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Players' physical performance in LaLiga across the season: insights for competition continuation after COVID-19

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ABSTRACT: Due to the COVID-19 outbreak, professional football players competing in LaLiga were confined at home for ~8 weeks and then they were allowed to train to prepare the first competitive match for 4 weeks. As the duration of summer break in the prior four seasons of LaLiga (from 2015-2016 to 2018-2019) was of similar length to the suspension of the championship due to COVID-19 (~12 weeks), we have analysed the running performance of teams competing in LaLiga in these four seasons to anticipate players' physical performance after the resumption of the competition. The analysis includes the average running distance per game for each of the 38 matchdays that compose LaLiga. One-way ANOVA revealed that there was a main effect of the matchday on total running distance per match ($p = 0.001$), and in the distance covered between 14.0 and 20.9 km/h ($p < 0.001$), between 21.0 and 23.9 km/h ($p < 0.001$) and at above 24.0 km/h ($p < 0.001$). Overall, the post-hoc analysis revealed that the running patterns progressively increased during the first 8-10 matchdays and then reached a plateau which was significantly different to matchday-1 ($p < 0.05$). This analysis reveals that, in the prior four competitive seasons of LaLiga, players' physical performance was lower at the beginning of the season and the teams needed approximately 8-10 matchdays to reach a steady state running performance. These data suggest that football players will progressively increase their performance across the 11 matchdays remaining to complete LaLiga.

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INTRODUCTION

The pandemic of coronavirus disease-19 (COVID-19), an acute respiratory syndrome caused by the coronavirus SARS-CoV2, entailed the suspension of sports competition worldwide and, in most territories, home confinement and quarantine. These exceptional measures were adopted by the majority of health authorities in European countries, especially after the World Health Organization characterized COVID-19 as a pandemic on 11 March, 2020 [1]. Home confinement was included within a battery of limitations that governments set to diminish the spread of the virus, while the restrictions were particularly restraining with professional sports competitions due to the high risk of virus infection when bringing together thousands of people in a sport arena. Although the length of home isolation due to the COVID-19 outbreak varied substantially among European countries, in the case of Spain, it entailed a strict quarantine that prohibited all individuals from practising any form of exercise outside of their own residence from 14 March, 2020. During quarantine, professional athletes and sportspeople used several forms of home training, attempting to maintain their physical conditioning and lifestyles, ultimately reducing the harmful physiological and psychological effects of home isolation. In this regard, the staffs of Spanish professional football teams provided to their players personalized training programmes to reduce the detraining effects of home isolation, by using video-based activities that primarily included strength exercise with body loads, and intermittent exercise routines performed within a low range of displacement. However, the critical movements and actions of football, including accelerations/decelerations, sprints

with and without changes of direction, and kicking the ball were difficult to replicate in the conditions for most players and it was speculated that players would need several weeks of football-specific retraining to recover their physical and technical performance [2]. The COVID-19 outbreak occurred when most of the European professional football leagues were unfinished, disrupting the competition. The great economic incomes associated with professional football in Europe increased the pressure to resume football competition as soon as possible once the pandemic was under control [3]. The German Bundesliga was the first major European football league to successfully return to play, resuming its football competition on 16 May, 2020. The English Premier League returned on 17 June, 2020 while the Italian Serie A resumed competition on 17 June, 2020. In contrast, the organisers of other leagues, as the French Ligue 1, decided to bring a premature close to avoid football matches until the next season. Due to the uneven evolution of the COVID-19 in each country, the return to football training and competition were tailored taking into account the characteristics of the pandemic in each country [4]. In Spain, on 11 May, 2020, the home isolation measures were alleviated, and professional football players competing in LaLiga, the top Spanish football league, were allowed to attend the club's facilities. From that date, players were allowed to train first by using football-specific training routines with a 1–2 m "social" distance (for 1 week) and by using training groups of an increasing number of players afterwards. Due to the positive evolution of the pandemic in Spain, and after adopting a strict protocol to minimize infection during football matches, football and medical authorities authorized resuming LaLiga on 8 June, 2020 [5] to complete the 11 matchdays remaining to finish the competition. Hence, in the case of Spain, professional football players competing in LaLiga were confined at home for ~8 weeks and they were allowed to train to prepare the first competitive match for 4 complete weeks, for a total suspension of the competition lasting ~12 weeks. Although much has been hypothesised about the potential effect of home isolation on players' physical performance when the competition was resumed after COVID-19 [4, 6–8], a potential answer may be obtained by analysing the data of previous seasons in LaLiga. The end of LaLiga normally occurs in the third week of May, and the start of the following season normally occurs in the third week of August. This means that the first division of professional football in Spain is suspended by ~12 weeks every year for the summer break. During this period, professional football players perform a transition period which may have different characteristics for those players competing in international football events (i.e., international football players competing with their national teams), while for most players it entails active recovery. During the transition period, there have been found several detraining effects such as changes in body composition, declines in sprint running performance and reduction in muscle power [9]. Afterwards, professional football teams perform a preseason period lasting ~4–6 weeks [10] to offset the detraining effects of the transition period and to start football competition with the best possible level of fitness. Although the main objective of the preseason period is to adapt players to the efforts, movements and physical challenges of competition and it usually entails high volumes of training and friendly matches [11], players usually need several weeks of official football competition to achieve a steady state of physical performance, as it has been previously found in the Bundesliga [12].

MATERIALS AND METHODS

This study is a descriptive analysis of the running performance of teams competing in LaLiga across the last 4 seasons (from 2015–2016 to 2018–2019). The analysis includes the average running distance per game for each of the 38 matchdays that compose LaLiga, for a total of 1,520 matches analysed. Data were obtained from La Liga, which authorised the use of the variables included in this investigation. Data were extracted by a valid multicamera tracking system and associated software (Mediacoach, Spain) that measures players' running distances at different speeds [13, 14].

RESULTS

By using a one-way analysis of variance of repeated measures (LSD post-hoc), and by using a significance level to determine meaningful differences at $p < 0.05$, we have found the following outcomes: there was a main effect of the matchday on total running distance per match ($F = 2.44$, $p = 0.001$). In comparison to matchday-1, the total running distance covered during the game in several fixtures after matchday-10 was significantly longer (Figure 1A). There was also a main effect of the matchday on the distance covered at < 14.0 km/h ($F = 1.63$, $p = 0.010$). However, in this case, the running distance at this speed threshold was progressively decreased from matchday-1 and it was significantly lower than matchday-1 at several matchdays after matchday-8 (Figure 1B). Regarding the distance covered between 14.0 and 20.9 km/h ($F = 5.76$, $p < 0.001$), between 21.0 and 23.9 km/h ($F = 3.22$, $p < 0.001$) and at above 24.0 km/h ($F = 2.50$, $p < 0.001$), there was a main effect of the matchday on the running performance at these speed thresholds, and the post-hoc analysis revealed that the running patterns progressively increased during the first 8–10 matchdays and then reached a plateau which was significantly different to matchday-1 (Figure 1C, 1D and 1E). A similar pattern was found for the number of sprints performed at ≥ 24.0 km/h ($F = 2.78$, $p < 0.001$; Figure 1F). In all running variables, there was a progressive decrease in the last four matchdays.

DISCUSSION

This analysis reveals that, in the prior four competitive seasons of LaLiga, players' physical performance was lower at the beginning of the season and the teams needed approximately 8–10 matchdays to reach a steady state running performance. As the durations of the transition period and the preseason period in these prior four seasons were of similar length to the duration of home confinement due to COVID-19 (8 weeks) and similar to the time allowed to prepare

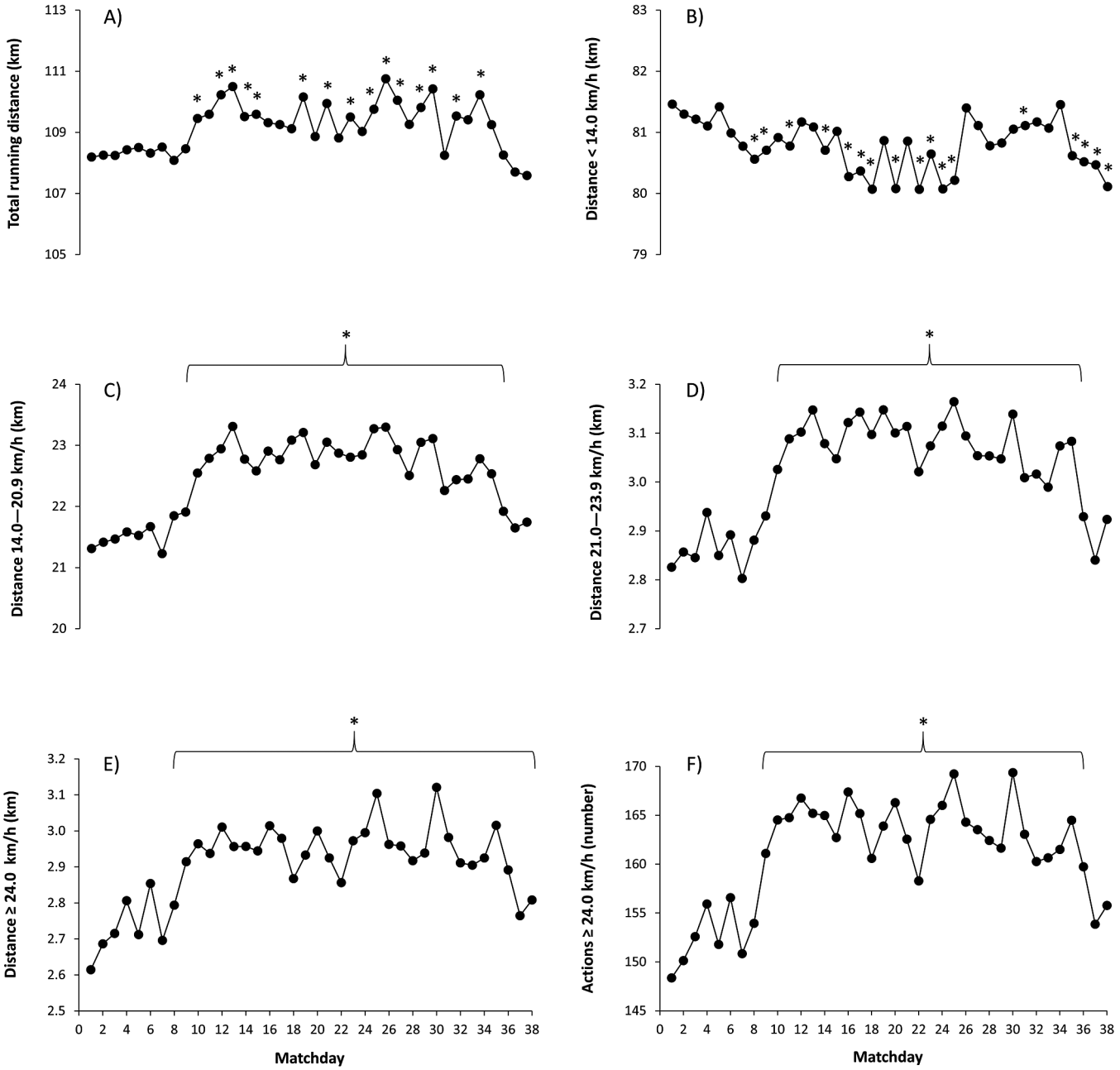

FIG. 1. Total running distance per match, distance at different speed thresholds and number of sprints across the 38 matchdays that composed *LaLiga*.
A) Total running distance, B) running distance covered at < 14.0 km/h, C) running distance covered between 14.0 and 20.9 km/h, D) running distance covered between 21.0 and 23.9 km/h, E) running distance covered at ≥ 24.0 km/h, F) number of sprints covered at ≥ 24 km/h. Each dot represents mean running distance on each matchday in the last four seasons (from 2015/16 to 2018/19). (*) Different from matchday-1 at $p < 0.05$

players before resuming football competition in Spain (4 weeks), these data suggest that football players will progressively increase their performance across the 11 matchdays remaining to complete the championship. The similarities in the length of the competition disruption due to COVID-19 in Spain and the summer break between football seasons indicate that players will face a scenario with resemblances to the onset of a football season. Furthermore, Spanish football authorities have included other measures to alleviate the physical strain induced by the official matches as the increase in the number of player substitutions up to 5 per match, in-game refreshment pauses and schedules to reduce the hours with higher ambient temperatures, all to promote a reduced physical load of the game.

CONCLUSIONS

In summary, when resuming competition after COVID-19, professional players of LaLiga will experience physical challenges similar to the ones they usually undergo during the first official matches of the season. This analysis might be useful for strength and physical conditioning coaches because it advocates that those teams that are better prepared, in physical and conditioning terms, to achieve high running performance from the first match after resuming the competition may increase their possibilities of succeeding [15], especially for those teams that are fighting to win the championship or to avoid relegation. In addition to football performance parameters, football practitioners should be aware of the potential higher injury risk [16] as the need to finish the season without affecting the start of the next championship will produce a congested calendar with lower-than-habitual recovery times. Although no research has been published to date with the injury incidence in professional football after COVID-19, informal and news media reports indicate that football players may have suffered a higher than usual number of injuries, especially muscle injuries, and with a particularly high incidence on the first matchdays after the resumption of competition [17]. However, this is not an unusual observation, as the preseason and the onset of the football season are periods with an increase in the incidence and prevalence of some type of injuries [8].

Once the 2019–2020 editions of the major European football leagues are finished, it will be necessary to investigate the effect of home isolation and quarantine on football performance by analysing running activity patterns and game statistics in the matches played after resuming football competition. As the duration of confinement and football competition interruption have been substantially different among the football leagues, future investigations will determine whether confinement length was associated with football performance decline or increased injury incidence in professional football. Finally, the study of football performance of the teams competing in the UEFA Champions League and Europa League, which will be resumed after the end of the European football leagues, will also be useful to determine how top European football teams managed a season that lasted over a year. French teams will merit special attention as they will have to compete in the last stages of these international football competitions after a period without official competitions longer than 4 months. All this information will be valuable not only to understand the impact of COVID-19 on current football performance, but potentially also to anticipate and lessen the impact of future disruptions of football competitions due to this disease, as the COVID-19 pandemic may spread cyclically and outbreaks may recur in large cities in autumn 2020 [18].

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Conflict of interest

The authors of this work declare no conflict of interest.

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REFERENCES

1. World Health Organization Archived: WHO Timeline – COVID-19 Available online: https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19 (accessed on Jul 6, 2020).
2. Herrero-Gonzalez H, Martín-Acero R, Del Coso J, Lalín-Novoa C, Pol R, Martín-Escudero P, De la Torre AI, Hughes C, Mohr M, Biosca F, et al. Position statement of the Royal Spanish Football Federation for the resumption of football activities after the COVID-19 pandemic (June 2020). Br J Sports Med. 2020.
3. Corsini A, Bisciotti GN, Eirale C, Volpi P. Football cannot restart soon during the COVID-19 emergency! A critical perspective from the Italian experience and a call for action. Br J Sports Med. 2020.
4. Eirale C, Bisciotti G, Corsini A, Baudot C, Saillant G, Chalabi H. Medical recommendations for home-confined footballers' training during the COVID-19 pandemic: from evidence to practical application. Biol Sport. 2020;37(2):203–207.
5. Kirkland A. La Liga given green light to restart on June 8 by Spanish prime minister Available online: https://www.espn.com/soccer/spanish-primera-division/story/4098472/la-liga-given-green-light-to-restart-on-june-8-by-spanish-prime-minister (accessed on May 27, 2020).
6. Primorac D, Matišić V, Molnar V, Bahtijarević Z, Polašek O. Pre-season football preparation in the era of COVID-19: Croatian Football Association Model. JJ Glob Health. 2020;10(1):010352.
7. Carmody S, Murray A, Borodina M, Gouttebarge V, Massey A. When can professional sport recommence safely during the COVID-19 pandemic? Risk assessment and factors to consider. Br J Sports Med. 2020; bjsports-2020-102539.
8. Bisciotti GN, Eirale C, Corsini A, Baudot C, Saillant G, Chalabi H. Return to football training and competition after lockdown caused by the COVID-19 pandemic: medical recommendations. Biol Sport. 2020;37(3):313–319.
9. Silva JR, Brito J, Akenhead R, Nassis GP. The Transition Period in Soccer: A Window of Opportunity. Sports Med. 2016;46(3):305-13
10. Campos-Vazquez MA, Toscano-Bendala FJ, Mora-Ferrera JC, Suarez-Arrones LJ. Relationship between internal load indicators and changes on intermittent performance after the preseason in professional soccer players. J Strength Cond Res. 2017;31: 1477–1485.
11. Rago V, Silva J, Mohr M, Randers M, Barreira D, Krustrup P, Rebelo A. Influence of opponent standard on activity profile and fatigue development during preseasonal friendly soccer matches: a team study. Res Sport Med. 2018;26:413–424.
12. Chmura P, Konefał M, Wong DP, Figueiredo AJ, Kowalczuk E, Rokita A, Chmura J, Andrzejewski M. Players' physical performance decreased after two-thirds of the season: Results of 3 consecutive seasons in the German first bundesliga. Int J Environ Res Public Health. 2019;16(11):2044.

13. Pons E, García-Calvo T, Resta R, Blanco H, López Del Campo R, Díaz García J, Pulido JJ. A comparison of a GPS device and a multi-camera video technology during official soccer matches: Agreement between systems. PLoS One. 2019;14:e0220729.
14. Felipe JL, Garcia-Unanue J, Viejo-Romero D, Navandar A, Sánchez-Sánchez J. Validation of a video-based performance analysis system (Mediacoach®) to analyze the physical demands during matches in LaLiga. Sensors (Switzerland). 2019;19(19): 4113
15. Brito Souza D, López-Del Campo R, Blanco-Pita H, Resta R, Del Coso J. Association of match running performance with and without ball possession to football performance. Int. J Perform Anal Sport. 2020; 483-494.
16. Wollin M, Thorborg K, Pizzari T. Monitoring the effect of football match congestion on hamstring strength and lower limb flexibility: Potential for secondary injury prevention? Phys Ther Sport. 2018;29:14–18.
17. Marca Bundesliga | Coronavirus: Fourteen injuries in first weekend of Bundesliga restart | MARCA in English Available online: https://www.marca.com/en/football/international-football/2020/05/20/5ec5100be2704e1e318b457b.html (accessed on Jul 6, 2020).
18. Huang Z, Huang J, Gu Q, Du P, Liang H, Dong Q. Optimal temperature zone for the dispersal of COVID-19. Sci Total Environ. 2020;736:139487