

A comparative analysis of home advantage in the Olympic and Paralympic Games 1988-2018

WILSON, Darryl and RAMCHANDANI, Girish <<http://orcid.org/0000-0001-8650-9382>>

Available from Sheffield Hallam University Research Archive (SHURA) at:

<https://shura.shu.ac.uk/22422/>

This document is the Accepted Version [AM]

Citation:

WILSON, Darryl and RAMCHANDANI, Girish (2018). A comparative analysis of home advantage in the Olympic and Paralympic Games 1988-2018. *Journal of Global Sport Management*. [Article]

Copyright and re-use policy

See <http://shura.shu.ac.uk/information.html>

A Comparative Analysis of Home Advantage in the Olympic and Paralympic Games 1988-2018

In this paper we examine the extent to which nations that are awarded the right to host the Olympic and Paralympic Games benefit from success in elite sport through a quantifiable home advantage or host nation effect. The prevalence and size of home advantage in the Olympic and Paralympic Games is investigated over 16 editions (eight Summer Games and eight Winter Games) between 1988 and 2018 at an overall nation level and within ten sports. These include seven summer sports (archery, athletics, cycling, fencing, shooting, swimming and table tennis) and three winter sports (alpine skiing, biathlon and cross-country skiing). Our study supports the prevalence of a statistically significant overall host nation effect in the Olympic and Paralympic Games, which is also evident in Olympic archery, Paralympic athletics, Paralympic table tennis and Paralympic alpine skiing. At the same time, our analysis illustrates that the size of this effect did not differ significantly between able-bodied and para-sport events. Nations that experienced a large home advantage effect in the Olympic Games also had a large home advantage effect in the Paralympic Games. Our research contributes to the study of the impacts of hosting international multi-sport competitions, including the largely overlooked area of the Paralympic Games.

Keywords: home advantage; performance; Olympics; Paralympics; multi-sport competitions

1. Introduction

As the costs associated with hosting major multi-sport competitions continue to escalate, the public expenditure required to host them is often justified in terms of their potential to generate a wide range of benefits for host countries. The International Olympic Committee (IOC, 2012) groups the proposed benefits associated with hosting the Olympic Games under five broad legacy themes: 'economic'; 'environmental'; 'sporting'; 'social'; and, 'urban'. The evidence to support legacy claims from hosting such events is however mixed. Indeed, a systematic review of literature by McCartney et al. (2010) found no conclusive evidence of positive health or socio-economic impacts on host populations resulting from major multi-sport events held between 1978 and 2008. In this paper we examine the extent to which nations that are awarded the right to host the Olympic and Paralympic Games benefit from success in elite sport through a quantifiable home advantage or host nation effect.

While different researchers have examined home advantage in these competitions separately (as will be evidenced in the literature review), the disparate nature of these studies means that they do not utilize a consistent definition of performance or success. Moreover, the analytical techniques employed and temporal dimension used in these studies are also not always uniform. By accounting for these shortcomings, our study improves upon previous isolated efforts in two ways. First, it allows a like-for-like assessment to be made of the prevalence and size of any home advantage effect in each competition. Second, it facilitates a genuine comparison of the findings between the Olympic and Paralympic Games. In our study we analyse 16 Olympic and Paralympic Games' editions from 1988 to 2018 using a standardised approach.

The rest of the paper is structured in the following order. We first review previous research on home advantage in international multi-sport competitions and studies that attempt to explain the causal factors that contribute to its occurrence, in order to develop and frame

the key research questions. The details of the methods used are then presented followed by the results obtained. In the final section, the key findings are discussed and direction for future research is proposed.

2. Literature Review

2.1. Home advantage in international multi-sport competitions

Studies concerning home advantage in international multi-sport competitions are seldom cited, or analysed as a separate category, in literature reviews (see Carron, Loughhead, & Bray, 2005; Courneya & Carron, 1992; Jones, 2013; Nevill & Holder, 1999). Nevertheless, there is now a critical mass of published academic literature concerning home advantage in these events. Most of this literature tends to focus on the Olympic Games, particularly the Summer Olympic Games. Clarke's (2000) macro-level analysis revealed that 14 of the 17 countries to have hosted the Summer Olympic Games between 1896 and 1996 had won their greatest ever percentage of available medals at home. He also found that host countries typically won a greater percentage of medals at home compared with both their historical away average as well as their average in the Games immediately before and after their home Games. Shibli and Bingham (2008) found that all host nations of the Summer Olympic Games from 1988 to 2004 won more gold medals and improved their medals' table ranking relative to the edition prior to being host. They calculated the average host nation effect to be worth seven gold medals. Subsequently, Shibli, Gratton and Bingham (2012) calculated that all host nations in the Summer Olympic Games between 1988 and 2008 increased the number of sports and disciplines in which they won medals compared with the pre-hosting edition - for sports this average is four and for disciplines the average is five.

Nevill, Balmer and Winter (2012) examined the number of medals won by the 14 countries that had hosted the Summer Olympic Games since the second world war until 2008.

Using a logit regression model, they estimated the host nation's odds of winning medals will increase in proportion (ratio) to 1:2.05 relative to its historical away average. The same authors carried out a study to assess the significance of home advantage for different event groups selected from the Summer Olympic Games between 1896 and 1996 (Balmer, Nevill, & Williams, 2003). They observed highly significant home advantage in event groups that were either subjectively judged (boxing and gymnastics) or relied on subjective decisions (team games). Similarly, Franchini and Takito (2016) provided evidence for the home advantage effect in five combat sports - boxing, fencing, judo, taekwondo and wrestling - contested during the Summer Olympic Games between 1996 and 2012 for total number of medals, gold and silver medals.

The prevalence of home advantage has also been documented in the Winter Olympic Games. Balmer, Nevill and Williams (2001) found a significant overall home advantage in the Winter Olympic Games during the period 1908-1998 when all events were combined, while controlling for nation strength, changes in the number of medals on offer and the performance of non-host nations. More recently, Pettigrew and Reiche (2016) analysed home advantage in the Summer Olympic Games during 1952-2012 and in the Winter Olympic Games during 1952-2014. Pooling together the Summer and Winter results, they found that Olympic hosts tend to increase their number of gold medals by 4.4 and their total medals by 7.4 relative to their medal count in the previous Olympics four years earlier.

Wilson and Ramchandani (2017a) were the first to examine home advantage in the Paralympic Games. They found clear evidence of a home advantage effect in the Winter Paralympic Games at country level and in the sports of alpine skiing and cross-country skiing. A subsequent study by the same authors also reported strong evidence of a home advantage effect in the Summer Paralympic Games at country level and in the sports of athletics, table tennis and wheelchair fencing (Wilson & Ramchandani, 2017b). Apart from

the Olympic and Paralympic Games, home advantage has been investigated and shown to exist in the Commonwealth Games and sport-specific differences in home advantage have also been observed in this competition (Ramchandani & Wilson, 2010, 2011, 2012).

2.2. Consideration of causal factors

According to the most well-researched model of home advantage conceived initially by Courneya and Carron (1992) and refined subsequently by Carron, Loughhead and Bray (2005), performance outcomes in sport are determined by four game location factors that differentially impact on teams competing at home or away from home, namely: the support of the home crowd; familiarity with the home venue; travel fatigue of the away team; and, competition rules that may favour the home team. These four factors contribute to the psychological states of competitors, coaches and officials, which in turn contribute to the behavioural responses of these individuals, which ultimately tend to favour home athletes and teams. We now review relevant literature on the influence of these game location factors in major multi-sport competitions.

Home advantage in some international multi-sport events has been documented as a result of referee bias in sports that require subjective scoring or judgments (Balmer *et al.*, 2001, 2003; Franchini & Takito, 2016; Nevill *et al.*, 2012; Ramchandani & Wilson, 2011, 2012). In their analysis of Great Britain's performance at the 2012 Summer Olympic Games in London, Nevill *et al.* (2012) reported that crowds appear to have had an important effect on influencing officials to favour the home athletes and hence increase their medal winning capacity.

Travelling across time zones for competitors from non-host nations can lead to jet lag and affect athletic performance (Reilly, Waterhouse, & Edwards, 2005). Moreover, the severity of jet lag and subsequent recovery is a function of the number of time zones crossed

(Pace & Carron, 1992). The problems of jet lag can last for over a week if the flight crosses 10 time zones or more, and they can reduce performance and the motivation to train effectively (Waterhouse, Reilly, & Edwards, 2004). In one previous study of the Winter Olympic Games the number of time zones and direction of travel produced no discernible trends or differences in performance (Balmer *et al.*, 2001), although another study found that the performance of nations in the Commonwealth Games was negatively correlated with the number of time zones they had to traverse (Ramchandani & Wilson, 2010).

Home competitors' familiarity with local conditions or the venue is also a game location factor sometimes associated with home advantage. For example, Bray and Carron (1993) acknowledged the beneficial effects of familiarity with the venue could contribute to the home advantage in alpine skiing. This observation was supported by Balmer *et al.* (2001), who noted that the effect of familiarity with local conditions in the Winter Olympic Games was most evident in alpine skiing, where the potential for variation is at its greatest. The relative importance of two game location factors - home crowd support and familiarity - was also perceived by a small sample of female athletes representing Team Great Britain prior to their participation at the London 2012 Olympic Games, according to a qualitative study (Kent, 2016).

With respect to rule factors, previous research suggests that home advantage in the Olympic Games is influenced by host nations having the right to contests more medals, field larger teams and compete in a larger range of events than usual, which increases the opportunity to win more medals (Clarke, 2000; Shibli *et al.*, 2012). In the Commonwealth Games, host nations are able to determine the inclusion of certain 'optional' sports and studies have shown that home advantage is more prevalent in sports held at the discretion of the host nation (Ramchandani & Wilson, 2011, 2012).

2.3. The research questions

The overall impression from the literature review is that nations do tend to experience a measurable performance benefit when competing in major multi-sport competitions on home soil. However, the findings from the literature are usually not directly comparable as a result of differing methodologies used by different researchers both in terms of how home advantage is defined and calculated and the time span under review. Our study overcomes these issues by using a consistent approach to home advantage calculation in the Olympic and Paralympic Games, including both Summer and Winter editions, across the same time period, which also enables us to draw comparisons between the two competitions. Three key research questions (RQs) were developed specifically for our study, as outlined below.

RQ1: Is home advantage prevalent in the Olympic and Paralympic Games among nations that have hosted both these competitions?

RQ2: Is any home advantage effect associated with hosting the Olympic Games significantly different compared with the Paralympic Games?

RQ3: Is there a correlation between the size of any home advantage effect observed in the two competitions? In other words, do nations with a relatively large home advantage effect in the Olympic Games also demonstrate a relatively large home advantage effect in the Paralympic Games, is there an inverse relationship or is there no clear trend?

3. Methods

3.1. Inclusion criteria and data sources

Our study focuses on 16 editions of the Olympic and Paralympic Games held between 1988 and 2018 (eight Summer and eight Winter) as shown in Table 1. The time frame was chosen deliberately to incorporate nations that had hosted both the Olympic and Paralympic Games in the same years. This approach ensured that a like-for-like assessment of home advantage

can be made for the two competitions. Apart from examining the overall host nation effect, we also examined home advantage in ten Olympic and Paralympic sports that have featured in every edition of the Summer or Winter Games in the time frame under review. These include seven summer sports (archery, athletics, cycling, fencing, shooting, swimming and table tennis) and three winter sports (alpine skiing, biathlon and cross-country skiing).

<TABLE 1 HERE>

The results of each edition of the Olympic and Paralympic Games between 1988 and 2018 were sourced from the official websites of the International Olympic Committee (<https://www.olympic.org/olympic-games>) and International Paralympic Committee (<https://www.paralympic.org/>) respectively. The data analysis was conducted using SPSS (version 24).

3.2. Defining performance and calculating home advantage

In order to control for fluctuations in the number of events contested (i.e. medals on offer) in each competition over time and between competitions (see Table 1), as well as for the performance of non-host nations, performance was measured in terms of 'market share' by: first, converting the number and type of medals won by each nation in a given edition into points (gold = 3, silver = 2 and bronze = 1); and, second, expressing those points as a proportion of the total number points won by all competing nations in that edition. The process of calculating market share as described above and its use as an indicator of nations' totality of achievement in multi-sport competitions is not new. Market share is regarded by some researchers as a more robust performance indicator relative to conventional measures of success such as the absolute number of medals won, particularly when diagnosing the

performance of nations' at different points in time (see De Bosscher, Knop, Bottenburg, Shibli, & Bingham, 2009; Ramchandani & Wilson, 2010 , 2011, 2012; Shibli & Bingham, 2008; Truyens, De Bosscher, & Heyndels, 2016; Wilson & Ramchandani, 2017a, 2017b).

Market shares were calculated for all Olympic and Paralympic host nations shown in Table 1. For example, at the 2012 Summer Olympic Games held in London the host nation - Great Britain - won 29 gold medals (equivalent to 87 points), 17 silver medals (34 points) and 19 bronze medals (19 points). Therefore the cumulative points' value of the 65 medals won by Great Britain at its home Olympics in 2012 was 140 (i.e. $87 + 34 + 19$). The total number of points awarded at the 2012 Summer Olympic Games taking into account the number of events contested and medals awarded to all nations was 1,847. This means that Great Britain's overall home edition market share at the 2012 Summer Olympic Games was 7.58% (i.e. $140 / 1,847$). To obtain a reliable estimate of home advantage we compared each nation's home market share in each competition with its own average market share in the editions immediately before hosting and immediately after hosting. For example, Great Britain's market share at the 2008 Summer Olympic Games held in Beijing (pre home) and the 2016 Summer Olympic Games held in Rio (post home) was calculated at 5.41% and 7.61% respectively - an average of 6.51%. Therefore, its home performance at the 2012 Summer Olympic Games was 1.07 percentage points better than its average pre/post home Olympic performance (i.e. $7.58\% - 6.51\%$).

Computing home advantage scores in this way ensured that less successful host nations were not unfairly compared with more successful host nations and avoided biased estimates of home advantage. Nations that had not hosted the Olympic and Paralympic Games in the time frame under review were excluded from the study because they had no home performances to compare with their away performances. In instances where there was no appropriate pre home or post home data point within the time frame under review (e.g. pre

1988 and post 2018 for South Korea and post 2016 for Brazil), only the available away (pre or post) data point was utilised for comparison with their respective home performances in the home advantage calculations. Similarly, because Russia was banned formally from competing in 2018 Winter Olympic and Paralympic Games, even though some Russian athletes were allowed to participate as neutral athletes, its home performance in 2014 was compared with its pre home performance in 2010.

3.3. Analytical procedure

Once home advantage values were calculated for each host nation, a one sample Wilcoxon signed ranked test was used to determine whether there was a genuine difference in nations' performance under host and non-host conditions in the Olympic Games and the Paralympic Games, both at an overall level and in the ten Olympic and Paralympic sports. We then compared the size of the host nation effect between the Olympic Games and Paralympic Games and tested for significant differences using a Wilcoxon signed ranked test for related samples. Finally, Spearman's rank-order correlation was carried out to explore the relationship between the size of the home advantage effect in the two competitions. Non-parametric statistical tests were preferred owing to the small sample size and to avoid the influence of outliers.

4. Results

4.1. Does home advantage exist in the Olympic and Paralympic Games?

We first tested whether for the sample of Olympic and Paralympic host nations included in our study there was evidence of an overall home advantage effect within each competition. Figure 1 shows the difference between the home market share and the away (average pre/post home) market share for each host nation in each competition between 1988 and 2018. All

Summer and Winter Olympic hosts in this time frame performed better at home, as illustrated by the positive overall home advantage values in Figure 1. It is also evident from Figure 1 that all eight Winter Paralympic hosts and six of the eight Summer Paralympic hosts exhibited positive home advantage values overall.

<FIGURE 1 HERE>

Based on the data presented in Figure 1, the median home advantage effect across the 16 editions of the Olympic Games (including eight Summer editions and eight Winter editions) was 2.30 percentage points. The corresponding statistic for the 16 editions of the Paralympic Games was 2.24 percentage points. The observed median home advantage effect in both competitions was found to be significantly greater than zero by a one sample Wilcoxon signed rank test ($p < 0.01$).

The occurrence of home advantage in the Olympic and Paralympic Games varied according to sport as illustrated by the median values for the ten sports presented in Table 2. The only sports to exhibit a statistically significant home advantage effect (i.e. significantly greater than zero according to a one sample Wilcoxon signed rank test) were Olympic archery ($p = 0.04$), Paralympic athletics ($p = 0.02$), Paralympic table tennis ($p = 0.03$) and Paralympic alpine skiing ($p = 0.03$). For all other Olympic and Paralympic sports, a home advantage effect was either not evident (zero or negative) or not sufficiently large to be statistically significant given the sample sizes ($p > 0.05$) as per Table 2.

<TABLE 2 HERE>

4.2. Does home advantage differ between the Olympic and Paralympic Games?

A Wilcoxon signed rank test for related samples confirmed that there was no genuine contrast in the size of the overall home advantage effect between the Olympic Games and Paralympic Games ($p = 0.352$). Similarly, when comparing the median home advantage effect between the ten Olympic and Paralympic sports, no statistically significant differences were obtained ($p > 0.05$).

4.3. Is home advantage correlated between the two competitions?

Figure 2 plots the home advantage effect for each host nation in the Olympic Games (on the horizontal axis) against their respective home advantage effect in the Paralympic Games (on the vertical axis). The axes intersect at the median home advantage values across all host nations in each competition, i.e. 2.30 percentage points in the Olympic Games and 2.24 percentage points in the Paralympic Games, resulting in four quadrants.

<FIGURE 2 HERE>

Nations positioned in the top right quadrant of Figure 2 have a relatively large home advantage in both the Olympic and Paralympic Games (above the median), whereas those in the bottom left quadrant exhibit a relatively small or no host nation effect in both competitions (below the median). The top left quadrant contains nations with a relatively large home advantage in the Paralympic Games (but not in the Olympic Games). Finally, nations with a relatively large home advantage in the Olympic Games (but not in the Paralympic Games) feature in the bottom right quadrant. The upward slope of the trend line in Figure 2 is indicative of a strong association between the size of the overall host nation

effect in the two competitions, which is verified by a large positive and statistically significant Spearman rank correlation coefficient ($r_s = 0.81$, $p < 0.01$).

When we repeated this analysis for the ten Olympic and Paralympic sports, some mixed patterns emerged, as illustrated by the Spearman rank correlation coefficient for each sport in Figure 3. In swimming ($r_s = 0.74$) and table tennis ($r_s = 0.71$) the home advantage values were significantly positively correlated between the Olympic and Paralympic Games ($p < 0.05$), a significant but negative relationship between the two competitions was revealed in the case of biathlon ($r_s = -0.85$, $p < 0.05$), whereas there was no significant correlation for the other seven sports ($p > 0.10$).

<FIGURE 3 HERE>

5. Discussion

5.1. Summary of key findings

Home advantage has been shown to exist by separate studies in the Summer Olympic Games (e.g. Balmer *et al.*, 2003; Clarke, 2000; Franchini & Takito, 2016; Nevill *et al.*, 2012), the Winter Olympic Games (e.g. Balmer *et al.*, 2001), the Summer Paralympic Games (Wilson & Ramchandani, 2017b) and the Winter Paralympic Games (Wilson & Ramchandani, 2017a). Because these studies were undertaken in isolation, they focused on different time periods and did not utilise a uniform approach to define performance and measure home advantage in these competitions. By pooling the results from the Summer and Winter editions for nations that have hosted both the Olympic and Paralympic Games, it was possible to test for the occurrence of home advantage in the two competitions using a standard methodology and draw like-for-like comparisons between them.

Our study revealed three key findings. First, in line with some of the previous research involving multi-sport competitions, we found evidence of an overall home advantage being prevalent in the Olympic Games and the Paralympic Games among the sample of host nations included in the study, as evidenced by the data presented in Figure 1. We also found a significant host nation effect in one Olympic sport (archery) and three Paralympic sports (athletics, alpine skiing and table tennis), but not in the other sports examined (see Table 2). Such variations in the prevalence and size of the home advantage effect between different sports have also been observed in previous studies of multi-sport competitions including the Olympic and Paralympic Games (Balmer *et al.*, 2001, 2003; Wilson & Ramchandani, 2017a, 2017b) as well as the Commonwealth Games (Ramchandani & Wilson, 2011, 2012).

Second, our analysis illustrates that the size of this effect did not differ significantly between able-bodied and para-sport events at an overall nation level, which provides a genuine insight into a previously unexplored aspect of home advantage research. Nevertheless, our research provides tentative evidence that there are within-sport variations in the occurrence of home advantage between able-bodied events and para-sport events (e.g. between athletics and para-athletics in Table 3). While these within-sport differences were not found to be statistically significant, it is possible that statistical reliability was compromised by the small sample size of nations involved in the sport-specific analysis.

Third, our study found that the size of the overall host nation effect in both competitions was significantly correlated (see Figure 2). This finding indicates that nations that experience a large home advantage effect in the Olympic Games also have a large home advantage effect in the Paralympic Games, although this association does not appear to be replicated for all sports as per the correlation analysis presented in Figure 3.

5.2. Theoretical contribution and management considerations

From a theoretical perspective, our research contributes to the study of the impacts of hosting major multi-sport competitions. Most of the previous research in this area has involved the Olympic Games, which feature able-bodied athletes. By contrast, there is a paucity of research regarding the impacts associated with hosting the Paralympic Games, which involve athletes with a disability. Indeed, a thematic analysis of Paralympic legacy research by Misener, Darcu, Legg and Gilbert (2013) found that few studies have evaluated the comparative outcomes, legacies and event leverage that the Paralympic Games have generated. Moreover, Gold and Gold (2007) emphasize how the Paralympic Games underline the change from sport as therapeutic competition to that of elite events that carry intrinsic prestige, with growing rivalry over medal tables. It is in this context that our study makes a novel contribution to the body of knowledge by illustrating not only that home advantage exists in the Paralympic Games, but also that the host nation effect is of a comparable magnitude to the Olympic Games.

A pertinent question that arises is whether and how nations can influence their performance when hosting the Olympic and Paralympic Games in order to benefit from home advantage. In terms of understanding why a significant home advantage effect is seen to occur in the Olympic and Paralympic Games, previous research highlights the role of certain game location factors (Courneya & Carron, 1992; Carron et al., 2005), most notably the influence of the home crowd on officials in certain sports, home athletes' familiarity with local venues and facilities and the detrimental effect of jet lag associated with travelling across time zones on athletes from non-host countries. Beyond these game location factors, there is also evidence that host nations tend to increase their level of investment in elite sport prior to hosting the Olympic and Paralympic Games (Nevill, Balmer, & Winter, 2009). To illustrate this point, in the four years leading up to the Beijing 2008 Games, UK Sport (the

agency in charge of maximizing the performance of athletes representing Great Britain in the Olympic and Paralympic Games) spent £235.1 million to support 27 Summer Olympic sports and this figure increased by 12% to £264.1 million in the four years leading up to the London 2012 Games, when Great Britain was the host nation. The proportionate increase in funding for Summer Paralympic sports in the UK between 2005-8 (£29.5 million) and 2009-12 (£49.3 million) was even higher at 67% (UK Sport, 2018).

The impact of funding on Olympic and Paralympic performance has also been documented previously in other countries. For example, Guan and Hong (2016) concluded that the financial support provided by the Chinese government had been the key to the nation's success in the Summer Paralympic Games while Hogan and Norton (2000) found that there was a significant linear relationship between money spent and total Olympic medals won by Australia leading up to its home Games in 2000. The basic point here is that financial support for elite sport is one of the fundamental 'pillars', which can be influenced by policy, through which international sporting success can be produced (De Bosscher, De Knop, van Bottenburg, & Shibli, 2006). It is therefore entirely plausible that taking a strategic approach to elite sport development by host nations in the build up to the Olympic and Paralympic Games can contribute to some of the observed home advantage identified by previous research and in our study.

From a broader sport management perspective, it is also worth considering the potential implications of this effect for wider social benefits such as international prestige for the host nation and a feel-good factor among the population. Evidence of these wider social outcomes occurring as a direct consequence of success in the Olympic and Paralympic Games is mixed. For example, Downie and Koestner (2008) found that Paralympic success was significantly and positively correlated with life expectancy and subjective wellbeing (happiness) of a nation's citizens but that Olympic success was negatively correlated with

happiness and unrelated to life expectancy. van Hillvorde, Elling and Stokvis (2010) note that the Olympic Games offer a wide variety of opportunities to experience national pride through both the medals' table and many individual sport narratives; however research has shown that national pride is a relatively stable characteristic of national identity that cannot easily be increased by improving national sporting success and winning more Olympic medals (Elling, van Hillvorde, & van den Dool, 2014). Given that there is no consensus on the social impact of success in the Olympic and Paralympic Games, it is somewhat premature to conclude whether any home advantage experienced by host nations in these competitions can induce such outcomes.

5.3. *Limitations and future research*

Even though our study did not reveal any significant difference in the size of the home advantage effect between the Olympic Games and the Paralympic Games, this does not necessarily imply that the same set of factors contribute in equal measure to its occurrence in both competitions. The influence of certain game location factors on home advantage has been tested empirically in the Olympic Games (see Balmer *et al.*, 2001, 2003; Nevill *et al.*, 2012). However the extent to which these factors operate in the Paralympic Games is still unclear, which provides one avenue for future research.

Our study stops short of measuring longer term performance benefits for host nations as a result of staging the Olympic and Paralympic Games. There is some evidence to suggest that nations who have been awarded the right to host the Olympic Games also tend to improve their performance in the editions that immediately precede and follow their home Games (Nevill, Balmer, & Winter, 2009). Heavy investment by host nations in elite sport appears to be an important factor to explain this trend. Home advantage research would

benefit from investigating the extent to which any pre-hosting and post-hosting effects are also evident in the Paralympic Games.

More generally, there is a distinct lack of research that examines home advantage from the perspective of Olympic and Paralympic athletes and their coaches. Undertaking such an exercise would help to better understand their psychological and behavioural states under host and non-host conditions. Finally, it would be worthwhile to explore whether any home advantage experienced by host nations in the Olympic and Paralympic Games translates to wider social impacts on host populations.

References

- Balmer, N. J., Nevill, A. M., & Williams, M. (2001) Home advantage in the Winter Olympics (1908-1998). *Journal of Sports Sciences, 19*, 129-139.
doi:[10.1080/026404101300036334](https://doi.org/10.1080/026404101300036334)
- Balmer, N. J., Nevill, A. M., & Williams, M. (2003) Modelling home advantage in the Summer Olympic Games. *Journal of Sports Sciences, 21*, 469-478.
doi:[10.1080/0264041031000101890](https://doi.org/10.1080/0264041031000101890)
- Bray, S. R., & Carron, A. V. (1993) The home advantage in alpine skiing. *Australian Journal of Science and Medicine in Sport, 25*, 76-81.
- Carron, A. V., Loughhead, T. M., & Bray, S. R. (2005) The home advantage in sport competitions: Courneya and Carron's (1992) conceptual framework a decade later. *Journal of Sports Sciences, 23*, 395-407.
- Clarke S.R. (2000) Home advantage in the Olympic Games. Proceedings of the Fifth Australian Conference on Mathematics and Computers in Sport. 14–16 June 2000, Sydney, Australia. Cohen G, Langtry T, eds. Sydney, NSW: University of Technology Sydney, 43–51.
- Courneya, K. S., & Carron, A. V. (1992) The home advantage in sport competitions: a literature review. *Journal of Sport and Exercise Psychology, 14*, 13-27.
- De Bosscher, V., De Knop, P., Van Bottenburg, M., & Shibli, S. (2006) A conceptual framework for analysing sports policy factors leading to international sporting success. *Journal European Sport Management Quarterly, 6*, 185-215.
- De Bosscher, V., De Knop, P., Van Bottenburg, M., Shibli, S. & Bingham, J. (2009) Explaining international sporting success: An international comparison of elite sport systems and policies in six countries. *Sport Management Review, 12*, 113-136.
doi:10.1016/j.smr.2009.01.001

- Downie, M. & Koestner, R. (2008) Why Faster, Higher, Stronger Isn't Necessarily Better-- The Relations of Paralympian and Women's Soccer Teams' Performance to National Well-Being. *Social Indicators Research*, 88, 273-280.
- Elling, A., Van Hilvoorde, I., & Van Den Dool, R. (2014). Creating or awakening national pride through sporting success: A longitudinal study on macro effects in the Netherlands. *International Review for the Sociology of Sport*, 49, 129-151.
- Franchini, E., & Takito, M.Y. (2016) Home advantage in combat sports during the Olympic Games. *Sport Sciences for Health*, 12, 287. doi:[10.1007/s11332-016-0286-9](https://doi.org/10.1007/s11332-016-0286-9)
- Gold, J., & Gold, M. (2007) Access for all: the rise of the Paralympic Games. *The Journal of The Royal Society for the Promotion of Health*, 127, 133-141. doi:[10.1177/1466424007077348](https://doi.org/10.1177/1466424007077348)
- Guan, Z., & Hong, F. (2016) The Development of elite disability sport in China: A critical review. *The International Journal of the History of Sport*, 33, 485-510.
- Hogan, K., & Norton, K. (2000) The 'price' of Olympic gold. *Journal of Science and Medicine in Sport*, 3, 203-218. doi:[10.1016/S1440-2440\(00\)80082-1](https://doi.org/10.1016/S1440-2440(00)80082-1)
- IOC (2012) Olympic Legacy. https://stillmed.olympic.org/Documents/Olympism_in_action/Legacy/Olympic_Legacy.pdf (last accessed 1 May 2018).
- Kent, R. (2016) Great British Athletes' Perceptions of Competing at the London 2012 Olympic Games. *The Sport Journal*. Available from: <http://thesportjournal.org/article/great-british-athletes-perceptions-of-competing-at-the-london-2012-olympic-games/> [Accessed 1 October 2017].
- McCartney, G., Thomas, S., Thomson, H., Scott, J., Hamilton, V., Hanlon, P., & Bond, L. (2010). The health and socioeconomic impacts of major multi-sport events: Systematic review (1978-2008). *British Medical Journal*, 340, c2369. doi:10.1136/bmj.c2369.

- Misener, L., Darcu, S., Legg, D., & Gilbert K. (2013) Beyond Olympic Legacy: Understanding Paralympic Legacy Through a Thematic Analysis. *Journal of Sport Management*, 27, 329-341. [doi:10.1123/jsm.27.4.329](https://doi.org/10.1123/jsm.27.4.329)
- Nevill, A. M., Balmer, N. J., & Winter, E. M. (2009) Why Great Britain's success in Beijing could have been anticipated and why it should continue beyond 2012. *British Journal of Sports Medicine*, 43, 1108-1110. doi:[10.1136/bjism.2008.057174](https://doi.org/10.1136/bjism.2008.057174)
- Nevill, A. M., Balmer, N. J., & Winter, E. M. (2012) Congratulations to team GB, but why should we be so surprised? Olympic medal count can be predicted using logit regression models that include "home advantage." *British Journal of Sports Medicine*, 46, 958-959. doi:[10.1136/bjsports-2012-091719](https://doi.org/10.1136/bjsports-2012-091719)
- Nevill, A.M., & Holder, R.L. (1999) Home advantage in sport: an overview of studies on the advantage of playing at home. *Sports Med.*, 28,221-36.
- Pace, A., & Carron, A. V. (1992) Travel and the National Hockey League. *Canadian Journal of Sports Sciences*, 17, 60-64.
- Pettigrew, S., & Reiche, D. (2016) Hosting the Olympic Games: an Overstated Advantage in Sports History. *The International Journal of the History of Sport*, 33, 635-647. doi:[10.1080/09523367.2015.1132201](https://doi.org/10.1080/09523367.2015.1132201)
- Ramchandani, G., & Wilson, D. (2010) Home advantage in the Commonwealth Games. *South African Journal of Sports Medicine*, 22, 8-11.
- Ramchandani, G., & Wilson, D. (2011) Do differences in gender and sport affect home advantage? A case study of the Commonwealth Games. *International Journal of Performance Analysis in Sport*, 11, 510-521.
- Ramchandani, G., & Wilson, D. (2012) India's performance in the Delhi 2010 Commonwealth Games: expected or otherwise? *Managing Leisure*, 17, 257-273. doi:[10.1080/13606719.2012.674398](https://doi.org/10.1080/13606719.2012.674398)

- Reilly, T., Waterhouse, J., & Edwards, B. (2005) Jet lag and air travel: implications for performance. *Clinics in Sports Medicine*, 24, 367–380.
- Shibli, S. & Bingham, J. (2008) A forecast of the performance of China in the Beijing Olympic Games 2008 and the underlying performance management issues. *Managing Leisure*, 13, 272-292. [doi:10.1080/13606710802200977](https://doi.org/10.1080/13606710802200977)
- Shibli, S. Gratton, C., & Bingham, J. (2012) A forecast of the performance of Great Britain and Northern Ireland in the London 2012 Olympic Games. *Managing Leisure*, 17, 274-290. doi: 10.1080/13606719.2012.674399
- Truyens, J. De Bosscher, V., & Heyndels, B. (2016) Competitive balance in athletics. *Managing Sport and Leisure*, 21, 23-43. doi:10.1080/23750472.2016.1169213
- UK Sport (2018) Historical Funding Figures. Available from: <http://www.uk sport.gov.uk/our-work/investing-in-sport/historical-funding-figures> (last accessed 15 May 2018).
- Van Hilvoorde, I., Elling, A., & Stokvis, R. (2010) How to influence national pride? The Olympic medal index as a unifying narrative. *International Review for the Sociology of Sport*, 45, 87-102.
- Waterhouse, J., Reilly, T., & Edwards, B. (2004) The stress of travel. *Journal of Sports Sciences*, 22, 946–966.
- Wilson, D., & Ramchandani, G. (2017a) Home advantage in the Winter Paralympic Games 1976-2014. *Sport Sciences for Health*. doi: 10.1007/s11332-017-0365-6
- Wilson, D., & Ramchandani, G. (2017b) An investigation of home advantage in the Summer Paralympic Games. *Sport Sciences for Health*. doi: 10.1007/s11332-017-0393-2

Table 1. Hosts of the Olympic and Paralympic Games 1988-2018 and number of events contested in each edition

Year	Host Nation	Number of Events Contested			
		Summer Olympics	Summer Paralympics	Winter Olympics	Winter Paralympics
1988	South Korea	237	733		
1992	France			79	57
1992	Spain	257	489		
1994	Norway			132	61
1996	USA	271	519		
1998	Japan			121	68
2000	Australia	300	550		
2002	USA			91	80
2004	Greece	301	519		
2006	Italy			56	84
2008	China	302	472		
2010	Canada			62	86
2012	Great Britain	302	503		
2014	Russia			70	98
2016	Brazil	306	528		
2018	South Korea			103	80

Figure 1. Overall home advantage effect in the Olympics and Paralympics by host nation

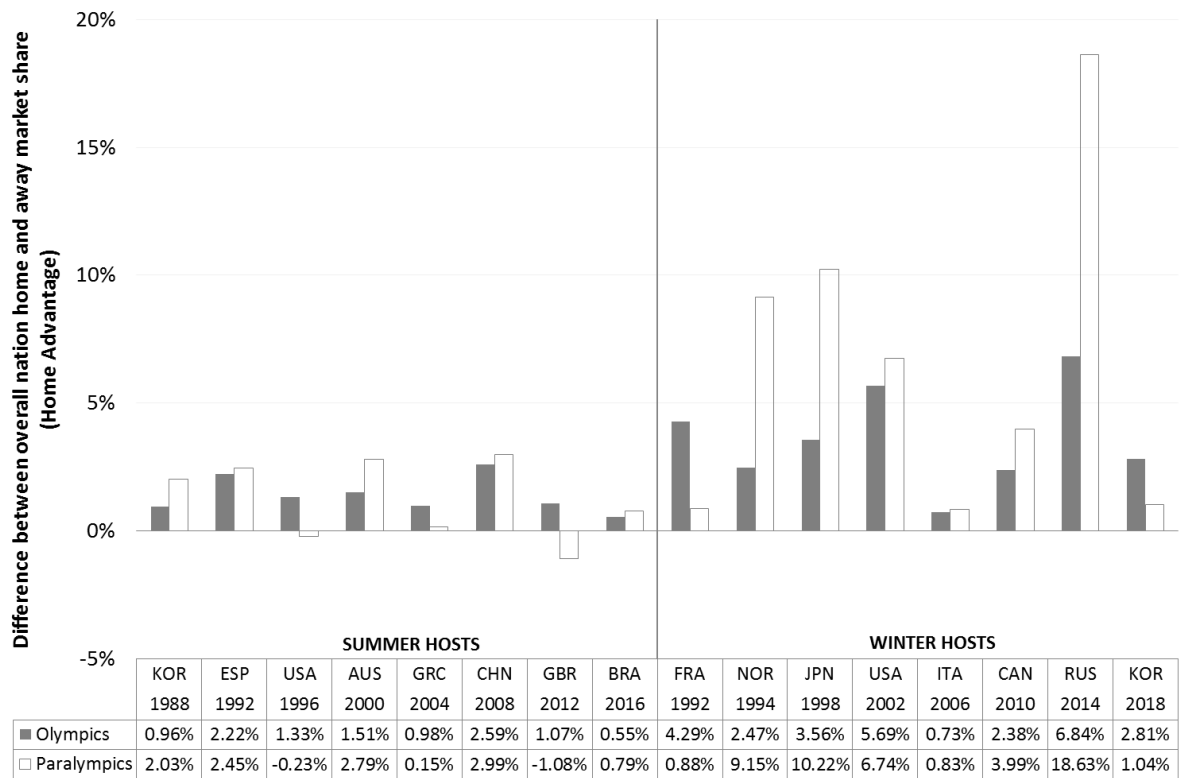


Figure 2. Relationship between home advantage in the Summer (S) and Winter (W) Olympic and Paralympic Games

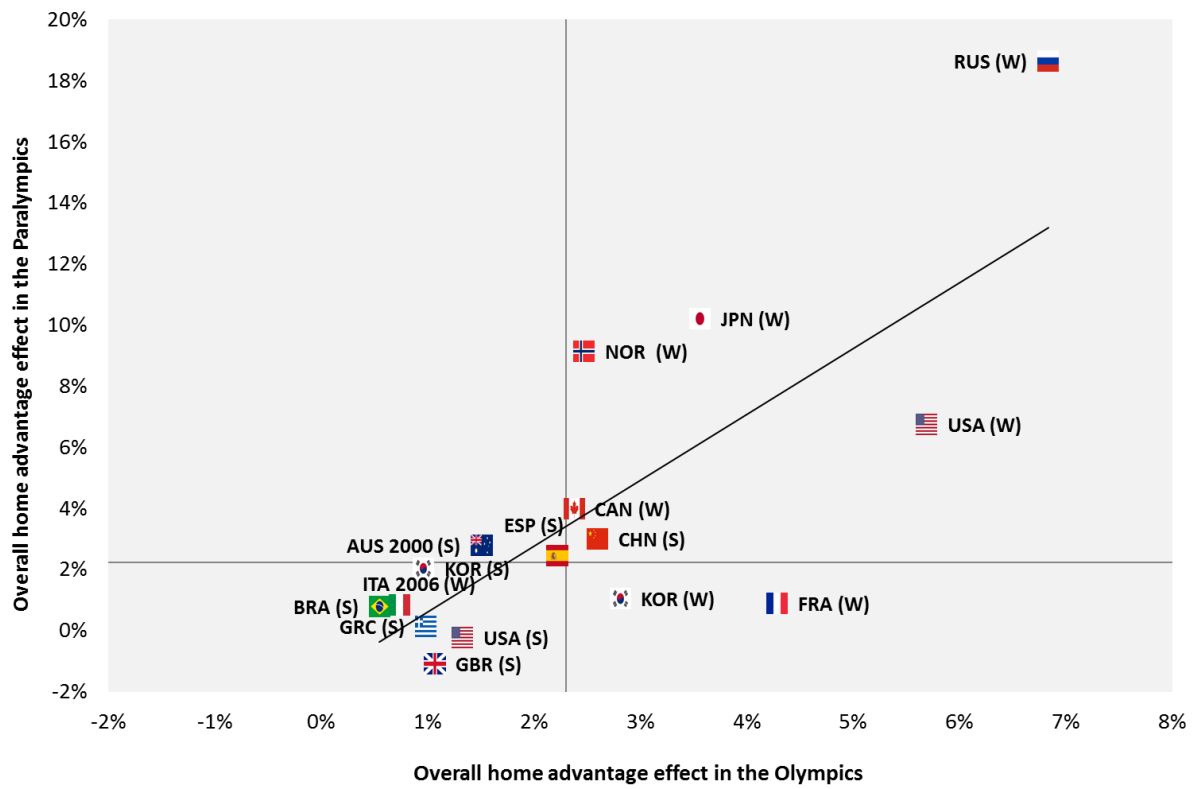


Table 2. Median home advantage effect in the Olympic and Paralympic Games by sport

Sport	Edition	Olympic Games		Paralympic Games	
		Median	Sig.	Median	Sig.
Archery	Summer	11.46%	0.043	0.00%	0.345
Athletics	Summer	1.41%	0.093	2.33%	0.017
Cycling	Summer	0.00%	0.500	1.37%	0.237
Fencing	Summer	0.00%	0.317	0.00%	0.225
Shooting	Summer	0.52%	0.176	0.21%	0.104
Swimming	Summer	-0.28%	0.917	0.13%	1.000
Table tennis	Summer	0.00%	0.285	2.03%	0.028
Alpine skiing	Winter	0.00%	0.893	4.43%	0.028
Biathlon	Winter	0.00%	0.285	0.00%	0.345
Cross country skiing	Winter	0.00%	0.715	1.78%	0.093

Figure 3. Correlation between home advantage in ten Olympic and Paralympic sports

