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ORIGINAL

EFFECT OF BEING THE ORGANIZER OF A HANDBALL WORLD CHAMPIONSHIP IN TEAM PERFORMANCE

EFFECTO DE ORGANIZAR UN CAMPEONATO DEL MUNDO DE BALONMANO EN EL RENDIMIENTO DEL EQUIPO

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ABSTRACT

When a team plays at home seems to get some advantage. This effect is called *home advantage* (HA) and has been widely studied in league competitions, but little in competitions in a single venue. 4.340 games played in all Handball World Championships since 1936 to 2011 were analyzed. The variables registered were games won, games drawn, games lost, the number of goals scored and goals against and the gender of the competitors. The HA (mean±sd) in the World Handball Championships is 67.9±0.23, for the male category and 71.2±0.27 for the female. A significant association exists between HA, the points obtained in a competition and the final classification of a team.

KEYWORDS: Home advantage, handball, performance analysis.

RESUMEN

Cuando un equipo actúa como local parece tener cierta ventaja. Este hecho se denomina *home advantage* (HA) y ha sido muy estudiado en competiciones de liga, pero poco en competiciones de sede única. Se analizaron 4.340 partidos disputados en todos los Campeonatos del Mundo de balonmano disputados hasta 2011. Las variables registradas fueron: partidos ganados, empatados, perdidos, número goles marcados y recibidos y sexo de los competidores. La HA en los Campeonatos del Mundo de balonmano es de $67,9 \pm 0,23$ para la categoría masculina y de $71,2 \pm 0,27$ para la femenina. Existe una asociación entre la HA, los puntos obtenidos y la clasificación final del equipo.

PALABRAS CLAVE: Ventaja de jugar en casa, balonmano, análisis rendimiento.

INTRODUCTION

Koppet (1972) proved scientifically the existence of an advantage of teams or athletes that participate in a competition as a home team or athlete. This effect is called *home advantage* (Bray, Obara & Kwan, 2005).

Since then investigations have tried to analyze this effect. Schwartz and Barsky (1977) established in their investigation the advantage of playing at home in professional baseball (53%), professional football (60%), professional hockey (64%) and university basketball (64%); Edwards (1979) calculated the advantage of playing at home in professional football (54,4%), university football (58,6%) and professional baseball (55,6%); Varca (1980) established in university basketball an advantage of playing at home of 70%, in NBA basketball (63,3%), in NHL hockey (59,9%), in American football (55%) and in American baseball (53,6%).

In basketball there are also studies that prove the existence of an advantage when playing at home, obtaining 64% of victories for male home teams (Courneya & Carron, 1992). In the Spanish professional league, the ACB has nearly 55,22% of victories when playing at home (García, Sáez, Ibáñez, Parejo & Cañadas, 2009) and 60% of teams in the WNBA and Italian female league (Gómez, Jiménez, Sánchez & León, 2008).

In other sports this effect has also been studied, such as baseball (Adams & Kupper, 1994; Dosseville, 2007; Levernier & Barrilla, 2007), football (Carmichael & Thomas, 2005; Dosseville, 2007; Pollard, 2002; Saavedra, Gutiérrez, Fernández & Sa, 2015; Sánchez, García-Calvo, Leo, Pollard &

Gómez, 2009; Seckin & Pollard, 2007; Thomas, Reeves & Davies, 2004; Thomas, Reeves & Smith, 2006), basketball (Greer, 1983; Jones, 2007; Moore & Brylinsky, 1993; Varca, 1980), volleyball (Marcelino, Mesquita, Palao & Sampaio, 2009) and rugby (Page & Page, 2010; Preez & Lambert, 2007; Thomas, Reeves & home, 2008).

All of these previous studies have not only analyzed the competitions disputed under a league system, but also it is known that in an eliminatory of round robin, the team that plays the home game in the return have more than a 50% probability of classifying (Page & Page, 2007).

Among the elements that contribute to the existence of playing at home Neville and Holder (1999) establish four main factors: the influence of the public, the familiarization with the conditions of the field of play, the reduction in the time of travelling and the factors related with the rules.

Other factors that may also be important in playing at home have also been studied. In the analysis of the influence that the distance travelled has a lineal relation between the places of the English football clubs (Clarke & Norman, 1995).

The influence of the quantity of fans was studied in eight English and Scottish football divisions, analysing the relation between the assistance of the public and the average amount of sending offs and fouls in favour of the home team (Nevill, Newell & Gale, 1996). The partiality of the referee has been analysed valuing the influence of the noise of the spectators in the decision making of the referee in favour of the home team in football (Boyko, Boyko & Boyko, 2007; Nevill, Balmer & Williams, 2002).

The territoriality and the hormonal factors were analysed in a total of 30 international matches and the authors concluded that a higher level of testosterone existed in local teams compared to matches played further away from home (Neave & Wolfson, 2003).

Recent investigations suggest that when studying the *home advantage* it is necessary to take into account the quality of the opposition (Sampaio, Drinkwater, & Lago, 2010) and the final classification of each team (Lago, 2009; Lago & Martín, 2007).

In handball various studies have analysed the *home advantage*. Strauß and Bierschwale (2008) analysed the 1st German league from 1997 to 2000 and concluded that there was a home advantage of 66.26%. In the Spanish league, the study by Gómez, Pollard and Luis-Pascual (2011) of nine professional teams in five seasons obtained values of 61,13%. Also in the Spanish handball league Gutierrez, Saavedra and Fernández (2012) analysed all matches disputed in the national categories (three male and two female) between the

1997/98 and 2007/2008 seasons, obtaining a 61,3% home advantage. However all of these studies have been done in competitions with a round robin format.

The handball World Championships has the following format. The competition is divided in two phases: a return classification in which competitions are played in groups and the teams compete in the same number of matches as a home and away team and the final phase, which is played in a single venue and only one team play as the home team (or two). This last phase is the one which is taken into account in this present study.

The objectives of this present study were the following: (i) determine the existence of the advantage of playing at home in the Handball World Championships, to see if a sport advantage is obtained, (ii) determines if there are any differences in the values obtained between genders, (iii) analyse the performance variation in the teams that play as a home team and (iv) observe the level of a team and its influence in the *home advantage*.

METHOD

Participants

The sample of the study is about a total of 22 World Championships (male and female) which constitutes all competitions played until 2011. Only 291 of the 4.340 games played were organized by the home country.

Variables

The variables registered were games won, games drawn, games lost, the number of goals scored and received, the number of goals scored and received per game and the gender of the competitors.

The information used was obtained from the following internet link: www.ihf.info.

Calculation of the advantage of playing at home

The championships with one (or two) venues, such as the World Championships (WC) only have one home team (or at the most two). In these types of competitions, the *home advantage* is quantified as the number of games won by the teams of the venue country in the competition, expressed as a percentage of the total number of games played, quantifying the number of points won at home as a percentage of the total points obtained (Pollard, 1986). When an analysis of the *home advantage* is done, independently for each team the home performance is compared with the away performance. This analysis can be done with the percentage of games won at home and away, understanding draws as half victories.

The significance level of the *home advantage* was calculated with the variables of points obtained as a home team, supposing that the void hypothesis that there is no advantage for home teams is true (Pollard, 1985, 1986), meaning that one of every two games played at home will be won (50%). The contrast was made using the sign test and the Wilcoxon sign range test. The comparisons between the advantage of playing at home in male and female competitions were made using the Mann-Whitney test. The bivariate correlations of Pearson and Spearman were used to establish the level of association between the classification of a team and the number of points obtained with the advantage of playing at home. In all cases the level of significance was less than 5% ($p<0,05$).

RESULTS

The *home advantage* in the WC is statistically significant ($p<0,001$) with a value of $69,4\pm0,25$. In the male categories of the WC the home advantage is about $67,9\pm0,23$ and in the female category the *home advantage* is about $71,2\pm0,27$. (Table 1).

Table 1.-Advantage of playing at home in handball World Championships.

Years Events	Played (As home team)	Number of games			HA	Wilcoxon	
		Won	Drawn	Lost			
1936-2011		291	195	14	82	69,4	0,25
22 Events	Male	154	100	9	45	67,9	0,23
18 Events	Fem.	137	95	5	37	71,2	0,27

* Statistic significance with the Wilcoxon range test

Influence of being the organizing country of the event and the number of goals scored and received

No significant differences were found between the number of goals scored per game and the teams that belonged to the organizing country and the rest of the teams neither in male ($p<0,235$) nor female categories ($p<0,915$). However, significant differences were found in the goals received per game, in both male ($p<0,001$) and female categories ($p<0,020$). The teams that belong to the organizing countries received fewer goals than the rest of the teams.

Table 2.- Goals per game scored and received in teams (local) and non belonging (visitors) of the organizing country.

Goals in favour per game					
Gender	Condition	Goals / game	KS/KSL	Levene	Sig. test T
Male	<i>Local</i>	21,7±5,6	0,111 ^a	0,921	0,234 ^c
	<i>Visitor</i>	23,1±5,2	0,152 ^a		
Female	<i>Local</i>	20,5±8,5	0,200 ^a	0,593	0,914 ^d
	<i>Visitor</i>	20,9±7,7	0,047 ^b		
Goals against per game					
Gender	Condition	Goals / game	KS/KSL	Levene	Sig. test T
Male	<i>Local</i>	18,5±5,9	0,200 ^a	0,984	0,000^c
	<i>Visitor</i>	23,9±6,0	0,342 ^b		
Female	<i>Local</i>	17,8±7,9	0,200 ^a	0,765	0,019^d
	<i>Visitor</i>	22,1±7,9	0,009 ^b		

a Significance of the Kolmogorov-Smirnov test variant Lilliefors.

b Significance of Kolmogorov-Smirnov test.

c Significance of the T test for two independent samples.

d Significance of Mann-Whitney test.

Influence of the gender of the participants in the home advantage

No significant differences were found between the male and female categories in the WC. The home advantage is higher in the female categories in the World Championships (3% higher) (Table 3).

Table 3.- Differences in the advantage of playing at home between males and females

	Gender	HA	Average range	Significance of Mann-Whitney
World Championships	Male	67,9	21,32	0,920
	Female	71,2	21,70	

Influence of the level of a team in the advantage of playing at home

The level of a team was measured using the final classification in the WC, as well as the points obtained by each of the teams. This association is significant, in both male and female categories, shown in table 4. In all of the situations, the association is stronger (higher than 0,84) and inverse, which means that a better classification corresponds with more of an advantage in playing at home and vice versa.

The points obtained, also present a significant association, being direct and strong with the advantage of playing at home.

Table 4.- The association between the advantage of playing at home, the classification of a team and the points obtained in a competition

Competition	Classification		Points	
	Male	Female	Male	Female
Correlation of Pearson Significance	-0,914	-0,875	0,594	0,845
World Championships	<0,001*	<0,001*	<0,005**	<0,001**
Number of events	22	18	22	18

*Significance of Rho of Spearman.

**Significance of Pearson.

Comparison between the organizing countries and the same teams when they are not organizers of a handball World Championships

Significant differences were only found in Germany ($p<0,028$), Hungry ($p<0,044$) and Norway ($p<0,044$). These three countries have participated in many occasions in the World Championships and have been organizers at least once (Table 5).

Table 5.- Comparison between the organizing teams and the same teams when they were not the organizers of the handball World Championships

World Championships	HA (J-G/E/P) ¹	Organizing country		Non organizing country		Dif.	Sig.	Events
		Classification	%PG (J-G/E/P) ²	Classification	Dif.			
Germany	87 (23-20/0/3)	1,67 (1-2-3)	66,5 (124-77/11/36)	5,73	4,06	0,027*	3+15	
Austria	52,5 (8-5/3/0)	8 (8)	50 (85-41/3/41)	9,69	1,69	0,857	1+13	
Czechoslovakia	65 (20-11/4/5)	4,67 (3-4-7)	58,2 (98-53/8/37)	5,24	0,57	0,921	3+17	
Korea	28,6 (7-2/0/5)	11 (11)	50,7 (149-71/9/69)	11,50	0,50	0,952	1+20	
Croatia	73,3 (15-11/0/4)	8 (2-14)	69,2 (99-66/5/28)	6,92	-1,08	0,791	2+12	
Denmark	76,7 (15-11/1/3)	5 (4-6)	59,2 (201-115/8/78)	6,13	1,13	0,909	2+31	
Egypt	66,7 (9-6/0/3)	7 (7)	47,7 (66-30/3/33)	11,33	4,33	0,800	1+9	
France	68 (25-17/0/8)	5,67 (1-4-12)	66,3 (160-105/2/53)	5,55	-0,12	0,952	3+20	
Holland	28,6 (9-2/0/7)	9 (8-10)	41,9 (31-12/2/17)	10,00	1	0,571	2+5	
Hungry	70 (15-10/1/4)	2 (2-2)	60 (226-127/17/82)	6,38	4,38	0,043*	2+32	
Island	42,9 (7-3/0/4)	14 (14)	48,8 (82-38/4/40)	8,45	-5,55	0,333	1+11	
Italy	33,3 (6-2/0/4)	16 (15)	30 (5-1/1/3)	18,00	2	0,999	1+1	
Japan	33,3 (6-2/0/4)	15 (15)	28,8 (111-29/6/76)	14,20	-0,80	0,952	1+21	
Norway	87,5 (16-14/0/2)	2 (1-3)	59,2 (153-85/11/57)	7,59	5,59	0,043*	1+22	
Portugal	57,1 (7-4/0/3)	12 (12)	27,3 (11-3/0/8)	17,50	5,50	0,667	1+2	
R.D.A.	79,2 (12-9/1/2)	2,50 (2-3)	70,4 (71-46/8/17)	3,82	1,32	0,641	2+11	
R.F.A.	71,9 (16-11/1/4)	4,67 (3-4-7)	54 (75-38/5/32)	6,46	1,79	0,239	3+13	
Romania	90 (5-4/1/0)	1 (1)	60,9 (193-112/11/70)	6,66	5,66	0,211	1+29	
Russia	100 (10-10/0/0)	1 (1)	71,7 (138-94/10/34)	5,38	4,38	0,353	1+16	
Sweden	73,1 (26-19/0/7)	3,25 (1-3-4-5)	65,8 (155-100/4/51)	6,09	2,84	0,283	4+22	
Switzerland	35,7 (7-2/1/4)	11 (11)	54,7 (32-16/3/13)	8,00	-3	0,999	1+5	
Tunisia	65 (10-5/3/2)	4 (4)	32,7 (78-25/1/52)	14,92	10,92	0,154	1+12	
Soviet Union	78,6 (7-5/1/1)	2 (2)	74,2 (89-64/4/21)	3,71	1,71	0,800	1+14	
Yugoslavia	80 (10-8/0/2)	2 (1-3)	66,2 (148-91/14/43)	4,27	2,27	0,181	2+22	

1 Home Advantage (Played-Won/Drawn/Lost)

2 Percentage of points won(Played-Won/Drawn/Lost)

*Significance of the Mann-Whitney test

DISCUSSION

The objective of the present study was (i) determine the existence of the advantage of playing at home in the Handball World Championships, to see if a sport advantage is obtained, (ii) determines if there are any differences in the values obtained between genders, (iii) analyse the performance variation in the

teams that play as a home team and (iv) observe the level of a team and its influence in the *home advantage*.

The results obtained prove a *home advantage* value of 69,4% in these types of Championships, which agrees with the results obtained by Pollard (2008) who established a value of 64%.

Handball is a sport that has an objective score with a certain referee influence (Balmer, Nevill & Williams, 2001) the same as the rest of team sports. For this reason, the *home advantage* of the handball WC in male categories obtained in this present study (67,9%) which is comparable with values of other investigations. Comparing the values obtained with recent studies in these types of sports, results observed that in championships of this type there was a higher result than in league competitions, such as the Spanish professional basketball league, the ACB obtains 55,22% of won when the teams played at home (García, Sáez, Ibáñez, Parejo & Cañas, 2009) and 60% in teams in the WNBA and the female Italian league (Gómez, Jiménez, Sánchez & León, 2008). It's possible that the increment in the motivation of representing your own country on your home ground increments even more the benefits of the *home advantage*.

It may be that the fact that no differences between the advantage of playing at home in male and female categories may be because the international events that are analyzed are of a higher level, where the level of professionalism is maximum in both male and female categories. This coincides with the studies that present nearly 64% of the victories of the home teams in male basketball (Courneya & Carron, 1992) and 60% in teams in the WNBA and the female Italian league (Gómez, Jiménez, Sánchez & León, 2008).

When the teams act as a local team their offensive performance didn't vary, as the results obtained do not show significant differences between the number of goals scored per game between the organizing countries and the rest of the teams nor in the male category ($p<0,235$) nor female ($p<0,915$). On the other hand, it seems that the defensive performance as there were significant differences found between the number of goals received per game in both male ($p<0,001$) and female categories ($p<0,020$). The organizing countries received fewer goals than the rest of the teams. The defensive conduct in handball is associated with the state of mind of the players. Also a part from the technical-tactical qualities, defensive success is linked with the intensity of movements, defensive anticipation and contact with the opponent, questions that are all related with the attitude of the defender.

The level of a team was measured using the final classification in each tournament, as well as the points obtained by each of the teams in each tournament. This association is more significant (higher than 0,84) in the handball WC, in both male and females competitions. We can conclude that the higher the level of a team, the higher is the advantage playing as a local team,

which coincides with the studies of the level of the teams in the Spanish football league and the incidence in the *home advantage* done by Saavedra, Gutiérrez, Fernández and Sa, (2015) and Sánchez, García-Calvo and Leo (2008) who observe that the teams in the first division that finish in the top positions achieve a higher advantage playing at home with percentages of victories at 66,1%. These results agree with the work of Madrigal and James (1999) in basketball teams, in which they determined that the home advantage is higher when a team plays against a team at a different level and consequently, when the teams are of a similar level, the effect of playing a game as a home team supposes an advantage for obtaining a victory, this question is also confirmed by the work of Pollard and Gómez (2009).

CONCLUSIONS

The advantage of playing at home in the handball World Championships is about $67,9 \pm 0,23$ for the male category and $71,2 \pm 0,27$ in the female. However, no significant differences were found in the advantage of playing at home between genders.

A direct significant association is found between the advantage of playing at home and the points obtained in a competition. In the same way an inverse significant association between the advantage of playing at home and the final classification of a team was found.

To conclude, it is important to mention that there is a significant difference in the goals received per game. In both male ($p < 0,001$) and female categories ($p < 0,020$), the teams that belong to the organizing country received less goals than the rest of the teams, although in the number of goals in favour per game there were no significant differences found.

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