported them as the position with the lowest values,[9] a trend also observed in 3- and 5-minute windows.[15] Moreover, the existing literature on youth soccer has predominantly focused on aspects, such as physical fitness, training load, and overall match demands,[22,23] whereas studies specifically examining the MDPs in youth players remain scarce. Consequently, gaps persist in the literature regarding high-intensity locomotor metrics across playing positions particularly in youth players and under different match contexts, highlighting the need for further investigation.

Building on the evidence reviewed above, there remains a need to characterize how MDPs manifest across age groups and positional roles. Therefore, the present study aims to quantify and compare the MDPs of play for TD, HSRD, and SpD across 1-, 3-, and 5-minute periods, examining both positional differences and the effects of age groups in U17, U19, and U23 male soccer players.

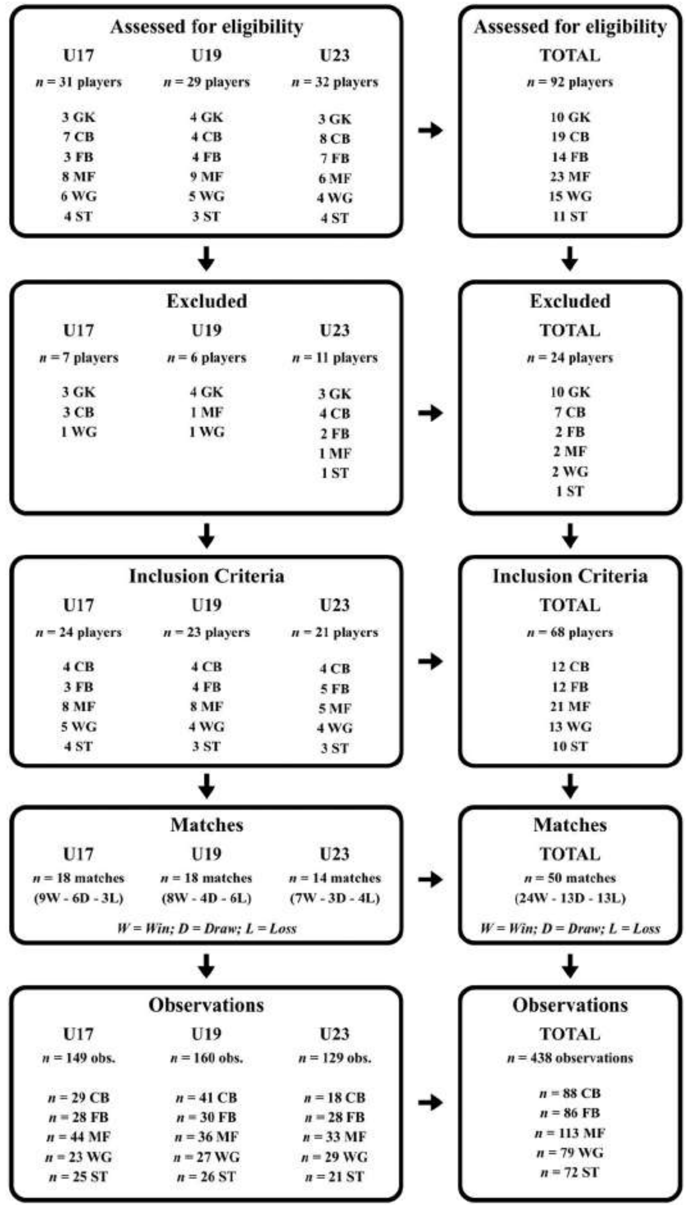

Figure 1 — Flow diagram illustrating the selection process for the number of players and observations included in the study. CB indicates center backs; FB, full backs; GK, goalkeepers; MF, midfielders; ST, strikers; U17, under 17; U19, under 19; U23, under 23; WG, wingers.

Methods

Participants

A convenience and purposeful sample of 68 outfield youth male players from the same soccer club was included in this study (Figure 1). All players competed in the highest national division for their respective age group, being classified as tier 3.[24] The sample comprised the U17 team (n = 24), U19 team (n = 23), and U23 team (n = 21). Data were collected across the first phase of the competitive season, corresponding to 18 official matches for the U17 and U19 categories, and 14 matches for the U23 category. Only players who completed more than 60 minutes of match play were included in the analysis, while goalkeepers were excluded due to the different nature of their activity profile.[25] This threshold was selected to ensure that players were exposed to a substantial portion of match play while minimizing potential bias introduced by substitutions. In modern soccer, where up to 5 substitutions are permitted, restricting the analysis to players who completed the full match would substantially reduce the number of eligible observations and potentially bias the sample toward players with greater playing time. Furthermore, studies examining the temporal distribution of peak match running demands indicate that the MDPs may occur at different moments throughout the match (specially within the first 17 min of each half) rather than exclusively in the final stages,[26] supporting the inclusion of players who completed a substantial portion of match play. In cases where players competed in age groups above or below their primary squad during the season, those match observations were not considered. The teams' formation was 4-3-3 irrespective of age group and comprised the following positional groups: CB, FB, MF, WG, and ST. All participants read and signed an informed consent form prior to participating in the study. The Ethical Committee at the University of Maia approved the study (#210/2024). All methods were performed in accordance with the Declaration of Helsinki.

Data Collection and Processing

The players' activity was monitored using 10-Hz portable global navigation satellite system (GNSS) units (Catapult, Vector S7, Catapult Sports) which holds FIFA certification (certification number: 1003407), and has been validated for measuring total distance[27] and maximum speeds.[28,29] Prior to each match, the devices were prepared according to the manufacturer's guidelines: they were positioned on a stable surface and powered on at least 10 minutes before the warm-up. During each match, the units were secured in a vertical orientation within a specially designed vest. To reduce potential interunit error, each athlete consistently used the same device throughout all matches.[30] After the match, the units were collected by the research staff and subsequently uploaded to the manufacturer's proprietary software (Catapult Openfield, version 3.11; Firmware 8.1) for further analysis.

For each match, a window of 1-, 3- and 5-minute MDPs were identified for TD, HSRD (distance covered ≥19.8 km/h and <25.2 km/h) and SpD (distance covered ≥25.2 km/h)[9,10,13,15,26,31] using the rolling average method (*RcppRoll package* in RStudio 2025.09.0+387). This approach requires the analysis of raw instantaneous speed data sampled at a rate dependent on the device used. In the present study, a 10-Hz device provided 10 samples per second. To identify peak demands, rolling averages of predefined durations were calculated across the entire match. For example, for 1-minute periods, a rolling average of 600 data points (60 s × 10 samples/s) was applied sequentially (0–600, 1–601, 2–602, etc) until the end of the file, with the maximum value extracted.[3] This procedure was repeated for 3- and 5-minute periods.

Statistical Analysis

All statistical procedures were conducted using R software (RStudio 2025.09.0+387). Since this study involves the analysis of longitudinal data (repeated measures over time), a linear mixed model analysis was adopted to compare MDPs among positional groups and age groups. MDPs were analyzed univariately, and each metric and time length was a dependent variable in the model (using the *lme4 package*). In the mixed-effects models, both player positions and age groups were included as fixed factors. Random intercepts were specified for player and match identity, with repeated measurements nested within players and players nested within matches. Inspection of studentized residuals using Q–Q plots and histograms indicated a nonnormal distribution. To improve the residual distribution and stabilize variance, the dependent variables were log transformed.[18] Model fit was assessed by comparing the adjusted model with a null model containing only random effects using likelihood ratio tests. Likelihood ratio tests compared models with 1 (player) versus 2 (player and match) random effects, confirming that including both clustering levels improved model fit. Both player position and age group were included as fixed factors in the models, serving as contextual variables to account for differences between playing roles and developmental stages. Bonferroni adjustment was applied for the multiple comparisons between positional groups. A significance level of $P \le .05$ was set for all comparisons. Cohen's (d) effect sizes were calculated for each comparison and categorized as trivial (≤0.2), small (>0.2–0.6), moderate (>0.6–1.2), large (>1.2–2.0), very large (>2.0–4.0), and extremely large (>4.0).[32]

Results

Age Groups

Table 1 presents the descriptive statistics for all time frames of each metric according to the different age groups. No significant differences were observed between age groups for any of the analyzed metrics. For TD, no significant differences were found across levels, with trivial to small effect sizes observed across all time frames ($d = 0.06$–0.46). Similarly, HSRD showed no significant differences between age groups, with trivial effect sizes ($d = 0.03$–0.16). For SpD, no significant differences were detected either, with trivial to small effect sizes across all time frames ($d = 0.03$–0.27).

Playing Positions

MDPs for TD

Figure 2 shows the descriptive statistics and comparisons between positional groups for 1-, 3-, and 5-minute MDPs for TD. One and 3-minute MDPs for TD showed large effect sizes in the differences between CBs and the remaining positions ($d = 1.18$–2.72). In addition, for 3-minute MDPs, large differences were also observed between the FBs and the MFs ($d = 1.2$), as well as the FBs and the STs ($d = 1.38$). In the 5-minute MDPs, similar results were observed; the CBs showed large differences in comparison with other positional groups ($d = 1.66$–3.06), with the exception of the FBs. Large differences were also exhibited between the FBs and the MFs ($d = 1.55$) along with the FBs and the STs ($d = 1.85$). Although no significant differences were observed, moderate and large effect sizes were also found for TD. Moderate effect sizes were found between MFs and WGs ($d = 0.73$) and STs vs WGs ($d = 0.74$) for 1-minute MDPs. Moderate effect sizes were observed between MFs and WGs ($d = 0.91$) and STs and WGs ($d = 1.08$) for 3-minute MDPs. Moderate and large effect sizes were observed between MFs and WGs ($d = 1.4$) and STs and WGs ($d = 1.09$) for 5-minute MDPs.

MDPs for HSRD

Figure 3 shows the descriptive statistics and comparisons between positional groups for 1-, 3-, and 5-minute MDPs for HSRD. The CBs presented moderate to large differences compared with the other positions in the 1-, 3- and 5-minute MDPs for HSRD ($d = 0.94$–1.82). However, the differences between CBs and FBs were moderate for 1-minute MDPs ($d = 0.77$). Moderate effect sizes were also found in the 3- and 5-minute MDPs for HSRD, although there were no statistically significant differences. In both time frames, the differences were between STs and WGs (3-min

Table 1 Descriptive Statistics (in Meters per Minute) for TD, HSRD, and SpD Across Competitive Levels During 1, 3, and 5 Minutes of Most Demanding Periods

Competitive level	TD—1 min	TD—3 min	TD—5 min	HSRD—1 min	HSRD—3 min	HSRD—5 min	SpD—1 min	SpD—3 min	SpD—5 min
U17	194.97 (17.82)	155.21 (12.35)	144.26 (11.56)	47.57 (12.88)	22.25 (6.07)	16.7 (4.67)	28.83 (13.58)	10.76 (5.04)	7.19 (3.49)
U19	197.88 (17.44)	154.36 (13.33)	142.98 (12.93)	46.83 (11.56)	22.34 (5.86)	16.65 (4.7)	30.93 (13.65)	11.53 (5.69)	7.64 (3.76)
U23	194.68 (15.48)	152.78 (11.34)	141.98 (10.62)	47.76 (11.75)	23.04 (5.57)	17.38 (4.21)	31.71 (11.23)	12.1 (4.76)	8.04 (3.23)

Abbreviations: HSRD, high-speed running distance; SpD, sprint distance; TD, total distance; U17, under 17; U19, under 19; U23, under 23. Note: Data are presented as average (SD).

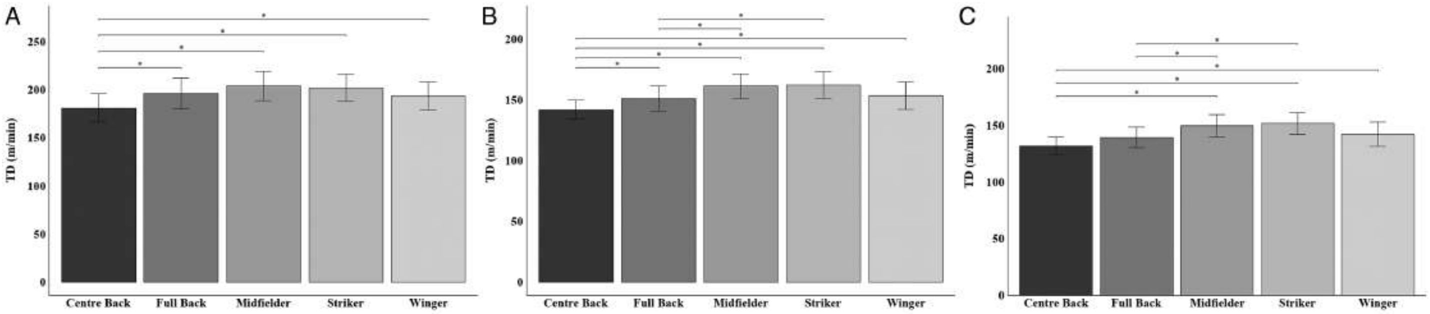

Figure 2 — Descriptive statistics and comparisons between positional groups for MDPs of TD: (A) 1 minute, (B) 3 minutes, and (C) 5 minutes. *$P < .05$. HSRD indicates high-speed running distance; MDPs, most demanding periods; SpD, sprint distance; TD, total distance.

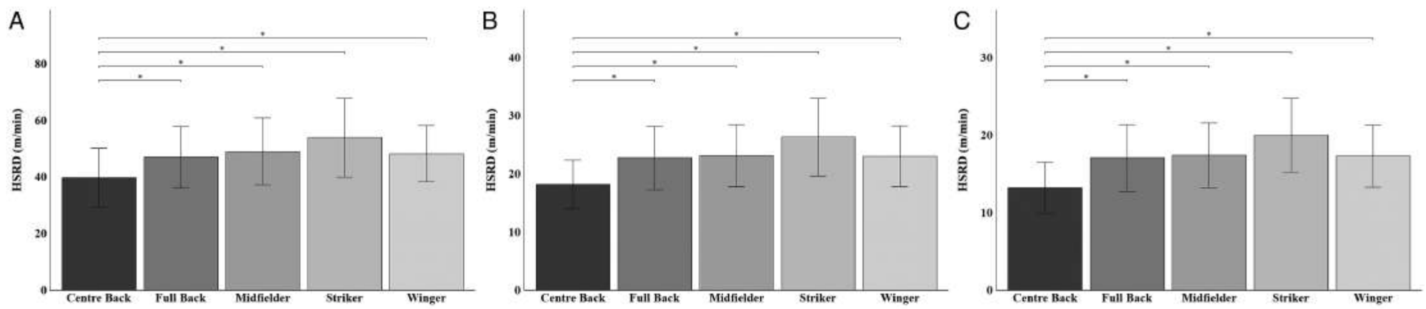

Figure 3 — Descriptive statistics and comparisons between positional groups for MDPs of HSRD: (A) 1 minute, (B) 3 minutes, and (C) 5 minutes. *$P < .05$. HSRD indicates high-speed running distance; MDPs, most demanding periods.

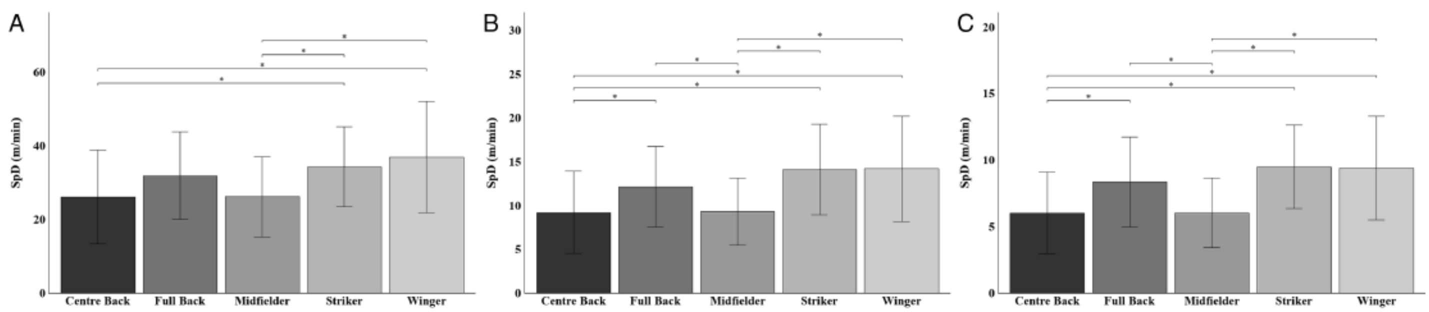

Figure 4 — Descriptive statistics and comparisons between positional groups for MDPs of SpD: (A) 1 minute, (B) 3 minutes, and (C) 5 minutes. *$P < .05$. SpD indicates sprint distance.

MDPs, $d = 0.61$; 5-min MDPs, $d = 0.62$) and STs and FBs (3-min MDPs, $d = 0.64$; 5-min MDPs, $d = 0.72$)

MDPs for SpD

Figure 4 shows the descriptive statistics and comparisons between positional groups for 1-, 3-, and 5-minute MDPs for SpD. For 1-minute MDPs, CBs had significantly lower values than STs (moderate effect size, $d = 0.83$) and WGs (moderate effect size, $d = 0.94$). In addition, MFs had lower values than STs (moderate effect size, $d = 0.78$) and WGs (moderate effect size, $d = 0.89$). For the 3-minute MDPs, moderate effect sizes were observed in the differences of CBs compared with FBs ($d = 0.75$), STs ($d = 1.13$), and WGs ($d = 1.03$). FBs also showed moderate effect sizes compared with MFs ($d = 0.67$). Furthermore, MFs showed lower values compared with STs (moderate effect size, $d = 1.06$) and WGs (moderate effect size, $d = 0.95$). Except for the MFs, the CBs showed large differences in comparison to the other positional groups in 5-minute MDPs ($d = 0.83$–1.18). Moderate differences were exhibited between FBs and MFs ($d = 0.78$). Meanwhile, MFs presented lower values than both STs (moderate effect size, $d = 1.14$) and WGs (moderate effect size, $d = 0.98$).

Discussion

To our knowledge, this is the first study to compare MDPs of the most common GNSS distance metrics between different age groups and positions. The main findings were (1) no significant differences were observed between age groups for any metric, regardless of the time window analyzed; (2) CBs consistently exhibited lower values across all metrics when compared with other positional groups; (3) MFs, together with CBs, showed consistently lower SpD MDP values compared with the remaining positions; and (4) shorter time windows resulted in higher relative values (in meters per minute) across all metrics.

Regarding differences in MDPs across age groups, the results demonstrated no significant differences for any metric with trivial to small effect sizes. In the case of TD, the findings were consistent with previous research,[12–14] suggesting a trend, whereby from at least the U17 level onward, highly trained players tend to maintain comparable TD values across all MDPs throughout their progression to professional levels. However, Thoseby et al[14] highlighted that when other metrics were examined, specifically peak average acceleration, the demands were moderately lower in youth players.[33] This suggests that youth competitions may not fully replicate the physical demands encountered at the professional level. Consequently, ensuring that developing players are adequately prepared to meet the greater physical demands associated with professional football training and competition is crucial for their long-term progression and success.[14] When considering HSRD, the absence of differences between age groups reinforces previous evidence,[14] although contrasting findings have also been reported,[13] indicating that this metric still requires further investigation. Finally, to the best of our knowledge, this study is the first to examine MDP of SpD across age groups, with results showing no significant differences between categories.

The lack of differences between age groups may be partially explained by the fact that all players belonged to the same club and followed the same tactical formation (4-3-3), since different formations could influence the MDP results.[9] Furthermore, as, in Thoseby et al,[14] internal load variables were not assessed, making it possible that, despite comparable external physical demands between categories, one group may have experienced greater physiological costs when performing these activities.[14] Similarly, even for the metrics analyzed in the present study, it is possible that, although no significant differences were observed, the relative effort required to achieve the same performance was higher at certain age groups. This is because the thresholds used to define HSRD and SpD are standardized, regardless of the age group considered. For example, a recent study demonstrated that U18 players exhibited higher sprint speeds than U16 players, indicating that they would reach the HSR threshold at a lower relative intensity and would likely attain this speed more frequently.[34] Consequently, the use of standardized speed thresholds across all age groups may not accurately reflect HSRD and SpD MDPs, as players with lower maximal sprint speed may experience greater difficulty surpassing these thresholds simply because their relative intensity to reach them is higher.

Moreover, different outcomes could also have been expected regarding positional differences, since it appears that the higher the speed threshold, the more difficult it becomes to detect positional differences in MDPs.[16] In this regard, we suggest that future research analyze these metrics using thresholds normalized to each player's individual maximal sprint speed thereby providing a more accurate representation of relative intensity across developmental stages. Additionally, the inclusion of other external load metrics not considered in the present analysis might have revealed subtle differences between age groups.

Similarly to the present findings, previous research has shown that MDPs during match play are position-dependent.[35] The positional differences observed may be explained by the distinctive tactical roles associated with each position,[36] as well as by the team's specific playing styles, formations, and overall tactical approaches.[33,37] In the present study, positional demands were interpreted according to the initial 4-3-3 formation reported in the official lineups, which provided a consistent framework for classifying player roles across matches. However, it is acknowledged that tactical adjustments commonly occur during matches (eg, shifts to 4-2-3-1 or 3-4-3), which may alter players' spatial occupation and role-specific physical demands. Previous research integrating physical and tactical analyses has shown that high-intensity actions during peak periods are closely linked to specific tactical behaviors and match contexts, highlighting the importance of considering tactical organization when interpreting peak locomotor demands such as MDPs.[38,39] Therefore, while the use of the initial formation allowed a standardized positional classification, the potential influence of in-game tactical variations on MDP outcomes cannot be completely excluded. One interesting finding was that CBs not only exhibited the lowest TD values, showing large differences compared with the remaining positions ($d = 1.18$–2.72 for 1- and 3-min MDPs; $d = 1.66$–3.06 for 5-min MDPs), but also displayed lower MDPs in high-intensity metrics such as HSRD ($d = 0.94$–1.82) and SpD ($d = 0.83$–1.19), with moderate to large and moderate effect sizes, respectively, compared with other positions. These lower values for CBs across the 3 metrics observed in our study are consistent with previous findings in both professional[16,17] and youth players (17.6 [0.6] y).[18] Although it has been reported that CBs exhibited lower values, no significant differences were found in the 1-minute MDP for any external load variables[16] nor for SpD across any time window.[17] In contrast, in the present study, CBs consistently demonstrated significantly lower values across all metrics, regardless of the time window analyzed. As observed in several studies, not only CBs but also STs exhibit the lowest TD values.[8,12,15,35] However, in the present study, STs did not display the lowest TD values; instead, they exhibited the highest TD values alongside MFs across all time windows, with moderate to large differences observed between FBs and both MFs ($d = 1.2$–1.55) and STs ($d = 1.38$–1.85). Although most of these differences were not statistically significant, it was nevertheless surprising to observe a trend opposite to that generally reported in the literature. Still within the high-intensity metrics, STs and WGs exhibited the highest SpD values, with moderate differences compared with CBs and MFs (SpD: $d = 0.78$–1.18), whereas only STs recorded the highest HSRD values, differing moderately from FBs ($d = 0.60$–0.72).

Another interesting finding was that MFs presented similar SpD MDP values to CBs, with both positions exhibiting the lowest values compared with the remaining positions. This may be partly explained by the limited space typically available to these roles, leaving insufficient distance to reach sprinting speed.[33] While studies on professional players found no differences between playing positions in SpD for any MDP duration,[16,17] other research has reported contrasting results, with FBs covering the greatest SpD and HSRD compared with the other positions, both in professional[19] and youth players (17.6 [0.6] y).[18] These higher SpD values among FBs may be explained by their tactical roles, as they are often required to perform both defensive and offensive duties, resulting in frequent transitions and repeated sprint efforts.[33] Similarly, it has been observed in addition to FBs, STs also exhibited higher HSRD MDP values.[21] Tactical roles appear to strongly influence these outcomes, as Varley and Aughey[33] noted that when FBs were given greater offensive responsibilities, WMs adopted more central positions, thereby reducing the space available for sprinting and limiting their sprint frequency.[33] Conversely, in tactical systems without FBs, WMs would likely cover greater sprinting distances due to increased width in their positioning. In contrast, while MFs showed the lowest SpD MDP with moderate effect sizes ($d = 0.78$–1.14) compared with STs and WGs, they simultaneously presented the highest TD MDP values, a trend consistent with studies conducted in professional,[8,9,35] as well as in U23[15] and U15, U16, and U17[12] players.

Although several studies have highlighted the need for a higher level of training specificity to meet the match demands of each playing position,[9,12,16,19] caution should be exercised when interpreting positional differences particularly for high-intensity metrics such as HSRD and SpD. As suggested by Rico-González et al,[8] these differences, while statistically significant, may not always be practically meaningful enough to justify fully individualized training prescriptions.[8] Moreover, specific match circumstances may require players to perform actions that are not typically associated with their usual playing positions.[9] For example, tactical adjustments, temporary numerical inferiority, or positional rotations during match play may lead players to assume roles imposing greater physical demands than those normally experienced. Considering that MDPs often occur at critical moments of match play,[3] not being prepared to effectively perform such roles could compromise the team's overall defensive tactical approach and potentially lead to dangerous situations which may result in conceding a goal. Therefore, all players should be prepared to cope with the MDPs characteristic of other positions, regardless of their primary role within the team.

This study has some limitations. First, all players belonged to the same club and followed the same tactical formation (4-3-3), which may limit the generalizability of the findings to teams employing different tactical systems of styles of play. Also, internal load indicators were not examined, implying that comparable external loads across age groups could have imposed distinct physiological stresses on the players. Finally, the use of standardized speed thresholds for HSRD and SpD may have limited the ability to account for individual differences in maximal sprint speed, thereby reducing the accuracy of relative intensity estimations particularly across age categories.

Practical Applications

Players from different age groups can display comparable external loads across all MDP absolute metrics when exposed to similar tactical and training contexts. This could suggest that youth players in elite environments could be already capable of meeting the physical requirements observed in professional football, although these demands may impose greater relative physiological stress. Therefore, coaches should ensure that training processes include progressive load exposure and adequate recovery strategies to facilitate long-term development. Moreover, clear positional differences were observed, reflecting the specific tactical roles of each position. Consequently, training programs should integrate position-specific drills replicating these activity profiles while maintaining exposure to the MDPs typical of other positions, given the fluid and unpredictable nature of match play.

Conclusions

Our study showed no significant differences between age groups, suggesting that highly trained players from U17 onward maintain similar external load demands in the MDPs of match play. In contrast, MDPs were position-dependent: CBs exhibited consistently lower values across all metrics, while MFs showed low SpD similar to CBs, and STs and MFs recorded the highest total distances. These findings highlight the influence of tactical roles and positional constraints on match demands. Overall, the results emphasize the need for position-specific training while acknowledging that players must be prepared for atypical demands arising from contextual factors during match play. Future research should consider the use of normalized speed thresholds to better capture relative intensity, thereby ensuring training prescriptions are accurately tailored to both positional requirements and individual player capabilities.

Acknowledgments

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