



Tactical differences between winning and losing teams in elite women's football

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Cite this article:

Iván-Baragaño, I., Maneiro, R., Losada, J.L. & Ardá, A. (2022). Tactical Differences Between Winning and Losing Teams in Elite Women's Football. *Apunts Educación Física y Deportes*, 147, 45-54. [https://doi.org/10.5672/apunts.2014-0983.es.\(2022/1\).147.05](https://doi.org/10.5672/apunts.2014-0983.es.(2022/1).147.05)

Abstract

Research into women's football has increased dramatically in recent years. Despite this, in the field of collective tactical performance, publications are still scarce. The objective of this study was to analyse and describe how dynamic offensive actions came about in the winning and losing teams in the 2019 FIFA Women's World Cup in France and to establish differences between the two groups. From an observational methodology, an *ad hoc* observation instrument was developed and 1,883 offensive actions that took place in the final phase of the championship were analysed. Two types of statistical tests were carried out to verify the existence of differences between groups. The chi-square test was applied for the qualitative type criteria and the Mann Whitney U test for the continuous type criteria with a significance level of $p < .05$. The existence of significant differences was demonstrated for the following criteria: temporality, match status, total time in possession, time in possession in opponent's half, opponent's defensive organisation, wide start area and result of the action. The teams that won the matches showed a greater ability to develop their attacks in the first moments of the first and second halves, as well as a greater collective quality to maintain possession of the ball in the opponent's half and to finish their actions successfully. These results can be used with the aim of implementing training and competition strategies to increase performance in elite women's football.

Keywords: ball possession, FIFA Women's World Cup, match analysis, observational methodology, performance indicators.

Editor:

© Generalitat de Catalunya
Departament de la Presidència
Institut Nacional d'Educació
Física de Catalunya (INEFC)

ISSN: 2014-0983

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Section:

Sports training

Original language:

Spanish

Received:

February 14, 2021

Accepted:

June 7, 2021

Published:

January 1, 2022

Cover:

Women Ski
Cross Competition.
Winter Youth Olympic
Games 2020.
Lausanne (Switzerland)
© EFE/ Gabriel Monnet

Introduction

The FIFA Women's World Cup held in France in 2019 highlighted the growth that women's football has experienced in recent years. This fact can be seen from the official report (FIFA, 2019). During the celebration of this championship, a clear improvement in the performance of the teams taking part was evident, as well as a notable growth in media interest from the spectators.

In the research field, women's football has been an understudied subject for researchers. Despite this, the number of recent publications has increased compared to previous years (Okholm Kryger et al., 2021). Currently only 25% of the publications covering football have specifically dealt with the women's game (Kirkendall and Urbaniak, 2020).

In addition to the lower number of scientific publications compared to men's football, most researchers have focused on topics related to physical fitness and injury prevention, as well as other areas related to the physiological and/or anthropometric characteristics of female footballers (Balsalobre-Fernández et al., 2015; Kirkendall, 2007; Okholm Kryger et al., 2021). For these reasons, from the point of view of tactical performance, those professionals dedicated to training and competition have been forced to extrapolate empirical conclusions from men's football to their own reality, at the expense of the differences between the two sexes' games (Bradley et al., 2014; Casal et al., 2020; Kirkendall, 2007).

Thanks to the remarkable growth in interest in this field of research, in recent years studies have proliferated with the aim of creating a solid base of knowledge to answer, among other questions, what the individual and collective technical-tactical criteria and indicators are that will enable improvement in performance in women's football. Many of these studies have been based on the analysis of performance in men's football (Amatria et al., 2019; Lago-Ballesteros and Lago-Peñas, 2010).

For performance in women's football, several authors have tried to analyse various criteria from the FIFA Women's World Cup, because this is the benchmark competition for national teams. Along these lines, Scanlan et al. (2020) analysed the criteria that were associated with the creation of scoring opportunities in the championship held in Canada in 2015. These authors verified that those actions that started dynamically, through the interception or a tackle, showed a greater probability of achieving a clear goal action compared to those preceded by a stoppage in the game. This same study also found that the duration of the attack, as well as the starting area of the attack, were significant criteria when assessing the probability

of offensive success by the teams analysed. Another study carried out on this same championship was the one presented by Maneiro et al. (2020), who wanted to know how a widely studied variable in men's football (match status) could modify the development of ball possession in elite women's football. An important conclusion of this work was, without a doubt, that differences were found in how the match status modified the tactical behaviours associated with ball possession: the teams who were leading were able to maintain their tactical behaviours without being influenced by the current score, in contrast to what happened in the losing teams.

Another variable in women's football analysed was set pieces (Maneiro et al., 2019). These authors established a multivariate comparative success model based on observational methodology and came to the conclusion that the offensive success in this type of action could increase significantly depending on the number of players who intervened in the action or the area to which the ball was targeted, among other criteria.

Establishing a time jump between championships, another recent study that tried to find out what were the statistical differences between the winning and losing teams in the 2019 FIFA Women's World Cup in France was published by Kubayi and Larkin (2020). These authors tried to discern, from the statistical data extracted from the provider InStat Scout, which were the variables that differentiated the winning teams from the losers in the 48 matches analysed. They observed that the winning teams presented better data in variables related to technical performance, such as the number of passes per game, the precision of the pass and the number of shots on goal, among others. Similar differences between the sexes were found by Casal et al. (2020), when they compared the technical performance of men's and women's teams in the Spanish League. Although the study by Kubayi and Larkin (2020) assumes a reduction in the differences between winning and losing teams in a championship, the great difference in performance between the best and worst teams in women's football in the early stages (see the 13 goals that the USA scored against Thailand at this stage) can lead to difficulty in analysing the data. Finally, another interesting recent piece of research was presented by De Jong et al. (2020). It comprehensively analysed statistical data from the last seven seasons in some of the most important women's competitions in the United Kingdom and the United States, as well as European and world national team championships. These authors analysed a total of 695 matches played and observed that a large number of the variables that determined the final result

were related to performance indicators associated with conditional aspects, such as the percentage of defensive challenges or duels won. Likewise, the most important conclusion drawn from this study was that the variable that was most positively associated with winning the match was scoring the first goal.

Because of all the above, the objective of this study was to analyse and describe how dynamic offensive actions came about in the winning and losing teams in the 2019 FIFA Women's World Cup in France and to establish differences between the two groups. To achieve this aim, two complementary types of analyses were carried out. Firstly, using a descriptive analysis we tried to establish the normal practices in these actions. Secondly, by means of a bivariate analysis, we tried to identify those criteria that differentiated the winning teams from the losing ones in this championship.

Methodology

Research design

To carry out this study, the systematic observational methodology (Anguera, 1979) was used. It was a nomothetic design, with several study units, isolated (intra-session follow-up) and multidimensional (several dimensions of the observational instrument were analysed) corresponding to quadrant III of those proposed by Anguera et al. (2011). Images from the matches were taken from public television and viewed after the event. The study was approved by the Research and Teaching Ethics Committee of the University of La Coruña (2019-0024).

Participants

The dynamic offensive actions for 13 of the 16 matches in the final phase of the 2019 FIFA Women's World Cup in France were analysed. Three games in which the final result was a draw were excluded from the study. The fact that all the matches analysed were in a direct elimination format removed any type of results speculation by the national teams. Likewise, the decision to analyse only the matches in this phase increased the equality between teams. For each of the matches, the dynamic offensive actions for the two teams were analysed.

Actions that met some of the following inclusion criteria were recorded: i) a player contacted the ball three times consecutively, ii) a pass occurred (provided the duration was greater than three seconds) or iii) a shot occurred. Offensive actions ended the moment possession

was transferred to the opposing team, or there was an interruption to the game.

Observation and recording instrument

The observation instrument used was developed *ad hoc*, it was a combination of field formats and category systems (Anguera et al., 2011).

To create the observation instrument, we followed Anguera et al.'s (2007) proposal. At first, a hierarchical range of behaviour units was established, which was implemented through the adoption of basic criteria for the segmentation of behaviour.

The creation of the observation instrument was based on the following pillars: i) a previous theoretical framework (in this case, the football regulations); ii) criteria and categories empirically collated in other observational studies; iii) and, finally, novel criteria that were tested in this work.

The methodological steps implemented are those proposed by Maneiro (2021), following Anguera et al. (2007). First, the problem was identified and an expert scientific group was created. This scientific group consisted of two doctors of Sports Science and teachers of football, a graduate in Sports Science with practical experience in the field, and a doctor of Psychology, with years of experience in observational methodology.

After consulting the theoretical framework and the empirical evidence, a first post-event exploratory observation was made. Then, and after a discussion by the group of experts, the problem was divided into smaller units. Subsequently, an observation instrument for a new post-event viewing was created and tested, in order to find the weaknesses in the instrument itself. Then, after another discussion by the group of experts, the observation instrument was readjusted. Finally, the post-event viewing was carried out again, to finalise the implementation of the observation instrument.

This instrument can be seen in Table 1. The criteria for the starting area in depth and spatial context of interaction were extracted and can be consulted in Castellano and Hernández-Mendo (2003). To define the categories for the initial defensive intention criterion, the definitions proposed by Casal et al. (2016) were used. The rival defensive positioning criterion was elaborated from the definitions proposed by Aranda et al. (2019) in the REOFUT observation instrument. These categories were established taking into account the collective behaviour of all the players on the team observed.

For the recording and coding of offensive actions, the Lince Plus program v 1.1.0 was used (Soto et al., 2019).

Table 1
Ad hoc observation instrument.

Criterion	Category	Definition
Match result	Winner	The team observed won the match
	Loser	The team observed lost the match
Temporality of the action	1q	The action starts between the start of the game and minute 15
	2q	The action starts between minute 16 and minute 30
	3q	The action begins between minute 31 and the end of the first half
	4q	The action starts between the start of the second half and minute 60
	5q	The action starts between minute 61 and minute 75
	6q	The action starts between minute 76 and the end of the match
Match status	Winning	The team observed is winning when the action starts
	Drawn	The teams are level when the action starts
	Losing	The team observed is losing when the action starts
From depth start area	Defensive	The action begins in the defensive area of the pitch
	Pre-defensive	The action begins in the pre-defensive area of the pitch
	Midfield	The action begins in the midfield area of the pitch
	Pre-offensive	The action begins in the pre-offensive area of the pitch
	Attack	The action begins in the offensive area of the pitch
Wide start area	Left wing	The action starts from the left wing
	Central	The action starts from the centre
	Right wing	The action starts from the right wing
Opponent's defensive organisation	Organised	The opposing team is defensively organised
	Circumstantial	The opposing team is defensively disorganised
Opponent's defensive positioning	Forward	Opponents positioning is forward at the start of the action
	Midfield	Opponents positioning is midfield at the start of the action
	Rear	Opponents positioning is at the back at the start of the action

Table 1 (Continued)
Ad hoc observation instrument.

Criterion	Category	Definition
Spatial context of the interaction	AA	Forward area vs. forward area
	AM	Forward area vs. midfield area
	AR	Forward area vs. rear area
	MA	Midfield area vs. forward area
	MM	Midfield area vs. midfield area
	MR	Midfield area vs. rear area
	RA	Rear area vs. forward area
	RM	Rear area vs. midfield area
	RR	Rear area vs. rear area
Initial intention offensive	PA	Goal area vs. forward area
	Progress	The team observed progresses towards the rival goal
Initial intention defensive	Maintain	The team observed maintains possession of the ball
	Recover	The opposing team shows a pressing intention to recover the ball
Own half P	Defend	The opposing team shows an intention to defend their goal
	Opponent half P	Time of possession in own half
T Total	Opponent half P	Possession time in opponent's half
Passes	T Total	Total time of possession
Possession area	Passes	Number of passes
	MD	Most possession in own half
Result of the action	MO	Most possession in opponent's half
	Goal	The offensive action ends with a goal
	Shot	The offensive action ends with a shot
	Ball into penalty area	The offensive action ends with a ball into the penalty area
	No success	The offensive action ends with failure

Data quality control

As a measure of the reliability of the *ad hoc* observation instrument, the Cohen's Kappa interobserver coefficient was calculated for the three authors of this work. To calculate this coefficient, the IBM SPSS v. 25.0 statistical package was used, following the protocol established by Losada and Manolov (2015). The average value was .869, considered excellent according to the Landis and Koch (1977) scale.

Statistical analysis

To verify the existence of differences between the winning and losing categories, corresponding to the match result criterion, two types of tests were used. First, there was a check for significant differences between the two groups of teams for the qualitative criteria. This was carried out using the chi-square test. The effect size was measured as the degree of association from the *Phi* statistic for the dichotomous

type criteria and Cramer's V for the other criteria. For the continuous type criteria, firstly, the normality of the distributions was verified using the Saphiro-Wilk test, which was rejected. For this reason, the existence of differences between the winning and losing groups was contrasted using the non-parametric Mann Whitney U test for this type of criterion. The effect size (ES) was calculated from the formula $ES = Z / \sqrt{n}$, where Z is the standardised value of the statistic and n is the number of observations. For all tests, a level of significance of $p < .05$ was assumed.

All statistical calculations were performed with the IBM SPSS v. 25.0 package. For the graphical representations the statistical packages R and RStudio were used.

Results

A total of 1,883 dynamic offensive actions were analysed. This value represents approximately 72 actions per team and game.

Seven of the fifteen criteria analysed showed significant differences between the winning and losing categories. Table 2 shows the results for the qualitative criteria. The criteria

that presented significant differences were the following: i) the temporality of the action ($p < .005$): the teams that won their matches had a higher percentage of possessions for categories 1q, 2q and 4q, compared to the losing teams, who increased their percentage of possessions in the last period of the first half and the last 30 minutes of the second half, ii) match status ($p < .001$): the winning teams were ahead on the scoreboard for 55.5% of the actions, compared to the losing teams, who, for almost 7 out of 10 actions, were behind on the scoreboard, iii) wide start area ($p < .05$): the winning and losing teams presented differences mainly in the percentage of actions initiated on the left and right wings, iv) opponent's defensive organisation ($p < .05$): the winning teams began their offensive actions against a circumstantial defence for twice the percentage observed for the losing teams (3.9% compared to 1.8%, respectively), and v) result of the action ($p < .05$): a greater number of the goal and shot categories was observed for the teams that won their matches compared to the teams that lost; the sum of both categories was 12.3% of the total actions observed for the teams that were successful at the end of the matches, compared to 8.4% observed for the losing teams.

Table 2

Bivariate analysis based on the final result.

Criterion	Category	Winner $N = 903$	Loser $N = 980$	p [ES] ^a
Temporality of the action	1q	183 - 20.3%	144 - 14.7%	.004 [.096]**
	2q	158 - 17.5%	160 - 16.3%	
	3q	155 - 17.2%	175 - 17.9%	
	4q	147 - 16.3%	148 - 15.1%	
	5q	130 - 14.4%	166 - 16.9%	
	6q	130 - 14.4%	187 - 19.1%	
Match status	Winning	501 - 55.5%	3 - 0.3%	<.001 [.75]***
	Drawn	365 - 40.4%	310 - 31.6%	
	Losing	37 - 4.1%	667 - 68.1%	
From depth start area	Defensive	127 - 14.1%	157 - 16.0%	.449[-]
	Pre-defensive	308 - 34.1%	330 - 33.7%	
	Midfield	246 - 27.2%	276 - 28.2%	
	Pre-offensive	195 - 21.6%	183 - 18.7%	
	Attack	27 - 3.0%	34 - 3.5%	

Note. * $p < .05$ ** $p < .005$ *** $p < .001$ ^aEffect size.

Table 2 (Continued)
Bivariate analysis based on the final result.

Criterion	Category	Winner <i>N</i> = 903	Loser <i>N</i> = 980	<i>p</i> [ES] ^a
Wide start area	Left wing	221 - 24.5%	211 - 21.5%	.009 [.07]*
	Central	493 - 54.6%	506 - 51.6%	
	Right wing	189 - 20.9%	263 - 26.8%	
Opponent's defensive organisation	Organised	868 - 96.1%	959 - 98.2%	.008 [.061]*
	Circumstantial	35 - 3.9%	18 - 1.8%	
Opponent's defensive positioning	Forward	399 - 44.2%	449 - 45.9%	.381[-]
	Midfield	159 - 17.6%	185 - 18.9%	
	Rear	345 - 38.2%	344 - 35.2%	
Spatial context of the interaction	AA	13 - 1.4%	20 - 2%	.212[-]
	AM	7 - 0.8%	3 - 0.3%	
	AR	82 - 9.1%	69 - 7%	
	MA	4 - 0.4%	4 - 0.4%	
	MM	7 - 0.8%	15 - 1.5%	
	MR	374 - 41.5%	385 - 39.3%	
	RA	18 - 2.0%	14 - 1.4%	
	RM	279 - 30.9%	341 - 34.8%	
	RR	28 - 3.1%	37 - 3.8%	
	PA	90 - 10%	92 - 9.4%	
Own half P		5 [0-11]	6 [0-11]	.966[-]
Opponent half P		6 [2-10]	5 [1-9]	.021 [.05]*
T Total		12 [8-19]	12 [7-17]	.033 [.04]*
Passes		3 [2-5]	3 [2-5]	.816 [-]
Initial intention offensive	Progress	383 - 42.4%	417 - 42.6%	.952[-]
	Maintain	520 - 57.6%	563 - 57.4%	
Initial intention defensive	Recover	575 - 63.7%	599 - 61.2%	.263[-]
	Defend	327 - 36.3%	379 - 38.8%	
Possession area	MD	444 - 49.3%	485 - 49.5%	.910[-]
	MO	457 - 50.7%	494 - 50.5%	
Result of the action	Goal	18 - 2%	5 - 0.5%	.006 [.081]**
	Shot	93 - 10.3%	77 - 7.9%	
	Ball into penalty area	127 - 14.1%	144 - 14.7%	
	No success	665 - 73.6%	754 - 76.9%	

Note. * $p < .05$ ** $p < .005$ *** $p < .001$ ^aEffect size.

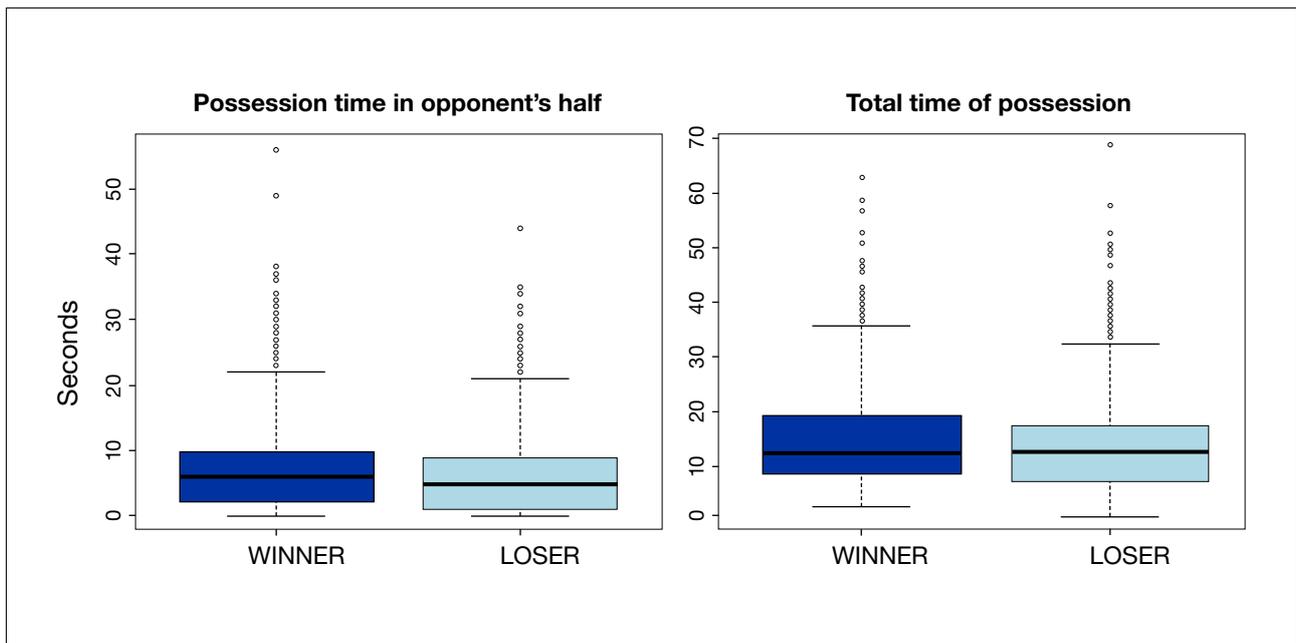


Figure 1
Total time of possession and time of possession in opponent's half based on the result.

On the other hand, two of the four continuous-type criteria analysed presented statistically significant differences between the two groups of teams: total time of possession ($p < .05$) and possession time in the opponent's half ($p < .05$). For both criteria, the time in possession was slightly higher for the winning teams compared to the losing teams. The distributions of both criteria can be seen in Figure 1.

Discussion

The objective of this study was to analyse and describe how dynamic offensive actions came about in the winning and losing teams in the 2019 FIFA Women's World Cup in France and to establish differences between the two groups. A study was proposed based on the systematic observational methodology in which 1,883 dynamic offensive actions in 13 matches of the final phase of that championship were analysed.

Seven of the fifteen criteria that made up the observation instrument presented significant differences related to the final result of the game analysed.

The criterion that presented the greatest degree of association with the result of the match was the temporality result ($p < .001$). The relationship between both criteria agrees with that observed by Maneiro et al. (2020) after analysing ball possessions at the 2015 FIFA Women's World Cup in Canada. It seems logical to think that the team that manages to win their matches tends to be ahead on the scoreboard for the longest time and vice versa. In any event,

the fact that only three offensive actions were recorded when the losing team was ahead is significant, since it seems to establish a clear relationship between scoring the first goal in the match and the final result. This fact has already been observed by De Jong et al. (2020), who concluded that getting ahead on the scoreboard was the element that most affected the outcome of elite women's football matches. At the FIFA Women's World Cup, nine out of ten teams that took the lead won their matches (FIFA, 2019). This highlights the difficulty of overcoming a deficit in women's football matches, as well as the superiority of the best teams throughout the match in terms of the scoreboard.

The temporality criterion showed significant differences between the two groups of teams. A common trend in elite football could be observed: losing teams increased the number of actions in the last periods of the first and second half. In this sense, it was observed that there is a certain tendency, more marked in the last 30 minutes of play, for the winning teams to assume a more defensive collective role in order to protect their goal and advance to the next phase. The winning teams, however, were able to create a greater number of offensive actions in the first five minutes. This fact can be justified by a higher individual and collective quality in the winning teams, reflected in variables such as passing precision (Kubayi and Larkin, 2020), for which, during the first minutes of the match characterised by a higher intensity and less tactical control, they are able to impose themselves by controlling ball possession to a greater extent.

On the other hand, differences were found in the time of possession between the winning and losing categories. The total time in possession criteria ($p < .05$) and possession time in the opponent's half ($p < .05$) were higher for the winning teams. This is logical, perhaps due to a greater collective quality when it comes to maintaining possession, even more so when it happens in the opponent's half. This is an important fact, since possession in the opponent's half has been shown to be an indicator that is positively associated with performance in men's football (Casal et al., 2017). The reduction of time and space for deciding and executing in the opponent's half, in which the density of players is greater, proved to be a criterion that differentiated the winning and losing teams in this championship. In addition, an important fact for a team to be able to keep possession of the ball away from their own goal is the option of quick pressure after a loss and to regain possession more quickly than the opponents, thus preventing the opposing team from gaining control of the ball.

As far as the collective ability to develop positional play is concerned, this has improved during in this latest championship, as shown by the increase in the average percentage of passing accuracy compared to other championships (FIFA, 2019). Despite this improvement, a criterion that has shown differences between the groups analysed has been the opponent's defensive organisation. This criterion was observed and recorded at the exact moment of initiating the offensive action. Therefore, those actions that began in the face of a circumstantial defence must normally have been preceded by a loss of the ball by the rival team. This explains the temporary impossibility of reorganising defensively and executing an effective defensive transition. Kirkendall (2007), after interviewing elite female coaches, suggested a differential characteristic between players: the coaches observed a lower technical performance for defensive players compared to players in more forward positions. This fact can make it difficult for women's teams when developing positional play from areas close to their own goal, running a high risk of losing possession of the ball and giving the opposing team a favourable moment of offensive transition in front of the goal. The fact that the winning teams started 3.9% of their offensive actions against a circumstantial defence, compared to the 1.8% observed for losing teams could be a clear indicator of the final performance in matches and offensive actions, as Casal et al. (2016) found for men's football.

The last criterion that presented significant differences was the result of the action. Differences were observed

between the two groups of teams analysed for the categories that imply a greater offensive success. Thus, the teams that won the matches managed to finish 12.3% of their offensive actions with a goal or a shot on goal. This value was four percentage points higher than for the losing teams. Although this difference may seem small, it must be assessed in relation to its low frequency: in the championship analysed, the teams that won their matches took approximately 15 shots per game, compared to the 8 taken by the losing teams, although the relative difference was higher in the analysis of shots on target: 6.38 shots on target versus 2.79 for the winning and losing teams, respectively (Kubayi and Larkin, 2020).

Conclusions

Differences were found in the criteria analysed between the winning and losing teams at the 2019 FIFA Women's World Cup in France. The teams that won their matches showed a greater capacity to maintain possession of the ball, even more so in the opponent's half, and to have a greater number of possession of the ball in the first periods of the first and second halves. Similarly, the best teams were able to initiate their offensive actions to a greater extent against an opponent's circumstantial organization, highlighting a higher performance when provoking this type of action or, likewise, a lower performance on the part of the losing teams when it comes to developing effective positional play in areas close to their own goal. On the other hand, the fact that the teams that went ahead on the scoreboard were able to achieve a favourable match result was corroborated, and differences were found in the effectiveness of the offensive actions by both groups of teams: teams that won the matches were able to finish their actions with a goal or shot significantly better than losing teams. These results allow tactical differences between winning and losing teams to be established and allow coaches and selectors to implement training and competition strategies to improve performance in international competitions. Along these lines, it is suggested that training tasks be elaborated in which ball possessions are carried out in confined spaces, as close as possible to the opponent's goal, of short duration, that allow the development of dynamic offensive actions without fatigue, in which the structures of female football players favour an optimal tactical development at the various moments of the game. Likewise, it is suggested that there is a need to implement optimal pre-game warm-up strategies that allow teams to impose their gameplay during the first minutes of play.

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Conflict of interests: the authors have not declared any conflict of interest.



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