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Creating Goal Scoring Opportunities in Men and Women UEFA Champions League Soccer Matches. Tactical Similarities and Differences.
Creación de Ocasiones de Gol en la UEFA Champions League Masculina y Femenina. Diferencias y Similitudes Tácticas

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Abstract. The aim of the present study was to describe and compare how goal scoring opportunities emerge in both men and women UEFA Champions League. The sample included 819 team possessions that led to the creation of goal scoring opportunities from 32 random matches (16=men; 16=women) during the 2018-2019 season. A total of 17 tactical indicators related to the start, development and the end of the team possessions were evaluated by observational methodology. An independent samples T Test was used to analyze the differences between gender. For the possessions start, men initiated the playing sequences less frequently in the opposing half (38.07±16.82% vs 64.78±23.30%; p<.05; ES=1.10) and against less frequent opponent pressure (48.67±21.77% vs 64.18±20.88%; p<.05; ES=0.68) than women. Regarding the possessions development, men registered longer duration of team possessions (18.48±6.58 vs 15.14±6.01 seconds: p<.05; ES=0.51), greater proportion of combinative attacks (30.83±16.55% vs 20.55±16.87%; p<.05; ES=0.54), as well as more passes per possession (6.36±2.41 vs 4.48±2.08; p<.05; ES=0.77) and faster passing tempo (one pass each 3.27±0.58 vs 4.01±0.80 seconds; p<.05; ES=0.94) than women. In conclusion, there are different tactical behaviours between men and women during the start and development of team possessions in UEFA Champions League soccer matches, while no differences were found at the end of the team possessions.
Key words: match analysis, gender, women´s football, scoring opportunities, football, playing tactics

Resumen. El objetivo de este estudio fue describir y comparar la creación de ocasiones de gol en la UEFA Champions League tanto masculina como femenina. La muestra incluye 819 posesiones de equipo que consiguieron producir ocasiones de gol en 32 partidos aleatorios (16=masculino; 16 femenino) durante la temporada 2018-2019. Un total de 17 indicadores tácticos relacionados con el inicio, desarrollo y final de las posesiones fueron evaluadas a través de metodologia observacional. Un test de Student para muestras independientes fue utilizado para analizar las diferencias entre generos. En el inicio de la posesión, los hombres iniciaron sus secuencias ofensivas menos frecuentemente en el campo contrario (38.07±16.82% vs 64.78±23.30%; p<.05; ES=1.10) y con una menor frecuencia de presión adversaria (48.67±21.77% vs 64.18±20.88%; p<.05; ES=.0.68) que las mujeres. En cuanto al desarrollo, los hombres registraron posesiones con más duración (18.48±6.58 vs 15.14±6.01 segundos: p<.05; ES=0.51), mayor proporción de ataques combinativos (30.83±16.55% vs 20.55±16.87%; p<.05; ES=0.54), asi como más pases por posesión (6.36±2.41 vs 4.48±2.08; p<0.05; ES=0.77) y una mayor velocidad en el ritmo de pases (un pase cada 3.27±0.58 vs 4.01±0.80 segundos; p<.05; ES=0.94) que las mujeres. Como conclusión, exiten diferencias tácticas entre el fútbol masculino y femenino durante el inicio y el desarrollo de las posesiones en la UEFA Champions League, mientras que no se han observado diferencias en el final de las posesiones.
Palabras clave: análisis de partidos, género, fútbol femenino, oportunidades de gol, fútbol, tácticas de juego.

Introduction

Soccer is an invasion sport with the main aim of breaking through an opponent's defense to score a goal. However, the low frequency of goals per game makes soccer different from other invasion team sports. Since goal scoring is the ultimate indicator of achieving offensive performance (Gonzalez-Rodenas, Aranda-Malavés, Desantes, Ramírez, Hervás & Aranda, 2020), an extensive attention among researchers has been given to scoring related indicators (Kubayi, 2020; Smith & Lyons, 2017; Yiannakos & Armatas, 2006; Hughes and Barlett, 2002).

In terms of attacking performance in soccer, the solely analysis of goals may not truly represent the underlying tactical strategies of a team (James, Mellalieu & Hollely, 2002). For this reason, other attacking outcomes have been analyzed in the scientific literature due to their higher frequency during the match. Overall, ball possession, passing accuracy, penalty box entries, shots

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on target and goal scoring opportunities are the match statistics most frequently used to measure attacking effectiveness (Collet, 2013; Tenga Holme, Ronglan, & Bahr, 2010; Lago-Ballesteros, Lago & Rey 2012; Mitrotasios, González-Rodenas, Armatas & Aranda, 2019). Consequently, although the analysis of other performance indicators related to offensive success is very useful to study the effectiveness of the style of play implemented by soccer teams, the specific evaluation of goal scoring opportunities may be key to identify the tactical factors that contribute to the creation of higher goal effectiveness (González-Rodenas, López-Bondia, Aranda-Malavés, Tudela, Sanz-Ramírez & Aranda, 2020).

It should be noted that the published scientific research that has examined goal scoring opportunities has been conducted predominantly using samples of men's soccer. Thus, the results from male tournaments presented that the majority of goal scoring opportunities started in the opponent half (Wright, Atkins, Polman, Jones & Sargeson, 2011), used more frequently the combinative attack (Lopez Bondia et al., 2017; Gonzalez-Rodenas et al., 2015), assisted the goal scorer from central areas of the field (Smith & Lions, 2017), finished inside the penalty area (Mitrotasios & Armatas, 2014) and used only one touch in the final action (Durlik & Bieniek, 2014).

Concerning women's soccer, there is a lack of literature describing effective attacking strategies and goal scoring opportunities. Even less is the number of studies comparing technical-tactical behaviour between men and women soccer matches. For instance, Bradley et al. (2014) concluded that women lost the ball more times than men, but did not find differences regarding the possession time at the UEFA Champions League. Also, Althoff et al. (2010) compared men's and women's World Cup matches, concluding that women used more long passes than short ones, they executed less dribbles and implemented a less aggressive game (less tackling), as well as they tried to get closer to the goal before shooting. In another study, a comparative analysis between male and female players of the Swedish national team, it was presented that men performed more short passes and receptions, while women performed more actions with a negative outcome (Hjelm, 2011). More recently, Casal et al. (2020) presented technical-tactical differences between men´s and women´s soccer in Spain. Authors concluded that women's game was more dynamic, with greater number of transitions, fewer passes, greater challenges, both defensive and offensive, and greater number of interceptions and recoveries.

In order to explain the above differences between genders, Kirkendall (2007) proposed technical, tactical and conditional variations. Moreover, Gomez (2008) argued that the technical limitations in women´s soccer arise from the late uptake of football as a female sport. In a recent review study, Pedersen, Aksdal and Stalsberg (2019) argued that the majority of differences between men's and women's soccer can be explained by women having to adapt to rules and regulations that are suited for men and their physical attributes. More interestingly, authors proposed that the present conditions for women is comparable to men playing on a 118 × 76 m pitch, with goals of 7.93 × 2.64 m and match duration of 113 min (ca. 2 × 56 min).

In order to advance in the knowledge of women´s soccer and its differences with men, the present study carried out a comparative analysis of the tactical indicators between men´s and women´s soccer, analysing matches from the most prestigious soccer club competition worldwide. Thus, the aim of the present study was to describe and compare how goal scoring opportunities emerge in both men and women of UEFA Champions League soccer matches during 2018-19 season.

Methods

Sample

The sample included 819 team possessions according to the definition of Pollard and Reep (1997) that led to the creation of goal scoring opportunities from 32 qualifying matches (16=Men; 16=Women) from the UEFA Champions League 2018-2019. The sample only included goal scoring opportunitties that took place in open play, excluding those that took place after a set piece (Corner kick, penalty kick, indirect free kick and direct free kick). For the selection of the sample, each match from the qualying matches of each tournament was assigned a number from 1 to 29. An online random number generator Research Randomizer 4.0; Urbaniak and Plous, 2013) was used to select 16 matches from each tournament. The selected matches were downloaded from the Wyscout platform (Wyscout Spa, Italy)

It was considered that a scoring opportunity was created when the team had a chance of scoring a goal during the team possession. This includes:

- All shots produced inside the score pentagon (Figure 1)
- All shots produced outside the score pentagon

that passed near the goal (2 meters or less with respect to the nearest goalpost).

- All chances of shooting inside the score pentagon as long as the player was facing the goal, there were not any opponents between him and the goal, as well as the player had enough space and time to make a playing decision (González-Rodenas, López-Bondia, Calabuig, Pérez-Turpin, & Aranda, 2017).

The score pentagon is defined as the zone within the official soccer field that selects the space with high shooting angle and short distance to goal (20 meters or less), which are very important factors to achieve a goal (Pollard & Reep, 1997: Pollard, Ensum & Taylor, 2004) (Figure 1)

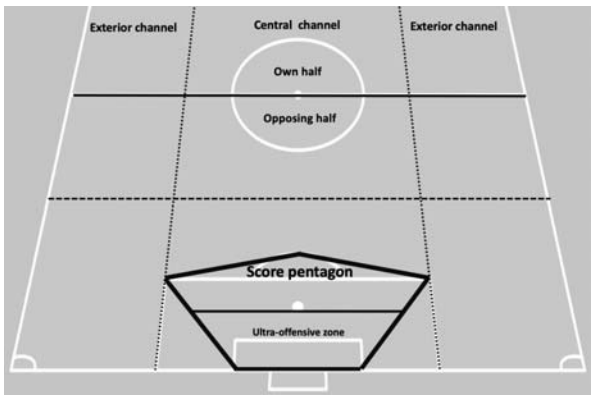

Figure 1. Field zones, score pentagon, ultra-offensive zone, and exterior channels

Dimensions

A total of 11 tactical dimensions and 17 categories selected from the REOFUT observational framework (Aranda, Gonzalez-Rodenas, Lopez-Bondia, Aranda-Malaves, Tudela-Desantes & Anguera, 2019) were analyzed to describe the start, development and the end of the team possessions (Tables 1, 2 and 3).

Match performance analysis

The study was based on systematic observation (Anguera & Hernandez-Mendo, 2013) and its design is nomothetic (several games), point (one game for each pair of teams, and within-session recording throughout the game), and multidimensional (the dimensions correspond with the criteria of the observation instrument). Lince software was used to register and save the data (Gabin, Camerino, Anguera & Castañer, 2012).

For the analysis, a soccer coach/researcher experienced in match performance analyzed each possession post-event as many times as necessary. Regarding the reliability of the data, inter-observer and intra-observer analysis were performed by analysing 80 team possessions (10% of the sample). In this sense, this analysis showed good and very good level of reliability according to Altman criteria (1991) (inter-observer kappa coefficient=0.86-1.00; intra-observer kappa coefficient = 0.88-1.00).

Table 1.
Operational definitions of the categories analyzed in this study during the possession start.

Dimension	Category	Definition
Initial Zone	Opposing half	The team possession starts in the opposing half of the opponent (Figure 1)
Initial defensive behavior	Initial Pressure	One or several opponent players pressure the attackers within the first three seconds of the possession (the defender(s) are always located within 1.5 meters of the first attackers) (Lago Ballesteros, Lago & Rey, 2012).
Initial offensive behavior	Initial penetration	Passes or dribbles towards the opponent´s goal past opponent player (s) performed during the first three seconds of the ball possession

Table 2.
Operational definitions of the categories analyzed in this study during the possession development.

Dimension	Category	Definition
Style of play	Counterattack	a) The possession starts by winning the ball in play. b) The progression towards the goal attempts to utilize a degree of imbalance right from start to the end with high tempo (Tenga, Kanstad, Ronglan, & Bahr, 2010). c) The circulation of the ball takes place more in depth than in width and the intention of the team is to exploit the space left by the opponent when they were attacking. d) The opposing team does not have the opportunity to minimize surprise, reorganize his system and be prepared defensively.
	Combinative attack	a) The possession starts by winning the ball in play or restarting the game. b) The progression towards the goal has a high percentage of non-penetrative and short passes. c) The circulation of the ball takes place more in width than in depth (Sarmento et al., 2018) and the intention of the team is to disorder the opponent using high number of passes and relatively slow tempo (Evaluated qualitatively). d) The opposing team has the opportunity to minimize surprise, reorganize his system and be prepared defensively
	Fast attack	a) The possession starts by winning the ball in play or restarting the game b) The progression towards the goal has high percentage of penetrative passes and short passes c) The circulation of the ball takes place in width and depth (Sarmento et al., 2018) but the intention of the team is to disorder the opponent with a reduced number of passes and high tempo (Evaluated qualitatively). d) The opposing team has the opportunity to minimize surprise, reorganize his system and be prepared defensively.
	Direct attack	a) The possession starts by winning the ball in play or restarting the game. b) The progression towards the goal is based on one long pass from the defensive players to the forward players (evaluated qualitatively). c) The circulation of the ball takes place more in depth than in width and the intention of the team is to take the ball directly near the goal area to have opportunities of finishing by using reduced number or passes and high tempo. d) The opposing team has the opportunity to minimize surprise, reorganize his system and be prepared defensively.
Possession length	Duration of the attack	Duration of the offensive sequence (in seconds) from the moment the ball is gained by the offensive team to the moment the scoring opportunity takes place.
	Passes per possession	Quantitative number of passes made during the team possession.
Possession tempo	Passing tempo	Average duration (in seconds) that elapses between passes made during the team possession.
Possession directness	Percentage of penetrative passes	Percentage of penetrative passes made during the team possession with respect of the total number of passes.

Table 3.
Operational definitions of the categories analyzed in this study during the end of the team possession.

Dimension	Category	Definition
Final Zone	Inside Score Pentagon	The scoring opportunity took place inside the score pentagon (Figure 1)
	Inside the ultra-offensive zone	The scoring opportunity took place inside the ultra-offensive zone (Figure 1)
Type of finishing	Header	The final player shoots at goal with the head.
	Finishing on the ground	The final player shoots at goal while the ball is on the ground.
Final defensive behavior	Final pressure	One or several opponent players pressure the attackers during the last action of the possession (the defender(s) are always located within 1.5 meters of the attacker) (Lago Ballesteros, Lago & Rey, 2012).
Success	Attempts per match	Number of scoring opportunities created per match (excluding set pieces)
	Goal Conversion	Percentage of scoring opportunities that achieved goal.

Statistical Analysis

Data was transcribed to a database created in the SPSS 20.0 program (SPSS, Chicago, IL). Descriptive statistics including means and standard deviations for each dependent variable were calculated. Data represents the mean percentage of scoring opportunities per match that teams created by means of each tactical dimension. A previous Kolmogorov-Smirnov test was carried out to determine the use of parametric analysis (p Ã.05). StudentT test was used to compare each mean between men and women. Also, the effect sizes of the differences were calculated by means of the Cohen´s *d* (small effect, $d = 0.2$; medium effect, $d = 0.5$; and large effect, $d = 0.8$)

Results

Descriptive analysis

Table 4 shows the descriptive statistics of all the dimensions analyzed in each team possession, as well as which of them presented differences between men and women.

For the possession start, it was most frequent to initiate the team possessions against initial defensive pressure (55.77±22.57%) and performing penetrating actions (70.64±20.91%). For the possession development, the counterattack was the most frequent type of attack, followed by combinative attacks, fast attacks, and lastly, by direct attacks. The scoring opportunities sequences had an average of 16.85±6.50 seconds of duration and 5.45±2.43 passes, while the passing tempo indicated that a pass was made each 3.62±0.78 seconds. As far as the finishing process, there was an average of 9.60±4.82 scoring opportunities per team and match with a goal conversion of 12.06±10.53%. Finally, the majority of goal scoring opportunities took place inside the score pentagon and against opponent pressure.

Table 4.
Descriptive statistics of the tactical indicators and independent samples T test to compare between men and women.

Moment	Category	Mean (SD)	Men versus Women	
			P*	Cohen's D
Possession Start	Starting in the opposing half	51.00±24.14	.000	1.10
	Initial pressure	55.77±22.57	.007	0.68
	Initial penetration	70.64±20.91	.302	0.26
Possession Development	Duration	16.85±6.50	.041	0.51
	Passes per possession	5.45±2.43	.002	0.77
	Percentage of penetrative passes	25.90±14.10	.063	0.47
	Passing tempo	3.62±0.78	.000	0.94
	Combinative attack	25.85±17.86	.019	0.54
	Fast attack	23.90±17.50	.320	0.25
	Direct attack	8.44±10.37	.623	0.12
	Counterattack	41.39±24.90	.316	0.25
Finishing	Attempts per match	9.60±4.82	.841	0.05
	Goal effectiveness	12.06±10.53	.920	0.02
	Score pentagon	57.81±21.55	.991	0.01
	Ultra-offensive zone	24.60±16.83	.335	0.24
	Header	6.20±8.25	.669	0.10
	Shot ground	77.65±17.12	.688	0.11
	Final press	65.62±18.90	.976	0.01

Tactical differences between men´s and women´s soccer

When comparing between men and women, the independent samples T-Test revealed significant differences in six dimensions related to the start and development of the team possession, while no differences were found at the finishing process. In this regard, Figures 2, 3 and 4 show graphically the tactical differences observed in each dimension.

Figure 2 shows that men started in the opposing half the 38.07±16.82% of the team sequences, while in women this percentage was significantly higher (64.78±23.29%) (p=0.001; Cohen's *d*=1.10).

Also, this figure shows that men started the team possessions against defensive pressure less frequently than women (48.67±21.77% vs 64.18±20.88; p=.007),showing a moderate size effect (Cohen's *d*= 0.68).

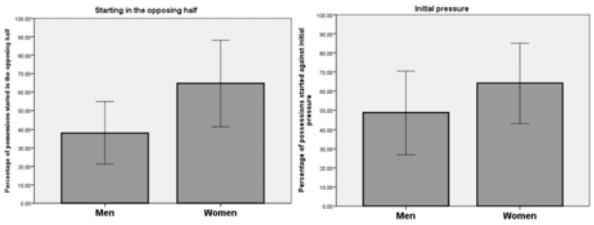

Figure 2. Bar graph showing the tactical differences between men and women regarding the A) initial zone of attack and B) the initial defensive pressure.

In Figure 3 can be observed the differences found between men and women in terms of duration of the attack and the style of play implemented. In this vein, men registered higher duration of teams possessions (18.48±6.58 vs 15.14±6.01 seconds; p=.41; Cohen's *d*= 0.51) and greater use of combinative attacks (30.83±16.55% vs 20.55±16.87%; p=.019; Cohen's *d*=0.54) than women.

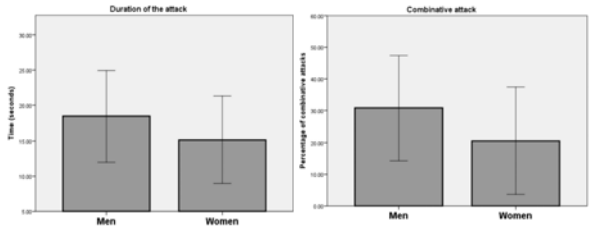

Figure 3. Bar graph showing the tactical differences between men and women regarding the A) duration of the attack B) the style of play implemented.

Finally, figure 4 shows the differences in the passing behaviour. On one hand, men performed an average of 6.36±2.41 passes per possession, while women made

4.48±2.08 passes (p=.002; Cohen's *d*=0.77). On the other hand, men registered a higher tempo when passing the ball (one pass each 3.2±0.6 seconds) than women, which made one pass each 4.0±0.8 seconds (p<.001; ES=0.94).

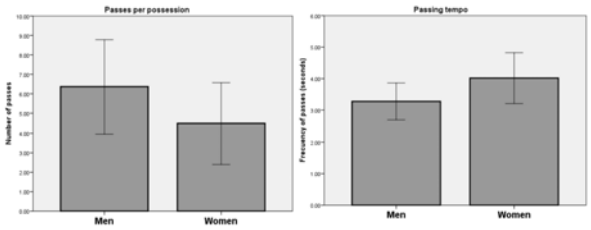

Figure 4. Bar graph showing the tactical differences between men and women regarding the A) passes per possession and B) the passing tempo.

Discussion

The aim of the present study was to describe and compare how goal scoring opportunities emerge in both men and women UEFA Champions League soccer matches. In this regard, our investigation found significant differences between men and women during the start and development of team possessions.

For the possession start, women initiated their team possessions more frecuently from the opposing half and against more opponent pressure than men (figure 2). In relation to these findings, Casal et al. (2020) observed that women's teams registered more interceptions, recoveries and turnovers won in the opposing half compared to men's teams in Spanish La Liga matches. These facts may reflect that women's teams built their scoring opportunities from more advanced zones of the field that men, which started building their team possessions more often from their own half. Our findings are in line with previous literature (González-Rodenas, Lopez-Bonida, Calabuig & Aranda, 2015; González-Rodenas et al., 2017) that observed how male teams started their scoring opportunities sequences more frequently from the own half, although other studies have also found a higher frequency of possession starts in the opposing half (Wright et al., 2011).

Our study also found that men registered longer duration, more passes and greater use of the combinative attacks than women (figures 2 and 3). These results also support the idea that men build their scoring opportunities with more combination and player participation than women, who seem to be more vertical and quicker to reach the opposing goal. Previous studies also found gender differences in the passing performance. In this sense, Bradley et al. (2014), who evaluated the match perfomance in UEFA Champions League, observed that women made fewer successful passess than their counterparts. Also, Hjelm (2011) analyzed the Swedish National teams and concluded that men performed more passes and more short passes than women, which performed more unsuccessful passes. In the same vein, a recent study of Casal et al. (2020) found that women teams in Spanish La Liga registered greater number of transitions related to lower number of successful passes, less passes per possession, as well as higher number of interceptions, defensive challenges, ball loses and recoveries. These tactical features may be due to the fact that playing more vertical in order to progress fast to the opposing goal may cause more risks and therefore, more unsuccessful actions, provoking more interchange of possessions between teams.

In addition to more duration and more passes per possession, our study found that men implemented a higher passing tempo (figure 4). Specifically, men made a pass each 3 seconds while women made it each 4 seconds, aproximately. This finding highlighs that not only men performed more passes, but the speed of the ball circulation between teammates was higher, what requires higher accuracy and ball control. This particular data also can mean that women may perform more or longer individual actions, what would reduce the quantity of passes and also the passing tempo during the team possession.

All these findings coincide in pointing out that in women's soccer the team possessions change more frecuently between teams due to mistakes and unsucessful actions. This fact may reflect the still early technical and tactical development of women's soccer due to its shorter trajectory in Europe in comparison with men's soccer. Also, it is worth mentioning that some tactical differences between men and women can be due to external and natural physical and physiological factors (Kinkerdall, 2007; Pedersen et al., 2019 Caballero-Ruíz, Carrasco-Legleu, De León, Candia-Luján & Ortiz-Rodríguez, 2019). For instance, female soccer players present largely lower performance in sprints, jumps and intermittent endurance than male players (Cardoso de Araujo, Baumgart, Jansen, Freiwald & Hoppe, 2020) as well as they produce less energy ratio to kick the ball (Sakamoto, Sasaki, Hong, Matsukura & Asai, 2014). This lower physical performance provokes that women have to use more energy not only to cover the same distance in the field but also to produce the same force and ball speed when kicking the ball than men, as the above studies demonstrated. These facts may contribute to induce fatigue earlier in the game,

lower the playing tempo and make higher number of mistakes, what create more shifts in the ball possession between teams (Pedersen et al., 2019). For this reason, the differences between men and women in soccer should be interpreted with caution and knowing that the spatio-temporal adaptations of women to the constraints of the game may not be equally compared to men. However, regardless of these factors, women's soccer has shown a notorius development in the last decades (Cardoso de Araujo & MieBen 2017) and it would be really interesting to analyze how women's soccer is going to evolve technically and tactically in the next 10 years.

Regarding the final actions, no differences were found in terms of finishing zone, finishing type, number of attempts or goal effectiveness. These results are in accordance with previous studies (Gómez, Álvaro & Barriopedro, 2009; Casal et al., 2020) that did not find noticeable differences between genders in the finishing process. Thus, both men and women show a similar way of finishing the scoring opportunities, hightliting the great proportion of shots taken from inside the score pentagon, with the feet and scoring an average of one goal each ten scoring opportunities.

This study has important limitations. On one hand, the fact of using observational methodology to register the technical and tactical aspects of the game may not capture the interactive, multifactorial and complex nature of soccer, as other authors have discussed (Glazier, 2010; Vilar Araujo, Davids & Button, 2012). On the other hand, following the work of Peterson et al. (2017), our study did not escale the demands of soccer according to physiological and physical differences between genders.

Nevertheless, this paper provides valuable insights on the tactical characteristics both in men's and women's soccer in high-level European teams. These insights can help coaches, sporting directors and soccer federations not only to design suitable training environments, but also to consider the possible regulations of rules to optimize the competition and performance in women's soccer.

As future areas of research, it would be very relevant to perform intervention studies in women´s soccer to check the effectiveness of several technical and tactical training regimes on the creation and production of goal scoring opportunitties.

To conclude, our study found tactical differences between men's and women's soccer during the start and development of team possessions that led to scoring opportunities. These differences highlight the fact that men implemented a more combinative style of play that included a higher passing tempo, while women progresssed to the opposing goal with shorter team sequences and slower passing tempo.

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