

# High-performance football in Spain: Systematic review (2015–2019)

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## ABSTRACT

Research in relation to elite football has shown a positive impact in the improvement of different variables related to training processes, as well as in the evaluation and analysis of performance. The objective of this review is to offer an overview of the most recent scientific publications in relation to high-performance Spanish football. For this, a systematic review was carried out from 2015 to 2019, searching with the terms of the UNESCO Thesaurus: “football”, “Spanish”, “Spain”, “the league”, “elite”, “professional football”, or “high performance” in two important international databases (Scopus and Web of Science) and in the Spanish Dialnet database, allowing the selection of original articles (experimental, descriptive, quasi-experimental and / or case studies), which included information on this line of research. A total of 380 articles were found, although after applying the review’s inclusion criteria, they were reduced to 56 articles. These publications were divided into four main categories: 1) research related to game conditions; 2) research related to training and workloads of physical, physiological and mechanical capacities; 3) research related to tactical-technical aspects; and 4) other topics investigated. A discussion was had on each of these categories. In conclusion, this systematic review makes it possible to observe the analysis of Spanish high-performance football research easily and quickly in recent years, as well as identify the most relevant scientific issues at present. These results are interesting for researchers and/or professional technical coaches of football, as well as for university professors or coaching courses.

**Keywords:** High performance; Professional football; Spain; La Liga; Elite sport.

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## INTRODUCTION

In relation to high level sports persons, the Real Decree 971/2007 of the 13<sup>th</sup> of July seeks to define high level sport, whilst also developing some of the aspects relevant to high level and high-performance sports laid out in Law 10/1990, stipulated on the 15<sup>th</sup> of October in relation to sport, and Organic Law 2/2006, stipulated on the 3<sup>rd</sup> of May in relation to Education. This decree defines high performance sport as sporting engagement that is of interest to the state. It constitutes an essential factor to the development of sport due to the stimulus it provides for the promotion of sport, and its function in representing Spain in official sporting meets and competitions of an international nature (Spanish Government, Royal Decree 971/2007). Thus, high-level performance in Spanish football could refer to those teams and players that participate in national competitions at the highest level, or those involved in international competitions, and/or those who have represented Spain in these competitions. It also refers to players recognised by their autonomous community as high-level sports persons and/or those who follow national technical sports programs.

Social responsibility emerges in high performance football, in the same way it does with other professional sectors in society. Corporate citizenship demands that companies, organisations and institutions commit to their environment and mitigate the impact of their activity on it. Logically, football clubs are not exempt from this. In the search for a better connection with society, professional clubs start to manage the way in which they communicate in a professional way, centring their efforts on building their public visibility and reputation (Guerrero and Ruíz, 2019). Likewise, analyses of sports performance has generally used samples of high-performance teams and athletes. Whilst these studies are useful for coaches and players, they are barely applicable in different contexts (Caballero et al., 2017). Requirements for the physical demands in football have evolved over recent years, establishing the need to investigate the aspects that condition sport performance (López et al., 2019). In accordance with these contributions, other authors (Benítez et al., 2015) indicate that the physical characteristics of football are extremely varied, however, the ability to produce high intensity efforts is hugely important, in addition to delaying fatigue in intermittent efforts for as long as possible. According to García, Pérez et al. (2018), previously conducted studies have analysed the influence of contextual variables in relation to performance and the physical demands of football. Nonetheless, the aspects required to stay at the highest level have not been previously analysed. In matches played away from home, players covered a significantly greater distance than in those played at home, although differences only emerged in the second half (García, Pérez et al., 2018).

In another research study, the different tactics applied were compared between the four main European leagues (Mitrotasios et al., 2019). In this sense, the Spanish league showed a higher proportion of long and combined attacks. In contrast, the English Premier League had a greater tendency to progress via quick and direct attacks. In exchange, the German Bundesliga had the highest number of counter-attacks, whilst the Italian Serie A had the shortest attacking sequences and a greater proportion of counter-attacks and direct attacks than combined quick attacks (Mitrotasios et al., 2019). Castellano and Pic (2019) analysed the twenty teams from the Spanish first division during the 2016-2017 season, using nine interaction performance indicators. Other authors (Castellano and Pic, 2019) indicated that teams with elaborate attacking styles and those with defensive mentalities obtained the best results.

For their part, Saavedra et al. (2015) revealed that home advantage has been studied in relation to many different sports, including both individual and team sports, with evidence being provided about its existence and potential causes. This study analysed 80 seasons and 22,015 matches from the Spanish first division. Home advantage exists and is significant. This was the case when victory used to be worth two points as the present day, when victory is worth three points. The extent of home advantage decreases with the

professionalisation of Spanish football and with the change of system introduced which increased the reward for winning from two to three points. Teams that are more highly placed in the league and have a higher number of points present higher values in relation to home advantage. For Mitrotasios et al. (2019), these results may help coaches and sporting directors understand the different tactical requirements of each competition and manage club strategies in relation to its tactical model, player recruitment and youth development.

Along this same line, Roca and Ford (2020) studied variables relating to the influence of sporting culture in different countries. They analysed the practical activities employed by 53 youth football coaches working at the academies of first division professional clubs in England, Germany, Portugal and Spain. Football is a sport that is practiced around the world; however, football training and competitions have different characteristics depending on the context and sporting culture. Thus, cultural determinants exist at a sporting level which condition the way in which football is played in each country. Examples include, for instance, a more physically conditioned game, which might be seen in Germany or England, or a more tactical orientation, which might be seen in Spain or Portugal. This is all derived from the type of training employed alongside its specific characteristics and competition in training academies for high-level footballers (Roca and Ford, 2020).

Given that which has been presented above, the aim of the present work is to conduct a systematic review of Scientific literature published over the last five years (2015-2019) in the Spanish football context. Article content was only selected for analysis if it was related with high-level performance. This ensured that the analysis was framed according to scientific evidence from this important line of research.

## METHODS

A literature review is a type of scientific article which, rather than use original data, collects the most relevant information already available on a specific theme. For the present review, a bibliographic search was performed of the two most important international databases available in this line of work. The first of these, the Scopus (Elsevier) database, was chosen because the present work concerns a review in the field of Social Sciences (with texts in different languages). The second database used was Web of Science (WoS). Further, the Spanish database Dialnet was used to complement these two databases due to its richness when it comes to indexing Spanish language articles. The following terms were extracted from the UNESCO thesaurus and selected as keywords: Football, Spanish, Spain, league, elite, professional football, high-level performance [Fútbol, español, España, la liga, élite, fútbol profesional, alto rendimiento]. The following inclusion criterion were used for the present review:

- 1) Scientific articles published between the 1st of January 2015 and the 31st of December 2019.
- 2) Deals with any type of research linked with football in the Spanish context, including experimental, descriptive, quasi-experimental and/or case studies.
- 3) Published in Spanish and/or English.
- 4) Study is performed with a sample of high-performance footballers, or if this is not the case, examines at least one variable related with this ambit.

Following the application of these criterion to the article search, a total of 155 documents were gathered for selection. All of these has been published in English and/or Spanish between January 2015 and December 2019.

The work schedule for the information search consisted of four differentiated stages. These are described next and can also be observed in the flow diagram which provides a graphical representation of the process in Figure 1.

1<sup>st</sup> Stage. Search and selection of descriptors through the UNESCO Thesaurus.

2<sup>nd</sup> Stage. Detailed search in the scientific databases Scopus, Web of Science (WoS) and Dialnet, using the previously described inclusion criteria.

3<sup>rd</sup> Stage. Analysis of article content and classification into themes.

4<sup>th</sup> Stage. Categorisation of articles and elaboration of the manuscript: Systematic review.

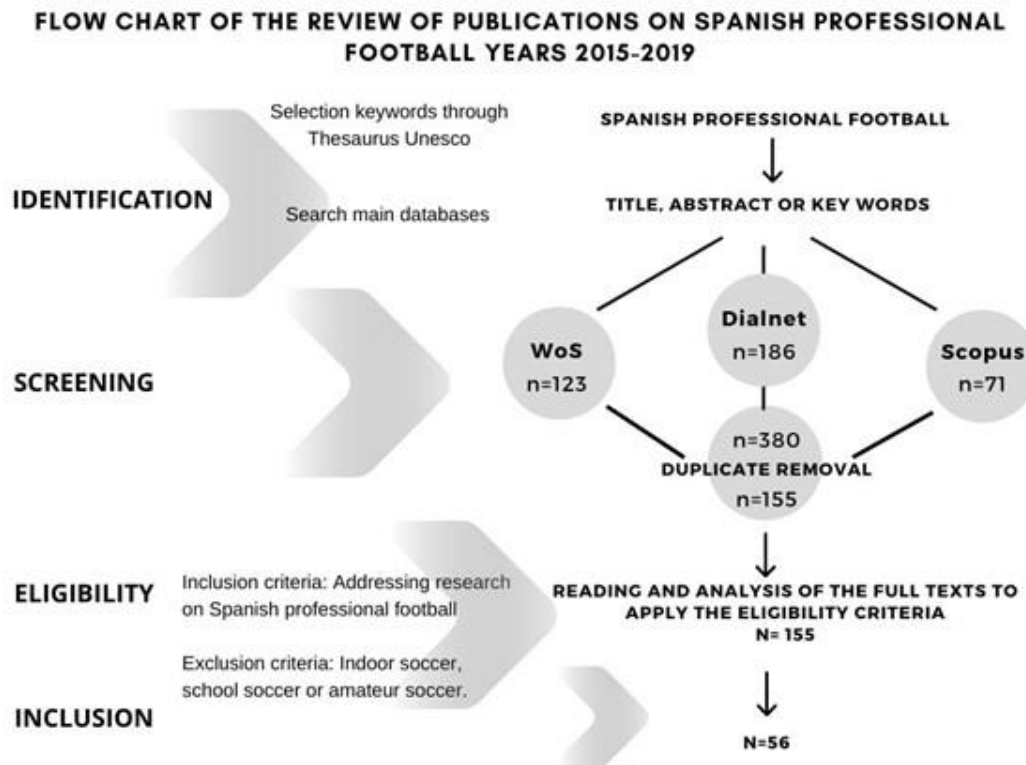


Figure 1. Flow diagram: number of relevant articles identified from the Scopus, WoS and Dialnet (2015-2019) databases.

Following preliminary review of the 155 documents, articles that did not directly approach, or were not associated with, high-performance sport were discarded. Following application of the selection criteria and categorisation, a total of 56 articles were counted which provided details of the scientific method followed and fulfilled all previously described inclusion criteria.

Once the 56 definitive articles were selected, a discussion group was conducted which was made up of three researchers working in the field. In the first phase of this discussion, a detailed account of all articles was individually provided by all researchers. They then performed a preliminary categorisation using a blind process. In other words, each researcher categorised each publication without knowing the categories given by the other two researchers. In the second phase, the outcomes derived from the reports of the evaluators were made common knowledge and the four definitive categories were solidified. In this phase, when the

three evaluators agreed on the category for a chosen article, that publication was entered directly into that category. On the other hand, in cases where the evaluators disagreed about the category of an article, a second, in-depth reading of the article was performed. Evaluators then discussed the category in which the article should be included and, once the three evaluators reached an agreement, the article was included in the corresponding category. Consensus was seen in the results of the 56 articles. As a result of this deductive process and the triangulation of information, the articles were finally classified into four categories. These data can be observed in table 1 which is found in the results section. Data are organised according to the volume of publications and are placed in descending order.

## RESULTS

Once the flow chart of the systematic review of high-performance publications of Spanish football was made, the result was 56 publications. All of them were included in a process of categorization by subject, finally finding four categories of analysis of the scientific literature (Table 1).

Table 1. Analysis categories of the scientific literature and number of articles published.

Categories	Number of articles
1) Research related to game conditions.	22
2) Research related to training and workloads of physical, physiological and mechanical capacities.	16
3) Research related to technical-tactical aspects.	14
4) Other topics investigated (radiography of goals, position of players, physical performance of starters vs substitutes and matches at home vs away).	4

As can be seen in Table 1, and taking into account the quantitative criteria, from 2015 to 2019 the most studied category in high-level Spanish football has been research related to the conditions of the game (22 studies), therefore this subject has been the one that has most interested scholars. It is followed by the two intermediate categories, research related to the training and workloads of physical, physiological and mechanical capacities (16 studies) and research related to tactical-technical aspects (14 studies), a topic that is increasingly taking on relevance in the scientific community. Finally, there is the category of other subjects studied (4 studies), with a significantly lower representation.

The results of the systematic review carried out are detailed below, specifying the publications that belong to each of the four categories analysed (Table 2).

Table 2. Synthesis of the studies found on high-performance football research in the Spanish context.

Categories	Number of articles	Authors and year
Research related to game conditions.	22	Asian et al. (2019); Azcárate, Yanci y Los Arcos (2018); Campos y Toscano (2018); Castellano y Blanco (2015); Castellano y Casamichana (2015); Castillo, Los Arcos y Martínez (2018); Díaz, Hernández y Hernández (2016); García, Pérez et al. (2018); Gómez, García, Díaz y Morera (2018); Gómez, González, Castellano y Teoldo (2019); Gutiérrez, Casamichana, Castellano y Sánchez (2018); Lago, Gómez, Megías y Pollard (2016); Lago, Gómez y Pollard (2017); Lago y Sampaio (2015); Los Arcos, Martínez, Yanci y Méndez (2017); Mallo, Mena, Nevado y Paredes (2015); Martín, Díaz, Bradley,

		Morera y Casamichana (2018); Martínez (2018); Martínez, Castillo y Los Arcos (2016); Martínez y García (2019); Pardeiro y Yanci (2016); Ramos et al. (2018).
Research related to training and workloads of physical, physiological and mechanical capacities.	16	Bendala, Vázquez, Suárez y Sánchez (2018); Benítez et al. (2015); Campos, Toscano, Mora y Suárez (2017); Campos, Castellano, Toscano y Owen (2019); De Hoyo et al. (2016); Leceaga, Los Arcos, Castillo y Yanci (2017); López et al. (2019); Lorenzo, Rey y Padrón (2019); Los Arcos, Martínez, Yanci, Mendiguchia y Méndez (2015); Los Arcos, Méndez y Martínez (2017); Los Arcos, Méndez, Yanci y Martínez (2016); Martínez, Castillo y Los Arcos (2016); Pérez, Martín, Carlos y Alcaraz (2017); Roca y Ford (2020); Vázquez y Belanda (2018); Yanci y Camara (2016).
Research related to technical-tactical aspects.	14	Bondía, González, Moreno, Pérez y Malavés (2017); Caro y Caro (2016); Fernández, Camerino y García (2017); Fernandes, Camerino, Garganta, Pereira y Barreira (2019); García, Haff, Feriche y Jaric (2018); González et al.(2019); González, López, Calabuig, James y Aranda (2015); Izquierdo, González, Montoya, García y Yagüe (2019); Liu, Gómez, Gonçalves y Sampaio (2016); Liu, Gómez y Lago (2015); Martínez, Ojeda y González (2019); Sarmiento et al. (2018); Serrano et al. (2018); Zambom, Ríos y Lera (2018).
Other topics investigated (radiography of goals, position of players, physical performance of starters vs substitutes and matches at home vs away).	4	Casamichana, Castellano, Díaz, Gabbett y Martin (2019); Martínez y González (2018); Padrón, Rey, Vidal y García (2018); Pic y Castellano (2017).

## DISCUSSION

### ***Research related to game conditions***

Physical characteristics have been extensively analysed to understand why some football players are more successful than others (Castillo et al., 2018). The results of this research (Castillo et al., 2018) indicate that aerobic endurance performance is not a relevant trait of success when identifying players from different seasons, divisions, tactical positions and competitions. Gómez et al. (2019) analysed the efforts made during a football match and their relationship to competitive success in a total of 712 first and second division matches in Spain. The total distance covered by the teams of the first and second division leagues was similar; however, the distance travelled at high intensity and the distance covered at very high intensity was greater in the first division teams. The distance travelled during the competition has no direct relationship with success (Gómez et al., 2019). García, Pérez et al. (2018) studied 14 matches in the Spanish second division league. The most notable differences are in the total distance covered. The away games accumulated significantly more distance than the games played at home. Castellano and Blanco (2015) showed that the distances travelled in intensity ranges varied during the season and this could be due to situational variables such as: place, level of rivals and final classification. Likewise, Gutiérrez et al. (2018) analysed the influence of the geographic location situational variable on the total distance travelled per game and the metres completed in different speed ranges of teams of the Spanish second division during the

2013/14 season. The results of this investigation (Gutiérrez et al., 2018) showed that the teams travelled more distance in the northern location compared to the southern location.

According to Mallo et al. (2015), the distance travelled during a game averaged 10.8 km, with the wide and central midfield players covering the greatest total distance. Specifically, the wide midfielders covered the longest distances with very high intensity runs. On the other hand, the central defenders covered the lowest total distance and high intensity, although they performed more accelerations (Mallo et al., 2015). Castellano and Casamichana (2015) compared the performance of the teams in the first and second divisions of the Spanish football league in 2013–14. Significant differences were found for all indicators, and the top-ranked teams performed better than the other three groups for almost all variables. It should be noted that the first division teams from the middle of the table and below performed significantly better than the second division teams in terms of width and depth of play (Castellano and Casamichana, 2015). Data analysis showed differences in physical performance characteristics between competitive levels. The volume of distance covered in the variables analysed was not related to success in football (Asian et al., 2019). In another study (García, Pérez et al., 2018) it was shown that the players covered greater distances during the first half in those games that were played by clubs in the relegation zone. The pressure of being further away from saving the category increases the distance travelled by the players in a game.

On the other hand, in a comparison between first and second division football players in Spain (Ramos et al., 2018), in terms of their cardiorespiratory response during recovery after an exercise test, cardiorespiratory values during the recovery period after that maximum effort are independent of the playing position, but it is associated with the division in which a player competes. Los Arcos et al. (2017) indicated that a high volume of sports practice associated with the airways and muscles can improve aerobic fitness and sprint performance in professional football players in the long term. Conversely, Martínez et al. (2016) explain that sprint and jump executions are not a relevant physical parameter to ascend to the highest level of football in Spain. In other research (Martín et al. (2018) show that the external load of a structured microcycle varies substantially depending on the day and the training position of the players. However, Azcárate et al. (2018) analysed the duration of the microcycle between matches during the competition weeks but this had no effect on the accumulated weekly workloads of the players. For Campos and Toscano (2018) it may be necessary to increase the volume and / or effort of certain training sessions to bring players closer to the demands of the competition. Pardeiro and Yanci (2016) indicated that the players feel more prepared to face a match after warming up; however, their acceleration capacity and physical performance decreased, probably due to accumulated fatigue. The results of another study (Gómez et al., 2018) revealed that the players should be carefully chosen for the role of substitutes, since the demands on them are lower compared to the players who play regularly and vary according to the position in which they play.

Martínez and García (2019) pointed out that there is a great balance between the European big leagues and the probability that the home team won when they scored the first goal was significantly higher compared to the probability of winning when the visiting team scored first. Scoring the first goal at home or away guarantees a high probability of obtaining a good result at the end of the match. In addition, these same authors (Martínez and García, 2019) state that football teams that take the lead on the scoreboard have a greater chance of winning the match, because football is a sport in which there is a low number of goals. Lago et al. (2016) showed that the home teams in the five major European leagues scored first in 57.8% of the matches and obtained 84.85% of the points earned in these games. In contrast, when the visiting team scored first, they had 76.25% of the points.

For Lago et al. (2017) the possession of the ball, the successful passes, the short passes and the touches reached their maximum values in the period of 0 to 5 minutes compared to other game periods in the major European leagues. However, as the first half progressed, the home teams exhibited lower performances compared to those shown at the beginning of the match. This was particularly evident in the 16–20-minute period to the end of the first half. The better the opponent, the lower the performance of home teams at the start of the match (Lago et al., 2017). Likewise, Lago et al. (2016) examined the importance of scoring the first goal in the result of the game, with the teams that scored first being those that managed to score an average of 1.88 goals more than their opponents. Following these contributions, Martínez (2018) showed that the teams that score first win more than half of their matches, regardless of whether they play at home or away.

According to Lago and Sampaio (2015) the results of the European big leagues suggested that the better the team's performance at the beginning of the season, the better their position will be at the end of the season. However, the impact of the effect depended on the clubs' budget, since lower budgets highlight the importance of having a good start to the season. Díaz et al. (2016) appreciated differences in the relationships of the game depending on the final result of the match, with the matches won and tied being those in which the analysed players established more relationships of mutual activation with the attack teammates, with increased use of combinatorial play over direct play.

### ***Research related to training and workloads of physical, physiological and mechanical capacities***

Bendala, et al. (2018) analysed the differences in the external load of high-speed actions between competitions and training sessions in a professional football club. The results showed how the players performed a substantially higher number of high-speed external load actions during games than during training. According to Pérez et al. (2017), improvement in agility can be obtained through weightlifting, plyometric training, combined strength and resistance training, training with contrast (isometric + plyometric), with small-sided games, direction change speed training, with the speed, agility and speed training method and with neuromuscular programmes (Pérez et al., 2017). However, for Leceaga et al. (2017), performing a higher volume of plyometrics training does not imply that the players who have done more volume have a greater subjective perception of respiratory and muscular effort.

Los Arcos et al. (2016) indicated that playing time influenced the relative effort to which the muscles of the players' legs were exposed during a match. For De Hoyo et al. (2016), the current strength training methods (such as sprints, squats or plyometric exercises) used appear to be effective in improving jumping and running skills. Los Arcos et al. (2017) quantified the seasonal perceived loads of respiratory and muscular training in 24 players belonging to the same reserve team of a Spanish La Liga club. The coaches periodized the training content to achieve the highest weekly muscle and respiratory training 72 hours before the game. Yanci and Camara (2016) evaluated the performance characteristics of the unilateral and bilateral vertical jump in football players and compared the characteristics of the reaction force on the vertical ground of the impulse and the landing phase of a vertical jump between the dominant and non-dominant legs. Although differences were found between the dominant and non-dominant legs in the jump drive phase, no significant differences were found between the dominant and non-dominant legs in the landing phase in the vertical jump (Yanci and Camara, 2016). Los Arcos et al. (2015) suggest that a high perception of the muscular effort of the leg associated with training sessions and games, as well as an excessive accumulation of training volume, can affect the improvement in several physical fitness variables that are considered relevant to football performance on the field.



Campos et al. (2019) compared the physical and physiological demands of professional football players in friendly matches with different types of standard training sessions. Top speed and relative distance were substantially higher in friendly matches than in tactical sessions. Using friendly matches within the preseason should ensure extra care when planning between high-intensity, high-volume training loads. Campos et al. (2017) suggested that practice volume and subjective measures of training load are better related than changes in intermittent performance after the preseason than human resource-based training methods. Vázquez and Belanda (2018) compared the perception of effort and training load between friendly matches to 12 football players from the same team in the Spanish first division. The results of this research (Vázquez and Belanda, 2018) indicated that it may be necessary to increase the volume and / or exercise of certain training sessions to bring players closer to the demands of the competition.

Martínez et al. (2016) described the evolution of neuromuscular performance over an 18-year period within a Spanish professional reserve team. Thus, the lowest sprint performances were from the central defenders and midfielders relative to other positions, although the first and second division central defenders performed better on these parameters than the semi-professional central defenders. On the other hand, Benítez et al. (2015) analysed the changes in jump, speed, agility and specific aerobic resistance in football players of the youth teams of a professional club that plays in the Spanish League. There was an increase in the level of performance with age, explosive strength and acceleration from 17 years of age and a plateau in speed and agility from 15 years. Following these contributions, Lorenzo et al. (2019) indicated that players younger than 25.2 years showed lower coefficients of variation for high-intensity activities such as high-intensity running, and sprinting compared to players older than 33.1 years. López et al. (2019) consider that the application of certain training contents must be carried out in accordance with the individual characteristics and lifestyle of the players. Roca and Ford (2020) analysed 83 football training sessions in players under 12 and players who were 16 years old in Spain, England, Portugal and Germany. Thus, the practice time in tasks with active decision-making was 67% and 68%, respectively, in Spain and Portugal, while in Germany and England they represented 58% and 56%, respectively. In Spain and Portugal, 50% of the training is carried out by “*small-sided games*” and positional games, with which a much more tactical game with strategic constraints is appreciated; however, in Germany, and especially in England, the game is more oriented to physical performance (Roca and Ford, 2020).

### **Research related to technical-tactical aspects**

Fernandes et al. (2019) indicate that research on the defensive phase of football shows many limitations regarding operating procedures and could be used to find strengths or weaknesses of tactical-technical game patterns to help coaches to better prepare their team. Following these contributions, the results of the study by Zamboni et al. (2018) support the idea that offensive actions are more relevant than defensive ones in the major European leagues. Within the analysis of offensive actions, Sarmiento et al. (2018) revealed that counter-attacks increased the success of an offensive sequence by 40% compared to positional attacks. The chance that an offensive sequence would effectively end in the Spanish, Italian and English league games was greater than in the Champions League. Offensive sequences that began in the pre-offensive or offensive zones were more successful than those initiated in the defensive zones (Sarmiento et al., 2018). Fernández et al. (2017) analysed and compared the effectiveness of the attack between teams that compete in the first and second divisions of the Spanish football league. In order to do this, they analysed 52 games played by the top five teams ranked in both divisions during the 2014–15 season. Statistically significant differences were found between the first and second division teams for the defensive organization of the opposing team, the strategic actions in the attack and the finishing of the same (Fernández et al., 2017).

Martínez et al. (2019) analysed the physical and technical-tactical performance based on the number of ball touches authorized in reduced games in football. The results showed that the total distance travelled and in the technical-tactical variables was greater when a touch was given, while the high-intensity and distance values in sprint were lower when three touches were made. For García et al. (2018), physical performance is a key factor in most of the actions that determine success in football competitions, and in this regard the different conditioning programmes implemented, in addition to regular training football, can improve the performance of high-speed football-related tasks. Liu et al. (2016) show that technical performances are different between players from stronger or weaker teams from different perspectives at different positions on the field. In addition, the variation of the technical performance of the players is affected by the context of the match and the greater opposition force of the opponent than the time of the match and the result of the match.

Furthermore, Serrano et al. (2018) examined the physical-technical demands and the influence of the team on the performance of elite goalkeepers for six consecutive seasons in the Spanish professional football league. When comparing the level of the teams, the goalkeepers of the lowest ranked teams showed a greater distance travelled than the best positioned. González et al. (2015) carried out an investigation on the Spanish team in the 2010 World Cup and showed that the strategy plays were more effective in producing scoring opportunities (29.2%) than the recoveries (15.4%) and restarts (8.9%), creating more scoring opportunities in the second half. Caro and Caro (2016) analysed all the goals of two top-level teams in the La Liga Professional Football League in the 2012/13 season and showed the little influence that the offensive tactical model proposed by the teams has on scoring effectiveness.

González et al. (2019) studied the combined effects of tactical and contextual dimensions on attacking offensive performance in open-play possession of Spanish first division football matches. These researchers (González et al., 2019) showed that penetrating actions after retrieving the ball and progressing through quick attacks or counter-attacks was more effective in creating scoring opportunities than performing a non-penetrating action and progressing through a combinatorial attack. In addition, Bondia et al. (2017) compared the game tactics used to create scoring opportunities between Real Madrid and FC Barcelona during 32 team matches for the 2011–12 season. In recoveries, Real Madrid recorded a higher initial penetration, a higher percentage of counter-attacks, fewer passes, and a higher percentage of penetrating passes than FC Barcelona. The main differences between Real Madrid and FC Barcelona occurred in the transition between defence and attack, where Real Madrid was more penetrating when retrieving the ball immediately, progressed faster and used the counter-attack more frequently.

Other authors (Liu et al., 2015) examined the performance of the match by elite goalkeepers considering three situational variables (opposition, result and location) during the 2012–13 season in the Spanish first division. The results indicated that fouls drawn, fouls committed, and takedowns showed no difference between the goalkeepers of the high, intermediate and low team levels. Thus, a goalkeeper from a high-level team had a greater number of stops when playing against a low-level team than a high-level team or an intermediate-level team. Furthermore, Izquierdo et al. (2019) showed that in games played in lower-level categories there are more actions on set pieces; however, there is a decrease in efficiency as the competition category does.

***Other topics investigated (radiography of goals, position of players, physical performance of starters vs substitutes and matches at home vs away)***

Martínez and González (2018) studied the differences in goals depending on the minutes and the match period of the main European leagues. For this, they analysed 98 first division football teams during the 2016-17 season and showed that the periods “16 to 30” and “31 to 45” can be the minutes of the game in which

the goals can determine a higher position in the final classification. Casamichana et al. (2019) analysed a total of 265 data from one half of matches during the competitive season and determined the differences between halves in the most demanding game times in football players according to position. Thus, the differences between the first and second half increased as the duration of the match increased.

Padrón et al. (2018) evaluated the physical performance of the substitute players against the replaced ones and those who completed the entire match in the Spanish League during the 2014–15 season. These authors (Padrón et al., 2018) showed that the substitute players covered greater distances at medium and high intensity compared to the players who played the whole game and those who were replaced. On the other hand, Pic and Castellano (2017) studied the advantage of playing home and away qualifying rounds and for this they analysed 2,056 games and 1,028 Copa del Rey qualifiers from the 1940–41 season to 2013–14. The results of this study (Pic and Castellano, 2017) confirmed significant differences between playing at home vs visiting in the first or second game of the play off. Learning to manage the goal margin according to location has possible consequences on the selection of the most appropriate game model.

## CONCLUSIONS

We will now present the conclusions reached following analysis of the 56 definitive articles selected for inclusion in the present systematic review of research into Spanish high-performance football between 2015 and 2019. The present research work enabled observation and analysis of all studies of high-performance football in the Spanish context. In addition, in-depth reading of existing texts enabled identification of the four most relevant scientific themes or categories in the present day:

- 1) Research related with factors which condition the game.
- 2) Research related with training loads, and work on physical, physiological and mechanical skills.
- 3) Research related with tactical-technical aspects.
- 4) Other investigated themes (radiography of goals, positioning of players, and physical performance of players in the starting line-up vs substitutes and of games at home vs away from home).

The present article contains a summarised version of scientific evidence, in addition to a valuable compilation of available references permitting readers to deepen understanding of one or more of the categories introduced. It is important to highlight that the research work analysed in the present review does not pertain to practical experiences or insights but is instead the result of the use of scientific methods. Thus, these research-based results, derived from sporting culture in high-performance football in Spain, are of interest for professionals working within the technical bodies (amongst others: coaches, physical trainers, doctors, psychologists, physiotherapists, match analysts, scientists). They will also be useful for lecturers of Physical Activity and Sport Sciences or for developing material to deliver on coaching courses. In a specific way, results are also important for all researchers dedicated to the study of football as they provide information about current strong points. In this way, results will assist the development of research projects and clarify future perspectives.

## AUTHOR CONTRIBUTIONS

Study concept and design: A.S.R.; V.A.G. and S.G.V., Literature review: A.S.R. and S.G.V.; Acquisition of data: V.A.G; Analysis and interpretation of data: A.S.R. and S.G.V.; Writing - original draft: A.S.R.; V.A.G. and S.G.V.; Writing - review and editing: A.S.R. and V.A.G. Supervision: A.S.R.; V.A.G. and S.G.V.

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