

# Comparison of Home Advantage in College and Professional Team Sports in the United States

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## ABSTRACT

*Home advantage in seven American college team sports (baseball, basketball, football, hockey, lacrosse, soccer and women's basketball) was compared with professional leagues in the United States for the same sports and for the same time period. A total of 81,063 college games and 22,477 professional games were analyzed for the four seasons 2006–07 to 2009–10. There was a significant home advantage, as measured by home winning percentage, in all sports, both college and professional. The overall home advantage in college sports was significantly greater than in professional sports ( $p < 0.015$ ). The mean difference was 3.73 home winning percentage points, being greatest for baseball, basketball, and hockey (all  $p < 0.001$ ). Plausible explanations for these results include differences in college and professional competition in terms of familiarity with local conditions, referee bias, territoriality and psychological factors. However, the influence of travel fatigue was inconclusive. Only for soccer was the home advantage greater for professionals. This was the only sport where crowd size appeared to be having an effect. In addition the rules of college soccer allow more substitution and hence greater coach intervention than in professional soccer, a factor that could also be reducing home advantage.*

**Key words:** home advantage, team sports, professional sports, college sports.

## Introduction

Sport sciences are one of the topics of great interest to the social sciences and particularly to anthropology<sup>1–7</sup>. Within this research framework, the home advantage phenomenon in team sports has been widely analyzed from different perspectives<sup>8–10</sup> (i.e., anthropological, historical, sociological or sports sciences), however very little is known about variations at different levels of competition. In a comprehensive review of home advantage Courneya and Carron<sup>11</sup> concluded that the degree of home advantage at college level was no different than in professional leagues in the United States. A recent meta-analysis of home advantage reached the same conclusion with overall home winning percentages given as 60.4% in college and 60.8% for professionals<sup>12</sup>. Although a range of sports were included in both these studies, the time periods for the college and professional data sets did not correspond. Moreover the sports used in the comparisons were not necessarily the same and none of the studies included in the meta-analysis were specifically designed to compare college with professional athletes. In fact the only three studies that have made a direct comparison between college and profession-

al sports all made use of data that is over 25 years old and all related to football. In this paper 'football' will refer to American football, and »soccer« to association football. Schwartz and Barsky<sup>13</sup> found that in the 1971 football season 174 professional games produced a home winning percentage of 57.5% compared with 59.2% for 899 college games. In a similar analysis for the seasons 1973, 1974 and 1975, Edwards<sup>14</sup> reported 54.4% for 349 professional football games compared with 58.6% from 577 college games. Stefani and Clarke<sup>15</sup> used data from 1979 – 1982 in which 1,669 college games and 671 professional games both had a home winning percentage of 57.4%. However these games included a small number of ties, the exclusion of which would have changed the home winning percentages to 58.4% (college) and 57.6% (professional). Although in all three studies the college home advantage was greater than the professional, in none was it statistically significant (all  $p > 0.20$ ). A further review of the literature failed to locate any other study in which home advantage for college and professional athletes were directly compared. In a slightly different context, Pollard<sup>8</sup> analyzed home advantage at nine different levels of soccer in England ranging from the elite Premier League down to semi-professional and ama-

teur regional leagues. The analysis covered the six seasons ending in 2002–03. It was found that home advantage existed at all levels, but was greater in the top four tiers (all professional and fully national leagues, averaging 61.0%), compared with the four lowest tiers where home advantage averaged 55.3%. Another factor known to affect home advantage is team quality. However, it is much less important when examining and comparing the home advantage of complete leagues<sup>16</sup>.

The explanations usually advanced for home advantage would appear to apply differently to college and professional competition so that a more carefully controlled comparison might be expected to shed further light on the causes of home advantage. The consensus reached by several review studies has been that home advantage can be explained by factors under the broad headings of crowd effects, referee bias, travel effects, familiarity with local conditions, rule factors, territoriality and other psychological, physiological and behavioral states<sup>17–19</sup>. It has been suggested that all these factors are likely to interact with each other and a model for their inter-relationship has been proposed<sup>8</sup>. In order to explain the way in which home advantage varies between sports, Stefani<sup>20</sup> and Tsonis and Tsonis<sup>21</sup> have suggested that the style and tempo of games might play a role, as well as the degree to which coaching intervention is allowed and substitutions permitted. There are various ways in which these explanations for home advantage might have a different impact on college and professional competition.

For crowd effects, professional teams attract larger crowds, but the intensity of support may be at least as great at college level. With regards to referee bias, referees in professional sport may be better trained to ignore the sound of a home crowd and thus be more likely to avoid making decisions biased in favor of the home team. For travel effects, professional teams travel longer distances over a longer season. On the other hand, they travel in greater comfort.

College students live and spend much time on or near campus, and thus will have intimate familiarity with home surroundings, more so than professionals living in large metropolitan areas. However, college athletes play fewer games per season than professionals and have a maximum of four years of eligibility for their college. Thus they have less time to become familiar with home surroundings, but also less time to gain familiarity with the surroundings of an opponent's location when playing away from home.

For territoriality, the sense of home territorial protection and the extra pre-game surge in testosterone that has been demonstrated at home locations<sup>22</sup> should apply both to college and professional athletes. Other psychological and behavioral factors should have been minimized for professional teams with better access to sports psychologists trained to dispel the perceived adverse effects of home advantage.

Although basic playing rules differ little between college and professional sports, there are some minor differ-

ences with respect to coach involvement and substitutions. For example college soccer allows much greater use of substitutions than the professional game and hence greater opportunity for a coach to influence the game, a factor termed »information transfer« by Tsonis and Tsonis<sup>21</sup> who felt it could be used to mitigate home advantage.

The importance of college sports in the United States and its relationship with professional sport is uniquely different from other countries in the world. Athletic competition at most colleges in the United States is organized by the National Collegiate Athletic Association (NCAA). In football, college teams essentially act as a feeder system to the professional NFL whose teams make their selections from the colleges in a much publicized annual draft. The NCAA enforces strict amateur rules on college players, many of whom are on athletic scholarships, the result of an intense period of recruitment from high schools. The same system is in place for basketball although an increasing number of foreign players, as well as other non-college players are also included in the draft. College football and college basketball have a huge following in the United States and can attract crowds and television audiences as big as the professional teams. Although drafts from college also exist for baseball, hockey and soccer, college athletes for these sports will be in competition with players from junior, amateur and overseas leagues and are seldom considered immediately ready for the major professional leagues. They will likely transition more slowly, first participating in minor leagues as part of a major league team farm system. Thus these sports tend to attract much less attention at college level compared with football and basketball. Lacrosse also has a college draft with direct entry into the professional league, but the sport has a much smaller following, with the league currently consisting of only six teams. Female college basketball players can also enter an annual draft for direct entry to the professional WNBA.

Since an analysis of sports at different levels of competition might have the potential to untangle some of the unresolved complexities of home advantage, the purpose of the study was to compare home advantage between college and professional competition in different sports in the United States. In view of the lack of a consistent difference found in previous studies and in view of the contradictory theoretical considerations, no specific hypotheses were formulated.

## Method

### *Data sets*

College sports: The men's sports for which direct comparison with professional leagues could be made were baseball, basketball, football, hockey, lacrosse, and soccer. For women this was possible only for basketball and soccer. Data for the four seasons 2006–07 to 2009–10 were used, since these were the only seasons for which college data was available. Since the current professional women's soccer league has only been in existence for one year, women's soccer was excluded from further analysis. Home

and away records for all Division I teams were obtained from the rankings page of the website [www.ncaa.com](http://www.ncaa.com) with the exception of football for which [www.shrpsports.com](http://www.shrpsports.com) was used. All these records included both games within each team’s local league or conference, as well as non-conference games. As a result, the records of teams were not balanced. That is to say, each team did not play the same number of total games, neither did each play the same number at home and away. However the very large number of games analysed, together with the large number of different teams involved, should have the effect of minimizing any slight bias due to the imbalance. The total number of teams and games played are shown in Table 1.

Professional leagues: The major professional league of each sport was used as follows: baseball (MLS), basketball (NBA), football (NFL), hockey (NHL), lacrosse (MLL), soccer (MLS), and women’s basketball (WNBA). Home and away records were obtained from [www.shrpsports.com](http://www.shrpsports.com) or from the website of the particular league. Data was extracted for the same four seasons (2006–07 to 2009–10) used for college sports. In no professional league was the schedule perfectly balanced. Although each team played the same number of games at home and away, these were not necessarily against the same opponents owing to the format of conferences and divisions prevalent in North American sports. This may have had a small effect on the home advantage of individual teams, but since all teams are combined for the calculation of home advantage for a league, the net effect of any imbalance would be negligible. Table 1 gives details of sample sizes (Table 1).

**Attendance**

Since the magnitude of the crowd may exert an influence on home advantage, an attempt was made to obtain attendance figures for the college and professional games. These are available for NCAA college competition at [www.ncaa.org](http://www.ncaa.org). It was only possible to extract information for all

sports for the most recent season (2009–2010). For basketball, football, hockey and women’s basketball the average attendance for all Division I games was obtained. However, average attendance for baseball and soccer was only available for the 50 Division I colleges with the highest attendance figures. However, the overall average Division I attendance could be estimated from this information. For example, in baseball there were 301 teams, so that the top 50 teams represent 16.6% of the total. In basketball, for which complete data was available, the overall average Division I attendance was 40.7% of the average of the top 16.6% of teams. In baseball the average for the top 50 teams was 2,922, so that the average for all teams could be estimated as 40.7% of 2,922, or 1,189. The same procedure was followed for soccer. Since the use of attendance data was used to help interpret the results and not as an integral part of the analysis, it was only the relative magnitude of the figures that was needed rather than precise values. Attendance at lacrosse games was not available. For professional sport, average attendance figures were obtained from the web-sites of the respective leagues. Attendance figures are summarized in Table 2 (Table 2).

**Quantification of home advantage**

Home advantage was quantified as the number of games won at home expressed as a percentage of all games played at home and away. This is also referred to as home-winning percentage and has been used extensively in previous studies. Games played at neutral locations were ignored. For the two sports (hockey and soccer) in which ties (draws) are allowed, a tie was included as half a win. Home advantage has been shown to exhibit considerable fluctuations for leagues over both short and long periods of time, and also between teams within a league caused by differences in team ability and other factors such as travel distance<sup>10,23–25</sup>. The study was structured so that the effect of these potential confounding factors would be

**TABLE 1**  
SAMPLES OF PROFESSIONAL AND COLLEGE DATA FOR THE FOUR SEASONS, 2006-07 TO 2009-10.

Sport	Gender	College (NCAA, Division I)		League	Professional	
		Total number of games	Number of teams per season		Total number of games	Number of teams per season
Baseball	Men	29,309	293-302	MLB	9,715	30
Basketball	Men	18,825	336-347	NBA	4,920	30
Football	Men	3,202	119-120	NFL	1,024	32
Hockey	Men	2,690	58-59	NHL	4,920	30
Lacrosse	Men	1,581	56-60	MLL	192	6-10
Soccer	Men	6,809	199-204	MLS	822	12-15
Basketball	Women	18,647	335-345	WNBA	884	12-14

Hockey college data available for only three seasons

**TABLE 2**  
AVERAGE ATTENDANCE PER GAME IN COLLEGE AND PROFESSIONAL SPORTS FOR THE SEASON 2009-10.

Sport	College (NCAA)	Professional
Baseball	1,189	MLB 30,338
Basketball	5,038	NBA 17,165
Football	45,545	NFL 68,240
Hockey	3,985	NHL 17,073
Lacrosse	n/a	MLL 5,377
Soccer	598	MLS 16,120
Women's basketball	1,584	WNBA 7,835

Values for college baseball and college soccer are estimates

minimized. Team variability was controlled for by calculating home advantage for entire leagues and, in the case of the college data, over large numbers of teams. The net effect would be to average out the effects of team variability. Since college and professional sports were being compared over identical periods of time, any short term fluctuations in home advantage would apply equally to the college and professional data.

**Analysis**

To establish the existence of home advantage a one-sided test compared the observed home advantage (home winning percentage) with a null value of 50% indicating no home advantage. The global difference in home advantage between college and professional sports was assessed using a paired t-test on home advantage values for the seven sports included. For each individual sport home winning percentages were compared using a test of the difference between two proportions after combining the data for the four seasons. Two-sided tests were used when comparing college and professional data.

**Results**

For all sports, both college and professional, there was a significant home advantage effect, the magnitudes of which are shown in Table 3 and range from 54.85% in professional baseball to 66.61% in college basketball. The level of significance was  $p < 0.001$  for all sports at both college and professional level, with the exception of professional lacrosse which was  $p = 0.026$ . There was a significant overall difference in home advantage between college and professional sports ( $p = 0.015$ ) with home advantage in college sports averaging 3.73 percentage points higher than in the corresponding professional leagues. The difference was highly significant for baseball, basketball and hockey (all  $p < 0.001$ ) and of the same magnitude for football, though less significant due to a much smaller sample of games. Only in soccer did the professional home advantage exceed that of the college teams (Table 3).

**Discussion**

Although the existence of home advantage for all sports at both levels of play was expected, the consistently higher home advantage observed in college sports was not. This was in contrast to the two previous review studies for which such a comparison had been made, both of which concluded that no such difference existed<sup>11,12</sup>. As noted in the introduction, these studies combined data from different sports and over different time periods, as far back as 1952. Home advantage has been shown to vary considerably between sports. Moreover it has fluctuated over the years, with a decline over the last 20 years especially evident in professional basketball, hockey and soccer (see the historical data in Pollard & Pollard<sup>10</sup>, compared with Table 3). The present study has controlled for these variations by specifically making comparisons between college and professional play for individual sports and over identical time periods. It is also possible that the decline in home advantage in professional sports has not been mirrored by

**TABLE 3**  
COMPARISON OF HOME ADVANTAGE IN NCAA AND PROFESSIONAL LEAGUES IN THE UNITED STATES FOR THE SEASONS 2006-07 TO 2009-10.

Sport	Gender	Professional league	Home advantage professional	Home advantage college	Difference	p
Baseball	Men	MLB	54.85%	60.26%	+5.41%	<0.001
Basketball	Men	NBA	59.86%	66.61%	+6.75%	<0.001
Football	Men	NFL	56.20%	62.77%	+6.57%	0.103
Hockey	Men	NHL	54.94%	59.20%	+4.26%	<0.001
Lacrosse	Men	MLL	57.29%	60.09%	+2.80%	0.459
Soccer	Men	MLS	62.29%	60.88%	-1.41%	0.421
Basketball	Women	WNBA	60.41%	62.14%	+1.73%	0.302
Mean			57.98%	61.71%	+3.73%	0.015

Hockey college data available for only three seasons



a similar decline in college sports, hence making the detection of a difference more likely for recent data.

The newly discovered fact that home advantage in college sports exceeds that of the professionals raises some interesting issues relating to the possible explanations for home advantage given in the introduction. However, before discussing these issues in more detail, two possible sources of bias need to be considered. The first is a selection bias. Since college athletic participation precedes professional play, the reason why only a small proportion of college athletes become professionals needs to be addressed. The obvious factor is talent, but other dynamics such as maturity and the ability to manage psychological stress must also play a part. Thus it is possible that athletes least likely to cope with the difficulties involved with playing away from home have been weeded out in the selection process, a consideration that might have some influence on the results obtained. The second possible source of bias relates to the fact that for the college sports the playing schedules were not balanced. Moskowitz and Wertheim<sup>16</sup> have noted that in college football strong teams tend to schedule early season games at home against weak opposition, a fact that could inflate home advantage unless adjustments for team quality are made. If this were also true for the other sports then part of the differences found could be attributed to schedule imbalance, a possibility that any subsequent research should consider in more detail.

The fact that average crowds are much larger for professional sport (Table 2) would suggest an increased home advantage for the professionals, when in fact the reverse is the case. However, Pollard<sup>8</sup> has shown that in soccer in England, once average home attendance in a league reaches only a few thousand, the home advantage effect is present to the same degree as when crowds are at their largest. College crowds for football, basketball and ice hockey all average over 3,000. This might be sufficient to produce a contribution to the home advantage as great as for the larger professional crowds. In support of this it should be noted that in soccer, the only sport for which home advantage was greater for professionals, college attendance was lower than in any other sport, well below 1,000. Another related factor is the intensity of the support. Although this is difficult to quantify, it is well known to be strong from partisan home crowds at college games, especially in basketball where the atmosphere can become particularly intimidating for visiting teams in a packed indoor arena. The extent to which vociferous crowd support might affect referees is another possible factor in home advantage, especially referees in college games who are likely to be less experienced and less well-trained than the officials in professional sport. Instant replay technology has the potential to reduce official bias. It is now used extensively in professional basketball, football and hockey, but less so in baseball and not at all in soccer. Although instant replay is also used at the top levels of college sports, its overall effect on reducing possible home bias in college play would probably be less than in the professional game. Thus the greater likelihood of referee bias remains a plausible con-

tributing factor to the extra home advantage in college sports.

There is now considerable research on the effects of travel on home advantage, well summarized by Carron, Loughhead and Bray<sup>17</sup>. Conclusions vary as to the magnitude, if any, of the effect. Much of college sport is played within regional conferences so that travel distance and the problem of adapting to different time zones would be more of a factor in professional competition. Against this, not all colleges can afford to provide their athletes with the comfort in which professional competitors now travel, especially for the sports that generate the least income. Professional teams spend long periods of time on the road, so playing away from home, and the travel involved, becomes part of a set routine. However travel discomfort is hard to quantify, so the differential effect of travel on home advantage for college and professional athletes remains unclear and in need of further research.

Most college athletes live on or near their home campus which they normally visit on a daily basis, so home surroundings are very familiar in a close-knit campus community. Professional athletes play in large cities and are likely to identify less with the local community, especially in the age of free agency, a fact that Smith<sup>25</sup> felt was a contributing factor in the decline in home advantage in professional sport. Furthermore in all the sports except football, the number of games that constitutes a professional season is much larger than for college, so over the years problems caused by the unfamiliarity of opponents' venues should become less of a disadvantage for professionals. It could therefore be argued that in comparison with professionals, college athletes have greater familiarity and identity with their home surrounding and less familiarity with away surroundings, the combined effect of which is to enhance home advantage and provide a partial explanation for the differences found.

Testosterone levels for male athletes have been shown to increase before a game, the increase being greater at home games than away<sup>22</sup>. This finding was for soccer players and at different levels of competition. It has also been shown to apply to other types of competitive encounters<sup>26</sup> and thus a probable factor in sports other than soccer. In the present context, it is therefore likely to enhance home advantage, but apply both at the college and professional level. However a related territorial explanation for home advantage is more likely to have a greater effect on college players. Territorial protection is a concept that has been suggested as a reason for the greater home advantage that has been demonstrated for soccer teams whose home location is both isolated and with a distinct closed, ethnic or social component<sup>24, 27</sup>. Soccer teams playing at places that fit this category, and with high home advantage, include teams on islands such as Corsica and Sicily, and in numerous towns in a variety of Balkan countries, as well as Turkey. In the context of college sports, campus communities can be considered a closed, socially homogeneous group, often located in relative isolation. Thus the feeling of territorial protection would likely be stronger for college teams than for their professional counterparts, and hence

a possible cause of the increased home advantage seen at colleges.

Although there are minor differences in the rules governing college and professional play in most sports, few of these would seem to have the potential to affect home advantage. One exception is the use of time-outs and substitutions, both of which would increase the opportunity for information transfer through coaching input. Both Stefani<sup>20</sup> and Tsonis and Tsonis<sup>21</sup> have hypothesized that these extra stoppages allow coaches to slow down the pace of the game and to limit the extent to which a build-up of home support might influence the outcome of a game. Skinn<sup>28</sup> found that coaches in basketball planned a more aggressive strategy when playing at home. Other studies have shown that college basketball coaches use time-outs to successfully disrupt the behavioral momentum of opposing teams<sup>29,30</sup>. Time-outs are particularly important in basketball, a sport for which professional and college rules differ in this respect. However, although this difference applies to the number, the timing and the lengths of the time-outs, the overall effect in both college and professional basketball is to allow a similar amount of coach intervention, so that the net differential effect on information transfer should be minimal. Similarly the professional and college rules regarding substitutions show little difference, with one notable exception. This is for soccer. Professional soccer permits a maximum of three substitutions and does not allow a substituted player to return. In contrast college soccer allows unlimited substitution and even permits a substituted player to return to the game under certain circumstances. This clearly increases the ability of the coach both to influence the flow of the game and to impact strategy, two factors that could be used to diminish home advantage and hence explain the fact that, in contrast to other sports, home advantage in soccer is lower at college level than professional. This scenario of coaching influence through the use of substitutes has been investigated for basketball where there is evidence of a difference between starters and non-starters in terms of their performance related to certain situational variables, thus providing an opportunity for coaches to upset the momentum of an opposing team by careful use of substitutions<sup>31,32</sup>.

Neave and Wolfson<sup>18</sup> have summarized the psychological aspects of home advantage. If players, coaches and officials believe in the existence of home advantage for whatever cause, it is inevitably going to affect their mental attitude, as well as their physical actions before and during a game and hence contribute to the result. Thus psy-

chological preparation before a game should certainly include a strategy to cope with the perceived disadvantage of playing away from home. It is likely that such preparation would be performed more thoroughly by professional teams than at the college level. Hence the psychological causes of home advantage should be a bigger factor for college athletes and therefore provide another plausible partial explanation for the difference found at college and professional levels.

At the professional league level, soccer has long been the sport with the highest home advantage<sup>10</sup>. This continues to be the case (Table 3). Home advantage in Major League Soccer has remained steady since the start of the league in 1996, consistently well above 60%. This is in contrast to leagues in Western Europe which have experienced a sharp decline in home advantage over the last 10 years<sup>24</sup>. However, at the college level home advantage in soccer is no higher than in other sports. There are two possible explanations as to why the higher soccer home advantage seen in the professional game does not carry over to college level. Firstly, crowds in college soccer are low, both compared to other college sports and to professional soccer (Table 2). Secondly, the rules regarding substitution may be having the effect on home advantage discussed above.

## Conclusion

Contrary to previous findings, home advantage in the United States has been shown to be consistently higher in college competition compared with professional leagues. In the seven sports analysed home advantage averaged 61.7% for college teams compared with 58.0% for professionals, a difference that was statistically significant. The differences found were greatest for baseball, basketball and hockey. Only in soccer was home advantage greater in the professional game, possibly a reflection of the much greater use of substitutions permitted in college soccer, a factor which allows more coach intervention and greater opportunity for the 'information transfer' which has been shown to have the potential to reduce home advantage. Future research might concentrate only on conference play for college sports where a more balanced playing schedule is used, leading to a more precise measure of home advantage. Studies could also be designed to investigate the hypothesized roles played by factors such as familiarity, referee bias and territoriality in explaining differences in the home advantage of college and professional teams.

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## **USPOREDBA PREDNOSTI DOMAĆEG TERENA KOD MOMČADI NA FAKULTETSKIM I PROFESIONALNŽIM SPORTOVIMA U SAD-U**

### **SAŽETAK**

Prednost domaćeg terena u ekipnim športovima je uspoređena kod sedam američkih koledža (bejzbol, košarka, nogomet, hokej, lakros, nogomet i ženska košarka) s profesionalnim ligama u SAD-u za iste sportove u istom razdoblju. Ukupno je analizirano 81.063 utakmica na koledžima i 22.477 profesionalnih utakmica za četiri godišnja doba u razdoblju od 2006–07 do 2009-10. U svim sportovima je pokazana značajna prednost domaćeg terena, mjerena pobjedničkim postotkom utakmica kod kuće, kako na fakultetima tako i profesionalno. Ukupna domaća prednost je na fakultetskim sportovima bila je znatno veća nego u profesionalnim sportovima ( $p < 0,015$ ). Srednja razlika bila je 3,73 postotnih bodova za pobjednički postotak utakmica kod kuće, a najveća je bila za bejzbol, košarku i hokej (sve  $p < 0,001$ ). Moguća objašnjenja za razlike u rezultatima između fakultetske i profesionalne konkurencije su: poznavanje lokalnih uvjeta, pristranost sudaca, teritorijalnost i psihološki čimbenici. Međutim, utjecaj umora putovanja na sportaše nije bio mjerljiv. Jedino je kod nogometa postojala prednost domaćeg terena kod profesionalnih sportaša. To je bio jedini sport u kojem je veličina publike imala učinak na rezultat. Osim toga pravila za fakultetski nogomet omogućuju više izmjena igrača i samim time i veću mogućnost za trenersku intervenciju nego u profesionalnom nogometu, faktor koji također može utjecati na smanjenje prednosti domaćeg terena.