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How does a change of coach affect the physical performance of football players?

Abraham García-Aliaga[1], Pablo Rivas-González[2], Adrián Martín-Castellanos[3], Antonio Cordón-Carmona[1], Diego Muriarte-Solana[1], Daniel Mon-López[1], Ignacio Refoyo Román[1] & Moisés Marquina-Nieto[1*]

[1] Faculty of Physical Activity and Sports Sciences (INEF - Sports Department), Technical University of Madrid (Spain).
[2] High Performance Department of Men's Formative Football FC Barcelona, Barcelona (Spain).
[3] Department of Physical Activity and Sports Sciences, Faculty of Health Sciences, University Alfonso X el Sabio, Madrid (Spain).

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***Corresponding author:**
Moisés Marquina Nieto
moises.mnieto@upm.es

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Two alpinists climbing a snowy mountain in the Arctic under the northern lights. Adobestock ®Urdialex

Abstract

The present study analysed the conditional manifestation of a semi-professional football team when it underwent a change of coach. The results showed external load data extracted from global positioning devices (GPS) in two periods of the season—regular league and permanence phase—, where it could be observed that the change of coach affected the physical performance of the team, as it was significantly higher in HSR Rel Dist (m) ($t_{348.26}$ = 2.72; p =.007; d = .27), HSR Rel Count ($t_{352.85}$ = 2.72; p = .007; d = .27), Sprints REL ($t_{260.9}$ = 2.12; p = .003; d = .28), HMLD (m/min) ($t_{156.69}$ = 7.07; p < .001; d = .74) and > 24 m/min (t_{354} = 2.16; p = .031; d = .23) with the first coach's work methodology. However, in the variables Distance (m) ($t_{186.65}$ = 2.5; p = .013; d = .29) and Player Load ($t_{188.94}$ = 2.63; p = .015; d = .29), higher values were obtained with the new coach. There was, therefore, no relevant variation and improvement in the data with the new coach, indicating that a team's performance was due to multiple factors and that more running did not guarantee a higher collective performance in terms of scoring success.

Keywords: change of coach, conditional demands, GPS, physical performance.

Introduction

Achieving performance in team sports is a complex process that depends on different variables (Del Coso et al., 2020; Gómez et al., 2019). These factors can be intrinsic (technical-tactical aspects, physical, psychological, and social domains), contextual (playing at home), or extrinsic, such as contractual situations (Del Coso et al., 2020; Pappalardo & Cintia, 2018). This set of areas must be coordinated in order to achieve the highest possible performance and the coach is the figure responsible for the performance of the team (Grusky, 1963), being decisive and influential in the development of these areas (Flepp & Franck, 2021).

The role of the coach is crucial for good sport performance, but it presents high job insecurity (Bentzen et al., 2020; Tozetto et al., 2019). This is mainly due to the fact that their performance is constantly evaluated, both by the managers of the different clubs and by the fans themselves (Semmelroth, 2021). Moreover, it often depends on the achievement of victories, titles, or the ability to perform in line with the club's stated objectives, so that the result is one of the most influential factors in the evaluation of coaches and decision-making by club officials (Tozetto et al., 2019).

One of the most frequent decisions taken by managers when the expected results are not achieved is to change the coach (Flepp & Franck, 2021). This change is made with the aim of reversing the team's situation, seeking to achieve a greater number of points and improve performance in the short term (Lago-Peñas, 2011). This phenomenon could occur over the next 5 (Lago-Peñas, 2007) or 10 days (Gómez et al., 2021), decreasing the number of points obtained from these days onwards (Balduck et al., 2010; Hughes et al., 2010; Lago-Peñas, 2007).

According to Balduck and Buelens (2007), the new coach would need a period of more than one month to change, develop, implement, or rebuild the team's game, equivalent to more than 4 or 5 matches. This period of work would coincide with the increase in points obtained by the team (Lago-Peñas, 2011) and, from these weeks onwards, the ability of the new coach could be the most important variable for the improvement of these results (Lago-Peñas, 2007). Similarly, variables such as the coach's experience (Balduck & Buelens, 2007; Gómez et al., 2021), the team's budget (Gómez et al., 2021), whether the coach was an elite player or a rookie in the competition did not show a significant improvement in the teams' results, although an improvement in the points recorded by the teams after the change of coach was detected (Gómez et al., 2021).

Although changing coach is commonplace, there is a lot of controversy about whether or not this "winner effect" exists. Several authors have highlighted in their research that changing coaches did not show improvements in team performance afterwards (Anderson & Sally, 2013; Balduck & Buelens, 2007; De Paola & Scoppa, 2012; Heuer et al., 2011; Ter Weel, 2011; Van Ours & Van Tuijl, 2016). As can be seen, team performance in relation to points scored has been a concurrent and disparate theme in studies supporting both sides. Despite this, coaching changes continue to occur, influencing not only the psychological or social aspects of the players but also the style of play and the physical conditioning of the team, an area where fewer studies have been carried out.

We found studies that report that coaches have little influence on the physical aspect of the teams (Heuer et al., 2011). Guerrero-Calderón et al. (2021) concluded that players show more high intensity values with the previous coach than with the entry of the new coach in training, while the rest of the training values and match records showed no differences in relation to the change of coach. They indicated that the differences in training could be explained by the use of different tasks (wide vs. small spaces) or by the pursuit of a different style of play.

However, we also find authors highlighting significant differences in these coach changes. Castellano and Casamichana (2016) observed differences in team behaviour in different coaching changes with the same players. Radzimińskiet al. (2022) noted an increase in total distance, distance per minute, high speed distance (19.8-25.1$^{km \cdot h^{-1}}$) and sprint distance (> 25.2$^{km \cdot h^{-1}}$) with the addition of the new coach, noting that its duration was limited to around 5 matches, losing out in the comparison when 10 matches were used. Even in other team sports it has been pointed out that the change of coach could generate different external and internal load demands, as it is common that different strategies are adopted to achieve the expected performance (Salazar et al., 2020).

Due to the lack of information in the literature on the influence of a change of coach on the physical performance of a football team, the aim of this study was to analyse whether there were differences in the physical performance of a team when there was a change of coach, both at a general level and by playing positions, in order to provide new information on this fact, which has been little studied from the perspective of physical performance.

Materials and methods

Experimental approach to the problem

The work was carried out within the framework of the research project: "Factors that determine sports performance in high competition" by the Technical University of Madrid (UPM) and the National Institute of Sports, Physical Education and Recreation (INDER), Provincial Directorate of Sports "Pinar del Río", Republic of Cuba. Resolution 10012023-DPD-m-Pinar del Río. Centre for the Study of Sports Training in High Performance Sports (CEEDAR).

A descriptive analysis of the physical activities performed by semi-professional football players was carried out using physical performance data from a semi-professional football team. The team played in Spain's 2nd division B. Each participant gave their consent and the ethical committee was approved in the project "Psychological factors and physical activity in the resident population in Spain" of the Sports Laboratory, at the Faculty of Physical Activity and Sport Sciences - INEF, on 7 May 2020, and currently in force. The choice of the club was based on access to GPS data collection over a full season. In order to carry out the research, three phases of the 2020/2021 season were analysed, divided as follows: the first phase covered matchday 1 to 8, the second phase covered matchdays 9 to 17 and the third phase included the data corresponding to matchdays 19 to 26. The choice and division of these league matchdays was due to the lack of data corresponding to the 18th matchday, therefore, the rest of the matchdays were divided in such a way that they had the same number of matchdays played. The first phase and the second phase referred to matches played with the coach in the regular season, while the third phase were matches played with the incorporation of a new coach and coaching staff, after the dismissal of the previous coach for the relegation play-offs in accordance with the new RFEF regulations. Teams would form a new group based on their regular season standings against teams they had not faced before. The position in the group determined promotion and relegation. On the other hand, the data were taken according to the position of the players: centre backs (CB), full backs (FB), midfielders (MF), wingers (WG) and forwards (ST).

Data collection and analysis

The collection of the physical data related to the external load of the players in the official matches was carried out using an inertial device (wireless inertial measurement unit, WIMU) called WIMU^{PROTM} (RealTrack Systems, Almería, Spain), which integrates different sensors (four accelerometers, a gyroscope, a magnetometer, GNSS, UWB, among others) (Giménez et al., 2020). The device recorded data pertaining to the accelerometer, gyroscope, and magnetometer at a sampling rate of 100 Hz, while data pertaining to the location (GNSS) were recorded at 10 Hz. The reliability and validity of this device has been evaluated for the analysis of positioning variables by GNSS (Muñoz-Lopez et al., 2017) and UWB (Bastida Castillo et al., 2018), and good results were obtained at a sampling frequency of 5 Hz and 20 Hz, respectively. For the purposes of this study, data were recorded on the device's built-in eight GB internal memory. To attach the device to the players, the device was inserted into a specific harness designed to be attached to each player. The variables are shown in Table 1.

Table 1
Description of the variables analysed in the study.

Variables	Definition
Distance (m)	Total distance travelled in metres
Dist (m/min)	Total distance travelled per minute
Explosive Dist (m)	Total distance travelled with an acceleration of greater than 1.12$^{m/s2}$
Explosive Dist (m/min)	Explosive distance in metres per minute
HSR Rel Dist (m)	High speed running relative is the distance travelled at speeds above the player's threshold (at 75.5% of maximum speed)
HSR Rel (m/min)	High speed running relative in metres per minute
HSR Rel Count	Number of times (counter) that the player has run at a speed above his HSR Rel threshold.
HSR Abs Dist (m)	High speed running absolute is the distance travelled at speeds above 21 km/h.
HSR Abs (m/min)	High speed running absolute in metres per minute.
HSR Abs Count	Number of times (counter) that the player has run at a speed above their HSR threshold Abs
Diff ACC DEC	Difference between accelerations and decelerations with value higher than 3$^{m/s2}$

Caption: Dist: distance; HSR: high sprint running; rel: relative; abs: abdolute; Dif: difference; ACC: accelerations; DCC: decelerations; HMLD: HMLD: High metabolic load distance, DSL: Dynamic stress load

Table 1 (Continued)
Description of the variables analysed in the study.

Variables	Definition
Sprint Abs (m)	Distance travelled above the absolute sprint speed threshold (24 km/h)
ABS Sprints	Number of sprints above the absolute sprint speed threshold
SprintsREL	Number of sprints above the relative sprint speed threshold
MAX Speed (km/h)	Maximum speed achieved
Sprints (min)	Number of sprints per minute
Step Balance	Percentage of decompensation between right and left step intensity. A negative result indicates that the dominant leg is the right leg
Player Load	Displays the accumulation of motion in the accelerometers
Player Load (min)	Player load per minute rate value
HMLD (m)	High metabolic load distance is the distance travelled by a player when his metabolic power is above 25.5 W/kg
HMLD count	Number of times the player has been at a metabolic power higher than 25.5 W/kg
HMLD (m/min)	HMLD value per minute
DSL	Dynamic stress load, number of impacts weighted above 2G
DSL (min)	DSL value per minute
> 24 (m/min)	Running at a speed of more than 24 km/h in metres per minute

Caption: Dist: distance; HSR: high sprint running; rel: relative; abs: abdolute; Dif: difference; ACC: accelerations; DCC: decelerations; HMLD: HMLD: High metabolic load distance, DSL: Dynamic stress load

Analysis of results

Data analysis was performed with IBM SPSS version 25.0 for Windows (IBM Corporation, Armonk, NY, USA). The assumption of normality was tested using the Kolmogorov-Smirnov test and the assumption of equality of variances was tested using the Levene test. For the analysis of the effect of season phase and player position on each of the physical variables, 1-factor inter-subject ANOVAs were performed. Tukey was applied as a *post hoc* test. The Student's t-test for related samples was used to compare the change of coach and physical variables. The effect size was calculated using Cohen's *d* and was interpreted as: trivial 0.2; small = 0.01; moderate = 0.6-1.2; large = 1.2-2.0; very large = 2.0- 4.0; and extremely large 4.0 (Batterham & Hopkins, 2006; Hopkins et al., 2009). Results are expressed as mean ± standard deviation (M ± SD) and the level of statistical significance is set at $\alpha = 0.05$.

Results

The physical performance of the players with respect to the change of coach obtained significantly better data with the previous coach. Data were significantly higher in HSR Rel Dist (m) ($t_{348.26} = 2.72$; $p = .007$; $d = .27$), HSR Rel Count ($t_{352.85} = 2.72$; $p = .007$; $d = .27$), Sprints REL ($t_{260.9} = 2.12$; $p = .003$; $d = .28$), HMLD(m/min) ($t_{156.69} = 7.07$; $p < .001$; $d = .74$) and > 24 m/min ($t_{354} = 2.16$; $p = .031$; $d = .23$), as can be seen in Table 2. However, in the variables Distance (m) ($t_{186.65} = 2.5$; $p = .013$; $d = .29$) and Player Load ($t_{188.94} = 2.63$; $p = .015$; $d = .29$), higher values were obtained with the new coach.

In the analysis of the physical variables analysed as a function of the third of the season, significant differences were observed in variables such as Distance (m) ($F_{2,297} = 3.74$; $p = .25$), with these values being higher in the third third compared to the second ($p = .027$), and in Explosive Dist (m/min) ($F_{2,338} = 11.57$; $p < .001$), being the third period the one with the lowest number ($p <. 001$ in both comparisons), which can be seen in Table 3.

In the variables related to High Speed Running, significant differences were detected in HSR Rel Dist (m) ($F_{2,353} = 6.06$; $p = .003$), being favourable to the second period compared to the third ($p = .002$), and in HSR Rel Count ($F_{2,353} = 5.11$; $p = .006$), where a higher number of efforts were maintained in the second third relative to the third ($p = .004$).

Table 2
Comparison between coaches.

	Former coach			New coach				
	M		SD	M		SD	*p*	*d*
Distance (m)	7,169.55	±	3,270.49	8,255.89	±	4,070.13	.013	.29
Explosive Dist (m)	968.68	±	443.51	1,077.96	±	532.43	.580	.22
Explosive Dist (m/min)	14.96	±	2.11	14.7	±	8.68	.750	.04
HSR Rel Dist (m)	153.87	±	162.17	120.34	±	68.89	.007	.27
HSR Rel (m/min)	2.3	±	1.81	2.18	±	2.21	.568	.06
HSR Rel Count	8.29	±	9.04	6.4	±	4.04	.007	.27
HSR Abs Dist (m)	404.62	±	231.68	414.07	±	230.15	.719	.04
HSR Abs (m/min)	6.71	±	3.36	6.38	±	4.55	.439	.08
HSR Abs Count	21.93	±	12.42	22.27	±	12.81	.809	.03
Dist (m/min)	109.6	±	9.86	111.04	±	60.65	.800	.03
Diff ACC DEC	-13.1	±	12.54	-14.39	±	13.48	.376	.10
Sprint Abs (m)	172.87	±	121.34	176.57	±	117.73	.786	.03
ABS Sprints	9.04	±	6.02	9.32	±	6.47	.689	.04
REL Sprints	0.63	±	2.59	0.12	±	0.38	.003	.28
MAX Speed (km/h)	29.14	±	2.28	29.58	±	2.17	.088	.20
Sprints (min)	11.88	±	26.75	10.88	±	33.01	.770	.03
Step Balance	-0.0056	±	0.02	-0.0043	±	0.02	.615	.07
Player Load	95.8	±	44.45	110.1	±	54.47	.015	.29
Player Load (min)	1.46	±	0.17	1.41	±	0.49	.170	.14
HMLD (m)	1,511.55	±	687.56	1,576.57	±	764.55	.422	.10
HMLD count	173.49	±	79.76	188.37	±	95.82	.124	.17
HMLD (m/min)	23.91	±	5.39	18.57	±	8.74	<.001	.74
DSL	278.35	±	194.88	554.14	±	2,802.38	.294	.14
DSL (min)	4.14	±	2.04	19.28	±	165.37	.328	.13
> 24 (m/min)	2.84	±	1.82	2.34	±	2.43	.031	.23

Caption: Dist: distance; HSR: high sprint running; rel: relative; abs: abdolute; Dif: difference; ACC: accelerations; DCC: decelerations; HMLD: HMLD: High metabolic load distance, DSL: Dynamic stress load

Significant differences were also reported between Rel Sprints ($F_{2,353}$ = 3.46; p = .033) performed in the second and third third of the season, accumulating in the final one a lower value (p = .026); the number of metres per minute at more than 24 km/h also showed significant differences ($F_{2,353}$ = 3.11; p = .046), with higher values in the first period than in the third (p = .035), and the HMLD (m/min) ($F_{2,353}$ = 25.04; p < .001), where better results were obtained in the first and second third than in the third (p < .001 in both cases).

Finally, with respect to the Player Load presented by the players, significant differences were observed ($F_{2,353}$ = 3.76; p = .024) between the second and third periods, with these demands being higher in the third period (p = .021).

The analysis according to the position of the players on the pitch with the arrival of the new coach did not show significant results in any of the comparisons (p > .05). Descriptive data show differences between them (see Table 4).

The final result of the matches in the first third was draw, win, lose, draw, lose, win, draw, lose, win, draw, lose, scoring a total of 9 points. In the second third, lose, draw, win, lose, lose, lose, lose, win, draw, draw, draw, for a total of 9 points. In the third trimester (with the new coach), win, win, win, win, lose, lose, draw, win, win, win, win, with a total of 16 points.

Table 3
Comparison by thirds of the season.

	1st third (*n* = 113)			2nd third (*n* = 128)			3rd third (*n* = 115)			
	M		SD	M		SD	M		SD	*p*
Distance (m)	7,275.13	±	3.319	7,076.35	±	3,237.24	8,255.89 B*	±	4,070.14	.025
Explosive Dist (m)	977.49	±	448.05	960.9	±	441.08	1,077.96	±	532.43	.124
Explosive Dist (m/min)	14.92 C***	±	2.05	14.99 C***	±	2.16	13.59	±	2.95	<.001
HSR Rel Dist (m)	142.63	±	102.45	163.8 C**	±	200.57	102.19	±	69.95	.003
HSR Rel (m/min)	2.35	±	1.56	2.26	±	2.01	2.18	±	2.21	.800
HSR Rel Count	7.56	±	5.19	8.94 C**	±	11.38	5.76	±	3.86	.006
HSR Abs Dist (m)	420.38	±	231.27	390.7	±	232.05	414.07	±	230.15	.572
HSR Abs (m/min)	7.09	±	3.57	6.38	±	3.15	6.38	±	4.55	.264
HSR Abs Count	22.61	±	12.79	21.32	±	12.09	22.27	±	12.81	.707
Dist (m/min)	109.98	±	9.09	109.27	±	10.53	111.04	±	60.65	.926
Diff ACC DEC	-13.73	±	13.04	-12.55	±	12.11	-14.39	±	13.48	.525
Sprint Abs (m)	181.15	±	120.89	165.55	±	121.75	176.57	±	117.73	.582
ABS Sprints	9.47	±	6.32	8.66	±	5.74	9.32	±	6.47	.554
REL Sprints	0.41	±	0.88	0.84 C*	±	3.44	0.12	±	0.38	.033
MAX Speed (km/h)	29.39	±	2.3	28.92	±	2.25	29.58	±	2.17	.064
Sprints (min)	14.48	±	29.42	9.59	±	24.02	10.88	±	33.01	.401
Step Balance	-0.0073	±	0.02	-0.0041	±	0.02	-0.0043	±	0.03	.482
Player Load	98.3	±	45.68	93.58	±	43.39	110.1 B*	±	54.47	.024
Player Load (min)	1.49	±	0.17	1.44	±	0.18	1.41	±	0.49	.214
HMLD (m)	1,534.5	±	696.62	1491.29	±	681.56	1,576.57	±	764.55	.649
HMLD count	175.11	±	80.76	172.05	±	79.16	188.37	±	95.82	.296
HMLD (m/min)	24.09 C***	±	5.55	23.75 C***	±	5.26	18.57	±	8.74	<.001
DSL	295.95	±	214.54	262.81	±	175.1	554.14	±	2,802.38	.312
DSL (min)	4.4	±	2.23	3.9	±	1.84	19.28	±	165.37	.365
> 24 (m/min)	3.01 C*	±	1.82	2.68	±	1.82	2.34	±	2.43	.046

Caption: A = significant differences with the 1st third, B = significant differences with the 2nd third, C = significant differences with the 3rd third. *= $p < .05$, **= $p < .01$, ***= $p < .001$.

Table 4
Descriptive data by positions as a function of the coach.

	CB				FB				MF				WG				ST			
	PRE (*n* = 37)		POST (*n* = 18)		PRE (*n* = 40)		POST (*n* = 21)		PRE (*n* = 72)		POST (*n* = 21)		PRE (*n* = 58)		POST (*n* = 22)		PRE (*n* = 34)		POST (*n* = 21)	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Distance (m)	8,974.6	± 1,724.6	9,457.1	± 3,594.1	7,445.1	± 3,784.9	9,108.2	± 4,006.7	6,710.1	± 3,396.5	9,108.2	± 4,006.7	6,653	± 3,159.2	7,813.6	± 4,276.4	6,735	± 3,268.9	5,894.2	± 3,728
Explosive Dist (m)	1,219.9	± 244.4	1,294.7	± 472.9	998.2	± 509.7	1,248.4	± 543.3	843.3	± 418.4	1,248.4	± 543.3	934.3	± 436.6	1,073.4	± 586.6	984.9	± 494	868.8	± 594.7
Explosive Dist (m/min)	13.6	± 1	12.4	± 1	14.9	± 1.6	13.4	± 1.7	14.5	± 2.6	13.4	± 1.7	16.1	± 1.9	14.5	± 1.7	15.5	± 1.4	14.7	± 2.8
HSR Rel Dist (m)	208.8	± 257.1	123.8	± 62.5	135.7	± 89.1	125.5	± 60.9	91.2	± 80.8	125.5	± 60.9	173.9	± 120.6	155.4	± 90	214	± 232.1	116.8	± 60.2
HSR Rel (m/min)	1.7	± 0.8	1.7	± 1.4	2.1	± 1.3	2.2	± 3.4	1.8	± 1.6	2.2	± 3.4	3	± 2.4	3	± 2.4	2.9	± 1.9	2.7	± 2.1
HSR Rel Count	11.5	± 15	6.9	± 4	7	± 4.4	6.8	± 3.7	4.9	± 4.1	6.8	± 3.7	9	± 5.9	8	± 4.7	12.4	± 13.2	6.2	± 3.8
HSR Abs Dist (m)	354.1	± 123.3	318.5	± 123.8	478.7	± 268.7	506	± 229	281.9	± 174.2	506	± 229	504.3	± 256.8	543.5	± 274.1	462.3	± 214.4	437.5	± 249.9
HSR Abs (m/min)	4	± 1.3	3.5	± 1.7	7.4	± 3	6.2	± 3.5	5.5	± 3.4	6.2	± 3.5	8.8	± 3	8.6	± 4.1	7.9	± 2.8	8.6	± 3
HSR Abs Count	20.1	± 6.4	18.3	± 7.6	23.9	± 13.7	26.4	± 12.1	15.5	± 9.5	26.4	± 12.1	26.8	± 13.5	27.8	± 15.2	26.9	± 13.3	23.5	± 15.8
Dist (m/min)	99.8	± 4.1	93.2	± 4.6	110.4	± 6.4	103	± 7.6	112.4	± 11	103	± 7.6	113.4	± 10.2	108	± 9.9	106.9	± 6.7	104.4	± 12.3
Diff ACC DEC	-7.3	± 11.8	-7.5	± 8.3	-12.7	± 12.3	-21	± 16.2	-10	± 8.8	-21	± 16.2	-20.3	± 13.1	-17.9	± 17	-14.1	± 14.1	-14	± 13.1
Sprint Abs (m)	140.4	± 74.9	131.2	± 59.9	219.4	± 135.3	248.9	± 118.2	99.8	± 72.3	248.9	± 118.2	234.5	± 140.6	265.5	± 144	202.9	± 104.2	179.5	± 102.4
ABS Sprints	7.5	± 3.6	7.1	± 3.7	10.6	± 6.6	12.6	± 6.3	5.4	± 3.7	12.6	± 6.3	12	± 6.7	13.7	± 7.9	11.5	± 5.9	9.6	± 6.7
SprintsREL	1.7	± 5.1	0.4	± 0.6	0.1	± 0.4	0.1	± 0.1	0.2	± 0.8	0.1	± 0.1	0.5	± 0.8	0.1	± 0.3	1.3	± 3.9	0.2	± 0.5
MAX Speed (km/h)	29.5	± 2	30.2	± 2.1	29.4	± 2.4	30.4	± 1.9	27.7	± 2.1	30.4	± 1.9	30.2	± 2	30.7	± 1.9	29.7	± 1.8	29.8	± 1.8
Sprints (min)	12.2	± 14.7	11.4	± 13.7	4	± 15.3	3.8	± 12.1	4.9	± 17.6	3.8	± 12.1	15.3	± 27.3	10.5	± 32	8.2	± 15.5	11.1	± 30.4
Step Balance	-0.01	± 0.02	0	± 0.03	-0.01	± 0.03	0	± 0.02	-0.01	± 0.02	0	± 0.02	0	± 0.02	0.01	± 0.02	-0.01	± 0.02	-0.01	± 0.02
Player Load	119.1	± 24.9	131.7	± 48.4	92.6	± 47.6	123.3	± 53.8	94.2	± 49	123.3	± 53.8	86.7	± 41.2	103.2	± 54.8	93.3	± 46.1	84.4	± 53
Player Load (min)	1.3	± 0.1	1.3	± 0.1	1.4	± 0.1	1.3	± 0.2	1.6	± 0.2	1.3	± 0.2	1.5	± 0.1	1.4	± 0.1	1.5	± 0.1	1.5	± 0.2
HMLD (m)	1,704.4	± 364.9	1,656.5	± 601.4	1,611.8	± 819.2	1,802.7	± 754.5	1,342.2	± 673.9	1,802.7	± 754.5	1,521.5	± 698.6	1,638.8	± 834.6	1,525.5	± 750.2	1,345.8	± 862.8
HMLD count	225.4	± 44.5	232.3	± 85.3	177.5	± 89.5	211.9	± 92.7	166.6	± 84.3	211.9	± 92.7	154.4	± 70.9	172.3	± 95.9	159.5	± 81.5	140.2	± 96.7
HMLD (m/min)	19	± 2.1	16	± 1.6	24.4	± 3.3	20	± 2.3	23.7	± 6.9	20	± 2.3	26.6	± 4.9	23.2	± 4.4	24.4	± 3.1	23.8	± 3.9
DSL	288.9	± 140.6	331.3	± 168.8	209.9	± 131.8	260	± 125	344.3	± 261.4	260	± 125	264.5	± 170.2	252.3	± 146.9	252.3	± 180.8	212.1	± 144.4
DSL (min)	3.2	± 1.3	3.1	± 1.1	3.2	± 1.6	2.8	± 0.8	5.2	± 2.6	2.8	± 0.8	4.2	± 1.6	3.6	± 1.1	3.9	± 1.5	3.7	± 1.2
> 24 (m/min)	1.6	± 0.8	1.5	± 1.5	3.3	± 1.6	2.9	± 3.6	2	± 1.4	2.9	± 3.6	4	± 2.1	3.5	± 2.4	3.4	± 1.5	2.9	± 2.1

Caption: A = significant differences with the 1st third, B = significant differences with the 2nd third, C = significant differences with the 3rd third. *= $p < .05$, **= $p < .01$, ***= $p < .001$.

Discussion

The aim of the present study was to determine possible differences in physical performance after a change of coach. The data shows that the change of coach obtained a greater number of points without presenting an improvement in the physical variables, only had a greater distance (m), Explosive Distance (m), Max Speed (km/h) and Player Load in the matches, in line with the results found (Guerrero-Calderón et al., 2021). This result indicates that they ran more in the final third, which may show that the importance of the change of coach lies in a different style of play (Augusto et al., 2021) with which the new coach scored more points (Lago-Peñas, 2011; Lago-Peñas, 2007; Balduck & Buelens, 2007; Gómez et al., 2021). This fact can be explained by the coach's vision on the conditional aspects of the players, prioritising high-intensity actions in areas closer to the opposing team's goal.

On the other hand, with the previous coach, better results were obtained in running > 24 km/h (m/min) and HSR Rel Dist (m), two variables that show the intensity in the players' running and the influence that coaches have on the type of running that players perform in matches (Flepp & Franck, 2021, Guerrero-Calderón et al., 2021). This may be due to the freedom or limitation of players' movements and, consequently, players' decision-making. An example of this could be that with one coach they have very marked movements and limit themselves to doing what the coach says and with another they have more freedom in decision making and perhaps do not make runs that provoke these speeds, making a better decision for the game.

After the analysis of the results found, it has been observed that it is important where to run at a higher intensity and what distance, among other aspects, so that with the new coach, in the same number of matches—eight—almost twice as many points were obtained (16 vs. 9). This is determinant for the team's ranking in the table, avoiding relegation or achieving promotion, in line with studies that showed that the new coach has an influence on the points obtained in matchdays 5 to 10 since their arrival to the team (Balduck et al., 2010; Flepp & Franck, 2021; Gómez et al., 2021; Hughes et al., 2010; Lago-Peñas, 2007, 2011).

On the other hand, despite the fact that coaching change is common, there is a lot of controversy regarding whether or not this "winner effect" exists. Several authors have highlighted in their research that changing coaches did not show improvements in team performance afterwards (Anderson & Sally, 2013; Balduck & Buelens, 2007; De Paola & Scoppa, 2012; Heuer et al., 2011; Ter Weel, 2011; Van Ours & Van Tuijl, 2016). Furthermore, performance recovery was reported to be independent of coach continuity or lack thereof (Kattuman et al., 2019; Scelles & Llorca, 2021). In this way, they inferred that the potential for better performance may be due more to social factors such as leadership and group motivation and behaviour (Kattuman et al., 2019).

Therefore, the importance of the change of coach by the club's leaders must respond to objective data and not to "bad luck" (Flepp & Franck, 2021), seeking to achieve a greater number of points in the short term so that in the medium term they seek to change the team's style of play, and for the players to make effective efforts, without this entailing running a greater distance at greater intensity. In line with the results found in the study, Kleinknecht and Würtenberger (2021) pointed out that change could be beneficial for clubs experiencing a decline in performance and that the profile of the successor should be studied according to the objectives presented by the club, analysing whether the incorporation of the new coach should be done with an external or internal person to the organisation, highlighting that those from outside the club could get the players to show greater effort.

Conclusion

The change of coach is a situation that seeks to improve the team's performance. This must be done on the basis of objective data (number of points, position in the ranking, objectives not achieved, etc.). When choosing a replacement, the style of play of the new coach must be taken into account, which is more important than the physical variables.

This study shows that physical variables should not be studied in isolation but in conjunction with technical and tactical variables in order to be able to derive transferable results in practice. Therefore, the relationship between these variables should be further investigated in future studies in order to understand the overall influence.

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