

# Gender differences in technical-tactical behaviour of La Liga Spanish football teams

CLAUDIO ALBERTO CASAL<sup>1</sup> ✉, JOSÉ LUÍS LOSADA<sup>2</sup>, RUBÉN MANEIRO<sup>3</sup>, ANTONIO ARDÁ<sup>4</sup>

<sup>1</sup>Department of Science of Physical Activity and Sport, Catholic University of Valencia “San Vicente Mártir”, Valencia, Spain

<sup>2</sup>Department of Methodology of Behavioral Sciences, University of Barcelona, Barcelona, Spain

<sup>3</sup>Department of Science of Physical Activity and Sport, Pontifical University of Salamanca, Salamanca, Spain

<sup>4</sup>Department of Physical and Sport Education, University of A Coruña, A Coruña, Spain

## ABSTRACT

The aim of this study was to identify differences in technical-tactical behaviour between the men and women first division football teams of the Spanish league, to this end 68 matches corresponding to 2016/17 season were analysed. A comparative analysis of the medians was carried out using the Mann-Whitney U-tests were conducted as post hoc tests. The size effect of this test was calculated and, finally, we performed a grouping of the variables through the clustering bootstrapping technique in both groups. We have detected statistically significant differences ( $p < .01$ ) regarding all accurate passes, in favour of men, as well as a greater number of yellow cards. In female football, a greater number of picking up free balls, interceptions, lost balls, recoveries and challenges are produced. Finally, in women's football a greater number of attacks are also carried out, both positional and counterattacks than in men. The clustering analysis allowed us to identify that in male football, the circumstance of receiving a red card is closely related to the number of goals conceded and most of the shots on goal are achieved by positional attacks. In the case of women's football, ball possession on own half is closely related to the number of losses. Data proves the existence of technical-tactical differences between male and female football of the La Liga teams. Such detailed analysis could be useful for gender-specific training information for optimal preparation. However, more research is warranted to establish the main gender differences and characterize women's football.

**Keywords:** Performance analysis; Observational methodology; Elite football.

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✉ **Corresponding author.** Department of Science of Physical Activity and Sport, Catholic University of Valencia “San Vicente Mártir”, Valencia, 46900, Spain. <https://orcid.org/0000-0001-9458-6345>

E-mail: [ca.casal@ucv.es](mailto:ca.casal@ucv.es)

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## INTRODUCTION

Women's soccer in recent years has experienced a very important boom, especially from different areas of knowledge (LeFeuvre et al., 2013; Meier and Leinwather, 2012). According to recent data from FIFA (2014) the number of participating teams has doubled, and the number of participants in the qualifying stages has almost tripled. The media in general and television in particular, are increasingly permeable to host matches and broadcast competitions in which women's football is present (Meier et al., 2016). As the general interest in a sport increases, the professionalization of it is inevitable and essential (Kjaer and Agergaard, 2013). This professionalization will have to lead to a potential increase in player and team performance, due to a greater and exclusive dedication of the same and will require a greater game knowledge and factors that influence performance. In this regard, it should be noted that scientific knowledge about women's football is quite deficient because, in some cases, this knowledge does not evolve at the same pace as social trends or changes, especially when the latter occur at high speed. To put this in perspective, the availability of the few scientific studies that focus the efforts on this soccer hardly refers to the last twenty years (Hoare and Warr, 2000; Little and Williams, 2005).

If we want to increase performance in women's football we will have to focus on the study of its conditional, technical, tactical-strategic, volitional and socio-affective structure. If we look at the first three, we can see that the number of studies on them is scarce. The works found that have analysed female football from the conditional and physiological side, such as speeds, accelerations, striking force, fatigue levels, displacements, distances recovered at high intensity and heart rate are those of Bangsbo et al. (1991), Barfield et al. (2002), Mohr et al. (2003, 2008), Anderson et al. (2010), Bradley et al. (2014) and Unveren (2015). As we can see, their number is not very wide. But, if the works focused on the conditional analysis are scarce, those related to the technical structure, and tactical-strategic, are still more, since we are facing a situational sport in which these two structures are fundamental, because the main actions of the game must be performed by manipulating a ball with the feet. In addition, these actions are acyclical, stochastic and unexpected. In this sense, some works have been developed that made a comparison of technical-tactical behaviour between male and female football, as the one published by Hjelm (2011). Specifically, in this study a comparative analysis of the technical errors (passes, receptions, dribbling, shots, actions with a negative outcome) between male and female players of the Swedish national team is performed. Results show that technical differences were found between genders, specifically, men football players performed more short passes and receptions, on the other hand, women football players perform more actions with a negative outcome, more dribbling and more shots. Another comparative study is that of Bradley et al. (2014) in which a comparative analysis was performed between genders of some technical-tactical parameters (duels won, possession time, lost balls, successful passes and touches for possession) in the UEFA Champions League matches, concluding that women lose the ball more times than men, but did not find differences regarding the number of touches by possession, nor in the possession time. In the work of Althoff et al. (2010) a comparison between genders was also carried out, analysing matches of the Men's World Cup in Korea 2002, and of women in the USA 2003. Their results conclude that, women use more long passes than short ones, the foot's instep, they execute less dribbling and a less aggressive game (less tackling) and they try to get closer to the goal before shooting.

In other studies, more emphasis is placed on the differences in tactical behaviour between both genders. An example being the works of Gómez et al. (2009) and Pollard and Gómez (2014). In the first one, finalization differences were analysed between male and female teams in the World Cup 2006 and 2007, respectively. Results show a greater goal shot average in women's football than in men. Women made more collective play shots, while men made more individual shots play. In the second work, a comparison between male and

female football was carried out on the influence of obtaining victory when playing at home. Thirty-nine European domestic leagues were analysed, from 2004 to 2010. Results confirm that, in men's football, playing home games is more decisive than in women's football.

On the other hand, some works do not carry out comparative analysis, but focus on studying only female football. An example is the one elaborated by Włodzimierz et al. (2011) in which the field area from which shots were executed and execution leg laterality was studied in the women's under-19 and absolute selections of the world championship, 2004 and 2005, respectively. The results indicate that senior players are ambidextrous, while juniors are not. Akalin et al. (2016) carry out a very similar study in which foot laterality of the Intercollegiate Women's Football Championship of Turkey players is analysed. They conclude that these players are characterized by dextrality.

Other works analyse the static phases of the game, specifically in the study done by Jiménez et al. (2016) the execution of set pieces was analysed by the F.C Barcelona women's team during the 2014-2015 season. Concluding that set pieces had a low impact in the final score, they were executed sending the ball mostly to the first post, they were produced mainly in the last thirds of the first and second part, and the majority of the goals obtained through these actions, were achieved in the final minutes of both parts of the match.

Studies found, for each of the performance structures, indicate the need to deepen the study of women's football, to perform a categorization and quantification of competition behaviours and model training, which will increase competitive performance. The absence of this type of studies will obviously lead to the use of male football training methods and systems, thus obviating one of the principles of sports training, which is none other than training specificity. To avoid this circumstance, it will be necessary to increase the number of studies that allow identifying the characteristics of women's football, focusing in the exclusive analysis of their game or, making comparative analysis between the game of both genders, in order to identify differences between them.

It will also be necessary to conduct studies in which domestic competitions are analysed during a regular season, since the type of competition can influence player and team behaviour (Taylor, et al., 2008). Most of the work carried out so far analysed special competitions (UEFA Champions League, UEFA Euro and FIFA World Cup). This type of design is limited, and results may not be conclusive, since in these competitions the number of matches is small and an elimination competition system is established, showing characteristics different from those of a regular league.

In addition, to be able to generalize results, it will also be necessary to carry out studies that analyse more than one team, because case studies, focused on a single team, do not generate results that can be extrapolated to other teams. In this sense, we have not found any previous study that analyses the technical-tactical structure of female elite football with this type of design (during a regular league, more than one team and with a high number of performance indicators). Only Pollard and Gómez (2014) use a domestic league sample, but they focus their analysis on the influence of obtaining victory when playing at home.

Consequently, to fill in the gaps detected in the previous scientific literature, in this study a comparative analysis of the technical-tactical structure between male and female football is carried out, analysing a several teams of a domestic competition, during one season. The objectives to be achieved with this study are, on the one hand, to characterize the game of women's football and, on the other hand, trying to identify the technical-tactical differences between the game of both genders.

## METHOD

Data were obtained from the analysis platform Instat Scout and analysed post event. Instat Scout ([www.instatscout.com](http://www.instatscout.com)) is a private platform dedicated to assessing the performance of teams in different world leagues. The information cannot be considered either personal or intimate, as the research consisted solely of naturalistic observations in public places, and it was not anticipated that the recordings would be used in a manner that could cause personal harm (A.P.A, 2010). No experimental analysis involving human studies is performed in the study. Also, according to Belmont Report (Belmont Report, 1978) the use of public images for research purpose does not required informed consent or the approval of an ethical committee. An ethics approval was therefore not required as per applicable institutional and national guidelines.

### **Participants**

A total of 68 matches of the men's first division of the Spanish league and of the women's league during the 2016/17 season were analysed. Unfortunately, the InstatScout platform only has statistics on 68 matches of the Spanish women's league, corresponding to 14 teams. Therefore, to work with similar samples the same number of matches from the men's league have been selected randomly. This selection has been developed applying the "srswor" method, which consists of applying a random sample without replacement with the "n" sample size (equal probabilities, setting a sample size without replacement or substitution).

### **Performance indicators**

The technical-tactical actions compared in this study and whose operative definitions can be consulted in [www.instatscout.com](http://www.instatscout.com), have been divided into three groups, according to the available literature (Castellano et al., 2012; Lago-Ballesteros et al., 2012; Lago-Peñas and Lago-Ballesteros, 2011; Lago-Peñas et al., 2010; Liu et al., 2013, 2015; Tenga et al., 2010 a,b,c), (see Table 1).

Table 1. Selected performance indicators.

<b>Groups</b>	<b>Performance indicators</b>
Outcome of attack	Goals scored, shots, shots on target
Offence	Attacks, positional attacks, attacks with shots-positional, counterattacks, counterattacks with shots, set pieces attack, attacks with shot set pieces attacks, ball possession, ball possession on own half, ball possession on opponent half, ball possession time in the final third of the field, attacking challenges, attacking challenges won, corners, crosses, crosses accurate, dribbles, dribbles successful, fouls opponent, lost balls, lost balls in own half, offsides, passes, passes accurate, extra attacking and key passes, extra attacking and key passes accurate, passes forward, passes forward accurate, passes back, passes back accurate, passes to the left, passes to the left accurate, passes to the right, passes to the right accurate.
Defence	Challenges, challenges won, air challenges, air challenges won, defensive challenges, defensive challenges won, fouls, goal conceded, interceptions, interceptions in opposition half, picking up free balls, picking up free balls in opposition half, recovered balls, recovered balls in opposition half, tackles, tackles successful, red cards, yellow cards.

**Data reliability**

To ensure the reliability of the data, five randomly selected matches were coded by the authors of this study and then compared with those provided by InstatScout. The Kappa (K) values obtained ranged from .92 to .98.

**Procedure and statistical analysis**

To carry out the statistical analysis the program R (v.3.4.1) was used, using the pvclust library (Suzuki and Shimodaira, 2006). The significance level for each performance indicator was set at 1% to be more conservative in the detection of differences between groups. Further, the data of the groups were checked for normal distribution (Shapiro-Wilk). Due to the fact that the samples were not normally distributed, non-parametric tests were applied, specifically the Mann Whitney U test.

In order to acknowledge the magnitude of the differences between groups, the Mann Whitney U effect size was calculated:

$$r = \frac{z}{\sqrt{N}}$$

We explain that z is the standardized score of the Mann Whitney U, and N the number of observations. For its interpretation, the Cohen (1988) criteria is followed, where  $r = .10$  equals low difference,  $r = .30$  equals medium,  $r = .50$  equals large and  $r = .70$  equals very large, although some authors (Gignac and Szodorai, 2016) indicate that Cohen's correlation guidelines are too demanding, being consistent with the significance value of 1%. We maintain this author's criteria.

Finally, due to the large number of variables analysed, a clustering analysis was carried out in both groups, in order to carry out groupings and check if there are differences in them. Specifically, the bootstrapping technique (Casella and Berger, 2002; Efron and Tibshirani, 1993) was applied following the following procedure: The R's pvclust package is used for the uncertainty evaluation in the hierarchical grouping analysis. For each group, p-values are calculated, which are determined using non-parametric multiscalar bootstrap resampling, which is a descriptive exploratory technique. This provides two types of p-values: p-value Approximate Unbiased (AU) and p-value Bootstrap Probability (BP). p-value AU is calculated by bootstrap resampling of multiple scales, it is a better approximation and more unbiased than the p-value of BP, calculated by normal bootstrap resampling, which is less accurate than the AU value. By an analogy with standard normal theory, the p-value AU is roughly estimated with values between 0 and 1. Clusters with AU greater than .95 are highlighted by rectangles, which are strongly supported by the data.

For a cluster with AU p-value  $> .95$ , the hypothesis that "the cluster does not exist" is rejected with a significance level of 0.05. These p-values include the sampling error, since they are also calculated by a limited number of bootstrap samples. The cluster analysis application collects a total of 10,000 samples to perform a multiscalar bootstrap resampling. Clusters whose result had an  $\geq .90$  alpha were selected, applying correlational distance.

**RESULTS**

Table 2 shows the results obtained from the comparison of medians between all the variables. No significant differences were found for any variables of the outcome of attack group. For the second group of variables (offensive performance indicators) it can be seen that significant differences were obtained in the variables:

attacks, positional attacks, counterattacks, attacking challenges, fouls opponent, lost balls, passes, passes accurate, passes back, passes back accurate, passes to the left and the right, passes to the left and the right accurate and passes forward accurate.

In the third group of variables (defensive performance indicator) significant differences have been found in: challenges, challenges won, defensive challenges, defensive challenges won, interceptions, interceptions in opposition half, picking up free balls, picking up free balls in opposition half, recovered balls, recovered balls in opposition half, tackles successful and yellow card.

Table 2. Summary descriptive table by group of categories.

Performance indicators	Female	Male	p. overall
<b>Categories related to Outcome of attack</b>			
Goals scored. Result	1.00 [0.00;2.00]	1.00 [1.00;2.00]	.681
Shots	11.0 [7.00;16.8]	10.0 [7.00;13.0]	.210
Shots on target	4.00 [2.00;7.00]	4.00 [3.00;6.00]	.699
<b>Categories related to offence</b>			
Attacks	102 [92.0;114]	91.0 [83.2;103]	< .001
Positional attacks	71.0 [62.0;83.0]	66.0 [58.0;73.5]	.010
Attacks with shots positional	6.00 [3.00;9.00]	5.00 [3.00;6.00]	.209
Counter attacks	19.5 [16.0;22.0]	18.0 [14.0;20.0]	.005
Counter attacks with shot	2.00 [1.00;3.75]	2.00 [1.00;3.75]	.950
Set pieces attacks	9.50 [7.00;12.8]	9.00 [6.00;11.8]	.159
Attacks with shots set pieces attacks	3.00 [2.00;4.00]	3.00 [1.25;3.75]	.462
Ball possession min.	25.0 [21.0;30.0]	27.5 [22.0;32.0]	.137
Ball possession in own half	782 [646;979]	920 [721;1.067]	.015
Ball possession in opp half	661 [499;957]	632 [523;833]	.707
Ball p. time in the final third of the field	392 [240;544]	342 [232;442]	.273
Attacking challenges	99.5 [84.0;106]	86.0 [76.8;98.5]	.009
Attacking challenges won	43.0 [34.0;47.0]	39.0 [35.0;46.0]	.503
Corners	4.00 [2.00;5.75]	4.00 [2.00;6.00]	.869
Crosses	11.0 [6.00;14.0]	10.0 [6.00;14.0]	.995
Crosses accurate	3.00 [1.00;5.00]	2.00 [1.00;3.00]	.156
Dribbles	33.0 [22.5;40.8]	33.0 [26.0;38.0]	.944
Dribbles successful	16.5 [11.0;23.8]	19.0 [14.0;24.0]	.136
Fouls opponent	11.0 [9.00;15.0]	14.0 [10.2;16.0]	.007
Lost balls	94.0 [79.5;108]	79.5 [62.8;92.8]	< .001
Lost balls in opp. Half	23.0 [16.0;29.8]	16.0 [12.2;21.8]	< .001
Offsides	2.00 [1.00;3.75]	2.00 [1.00;3.00]	.611
Passes	393 [357;490]	481 [390;572]	.001
Passes accurate	276 [240;378]	397 [311;488]	< .001
Extra attacking and key passes	13.0 [6.00;19.5]	16.0 [10.2;23.8]	.043
Extra attack. And key passes accurate	5.00 [3.00;10.0]	7.50 [5.00;11.0]	.047
Passes forward	296 [266;328]	321 [276;368]	.122
Passes back	106 [74.8;147]	164 [129;201]	< .001
Passes to the left	195 [175;240]	238 [201;286]	< .001
Passes to the right	198 [170;240]	245 [195;276]	.003
Passes forward accurate	190 [171;236]	239 [196;294]	< .001

Passes back accurate	92.5 [64.5;136]	151 [118;192]	< .001
Passes to the left accurate	140 [121;181]	196 [156;242]	< .001
Passes to the right accurate	146 [118;183]	199 [154;237]	< .001
<b>Categories related to defence</b>			
Challenges	201 [178;207]	174 [154;193]	< .001
Challenges won	98.0 [87.0;108]	89.0 [79.2;99.5]	.003
Air challenges	43.0 [33.8;54.2]	47.0 [36.0;63.2]	.167
Air challenges won	21.5 [17.2;27.8]	25.0 [17.2;32.0]	.244
Defensive challenges	99.5 [84.0;107]	85.0 [77.0;96.0]	.002
Defensive challenges won	54.0 [49.2;61.0]	47.0 [41.0;53.8]	< .001
Fouls	12.0 [9.25;16.0]	13.50[10.2;17.0]	.112
Goals conceded. Result	1.00 [0.00;2.00]	1.00 [0.00;2.00]	.467
Interceptions	63.5 [55.0;71.0]	51.0 [45.2;55.8]	< .001
Interceptions in opp. Half	15.5 [11.0;19.0]	9.00 [7.00;13.0]	< .001
Picking up free balls	80.0 [74.0;92.0]	63.0 [56.0;74.0]	< .001
Picking up free balls in opp. Half	26.0 [22.0;36.5]	20.0 [15.0;25.8]	< .001
Recovered balls	67.5 [60.0;72.8]	54.0 [51.0;58.0]	< .001
Recovered balls in opp. Half	14.0 [11.0;19.0]	8.00 [6.25;11.8]	< .001
Tackles	44.0 [36.0;52.0]	39.0 [32.0;46.8]	.022
Tackles successful	26.0 [21.0;29.0]	20.0 [17.0;24.8]	< .001
Red card	1.00 [0.00;2.00]	1.00 [0.00;2.00]	.013
Yellow card	0.00 [0.00;0.00]	0.00 [0.00;0.00]	< .001
ID_unit	794 [777;810]	484 [224;660]	< .001
Prob.	2.00 [2.00;2.00]	1.00 [1.00;1.00]	< .001
Stratum	1.00 [0.00;2.00]	1.00 [0.00;2.00]	< .001

In table 3 we can observe the effect size of the significantly different variables for both genders. The biggest differences are found in the variables recovered balls, recovered balls in opp. half and picking up free balls. The following variables that show intermediate significant differences are interceptions in opp. half, interceptions, passes back accurate, yellow card, passes back, passes to the left accurate, passes accurate, tackles successful, passes to the right accurate, lost balls, picking up free balls in opp. half, defensive challenges won, passes forward accurate, attacks, challenges and passes to the left. Finally, the other variables show very small differences between both genders.

Table 3. Mann Whitney's U effect size test results.

<b>Performance indicators</b>	<b>r</b>	<b>Interpretation</b>
Recovered balls	.549	Big difference
Recovered balls in opp. Half	.538	Big difference
Picking up free balls	.509	Big difference
Interceptions in opp. Half	.474	Medium difference
Interceptions	.467	Medium difference
Passes back accurate	.450	Medium difference
Yellow card	.443	Medium difference
Passes back	.418	Medium difference
Passes to the left accurate	.416	Medium difference
Passes accurate	.404	Medium difference
Tackles successful	.397	Medium difference

Passes to the right accurate	.380	Medium difference
Lost balls	.372	Medium difference
Picking up free balls in opp. half	.366	Medium difference
Defensive challenges won	.350	Medium difference
Passes forward accurate	.341	Medium difference
Attacks	.336	Medium difference
Challenges	.318	Medium difference
Passes to the left	.309	Medium difference
Passes	.286	Low difference
Defensive challenges	.275	Low difference
Passes to the right	.262	Low difference
Challenges won	.258	Low difference
Counter attacks	.244	Low difference
Attacking challenges	.228	Low difference
Fouls opponent	.233	Low difference
Positional attacks	.224	Low difference

Regarding the results of the clustering analysis, the dendrograms of both genders are presented with two p-values. AU that is used for grouping interpretation, and the BP that is the value of "probability bootstrap", less precise than the AU value. In men's football, 15 clusters have been obtained (Fig. 1). Eleven of them are formed by two variables: Goals conceded result - Red card with AU = .99 and Ball possession in own half - Ball possession in own half seconds; Dribbles - Dribbles successful; Extra attacking and key passes - Extra attacking and key passes accurate; Shots - Attacking with shots positional; Interceptions in opp. half - Recovered ball in opp. half; Crosses - Crosses accurate; Yellow card - Fouls; Tackles - Tackles successful; Lost ball - Lost ball in own half all of them with AU = 1.

A cluster with three variables: Attacks with shots set pieces attacks - Corners - Set pieces attacks (AU = 1). A cluster with four variables: Ball possession in opp. Half min. - Ball possession in opp. half second - Ball possession in the final third of the field min - Ball possession in the final third of the field (AU = 1). Another cluster with six variables: Attacking challenges - Challenges in attack won - Air challenges - Air challenges won - Challenges - Challenges won - Defensive challenges - Challenges in defence won (AU = .96). Finally, the largest cluster formed by eleven variables: Ball possession min - Passes back - Passes back accurate - Passes forward - Passes forward accurate - Passes to the right - Passes - Passes accurate - Passes to the left - Passes to the left accurate (AU = 1).



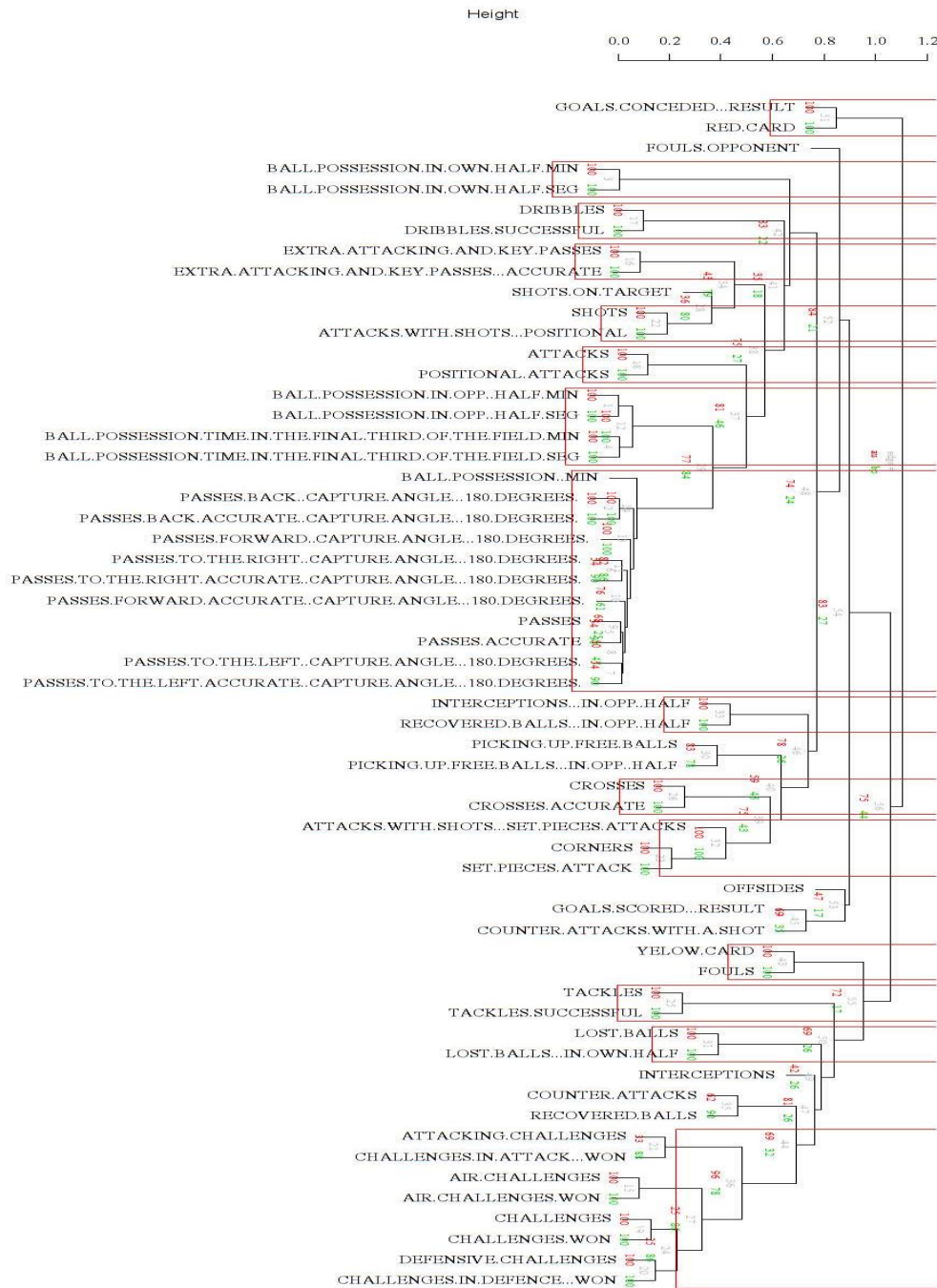


Figure 1. Cluster dendrogram with AU/BP values (%) men.

In the case of women's football (Fig.2), 7 clusters are detected. Four clusters are formed by two variables: Air challenger - Air challenger won (AU = .1); Picking up free balls - Picking up free balls in opp. half (AU = .92); Dribbles - Dribbles successful (AU = 1); Tackles - Tackles successful (AU = .98).

A cluster formed by three variables: Attacks with shots set pieces attacks - Corners - Set pieces attacks (AU = 1). A cluster of four variables: Ball possession in own half min. - Ball possession in own half s. - Lost ball - Lost ball in own half (AU = .96). Finally, a cluster formed by twenty-six variables (AU = .9): Goal scored -

Attack - Positional attack - Passes forward - Ball possession - Passes back - Passes back accurate - Passes to the left - Passes to the left accurate - Passes forward accurate - Passes accurate - Passes to the right accurate - Passes - Passes to the right - Crosses - Crosses accurate - Recovery ball in opp. half - Extra attacking and keys passes - Extra attacking and key passes accurate - Ball possession in opp. half min. - Ball possession in opp. half s. - Ball possession time in the final third of the field min. - Ball possession time in the final third of the field s. - Shots on target - Shots - Attacks with shot positional.

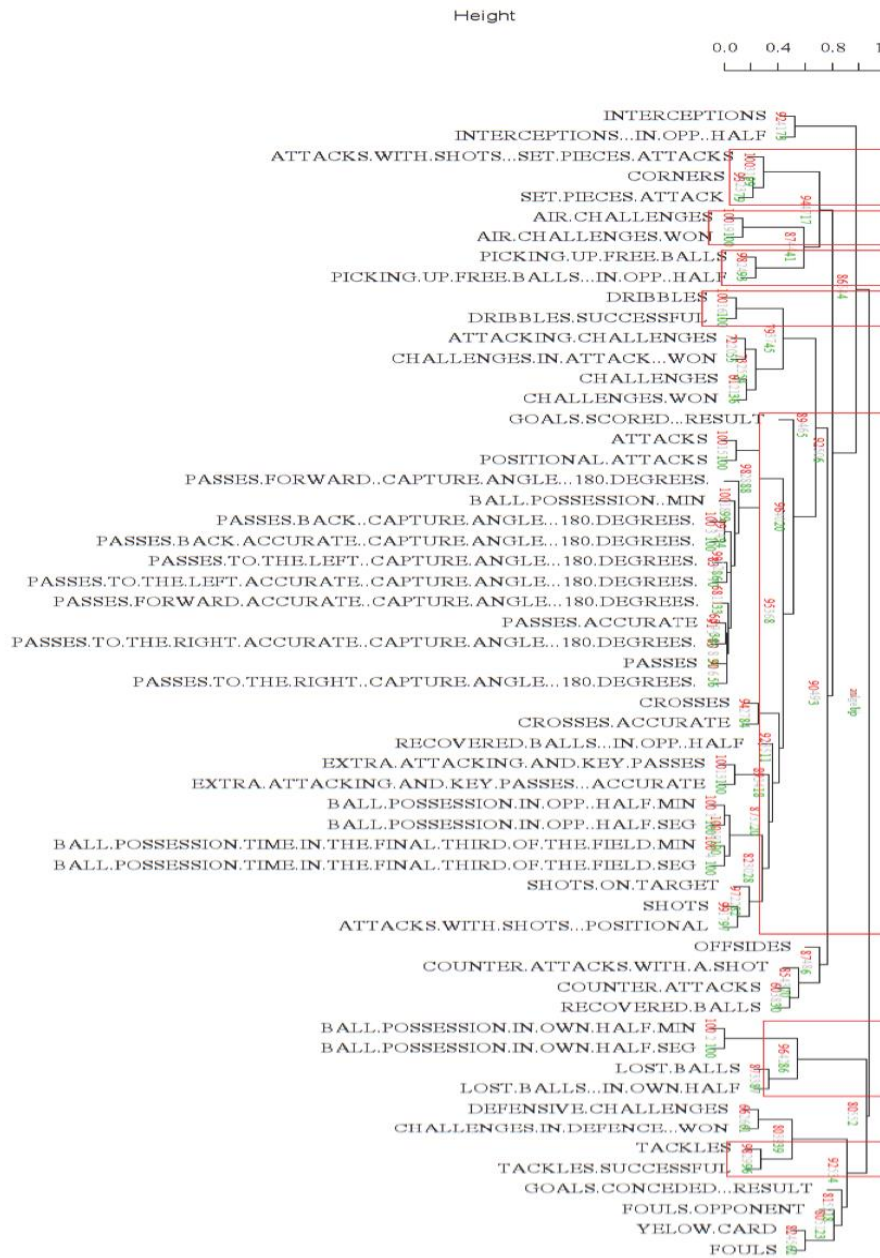


Figure 2. Cluster dendrogram with AU/BP values (%) women.

## DISCUSSION

The objectives of the study were, on the one hand, to describe the characteristics of women's football and, on the other hand, to identify the differences in technical-tactical behaviour between the male and female first division football teams of the Spanish league. For this, 68 matches of both competitions were analysed, corresponding to the 2016/17 season. In this work we intend to establish a comparative analysis to identify differences, not to point them as weaknesses, but as a practice particularity of each gender. In this context, it is the first study that analyses technical-tactical performance factors of elite women's football in a domestic league during the game's dynamic phase. Therefore, discrepancies can be found between the evidence found in this study and those of previous works with samples corresponding to special competitions (UEFA Euro, FIFA World Cup and UEFA Champions League), among other reasons, by the type of competition analysed.

Results obtained allow us to indicate the existence of technical-tactical differences between elite football for women and men. Specifically, we can say that women's football is characterized by carrying out a greater number of attacks, both positional and counterattacks. This circumstance, together with a greater number of recoveries and recoveries in the opposite field, will necessarily be linked to the existence of a greater number of transitions, producing more possession changes per game cycle prior to an interruption, which makes it more dynamic. Keeping possession of the ball, first of the objectives of the attacking game of high-level teams, seems that it has not yet been achieved by women teams, perhaps it has something to do with a need to improve the ability to keep the ball in situations of tactical commitment and space-time pressure.

Another important difference found refers to the number of passes and successful passes. Our work shows evidence that women make fewer passes of any kind and fewer successful passes than men. These results corroborate those of previous studies such as those of Hjelm (2011), who analysed the Swedish men's and women's national teams during the 2002, 2006 and 2003, 2007 world championships, respectively. In his work he concludes that men make more passes and short passes and women make more long passes and more unsuccessful passes. Another work that corroborates these results is that of Miyamura et al. (1997), who also obtained a greater number of passes in men, as well as the work of Bradley et al. (2014) who analysed gender differences in the UEFA Champions League matches and concluded that women lose more balls and make fewer successful passes than men. The fact of making fewer passes and a greater number of lost balls clearly identifies a less evolved style of play, a style currently abandoned by men's football, which is currently based on long possessions (Bloomfield et al., 2005; Carling et al., 2005; Casal et al., 2015, 2017; Hook and Hughes, 2001; James et al., 2004) and high number of players interventions. We insist that this feature of the game can be closely linked to a deficit in the ball's domain, in situations of time-space compromise. This data also helps to strengthen the individual character of this game, as just mentioned when describing the type of possessions of women's football.

The results of this study also indicate that in women's football a greater number of attacking challenges, defensive challenges and defensive challenges won, picking up free balls and picking up free balls in opposition half is observed. These data coincide with those obtained in the work of Hjelm (2011), indicating that in women's football there is less control of the ball and it remains for a longer time without a clear possessor, which leads to a greater number of challenges to gain the ball's control. We will, therefore, in front of a game in which the percentage of split possession time should be higher than that of male football, which reveals, again, a low technical level game, typical of players in formation stages.

We have also found that in women's football there is a greater number of interceptions, interceptions in opposition half, losses, recoveries and recoveries in opposition half. These data are in line with the previous ones and do nothing but strengthen the echo that in women's football there is less control of the ball in real game situations. In the study by Hjelm (2011), it is also indicated that women make more mistakes than men, as in the work of Bradley et al. (2014) who indicates that women's football produces a greater number of lost balls than in men's.

On the other hand, we have not detected differences regarding dribbling, number of shots on target and goals, as Hjelm's work detects, (Hjelm, 2011), although these differences may be because in their study only the matches of the national Swedish teams were analysed during the development of two world championships. As in some previous works, we have not detected differences in elements related to the number of corners, offsides, fouls, ball possessions, shots and set pieces.

Results found through clustering analysis have also allowed us to identify some relevant differences between the game of both genders. The number of groupings in both genders has been different, as well as the relationships between the different variables. The first thing we can see is that, in the case of male football, a greater number of groupings have been found (15) and with greater discrimination between the relationships of the different variables. In women's football, the number of groupings has been lower (7) and there is less differentiation between variables. Groupings of men's football allow establishing a better relationship between similar technical-tactical actions, while in female football this discrimination does not occur and a large number of actions with a greater or lesser technical-tactical similarity are included in the same grouping.

Of the groupings found in men's football it is possible to emphasize the narrow relation found between the circumstance of receiving a red card with the number of conceded goals. Which indicates that receiving a red card will entail conceding a greater number of goals. We also checked how the number of shots on goal is related to positional attacks, which corroborates data shown in previous analysis and indicates that male football is characterized by attacks, mostly positional and that these types of attacks are the most successful, results that coincide with some previous works (Bloomfield et al., 2005; Carling et al., 2005; Casal et al., 2015, 2017; Hook and Hughes, 2001; James et al., 2004).

In the case of women's football, we have seen how challenges are mostly aerial. It is not possible to discriminate different types of attack, passes, possessions and recoveries and a very significant circumstance is that possession time in one's own field is very related to the number of ball losses. As indicated above, women's football is characterized by many ball losses, if we maintain possession a long time in our midfield, this will cause a greater probability of losses in that sector.

We can also affirm that women's football is characterized by a less controlled team game, favouring the existence of a greater number of divided balls, proposing a very different playstyle from male football, a game based on dispute and individual duels, very contrary to what one might think by their physical abilities, and that we believe may be related to deficits in their coordinative structure. In this sense it would be necessary to reflect on the suitability of certain changes in the structural elements of the sport itself, such as the ball model and the playing field dimensions, a circumstance similar to that which occurs in lower category competitions in which these elements are modified, to facilitate the game action of players.

The data obtained in this study, in which the game of the Spanish league's first division is analysed, allows to affirm the existence of functional differences between male and female football and coincide with most of

the previous works that studied World Cups, UEFA Euro and UEFA Champions League matches. Therefore, we can indicate that Spanish female elite football has characteristics very similar to those played by national teams and local leagues in other countries. We should ask ourselves if those differences represent a problem to solve or we have to accept them as an identity factor of the women's game.

Results found in this work allow to have greater knowledge of how the game action is developed in women's football and what are the main differences with male football, which will make possible to design a specific preparation, which should pursue as its main objective the improvement of the players coordinating structure. However, we believe that there is a long way to go in the development of training processes that lead to an improvement in technical-tactical skills, so it will be necessary to continue analysing women's football in depth, in order to have a more exact knowledge of their singularities, thus being able to increase its performance.

### **AUTHOR CONTRIBUTIONS**

CAC reviewed the literature, performed the method and wrote the manuscript. JL analysed the data, performed statistical analysed and performed the method. RM and AA supervised the work critically.

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### **DISCLOSURE STATEMENT**

No potential conflict of interest was reported by the authors.

### **REFERENCES**

- Akalin, T., Gümüş, M., Göktepe, M., Acar, H., & Tutkun, E. (2016). Cerebral Laterality of Women Soccer's. *International Journal of Academic Research*, 8(5), 48-52. <https://doi.org/10.7813/2075-4124.2016/8-5/B.8>
- Althoff, K., Kroiher, J., & Hennig, E. M. (2010). A soccer game analysis of two World Cups: playing behavior between elite female and male soccer players. *Footwear Science*, 2(1), 51-56. <https://doi.org/10.1080/19424281003685686>
- Anderson, H., Randers, M., Heiner-Moller, A., Krstrup, P., & Mohr, M. (2010). Elite female soccer players perform more high-intensity running when playing in international games compared with domestic league games. *Journal of Strength and Conditioning Research*, 24(4), 912-919. <https://doi.org/10.1519/JSC.0b013e3181d09f21>
- A.P.A. (2010). Ethical principles of psychologists and code of conduct.
- Bangsbo, J., Norregaard, L., & Thorso, F. (1991). Activity profile of competition soccer. *Canadian journal of sport sciences*, 16, 110-116.

- Barfield, W., Kirkendal, D., & Yu, B. (2002). Kinematic instep kicking differences between elite female and male soccer players. *Journal of Sports Sciences and Medicine*, 3(1), 72-79. <https://doi.org/10.1097/00005768-200105001-00576>
- Belmont Report, T. (1978). *Ethical Principles and Guidelines for the Protection of Human Subjects of Research*. (The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research). Washintton.
- Bloomfield, J. R., Polman, R. C. J., & O'Donoghue, P. G. (2005). Effects of score-line on intensity of play in midfield and forward players in the FA Premier League. *Journal of Sports Sciences*, 23, 191-192.
- Bradley, P. S., Dellal, A., Mohr, M., Castellano, J., & Wilkie, A. (2014). Gender differences in match performance characteristics of soccer players competing in the UEFA Champions League. *Human Movement Science*, 33, 159-171. <https://doi.org/10.1016/j.humov.2013.07.024>
- Carling, C., Williams, A. M., & Reilly, T. (2005). *Handbook of soccer match analysis: A systematic approach to improving performance*. Abingdon UK: Routledge.
- Casal, C.A., Losada, J. L., Maneiro, R., & Ardá, T. (2017). Influencia táctica del resultado parcial en los saques de esquina en fútbol / Influence of Match Status on Corner Kick in Elite Soccer. *Revista Internacional de Medicina y Ciencias de la Actividad Física y del Deporte*, 68(2017). <https://doi.org/10.15366/rimcafd2017.68.009>
- Casal, Claudio A., Losada, J. L., & Ardá, T. (2015). Análisis de los factores de rendimiento de las transiciones ofensivas en el fútbol de alto nivel. *Revista de Psicología del Deporte*, 24(1), 103-110.
- Casella, G., & Berger, R. . (2002). *Statistical Inference (2nd Edition)*. Pacific Grove: Duxbury Press.
- Castellano, J., Casamichana, D., & Lago, C. (2012). The Use of Match Statistics that Discriminate Between Successful and Unsuccessful Soccer Teams. *Journal of Human Kinetics*, 31(1). <https://doi.org/10.2478/v10078-012-0015-7>
- Efron, B., & Tibshirani, R. (1993). An Introduction To The Bootstrap. En *Journal of the American Statistical Association* (Vol. 89, p. 436). <https://doi.org/10.2307/2291020>
- Gignac, G. E., & Szodorai, E. T. (2016). Effect size guidelines for individual differences researchers. *Personality and Individual Differences*, 102, 74-78. <https://doi.org/10.1016/j.paid.2016.06.069>
- Gómez, M., Álvaro, J., & Barriopedro, M. (2009). Patrón de actuación en las acciones de finalización en el fútbol masculino y femenino. *Kronos*, VIII(14), 5-14.
- Hjelm, J. (2011). The bad female football player: women's football in Sweden. *Soccer & Society*, 12(2), 143-158. <https://doi.org/10.1080/14660970.2011.548352>
- Hoare, D., & Warr, C. . (2000). Talent identification and women's soccer: an Australian experience. *Journal of Sports Sciences*, 18(9), 751-758. <https://doi.org/10.1080/02640410050120122>
- Hook, C., & Hughes, M. (2001). Patterns of play leading to shots in 'euro 2000'. In *Pass.com*. UWIC.
- James, N., Jones, P. D., & Mellalieu, S. . (2004). Possession as a performance indicator in soccer. *International Journal of Performance Analysis in Sport*, 4, 98-102. <https://doi.org/10.1080/24748668.2004.11868295>
- Jiménez, C., Díaz, R., & Rodríguez, D. (2016). Análisis observacional de los saques de esquina y tiros libres indirectos en el fútbol femenino de alto nivel. *Kronos*, 15(2), 1-13.
- Kjaer, J. B., & Agergaard, S. (2013). Understanding women's professional soccer: the case of Denmark and Sweden. *Soccer & Society*, 14(6), 816-833. <https://doi.org/10.1080/14660970.2013.843915>
- Lago-Ballesteros, J., Lago-Peñas, C., & Rey, E. (2012). The effect of playing tactics and situational variables on achieving scorebox possessions in a professional soccer team. *Journal of Sports Sciences*, 30, 1455-1461. <https://doi.org/10.1080/02640414.2012.712715>
- Lago-Peñas, C., & Lago-Ballesteros, J. (2011). Game location and team quality effects on performance profiles in professional soccer. *Journal of Systems Science and Medicine*, 10(3), 465-471.

- Lago-Peñas, C., Lago-Ballesteros, J., Dellal, A., & Gómez, M. (2010). Game-related statistics that discriminated winning, drawing and losing teams from the Spanish soccer league. *Journal of Systems Science and Medicine*, 9(2), 288-293.
- LeFeuvre, A. ., Stephenson, E. ., & Walcott, S. . (2013). Football frenzy: The effect of the 2011 world cup on women's professional soccer league attendance. *Journal of Sports Economics*, 14(4), 440-448. <https://doi.org/10.1177/1527002513496012>
- Little, T., & Williams, A. (2005). Specificity of acceleration, maximum speed, and agility in professional soccer players. *Journal of Strength and Conditioning Research*, 19(1), 76-78. <https://doi.org/10.1519/00124278-200502000-00013>
- Liu, H., Gomez, M.-Á., Lago-Peñas, C., & Sampaio, J. (2015). Match statistics related to winning in the group stage of 2014 Brazil FIFA World Cup. *Journal of Sports Sciences*, 33(12), 1205-1213. <https://doi.org/10.1080/02640414.2015.1022578>
- Liu, H., Hopkins, W., Gómez, M. ., & Molinuevo, J. S. (2013). Inter-operator reliability of live football match statistics from OPTA Sportsdata. *International Journal of Performance Analysis in Sport*, 13(3), 803-821. <https://doi.org/10.1080/24748668.2013.11868690>
- Meier, H. ., Konjer, M., & Leinwather, M. (2016). The demand for women's league soccer in Germany. *European Sport Management Quarterly*, 16(1), 1-19. <https://doi.org/10.1080/16184742.2015.1109693>
- Meier, H. ., & Leinwather, M. (2012). Women as 'armchair audience'? Evidence from German national team football. *Sociology of Sport Journal*, 29(3), 365-384. <https://doi.org/10.1123/ssj.29.3.365>
- Miyamura, S., Susuma, S., & Hisauki, K. (1997). A time analysis of men's and women's soccer. *Science and Football III*, 251-257.
- Mohr, M., Krstrup, P., Anderson, H., Kirkendal, D., & Bangsbo, J. (2008). Match activities of elite women soccer players at different performance levels. *Journal of Strength and Conditioning Research*, 22(2), 341-349. <https://doi.org/10.1519/JSC.0b013e318165fef6>
- Mohr, M., Krstrup, P., & Bangsbo, J. (2003). Match performance of high standard soccer players with special reference to development of fatigue. *Journal of Sports Sciences*, 21, 519-528. <https://doi.org/10.1080/0264041031000071182>
- Pollard, R., & Gómez, M. A. (2014). Comparison of home advantage in men's and women's football leagues in Europe. *European Journal of Sport Science*, 14(1), 77-83. <https://doi.org/10.1080/17461391.2011.651490>
- Suzuki, R., & Shimodaira, H. (2006). Pvcust: an R package for assessing the uncertainty in hierarchical clustering. *Bioinformatics*, 22(12), 1540-1542. <https://doi.org/10.1093/bioinformatics/btl117>
- Taylor, J. B., Mellalieu, S. ., James, N., & Shearer, D. A. (2008). The influence of match location, quality of opposition, and match status on technical performance in professional association football. *Journal of Sports Sciences*, 26(9), 885-895. <https://doi.org/10.1080/02640410701836887>
- Tenga, A., Holme, I., Ronglan, L. T., & Bahr, R. (2010a). Effect of playing tactics on achieving score-box possessions in a random series of team possessions from Norwegian professional soccer matches. *Journal of Sports Sciences*, 28(3), 245-255. <https://doi.org/10.1080/02640410903502766>
- Tenga, A., Holme, I., Ronglan, L. T., & Bahr, R. (2010b). Effect of playing tactics on goal scoring in Norwegian professional soccer. *Journal of Sports Sciences*, 28(3), 237-244. <https://doi.org/10.1080/02640410903502774>
- Tenga, A., Ronglan, L. T., & Bahr, R. (2010c). Measuring the effectiveness of offensive match-play in professional soccer. *European Journal of Sport Science*, 10(4), 269-277. <https://doi.org/10.1080/17461390903515170>
- Unveren, A. (2015). Investigating Women Futsal and Soccer Players' Acceleration, Speed and Agility Features. *Anthropologist*, 21, 361-365. <https://doi.org/10.1080/09720073.2015.11891825>

Włodzimierz, S., Józef, B., & Andrzej, S. (2011). Movement symmetry and asymmetry of goal shots in female football at European championships and at World Cup. *African Journal for Physical Health Education, Recreation and Dance*, 17(4), 865-878.



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