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Comparison of Home Advantage between Level 1 and Level 2 in Women's Football Leagues

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Abstract

Professional sports teams derive an advantage from playing at home; this phenomenon is known as home advantage. The aim of this study was to compare the magnitude of home advantage between levels 1 and 2 of women's football leagues. A total of 10 countries were included, each for the most recent 9 seasons, resulting in 31,186 matches analysed. A preliminary analysis of the results was carried out in order to assess the difference in home advantage between level 1 and level 2 for each country separately. A two-sided paired t-test was used and the effect size was reported using Cohen's d statistic. A general linear model was fitted and after adjusting for differences between seasons and between countries, the main finding was that there existed a small, yet significant difference between the home advantage of the two levels, with level 2 (mean of 55.5%) higher than at level1 (mean of 54.6%). The results therefore suggest that in women's football there occurs the same phenomenon that has been shown to exist in women's water polo and handball, and in men's football. Some of the main factors that have been found to explain home advantage in men's football appear to operate in a slightly different way when applied to women's football. These are crowd support, familiarity, referees bias, travel effects and psychological factors.

Keywords: *Home Advantage, Levels of Play, Match Location, Performance Analysis, Soccer*

Introduction

Professional sports teams derive an advantage from playing at home. This has been shown to exist for a wide variety of professional sports, all over the world, and for both male and female teams (Pollard, Prieto, & Gómez, 2017). This phenomenon, known as home advantage, has been extensively researched over the last 40 years, a brief summary of which is given by Leite & Pollard (2018), with a special emphasis on football.

In football, and in other sports leagues, home advantage can be represented by the ability of the home team to attain more than 50% of all points gained in an official competition with a balanced schedule, that is one in which each team plays each other team the same number of times at home and away over the course of a league season (Courneya & Carron, 1992; Pollard, 2008a).

The worldwide presence of home advantage in football has been demonstrated by Pollard and Gómez (2014a) in an investigation that encompassed the national domestic leagues of 157 countries. Among the possible factors that lead to home advantage in football are the crowd support, travel effects, familiarity with the field of play, referee bias, territoriality and psychological factors (Pollard, 2008a; Pollard & Gómez, 2014a). It has been suggested that all these factors are likely to interact with each other and a model for their inter-relationship in football was proposed by Pollard and Pollard (2005).

Despite the extensive number of studies in men's football, research on the phenomenon of home advantage in women's football still is scarce and mainly limited to a comparison of home advantage in men's and women's football in 26 countries in Europe (Pollard & Gómez, 2014b). Home advantage in the women's leagues was found to exist, but at a significantly lower level than for men, a result that was similar to that found in a subsequent larger worldwide study of home advantage in football and other

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sports (Pollard, Prieto, & Gómez, 2017).

Some studies have compared the difference between levels 1 and 2 in men's football in different countries: Brazil (Almeida, Oliveira, & Silva, 2011); England (Pollard, 2006; Pollard & Pollard, 2005); France (Dosseville, 2007; Pollard, 2006); Germany (Pollard, 2006); Iran (Pollard, Armatas, & Sani, 2017); Italy (Pollard, 2006); Spain (Pollard, 2006; Sanchez, Garcia-Calvo, Leo, Pollard, & Gómez, 2009); Turkey (Seckin & Pollard, 2008). Most of these studies found a higher home advantage at level 2 than at level 1, based on a wide range of national league data going as far back as to 1892 in England. The full results of these studies are summarized by Leite & Pollard (2018) who also made a comparison of home advantage at the top two levels of the national leagues in 47 countries worldwide. Their conclusion was that home advantage was significantly more likely to be higher at level 2 than at level 1.

Only two studies could be identified in which a specific comparison of home advantage was made at different levels in women's sport. One was in Spanish water polo in which, over a four-year period starting in 2007-08, the second division (55.3%) had an overall higher home advantage than the first division (52.1%). The overall results of the study found home advantage for men to be significantly higher than for women, and home advantage at level 2 to be significantly higher than at level 1 (Prieto, Gómez, & Pollard, 2013). For the women's leagues the mean home advantage at level 1 was 52.1% compared with 55.3% at level 2. The other study involved Spanish handball, analysing the results of men's and women's leagues at two levels of play from 1997- 98 for the 11 seasons ending 2007-08 (Pollard & Gómez, 2012). As with the handball report, home advantage was higher for men than for women and higher at level 2 than at level 1. The mean home advantage for the women's league were 57.8% at level 1 and 60.5% at level 2.

The vast majority of published work on home advantage is based on men's sports and to our knowledge, there have been no reports comparing home advantage at different levels of play in women's football. Hence the motivation for the present study which will compare the magnitude of home advantage between levels 1 and 2 in all countries which operate national women's football leagues at more than one level. The more general aim will be to throw new light on the phenomenon of home advantage as it applies to women's sports.

Methods

Scope

The study was developed through the analysis of the 2 main levels of women's football in each country for which the data were available. The home and away league tables were obtained from the website (www.soccerway.com). The last nine complete seasons of the leagues in which there was a balanced schedule were analyzed. For national leagues that start and finish in a single calendar year, the seasons from 2011 to 2019 were included; for those that overlap years, the seasons 2010-11 to 2018-19 were used. A total of 10 countries were included, resulting in 31,186 matches analyzed.

Home advantage

Home advantage was quantified by the method first proposed by Pollard (1986) for calculating the advantage of playing at home, during a league in a full season for sports in which the draw is a possible result of a match. FIFA currently mandates three points for a win and one point for a draw. The advantage of playing at home is then calculated as the number of points earned by teams playing at home, expressed as a percentage of total points earned in the league, at home and away. Thus, a value of 50% represents no home advantage since the same number of points is won at home and away. The greater the value above 50%, the greater the advantage derived by the home team.

Analysis

A preliminary analysis of the results was carried out in order to assess the difference in home advantage between level 1 and level 2 for each country separately. A two-sided paired t-test was used and the effect size was reported using Cohen's d statistic. The original and still the usual interpretation of the magnitude of an effect size was used: small below 0.5, moderate between 0.5 and 0.8, and large above 0.8 (Cohen, 1988).

A general linear model was then fitted to the data using the statistical software Minitab 18. Home advantage each season was the dependent variable, with country, season and level as the three explanatory variables. This allowed the overall effect of each variable to be quantified and assessed in the presence of the other variables, with the results presented in a standard ANOVA table.

Results

The initial analysis revealed that for seven of the ten countries, home advantage was greater at level 2 than at level 1. However, only Poland had a difference with a p-value below 0.05. The effect size for this country was strong (0.82), while for France and for Turkey it was considered as moderate (above 0.50). For these three countries, home advantage at level 2 was higher than at level 1.

Table 1. Comparison of mean home advantage (%) between level 1 and level 2 over nine seasons in women's national leagues by country

Country	Level 1	Level 2	Difference	p	n_1	n_2	Effect size
Belgium	57.00	55.38	1.62	0.399	1512	1982	0.30
Denmark	53.01	54.00	-0.98	0.479	640	914	0.25
France	53.43	55.25	-1.82	0.143	1188	3150	0.54
Germany	53.57	54.40	-0.83	0.650	1188	2294	0.16
Iceland	52.76	53.78	-1.03	0.620	810	994	0.17
Italy	53.93	53.49	0.43	0.729	1554	4604	0.12
Norway	55.99	58.05	-2.06	0.247	1188	1144	0.42
Poland*	53.70	56.05	-2.35	0.039	1020	1591	0.82
Sweden	58.34	57.48	0.86	0.389	1166	1780	0.30
Turkey	53.88	57.23	-3.35	0.126	788	1679	0.57

Note: n_1 and n_2 are the total number of matches during the nine seasons at each level; * Country with a significant difference between level 2 and level 1 ($p<0.05$).

The results of the general linear model are summarized in Table 2. There was a difference between countries ($p<.001$) and also between levels ($p<0.05$), but not between the seasons. The results for each variable allow for the simultaneous effects of the other variables. Thus, after adjusting for differences between the seasons and between countries, the mean home advantage for level 1 was found to be 54.6% and the mean for level 2 was 55.5% The proportion of the variability in the home advantage values accounted for by the combined effect of the three explanatory variables (season, country and level) was 23%.

Table 2. ANOVA table summarizing the results of fitting a general linear model to quantify the effects on home advantage of country, level of play and season

Source	df	Adj SS	Adj MS	F	p
Country	9	407.35	45.262	4.37	0.000
Level	1	40.66	40.659	3.93	0.049
Season	8	50.60	6.325	0.61	0.768
Error	161	1666.33	10.350		
Total	179	2164.94			

Discussion

The aim of this study was to compare the magnitude of home advantage between levels 1 and 2 of women's football leagues. The main finding was that there existed a small, yet significant difference between the home advantage of the two levels, with level 2 higher than at level1. This result was based on the leagues of 10 countries over the last 9 seasons. The results therefore suggest that in women's football there occurs the same phenomenon that has been shown to exist in women's water polo and handball, and in men's football, where home advantage at level 2 usually is greater than at level 1.

This information may help anticipate match scenarios in a particular league and could be used by coaches in their match preparation and training process (Almeida & Volossovitch, 2017). In this sense, the main causes of home advantage will be discussed as possible explanations for differences found between level 1 and level 2 specifically in women's football leagues.

Crowd support

Female football players have highlighted the crowd as one of the most important causes of home advantage. They have felt that a supportive home crowd is positive for individual and team performance (George, 2015).

According to George (2015), female football players noted that a supportive home crowd was a positive factor and reduced feelings of pressure. In particular, cheering seemed to have a beneficial effect upon players as it increased their positive thinking. Interestingly, some participants in the study seemed to prefer a small crowd at home as they felt that it was more supportive and less intimidating. Additionally, these participants felt less pressure to perform in front of fewer spectators. According to Perkins (2017), if a crowd is big, intense and is near the female players and coaches, it could distract them and cause them to lose focus on the match. Thus, as women's football at level 2 certainly has a much smaller audience than at level 1, the results are plausible in accordance with the players' testimonies.

There are some other possible explanations for crowd support and its influence on home advantage at lower levels of women's football. According to Leite & Pollard (2018), the better supported teams in a country are likely to be at level 1 and a sizeable number of these supporters will travel to away matches, thus providing a more balanced level of crowd support than might be expected at level 2. Furthermore, away players at level 1 may have been better trained to cope with the atmosphere created by a hostile home crowd (Leite & Pollard, 2018).

Usually, in football matches there is a smaller audience at lower levels than at level 1. Although level 2 may have less crowd support, another possible explanation is that spectators at lower level games are more vocal and more hostile towards visiting teams. Smaller more intimate stadiums, with the crowd closer to the field, also may produce a more unified support in favour of the home team and create a more intimidating atmosphere even with lower attendances (Almeida et al., 2011; Leite & Pollard, 2018; Pollard et al., 2017).

The data of Almeida and Volossovitch (2017) showed that there is bigger home advantage in amateur (60.4%) and semi-professional (60.5%) level than in professional level (58.3%) in Portuguese football, even with attendances of up to over 60,000 spectators in some matches of professional level.

Familiarity

When playing at home, a team will be familiar with local conditions which include climate, altitude, and the playing surface, as well as the alignment of the pitch with familiar cues inside the stadium, among other factors. All in addition to a pre-match routine that will be the same at all home matches (Leite & Pollard, 2018).

Almeida and Volossovitch (2017) suggest one of the factors of the decrease in home advantage is that the competitive conditions have become more standardised (e.g. league structure and pitch dimensions). However, these changes probably start at level 1 and only later they are implemented at level 2. As we could verify during the data collection, level 2 women's leagues show more differences than level 1 in such factors as greater quantity and greater variation in number of teams, greater variation in league format as well as possible differences in the size of the playing field and the stadiums themselves.

Almeida et al. (2011) also suggest that the playing fields of level 2 are worse than those of level 1, and generally the teams of level 2 train in the same field in which they play, which can increase knowledge about the field and playing surface, and expand home advantage for these teams. In addition, the physical structure of the stadiums also tends to be less comfortable at level 2 than at level 1. This can inhibit away teams from preparing properly before and during the interval of matches.

Referees bias

There is overwhelming evidence that referee decisions favour the home team (Pollard, 2008a). The findings of the study by George (2015) revealed that female players perceived the referee to be a significant factor. Importantly all study participants felt that the referee's decision-making provided them with an advantage when playing at home. The participants highlighted their feeling that the referee was more likely to award arguable decisions to the home team. In the same way, the results showed that when participants played away, they felt that the referee provided

the opposition with an advantage.

Level 1 has better and more prepared referees than at level 2. Thus, it is likely they are better able to make decisions without being influenced by the noise of the home crowd (Almeida & Volossovitch, 2017). Thus, this being a relevant aspect for home advantage, the referees at level 2 (for being less prepared, technically and/or psychologically; for having a more hostile crowd in favour of the home team, and for having a crowd closer to the field due to smaller stadiums) will be more influenced by home crowd support, even if subconsciously.

According to Leite & Pollard (2018), the recent introduction of a video assistant referee (VAR) to enable certain referee decisions of important consequence to be reviewed, will in theory correct a decision seen to be clearly wrong. If subconscious referee bias influenced by the noise of the home crowd does exist, causing referees to unjustly penalize away players, or favour home players, then these decisions will be reversed and one of the effects of VAR could be to reduce home advantage. On the other hand, it is unlikely that VAR technology is yet introduced in most national women's leagues and when this occurs it is likely to be introduced initially in the major leagues at level 1.

Travel effects

For a long time, the effects of travel have been identified as a possible cause of home advantage. According to Marques (2002), the improvement of communication modes and transport decreased fatigue of players in travel to away matches. In continental European countries, which have a well-developed transport infrastructure, travel became faster, safer and more comfortable (Drummond, Drummond & Silva, 2014). However, as a consequence of lesser financial support, probably lower-level football players travel less comfortably than players in the main leagues.

As the evidence for a travel effect disadvantaging the away team is inconclusive (Pollard, 2008a), the disruption in the players' routine can be another important aspect when a team plays away. The study by George (2015) found that for female players travel, regardless of how long the time travelled, was perceived as disruptive. Female athletes expressed that they felt less physically and mentally prepared for matches when they had to travel (Vealey, 2001).

We can also speculate that the teams of level 1 have a largest support team (as well as financial support) than the teams of level 2. Thus, the organization of the away matches will be better (travelling in advance, better hotels, among other factors), leaving the players more comfortable and more focused on the match, each match being prepared in more detail.

For female athletes, the pre-match routine, when performing at home, was identified as a key type of confidence emphasising its effect on home advantage (Owen, 2009). Key aspects of preparation were identified as sleep, breakfast and relaxation time. At home, female players indicated the benefits of not travelling which allowed preparation and routine to be kept the same. In the same way, all participants said that travelling to play away was disruptive and interfered with their preparation and routine (George, 2015).

The findings of Almeida & Volossovitch (2017) indirectly suggest a negative relationship between distance travelled and the magnitude of home advantage in Portugal. In this country, amateur teams only played in their district, semi-professional teams were grouped by geographical location (e.g. south, centre and north), and professional teams played across the whole country, including the islands. Therefore, fatigue caused by long and/or uncomfortable travels does not appear to be a relevant cause. In this sense, the interruption in the players' routine can be the main aspect related to travel.

Psychological factors

Performance analysis research in team sports has shown that most teams that play on their home venues have a psychological advantage over their rivals (Campos, Stanganélli, Campos, Pasquarelli & Gómez, 2014).

The study of George (2015) sought to investigate female football players' perceptions of playing at home and away as well as examining how playing at home or away influenced their levels of confidence. The results showed that overall the female football players believed that home advantage existed and felt that they experienced a positive psychological state at home. Importantly all participants expressed feelings of greater happiness, comfort, and higher levels of confidence when playing at home.

Another probable contributor to the home advantage differences could be the players' level of expertise (Almeida & Volossovitch, 2017). Thus, players at level 1 are psychologically better prepared to face challenges and pressure. In this same sense, players less able to cope with the additional pressure involved in away matches could be weeded out in the selection process, never reaching the professional status (Pollard & Gómez, 2015).

Limitations of the study

This study contains some limitations due to the sparse data available on women's football: (i) it was not possible to include more countries, as there were no data available that met the inclusion criteria; (ii) in some countries and in some seasons, the level 2 leagues (although always having a completely balanced schedule) were played in smaller regional leagues. In addition, in some countries there was also variation in the number of teams between some seasons, although the playing schedule in all leagues was still balanced; (iii) it was not possible to quantify the attendance for leagues, since data were not available; (iv) the travel distances have not been calculated; however, none of the countries; were especially large and none involved different time zones (v) the competitive balance within in each league was not considered.

Practical and coaching application

Research on home advantage in women's sport is still limited, especially in football. This is the first study to compare different levels in women's football. Although it has been suggested that the same factors influence home advantage in men's and women's football, it was now possible to identify the main factors and the way they seem to specifically affect women. The importance of home advantage has been confirmed for teams at level 1 and, especially, for teams at level 2. Thus, coaches, managers and female players at both levels of play can better understand this phenomenon in women's football, try to make adjustments for a better adaptation, and try to minimize the adverse affects that can be found in away matches. Specific recommendations for coaches, both to exploit and minimize home advantage, have previously been proposed (Pollard, 2008b; Wolfson & Neave, 2004),

Conclusion

This study has compared the magnitude of home advantage between levels 1 and 2 of women's football leagues of 10 countries over the last 9 seasons. The main finding was that there existed a small, yet significant difference between the home advantage of the two levels, with level 2 (mean of 55.5%) higher than at level1 (mean of 54.6%). In the context of women's football, factors that could explain this result include: (i) crowd support: spectators at level 2 being more hostile and vocal towards visiting teams; (ii) familiarity: playing fields of level 2 being worse than those of level 1, and generally the teams of level 2 training in the same field in which they play; (iii) referees bias: the referees at level 2 being less prepared and likely to be more influenced by home crowd sup-

port, even if subconsciously; (iv) travel effects: the disruption in the players' routine and the discomfort of travel being an important aspect when a team plays away, with these effects being more pronounced at level 2; (v) psychological factors: players at level 1 being psychologically better prepared to face the challenges and pressure of playing away than players at level 2.

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Conflict of Interest
The authors declare that there are no conflicts of interest.

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