The Home Advantage: Performance Effects in Female Collegiate Division I Gymnastics

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Abstract
The current study investigated the performance effects of competing at home or away venues in female collegiate Division I gymnastics. Teams (N = 15) selected for analyses were ranked in the top 25 nationally at the end of each regular season during the period of 2003 to 2007 with the exclusion of 2005. Each team’s total scores at all regular season home meets over the four years were compiled and compared to their respective away meet total scores. A repeated measures analysis of variance revealed home scores to be significantly higher than away scores. Additionally, with the introduction of the Judges’ Assignor System (JAS) in 2005, team scores at home and away were compared before and after its introduction. Team scores were significantly higher at home prior to and following the introduction of JAS. However, performance scores were found to be significantly reduced at both home and away with JAS. The results of this study suggest that teams perform significantly better at home than away. In addition, the findings suggest that JAS has significantly reduced gymnastics scores, yet has not significantly altered the effects of competing away from home. Findings are discussed in light of current research and application for coaches and officials is provided.

Introduction
There is considerable support for the notion that competing in athletic events at home provides an advantage (e.g., Boyko, Boyko, & Boyko, 2007; Pollard, 2006). According to Courneya and Carron (1992), a home advantage exists when teams win more than 50% of their competitions at home than away in a balanced schedule. They also noted that such advantages exist in major team sports, they do not differ between collegiate and professional sports, and the magnitude of the difference in each sport is stable and consistent over time. Such a home advantage has been found in a variety of female collegiate sports (Bray, Jones, & Owen, 2002). However some
female sports have failed to exhibit a significant home advantage (Gayton, Mutrie, & Hears, 1987), particularly individual sports such as alpine skiing (Bray & Martin, 2003).

The causes of a home-and-away performance effect have yielded a variety of reasons to explain this phenomenon, although it is proposed that no one reason can completely account for the home advantage (Salminen, 1993). Reasons range from psychological effects (Bray et al. 2002), nutrition (Hinton, Sanford, Davidson, Yakushko, & Beck, 2004), experience of the performer (Thelwell, Weston, Lane, & Greenlees, 2006), self-fulfilling prophecy (Gayton, Broida, & Elgee, 2001), travel fatigue (Salminen, 1993), home audience (Nevill & Holder, 1999), familiarization with the facility and equipment (Bray & Widmeyer, 2000; Gayton et al. 2001), and referee bias (Balmer, Nevill, & Lane, 2005).

While the home advantage has been investigated in a variety of team sports, one shortcoming which may influence the findings of previous studies is the skill level and performance of the opponent. The majority of home and away studies are largely based on a win – loss record with consideration of the quality of the opposition infrequently considered (Gayton et al. 1987; Thelwell et al. 2006). NCAA Division I female gymnastics differs from many other team sports, as both ranking and performances are judged by total team score rather than a win – loss record. Therefore, the primary aim of this research was to determine whether a performance measure of home advantage existed in female collegiate gymnastics.

NCAA collegiate gymnastics is a judged sport and this subjectivity may contribute to a home advantage. For example, Boyko et al. (2007) reported that soccer referees contribute to the home advantage. They found that the subjectivity and degree of bias varied depending on the referee. Similarly, Balmer et al. (2005) found that boxers competing at home were more likely to be given a points decision win when a bout was not determined by a knockout. The authors concluded that judges should be provided with interventions in order to counter home advantage bias. In order to negate possibilities of bias, the NCAA Women’s Gymnastics Committee implemented a Judges’ Assignor System (JAS) in 2005 (NAWGJ, 2007). Prior to this system, teams were permitted to select their own judges. While only optional the first year, the JAS became mandatory in 2006. It aims to eliminate bias and the intimidation factor, develop consistency in officiating across the country, control costs, discontinue selection of judges by coaches and meet sites and events by judges, create a system for impartial assignments for meets and events, and lay the groundwork for future development of an educational component (NAWGJ, 2007). Consequently, a second aim of this research was to determine the effects of the JAS on home and away scores.
Method

Selection of the Sample
The sample consisted of female collegiate Division I gymnastic teams. Teams were selected based on their national ranking at the end of each regular season in 2003, 2004, 2006, and 2007. Because JAS was introduced in 2005 as optional, these data were excluded from the study. Teams selected for analysis were required to be nationally ranked by the NCAA in the top 25 at the end of each regular season of the four-year period. Using these criteria, 15 teams were available for comparison.

Collection of Data
Data were obtained from Troester Consulting (2007) and from each athletic program’s archival data. Gymnastics scores that occurred following the regular season were excluded from the study. For all home and away fixtures in each season, the total team score was obtained. Teams compete on the vault, uneven bars, balance beam, and floor. Six athletes are selected to compete on each apparatus with the five best scores from each apparatus summed to create a final team score. The highest score possible for each event is 50, with the total highest score at the end of a meet being 200.

Data analysis
The mean of all home fixture scores for each team during each of the four years was compared to their respective away scores during the same period using a repeated measures ANOVA. Similarly, a repeated measures ANOVA was used to calculate differences between home and away scores prior to and following the introduction of JAS.

Results

All statistical procedures were performed with SPSS 14.0 (Chicago). Mean scores with respective standard errors of the four years by location and team are presented in Figure 1. A Location x Time (2 x 4) repeated measures ANOVA was used to determine differences between home and away scores from 2003 to 2007 (with the exclusion of 2005). Analysis, using a Greenhouse – Geisser correction due to the significance of Mauchley’s Test of Sphericity (\(p < .05\)), showed main effects for Location (\(F(1, 14) = 18.266, p = .001\)), Time (\(F(1.724, 24.139) = 12.037, p = .001\)), and no interaction of Location with Time (\(F(1.581, 19.337) = 0.380, p = .612\)). Tukey’s Honestly Significant Difference post hoc tests revealed 2006 and 2007 Away scores to be significantly lower than 2004 Home and Away scores, and 2003 Home scores respectively. In addition, 2004 Home scores were significantly higher than 2006 Home scores (Figure 2).
Home versus Away Prior to and Following JAS

A Location x Time (2 x 2) repeated measures ANOVA was used to determine the effects of the JAS scoring system on scores both at home and away. Because the JAS system was introduced for the 2005 gymnastics season as optional (NAWGJ, 2007), data from that season were excluded from the analysis. Consequently, performance results for the two years prior to JAS being introduced (2003-2004) were collapsed with home and away means compared to the performance results of home and away for the two years following its required adherence (2006-2007).

Analysis revealed significant main effects for Location ($F_{(1, 14)} = 18.266, p = .001$) and Time ($F_{(1, 14)} = 23.669, p = .001$), with a non-significant interaction effect between Location and Time ($F_{(1, 14)} = .667, p = .428$). Specifically, scores were higher at home prior to and following the introduction of JAS, but mean scores were lower both at home and away following the introduction of JAS (Figure 3).

Discussion

The purposes of this study were to investigate the performance differences between home and away venues in female collegiate gymnastics and to determine whether judging changes by the NCAA have altered the home and away effect. Results indicate that similar to other team sports, teams that competed at home produced significantly superior results compared to competing away from home. In addition, while the JAS has significantly lowered scores at home and away, they have not reduced the effects of competing away from home.

Based on the current findings, a performance advantage at home venues in female collegiate gymnastics exists. Unfortunately, the causes of these effects have yet to be examined in this sport. However, coaches should consider applying strategies to reduce this effect based on current knowledge derived from other sports. In an investigation of coaches’ perceptions of the home advantage, it was found that site familiarity was the greatest attributor (Gayton et al. 2001). Similar findings have also been reported by athletes (Bray & Widmeyer, 2000). As the findings of this study show that gymnastics performances are affected by venue location, gymnastic coaches of this sport should also consider arriving at away events as early as possible to allow athletes to familiarize themselves to the arena and layout of the apparatus.

There is support to suggest that subjectively judged sports are favored by a home advantage (Balmer, Nevill, & Williams, 2001; Balmer, Nevill, & Williams, 2003; Balmer et al. 2005). Balmer et al. (2005) suggest that interventions be considered for judges, which could counter the
home advantage phenomenon. These intervention techniques should include anxiety management and coping skills.

Additionally, officials should consider which venues are selected for regional and national championships. Currently, regional championships are held at one of the venues within the six teams of that region (NAWGJ, 2007). Thus, at each regional championship one team is competing at their home venue whereas the remaining five teams are competing away from their home. Based on the findings of this study, such a format provides the home team with a distinct performance advantage. Because different teams qualify for the regional championships each year, it would be difficult to assign a rotational policy. Thus, officials should consider making all teams in each region compete away from home at a neutral venue so that no team receives a performance advantage from competing at their home venue.

In summary, similar to other team sports, a home advantage appears to exist in female collegiate gymnastics. While the JAS has reduced the total team score since its introduction, both home and away scores have been reduced. Based on the findings of this study, JAS has not significantly altered the home advantage. It is unclear whether judges were unbiased prior to introduction of JAS, or whether biases have remained.

Future research should consider assessing attendance and the audience effect in relation to the home advantage. For example, of the 15 teams assessed during the 2007 gymnastics season, there was a range of 14,701 between the lowest and highest attended meet (Troester, 2007). Because total scores were used in all analyses, it is unclear whether some apparatus are more affected by away competition. Therefore, future research may wish to consider assessing each apparatus individually in order to further understand the home and away phenomenon.

References


Figure 1. Mean scores (2003, 2004, 2006, & 2007) with standard error by location and team (N=15).
Figure 2. A comparison of mean scores by year and location.

Figure 3. Mean scores before and after JAS by location.