Position-Dependent External Load Management in Professional Football: An Exploratory Observational Study on the Effects of Microcycle Length

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Abstract

Galiano, C, Nakamura, FY, Ribeiro, J, Asín-Izquierdo, I, and Asian-Clemente, JA. Position-dependent external load management in professional football: an exploratory observational study on the effects of microcycle length. *J Strength Cond Res* XX(X): 000–000, 2026—The literature shows that professional football players face different external loads during matches based on their playing positions, but it remains unclear whether their weekly accumulated load reflects their specific roles or remains consistent regardless of position. The objectives of this study were to analyze how microcycle length affects the external load ratio across different playing positions in professional football players, and to examine differences in the ratio values depending on players' specific positions and microcycle length. Global Positioning System-based metrics from a professional football club were collected for 2 consecutive seasons, covering a total of 92 matches (68 regular season, 12 European competitions, and 12 national cup). The external load ratio was defined as the accumulated load in the microcycle/match load in competition. The results of the study show that, in most cases, longer microcycles are associated with higher external load ratios across all playing positions and variables analyzed ($p < 0.001$). However, except for total distance, all external load variables showed similar ratios between 3-day and 4-day microcycles. Furthermore, the ratios between positions remained similar across all playing positions and microcycle lengths evaluated, except for high decelerations in 3- and 6-day microcycles ($p < 0.040$) and high accelerations in 3-day microcycles ($p < 0.001$). In conclusion, longer microcycles increase external load ratios across all playing positions, with training loads generally aligned with match demands regardless of position or microcycle length. Effective load monitoring and individualization are essential to optimize performance and reduce injury risk in professional football.

Key Words: training load, football, ratio, high-speed running, monitoring

Introduction

Load monitoring is widely regarded as one of the most important responsibilities of the strength and conditioning staff in modern football (10,21). Training load is commonly divided into 2 categories: external load, which includes objective measurements of the physical work performed during training or competition, and internal load, which reflects the body's psychological and physiologic responses to external stimuli (4,5,12,15). In football, there are numerous variables related to internal and external load measures, which require coaches and sports scientists to focus on the most relevant and specific metrics to optimize the monitoring process (14,20). Although both load types are important, external load metrics tend to receive much more attention than internal load metrics in professional football teams (10). In this regard, although there is no universally adopted monitoring approach in high-level football, the monitoring of external load receives more attention than the monitoring of internal load. This can be explained by the greater usability of external load data for training planning and the current challenges associated with monitoring internal load (1). In this context, one area of external load that has garnered significant attention recently is the analysis of external load during the microcycles of these teams (5,11,15).

It has been demonstrated that microcycles in football are highly variable, making the understanding of the cumulative external load within the microcycle and its relationship to match demands a fundamental aspect (4,19,20). This relationship between accumulated training load and competition demands has been commonly calculated using the ratio of the weekly training load to match load (5). Previous research has indicated that this ratio varies depending on the specific external load metric analyzed and the length of the microcycle (5,11,15,19). Similarly, factors such as the number of training sessions within the microcycle (5) or the players' status (starters vs. nonstarters) (19) have been shown to directly influence this ratio. However, caution is needed when interpreting accumulated training/match load ratios, because these values often reflect average team data. It is crucial to

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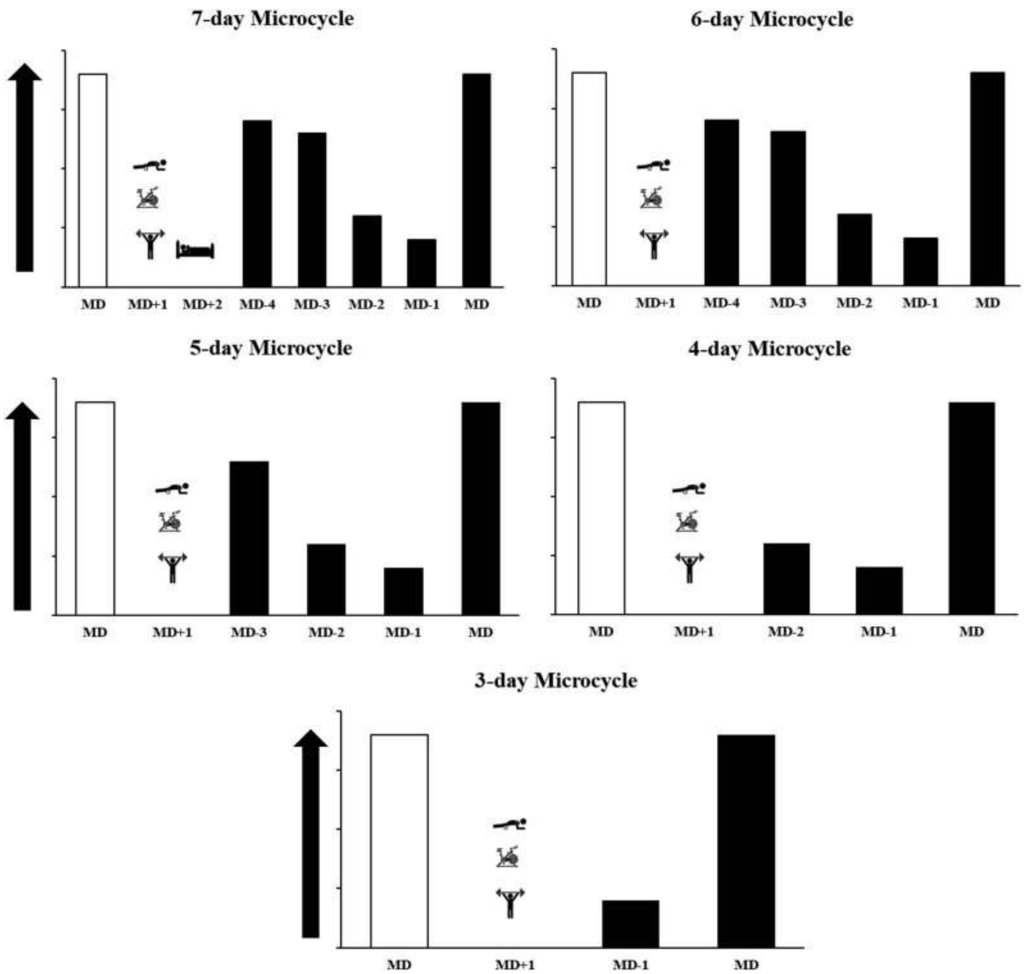

Figure 1. Representation of the different types of microcycles described in the text for players meeting the inclusion criteria. The black bars represent the prescribed load for players based on the day of the week. The white bar indicates the match played in the previous microcycle. Training sessions are categorized by their proximity to match day (MD), using the MD± notation. In 7-day microcycles, players who accumulated more than 45 minutes in the previous game (white bar) performed a recovery session on MD + 1, which consisted of 10 minutes on a cycle ergometer at a self-paced speed, followed by 5 minutes of joint mobility and 10 minutes of muscle foam rolling. On MD + 2, the squad had a day off with no training session. The arrow on the *Y*-axis indicates greater load.

consider the significant variability that can exist between individual players, even for the same external load metric (7). Currently, one of the factors shown to have a significant impact on players' external load is the position they occupy on the field during competition (3,8,12). Previous studies have demonstrated that wide midfielders achieve the highest peak running speeds during matches, and this position, along with central midfielders, also experiences more high-intensity accelerations and decelerations (6,13).

Although it has been well established that players exhibit different external load demands during competition depending on their playing position, it remains unclear whether the training/match external load ratio is position dependent or whether it remains stable regardless of the role assumed by the players. Therefore, playing position should also be considered for weekly accumulated load analysis (20). To the best of the authors' knowledge, only 2 studies have investigated this aspect (12,15). Kokstejn et al. (12) examined the external load ratio in U17 players from a Czech football academy, finding that the accumulated ratio differed between not only the variables studied, but also the players' positions (12). The only published study in professional football on this topic also reported positional differences, showing that central defenders and strikers exhibited the highest total distance ratio (15), while central defenders and full-backs had the highest ratios for high-intensity running. Although these studies have shed some light on this aspect, their study designs do not fully represent the current reality of top-level teams (e.g., seasons with a large number of matches, congested periods, players participating in multiple competitions). For this reason, there is a clear need to conduct a study analyzing the external load ratios of professional players, taking into account the variety of microcycle lengths that reflects the reality of top-level teams. Therefore, the objectives of the study are as follows: (a) to analyze the influence of microcycle length on the external load ratio according to the playing positions of professional football players and (b) to examine differences in the ratio values for the external load variables studied, depending on the specific players' position and the length of the microcycle. We hypothesize that, regardless of the player's specific position, ratio values for external load variables will be higher with longer microcycle lengths, and that the ratio values will be similar across positions, irrespective of the variable studied and the length of the microcycle.

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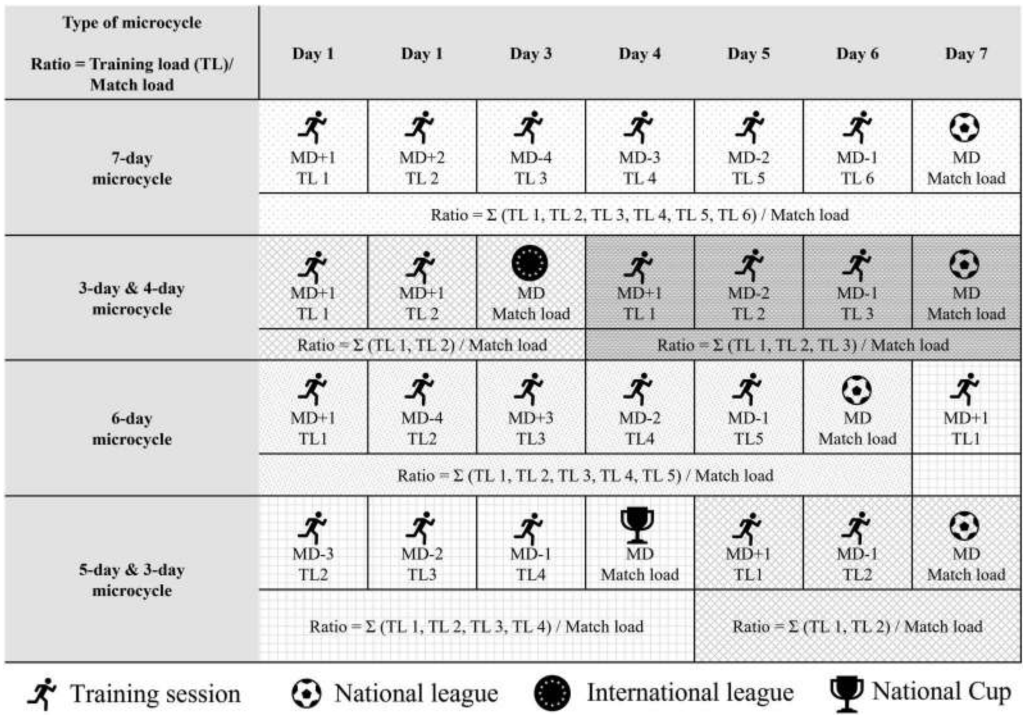

Figure 2. Representation of 4 consecutive weeks showing the different microcycles analyzed across both seasons.

Methods

Experimental Approach to the Problem

This study used a retrospective observational cohort approach to analyze the external load ratios of professional football players according to their playing positions for 2 seasons. Global Positioning System (GPS) technology was used to track daily external load during both training and matches, measuring variables such as total distance, high-speed running, sprinting distance, number of sprints, and accelerations/decelerations >3 m·s^{-2}. Players participated in microcycles lasting 3, 4, 5, 6, or 7 days, with external load ratios calculated by dividing the accumulated training load by the match load. Accumulated external load data for a given player were included in the analysis only if the player participated in the full 90 minutes of the match and completed fully all training sessions within the same microcycle. If any of these conditions were not met, that player's data for the microcycle were excluded. In addition, player' data were excluded from the analysis if the player had to perform in a position different from their usual one. This approach facilitated the examination of how different microcycle lengths affect load ratios, offering valuable insights into the distribution of training and competition loads.

Subjects

Across the 2022/2023 and 2023/2024 seasons, time–motion data from a total of 92 matches (regular season = 68; European competitions = 12; national cup = 12) involving a single top-5 Portuguese football club were analyzed. The team's head coach remained the same person throughout both seasons. External load metrics were collected from 27 outfield professional football players (age: 25.7 ± 4.7 years; height: 180.1 ± 8.0 cm; mass: 73.5 ± 6.3 kg), all of whom participated in at least 20 matches (36.0 ± 14.0 matches), and were divided into 5 different groups depending on playing positions: central-defenders (CD; n = 5), full-backs (FB; n = 5), central-midfielders (CM; n = 7), wide-midfielders (WM; n = 7), and strikers (ST; n = 3). The average number of seasons in which players competed in the first division was 6.2 ± 3.2. In addition, the average total number of matches they played as professional footballers was 208.6 ± 158.5. All subjects were informed about the study and provided signed informed consent. The study was approved by the University of Maia Ethics Committee (210/2024) and was conducted in accordance with the Declaration of Helsinki.

Procedures

An observational cohort study was implemented on a professional football team during 2 full seasons. The external training load data were recorded as part of the regular monitoring routine of the club and a retrospective analysis was conducted subsequently. Although players were monitored from the first training session of the preseason, the data included in this study were collected starting from the first training session of the team's first competitive microcycle (match week 1). In both seasons, the team completed a 5-week preseason period before the start of official competition. The participation data comprised 1,426 individual training records and 542 individual match records. In accordance with previous authors (18), training sessions were categorized by their proximity to MD, using MD± notation. The team's training schedule maintained a similar structure in both seasons to manage workload distribution. On a regular 7-day microcycle, the day after the match, nonselected and those who participated for less than 45 minutes undertook a compensatory training session designed to provide an overload stimulus for these individuals. On the contrary, those who accumulated more than 45 minutes in the game performed a recovery session, which

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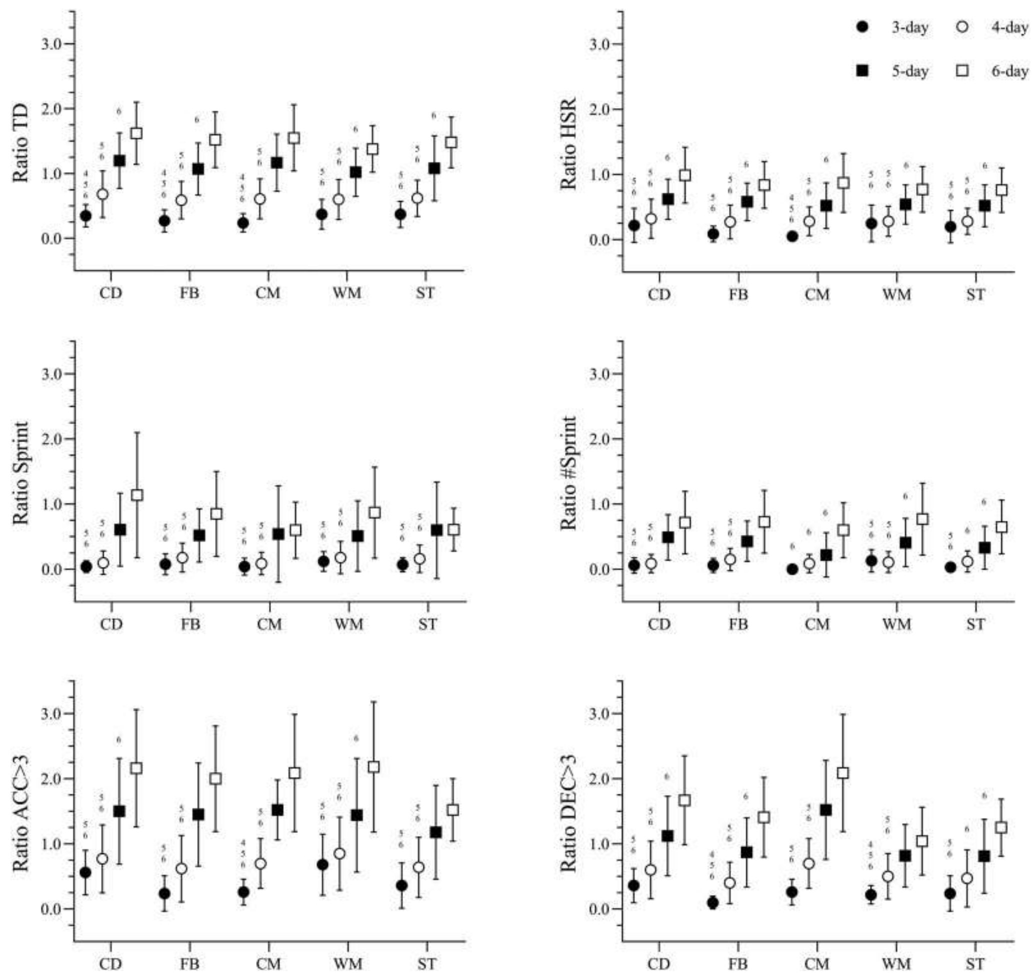

Figure 3. Comparison of external load ratio variables across specific positions based on microcycle length. CD = central defenders; FB = full-backs; CM = central midfielders; WM = wide midfielders; ST = strikers. 4 = Significant differences with 4-day microcycles; 5 = Significant differences with 5-day microcycles; 6 = Significant differences with 6-day microcycles; TD = total distance; HSR = high-speed running; sprint = sprint running; #Sprint = number of sprints; $ACC_{>3}$ = accelerations >3 m·s^{-2}; $DEC_{>3}$ = decelerations >3 m·s^{-2}.

consisted of 10 minutes of cycle ergometer at self-paced speed, followed by 5 minutes of joint mobility and 10 minutes of muscle foam rolling. On MD + 2, the squad had a day off without a training session. During the central days of the microcycle (MD-4 and MD-3), the entire squad participated in the 2 training sessions with highest volume and intensity of the microcycle. Finally, on the MD-2 and MD-1, all players participated in tapering sessions, characterized by a reduction in training volume while maintaining intensity, aimed at eliminating any potential accumulated fatigue from previous days. In addition to training sessions, external load during official matches was monitored using a 10 Hz GPS device (Vector S7; Catapult, Melbourne, Australia), equipped with integrated 100 Hz triaxial accelerometers, gyroscopes, and magnetometers. Devices were worn in fitted vests positioned between the players' scapulae. Data were downloaded and stored using the manufacturer's software. In line with previously published research (11), the monitored variables were total distance (TD), high-speed running (HSR: distance covered between 19.8 and 25.1 km·h^{-1}), sprint (distance covered >25.2 km·h^{-1}), number of sprints (#Sprint), number of accelerations and decelerations >3 m·s^{-2} ($ACC_{>3}$ and $DEC_{>3}$, respectively). For MD, warm-up data were excluded, and only data from players who played the entire game were used. The average number of satellites recorded across all sessions and matches was 14.9 ± 0.5, the GNSS quality was 66.6 ± 6.8, and the HDOP value was 0.8 ± 0.1.

The ratio was calculated following the approach proposed by previous authors (5): ratio = accumulated load in the microcycle/match load in competition. For example, in a 4-day microcycle, the ratio would be calculated by summing the training sessions (MD+1 + MD-2 + MD-1) and dividing it by the load of MD. Only players who completed the entire match and all the training sessions of the microcycle were included in the analysis. Therefore, for the 2 years, 1,093 individual training data points and 345 individual match data points were excluded. Reflecting the current reality of professional football, the team participated in 3 competitions most of the months for the 2 seasons, resulting in a variety of microcycles ranging from 3 to 7 days. Figures 1 and 2 represent the different microcycles studied for players who met the inclusion criteria. In 7-day microcycles, players who played 90 minutes in the previous match underwent the previously mentioned recovery session on MD + 1 and had the day off on MD + 2. Similarly, in 6-day microcycles, players who played the full match had the recovery session on MD + 1 and underwent a normal training session with the group on MD-4. Therefore, in both 6-day and 7-day microcycles, the players included in the

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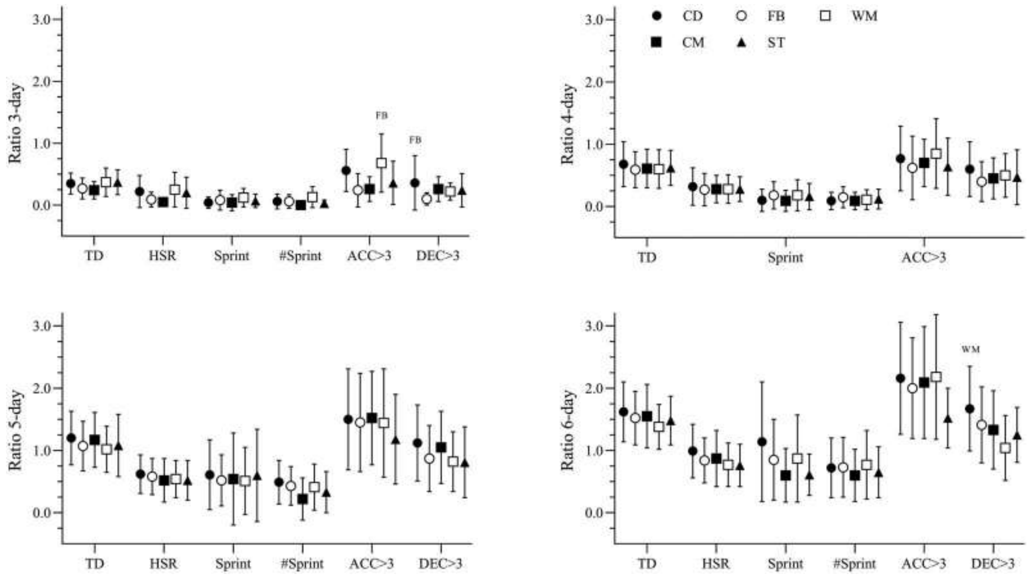

Figure 4. Comparison of external load ratio variables between different playing positions for each microcycle length. FB = significant differences with full-backs; WM = significant differences with wide midfielders; TD = total distance; HSR = high-speed running; sprint = sprint running; #Sprint = number of sprints; $ACC_{>3}$ = accelerations >3 m·s^{-2}; $DEC_{>3}$ = decelerations >3 m·s^{-2}.

study participated in 4 training sessions plus the match, and both are referred to herein as 6-day mycrocycles. Therefore, the ratios examined in this analysis will range from 3-day to 6-day microcycles. As a result, thirteen 3-day, thirty 4-day, nineteen 5-day, and twenty-two 6-day microcycles were analyzed. Ratios were calculated for each external load variable analyzed in the study.

Statistical Analysis

Values are reported as mean ± *SD*. Before starting the data analysis, outliers were removed. The normality of distribution of the variables and the homogeneity of variance were verified using the Shapiro–Wilk test and Levene's test, respectively. A repeated-measures ANOVA was used to analyze the differences among different microcycle lengths for a given variable for any specific playing position. A repeated-measures ANOVA was used to compare the differences in external load ratios for each variable within the same microcycle length. In case of significant differences, a Bonferroni post hoc test was used to analyze the differences between microcycle lengths and playing position for a given external variable. When the variable did not show homogeneity of variances, a parametric Kruskal–Wallis test and a Dunn's test were used to assess the differences between the different microcycles. The Mauchly's test was performed with the Greenhouse–Geisser correction when a violation of sphericity was observed. For all the analyses, a significance level of $p < 0.05$ was used. Partial eta-squared (η_p^2) was used, with the following ranges: ≤0.01 (trivial), 0.01–0.06 (small), 0.06–0.15 (moderate), and >0.15 (large). Threshold values for assessing magnitudes of the Cohen's effect size (ES) were ≤0.2 (trivial), >0.2 (small), >0.5 (moderate), and >0.8 (large) (9). Statistical analysis was performed using JASP software (JASP Team 2019, Version 0.11.1, University of Amsterdam).

Results

Table 1 shows descriptive data of the accumulated training external load based on microcycle length. Figure 3 depicts the differences between the ratios for each variable and playing position, for each microcycle length. Total distance ratio increased significantly with microcycle length across all positions ($p < 0.001$; $\eta_p^2 > 0.555$), with the exception of WM and ST between the 3-day and 4-day microcycle length ($p > 0.267$; ES < 0.7) and CM between the 5-day and 6-day microcycle length ($p = 0.103$; ES = 0.95). High-speed running ratio increased significantly with microcycle length across all positions ($p < 0.001$; $\eta_p^2 > 0.351$), except for CD, FB, WM, and ST between the 3-day and 4-day microcycle length ($p > 0.05$; ES < 0.47). Sprint ratio increased significantly with microcycle length across all positions ($p < 0.001$; $\eta_p^2 > 0.244$), with the exception of between the 3-day and 4-day and between the 5-day and 6-day microcycle length ($p > 0.05$). #Sprint ratio increased significantly with microcycle length across all positions ($p < 0.001$; $\eta_p^2 > 0.363$). This increase was not observed between the 3-day and 4-day microcycle length. Central-midfielders and strikers did not show statistical differences between the 4-day and 5-day microcycle length ($p > 0.05$; ES < 0.75). Only CM, WM, and ST showed statistical differences between the 5-day and 6-day microcycle length ($p < 0.031$; ES > 0.96). $ACC_{>3}$ ratio increased significantly with microcycle length across all positions ($p < 0.001 > \eta_p^2 > 0.365$). Only CM showed statistical differences between the 3-day and 4-day microcycle length ($p = 0.048$; ES = 0.68). Also, only WM and CD showed statistical differences between the 5-day and 6-day microcycle length ($p = 0.015$; ES = 0.96). Finally, $DEC_{>3}$ ratio increased significantly with microcycle length across all positions ($p < 0.001$; $\eta_p^2 > 0.293$). Significant differences were observed between the 3-day and 4-day microcycles for FB and WM ($p < 0.036$; ES > 0.63). In addition, only CD, FB, and ST showed significant differences between the 5-day and 6-day microcycles ($p < 0.026$; ES > 0.96).

The comparison of external load ratio between specific playing positions and microcycle length is shown in Figure 4. In 3-day microcycles, only $ACC_{>3}$ and $DEC_{>3}$ showed significant differences between positions ($p < 0.040$; $\eta_p^2 >$

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Table 1

Descriptive data of the accumulated training external load and match external load based on microcycle length.*

		Accumulated training external load						Match external load					
		TD	HSR	Sprint	#Sprint	ACC$_{>3}$	DEC$_{>3}$	TD	HSR	Sprint	#Sprint	ACC$_{>3}$	DEC$_{>3}$
3-day	CD	4,020.0 ± 2001.5	106.9 ± 116.9	21.9 ± 39.4	1.0 ± 1.5	15.5 ± 9.8	16.2 ± 13.1	7,242.3 ± 3,908.5	407.1 ± 248.1	81.0 ± 72.0	4.5 ± 3.5	19.5 ± 11.1	27.2 ± 17.9
	FB	2,895.8 ± 1783.7	72.1 ± 95.9	12 ± 22.2	0.6 ± 1.1	6.1 ± 7.0	8.4 ± 12.6	6,220.7 ± 3,598.2	448.0 ± 270.7	79.9 ± 62.9	4.4 ± 3.1	16.8 ± 10.2	23.8 ± 17.3
	CM	2,693.8 ± 1,356.4	21.7 ± 24.8	1.2 ± 3.7	0.1 ± 0.3	5.3 ± 4.1	7.0 ± 7.0	6,091.2 ± 3,361.0	343.2 ± 198.8	35.4 ± 37.1	1.9 ± 2.7	12.8 ± 7.0	17.7 ± 11
	WM	4,243.6 ± 2,183.5	144.4 ± 147.6	11.9 ± 15.5	0.8 ± 1.1	14.5 ± 7.8	11.2 ± 9.4	6,319.2 ± 3,644.1	430.5 ± 282.5	79.2 ± 66.7	4.4 ± 3.5	16.1 ± 9.0	22.8 ± 13
	ST	4,016.3 ± 2032.2	139.0 ± 183.2	7.8 ± 10.3	0.7 ± 1.0	12.7 ± 11.4	10.9 ± 9.9	7,023.5 ± 2,995.2	497.7 ± 226.3	91.5 ± 58.1	5.6 ± 4.2	29.2 ± 13.1	36.2 ± 17.5
4-day	CD	6,617.9 ± 3,317.1	163.8 ± 163.4	35.4 ± 52.1	1.76 ± 2.6	21.6 ± 14.9	20.0 ± 15.2	7,249.5 ± 3,688.2	380.0 ± 201.0	74.0 ± 51.0	4.3 ± 2.5	20.3 ± 11.2	25.4 ± 15.5
	FB	6,065.3 ± 2,846.2	202.0 ± 189.4	32.2 ± 41.8	2.1 ± 2.5	17.3 ± 14.1	16.7 ± 13.1	6,985.1 ± 3,813.3	524.4 ± 284.1	110.8 ± 77.5	6.1 ± 4.8	20.0 ± 11.6	28.4 ± 16.2
	CM	6,688.7 ± 3,298.1	145.4 ± 121.8	11.4 ± 23.9	0.6 ± 1.0	17.2 ± 13.0	13.9 ± 10.5	6,516.4 ± 3,667.2	347.8 ± 198.4	37.5 ± 34.4	2.1 ± 2.1	12.7 ± 8.5	19.5 ± 12.0
	WM	6,557.8 ± 3,289.5	270.8 ± 263.7	46.2 ± 70.3	2.6 ± 3.9	24.6 ± 18.2	21.2 ± 17.5	6,754.6 ± 3,635.7	493.4 ± 306.5	101.2 ± 82.1	5.4 ± 4.8	19.6 ± 11.1	25.5 ± 16.5
	ST	6,286.6 ± 2,924.7	215.4 ± 171.3	43.3 ± 53.4	2.3 ± 2.6	25.1 ± 16.0	21.5 ± 17.4	7,009.4 ± 3,450.1	493.1 ± 253.2	87.2 ± 64.0	5.4 ± 3.7	30.2 ± 15.0	33.1 ± 17.3
5-day	CD	11,750.4 ± 4,416.0	350.3 ± 174.9	66.5 ± 53.5	4.1 ± 3.0	42.3 ± 22.4	43.6 ± 25.6	7,386.8 ± 3,585.0	439 ± 252.0	109.0 ± 94.0	6.2 ± 4.0	22.7 ± 11.6	29.0 ± 16.1
	FB	11,209.9 ± 4,219.3	493.3 ± 207.7	80.7 ± 52.6	5.1 ± 3.5	38.4 ± 19.6	39.6 ± 23.5	7,555.6 ± 3,530.0	548.0 ± 317.0	117.1 ± 81.2	6.5 ± 4.5	20.5 ± 12.7	31.9 ± 83.5
	CM	12,693.0 ± 4,751.9	264.0 ± 159.7	26.1 ± 40.6	1.5 ± 2.2	30.2 ± 13.2	34.6 ± 19.3	6,684.8 ± 3,993.2	361.3 ± 229.3	42.8 ± 41.6	2.4 ± 2.8	13.0 ± 7.1	20.7 ± 13.7
	WM	11,029.7 ± 4,151.1	406.7 ± 202.1	68.5 ± 65.1	3.7 ± 3.2	35.7 ± 18.7	30.6 ± 19.1	6,815.0 ± 3,829.1	508.8 ± 298.1	106.5 ± 81.5	4.7 ± 4.1	17.8 ± 10.8	25.5 ± 14.8
	ST	10,229.1 ± 5,363.8	339.2 ± 232.8	57.3 ± 58.2	3.5 ± 3.6	42.7 ± 29.3	33.5 ± 28.4	6,280.0 ± 3,567.2	452.4 ± 276.0	86.7 ± 76.1	5.1 ± 4.8	26.8 ± 15.5	29.0 ± 15.9
6-day	CD	15,940.5 ± 4,745.1	479.2 ± 180.3	90.1 ± 58.8	4.5 ± 2.6	56.7 ± 21.3	62.1 ± 26.5	7,355.7 ± 3,341.0	413.0 ± 190.0	85.3 ± 65.7	4.7 ± 3.6	20.2 ± 10.5	27.8 ± 15.6
	FB	16,078.6 ± 4,589.3	614.5 ± 223.4	109.4 ± 67.8	6.4 ± 3.8	49.4 ± 18.4	53.1 ± 21.1	7,959.2 ± 3,452.1	863.9 ± 269.5	117.1 ± 72.1	5.9 ± 3.5	20.4 ± 9.1	29.3 ± 14.4
	CM	16,990.2 ± 5,553.9	401.7 ± 149.2	46.49 ± 37.1	2.7 ± 2.1	38.7 ± 15.0	43.2 ± 18.9	6,262.2 ± 3,780.8	357.5 ± 207.0	47.1 ± 41.0	2.6 ± 2.0	13.2 ± 7.0	18.7 ± 11.5
	WM	15,605.8 ± 587.2	607.9 ± 321.4	106.0 ± 82.0	5.8 ± 4.2	49.1 ± 18.7	44.6 ± 23.3	6,892.2 ± 3,776.5	515.2 ± 268.6	99.8 ± 64.9	5.6 ± 3.2	17.5 ± 8.5	25.0 ± 12
	ST	14,725.3 ± 3,875.8	594.3 ± 256.1	110.4 ± 93.7	6.5 ± 5.4	65.8 ± 22.8	59.9 ± 21.5	6,400.0 ± 3,764.6	511.3 ± 304.8	113.4 ± 98.8	6.6 ± 5.2	29.1 ± 17.2	31.4 ± 19.2

*TD = total distance; HSR = high-speed running; sprint = sprint running; #Sprint = number of sprints; ACC$_{>3}$ = accelerations >3 m·s^{-2}; DEC$_{>3}$ = decelerations >3 m·s^{-2}; CD = central defenders; FB = full-backs; CM = central midfielders; WM = wide midfielders; ST = strikers.

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0.139). Full-backs showed lower $ACC_{>3}$ ratios than WM ($p = 0.030$; ES = 1.30), and lower $DEC_{>3}$ ratios than CD ($p = 0.046$; ES = 1.15). In 6-day microcycles, only $DEC_{>3}$ showed significant differences between positions ($p = 0.001$; $\eta_p^2 = 0.126$), with CD reporting higher ratios than WM ($p < 0.001$; ES = 1.06).

Discussion

The aims of the study were (a) to analyze the influence of microcycle length on the external load ratio according to the playing positions of professional football players and (b) to examine differences in the ratio of external load, depending on the specific player's position and the length of the microcycle. The findings confirmed that, in most cases, longer microcycles are associated with higher external load ratios across all playing positions. In addition, although the ratios varied with microcycle length, they remained similar when compared across different playing positions. Thus, despite external load during competition varied depending on the specific position, the reported weekly training loads were proportional to the positional competitive demands. Therefore, as hypothesized, although players experience different external loads during matches, the ratios within the microcycle remain similar, regardless of the player's position or microcycle duration.

During competitive periods, this study found that shorter microcycles result in lower ratios because the limited time available prioritizes recovery and tactical preparation (2,5,15). In contrast, longer microcycles allow for a more balanced distribution of external load, combining recovery periods with high-intensity training sessions, which leads to higher ratio values (5,15). However, most studies analyze the average values across all players in the squad (5,11,12,19). Therefore, it remains unclear whether the training/match ratio is position dependent or whether it remains similar regardless of the role assumed by the players. Our results reveal that external load ratios tend to increase with longer microcycle lengths, regardless of the position. Nonetheless, this trend does not manifest uniformly across all playing positions or variables studied. In this regard, only TD shows a directly proportional increase with the number of sessions. In contrast, for most playing positions, the ratio value begins to rise starting from microcycles of more than 4 days for the other analyzed variables, with similar values observed for 3-day and 4-day microcycle lengths. Our results are consistent with the scientific literature (5,15), suggesting that a higher ratio is generally associated with a greater number of training sessions available during the microcycle. However, studies published to date have typically examined average team values without distinguishing between specific playing positions (5,11,19). Although the description of session load is beyond the scope of this study, the finding that shorter microcycles lead to lower ratios suggests a possible preference for shorter microcycles aimed at optimizing player recovery and low-load tactical preparation. This approach is reflected in the consistently lower ratio values observed for high-speed running and high-acceleration/deceleration variables in 3-day and 4-day microcycles, and the plateau observed for sprints in microcycles longer than 5 days, with these external-load parameters being associated with muscle-damage biomarkers and postexercise declines in physical performance (16,17).

Player position is a key factor that significantly affects external load during matches (3,8,12). Previous studies have shown that although CD generally exhibit lower running demands than other positions (3), WM reach the highest speeds and, along with CM, experience more high-intensity accelerations and decelerations (6,13). Our results confirmed this pattern, with similar ratios across different playing positions within each microcycle length. Despite this similarity, exceptions were found in the 3-day microcycle, where significant differences were only observed in high-intensity accelerations between FB and WM, and in high-intensity decelerations between CD and FB. In addition, in 6-day microcycle, differences were observed only between WM and CD in high-intensity decelerations. To the best of our knowledge, only 2 articles reported accumulated external load training/match ratios according to the specific positions of the players (12,15). In contrast to our results, these previous studies showed different TD ratio across positions, with the highest values for ST and the lowest for CM, and higher HSR ratio in CD than in CM (15). The other study published on this topic (12) reported large differences in TD ratios across playing positions. For HSR, moderate differences were observed between CD and FB, CM, and ST. Also, large differences were found between CD and FB, and between CM and ST in Sprint. The difference between these results and ours may be attributed to the number of matches recorded and the duration of the microcycles. Although Modric et al. (15), in their study conducted with professional football players, recorded 12 matches without taking into account microcycle lengths, Kokstejn et al. (12) recorded 13 matches within microcycles composed of 4 training sessions, using U17 players. In contrast, our study analyzed all microcycle durations within a professional football context, including a total of 84 matches. The absence of significant differences in ratios across playing positions suggests that training loads were individualized based on match load, regardless of microcycle length, taking into consideration the match demands placed on the players.

Although the selected sample consisted of elite players and all possible microcycle lengths were analyzed within a professional football context, this study is not without limitations. The authors only analyzed 1 football team with a specific playing style and tactical approach; therefore, caution should be exercised when extrapolating these results to teams with different competitive levels or playing systems. Future studies should examine these training/match ratio values to corroborate our findings. In this regard, future studies should also explore whether higher or lower weekly external-load ratio approaches are associated with improved performance or greater readiness to perform, which would help identify effective training methods in high-level competitive contexts such as the one analyzed in this study. Another limitation of this study is that it only analyzed external load variables, without considering internal load data. Consequently, the results reported do not reflect the level of fatigue experienced by the players. Future studies should include internal load variables to provide a more comprehensive understanding of the players' demands. Finally, the findings of this study were discussed without considering an objective analysis of the technical–tactical requirements established by the coaching

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staff. Consequently, it would be valuable for future research to incorporate these factors to ensure a more ecologically valid interpretation of the results.

Practical Applications

The findings of this study provide valuable practical guidance for managing training load in professional football. Given the study's aim to analyze the influence of microcycle length on external load ratios across playing positions, and the confirmed association between longer microcycles and increased external load ratios, the implications for daily load monitoring are significant. First, the results emphasize the importance of closely tracking external loads, both daily and weekly, in accordance with the competitive calendar. Professional teams typically face variable microcycle durations throughout the season. Therefore, understanding how external load ratios fluctuate in relation to match congestion is essential for preventing excessive overload and mitigating acute spikes in load. This is particularly relevant when teams shift from periods of high match density (e.g., 2 matches within a 7-day period) to weeks with only 1 match. During such transitions, training loads may increase to compensate for reduced match exposure, and without proper monitoring, this may elevate the risk of excessive fatigue or overtraining. Moreover, the findings underscore the necessity of individualizing training loads according to players' positions. Although match demands may vary depending on playing position, the relative similarity in external load ratios across microcycle lengths suggests that players generally receive training loads proportional to their competitive demands. However, to ensure that all players are sufficiently stimulated and recover appropriately, load management must be tailored to the positional roles and physiologic requirements of each athlete. Consequently, designing training tasks that are both game-specific and aligned with competition demands can be an effective method for technical staff. Such an approach facilitates a more individualized and balanced load distribution, helping to optimize performance while reducing injury risk across the squad.

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