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Understanding College Application Decisions: Why College Sports Success Matters

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Abstract

Using a unique, national data set that indicates where students choose to send their SAT scores, the authors find that college sports success has a large impact on student application decisions. For example, a school that has a stellar year in basketball or football on average receives up to 10% more SAT scores. Certain demographic groups (males, Blacks, out-of-state students, and students who played sports in high school) are more likely to be influenced by sports success than their counterparts. The authors explore the reasons why students might be influenced by these sporting events and present evidence that attention/accessibility helps explain these findings.

Keywords

college sports, school choice, student quality, student demographics

Introduction

Choosing where to apply to college is both an important and complex decision. Models of college choice typically assume that high school students are fully informed and choose to apply to and eventually attend a school that maximizes their expected, present discounted value of future wages less the costs associated

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with college attendance (Card & Krueger, 2004; Fuller, Manski, & Wise, 1982; Willis & Rosen, 1979). Thus, variables such as school quality, distance, and tuition should be key predictors of the schools to which students apply and attend. While this choice problem appears daunting, economists typically argue that due to the sizable incentives involved, student outcomes should closely approximate predictions from this rational, decision-making process.

While these classic economic variables are surely important and have been shown to contain predictive power, it is possible that students are not fully informed about all potential options and at times use heuristics when making application decisions. One such case is that students may be more likely to apply to and attend a college that has recently entered a student's consideration set due to an attention-generating event. The degree to which attention/accessibility can affect the college application process and how the size of these effects relate to other classic economic variables such as school quality and tuition costs is an important question since it could provide information on the relative costs and benefits of providing information to inattentive students.

In this article, we explore the impact of attention in the college application process by focusing on college sports. There is little doubt that the media exposure generated by high-profile college sports such as football and basketball can act as a powerful advertising tool for institutions of higher education. In fact, one might expect that future college applicants are much more likely to be aware of a particular college or university because of the school's appearance in the "Final 4" of the National Collegiate Athletic Association's (NCAA) basketball tournament, rather than the recent hiring of a world-renowned professor. However, college sports success is different from a typical economic variable that predicts college application decisions since it does not necessarily relate to the quality or cost of the academic education that a university provides.

In order to evaluate the impact of sports success on college application decisions, we use an administrative data set from the College Board that records where students sent their SAT scores—a proxy for where students send their applications. This unique data set allows us to produce counts for the number and type of students that send their SAT scores to each college that participates in Division I, NCAA basketball or football. Using a fixed-effects identification strategy that controls for year- and school-specific unobserved heterogeneity, we find that there is a large and statistically significant increase in the number of students who send their SAT scores to schools that perform well in recent basketball or football events. For example, we find that a school that makes it to the "Final 4" in the NCAA basketball tournament or is ranked in the top 10 in the Associated Press Poll at the end of the football season experiences an average increase in sent SAT scores by 6%–8% the following year. The results we find are robust to including various school-level controls and trends. Our graphical representation of the results further illustrates how our results are unlikely to be explained by the endogeneity of sports successes or spurious trends that can plague this type of analysis.

We argue that the large impact of sports success on student application decisions is somewhat puzzling, given the classical model of college choice. We posit two key explanations for our findings. First, it is possible that the standard model is adequate and that similar to school quality or costs of attendance, college sports success is simply an important component to a student's utility function (utility hypothesis). A second explanation for our findings is that high school students are not fully informed about potential colleges to which they could apply and that their application decisions can be significantly affected by schools that enter their consideration set via attention-generating events like sports (attention hypothesis). This hypothesis draws largely on evidence presented in the marketing literature (See for example, Bain [1956] and Nelson [1974] for a discussion of reasons for advertising and Roberts and Lattin [1997] and Manrai and Andrews [1998] for reviews of the consideration set literature).

The empirical relationship between sports success and student applications is certainly interesting and important, independent of the mechanism driving the results. However, disentangling these two effects is important from a theoretical perspective. If students are simply placing a large weight on sports success in their utility function and subsequently optimizing when making application decisions, then there is little need for changes to current education policy. However, if students are responding to sports success due to the lack of information about college options, this may suggest that high school students are not being well guided in their college application decisions. Increasing the number of guidance counselors and providing information in other ways may improve student welfare by helping students make better informed college decisions.

Disentangling these two mechanisms is very difficult and we do not pretend that our data allow us to identify how much of the sports impact is caused by an attention effect and how much is caused by a utility effect. Most events that provide a shock to the attention/accessibility of a school, like sports successes, are likely to impact the perceived utility of attending that school as well. Even though these two mechanisms are largely intertwined, we present six pieces of evidence that are, at the very least, suggestive of the fact that attention could be an important component in application decisions.

First, the results we present indicate that high school students' responses to sports success decay very quickly across time—consistent with a model of inattention. Second, we find a larger effect of sports success on out-of-state than for in-state students. While a sports victory for a given school may not change the awareness of in-state students regarding its existence, the sports victory may present a significant shock in attention/awareness for out-of-state students. Third, we estimate the effect of women's basketball success on application decisions. Given the lack of media attention that women's basketball receives relative to men's basketball, one would expect a smaller effect. Indeed, we find no effect of women's basketball success on the number of SAT scores sent to the winning schools. Fourth, using the demographic information that the SAT data provide, we perform a heterogeneity analysis by identifying the impact of sports on SAT score-sending decisions by demographic subgroupings. We find the influence of sports success on males, Blacks, and students who played sports in high school to be significantly higher than their counterparts. Fifth, while certain demographic subgroups are clearly more responsive to sports success overall, nearly all subgroups become responsive to the most attention-generating sports victories (e.g., championships). Sixth, we use a regression discontinuity design in the NCAA basketball tournament to measure the impact of barely winning and thus moving on to receive more attention in later rounds of the tournament. We find that teams that barely win and thus move on in the tournament are no more likely to have success in future years relative to teams that barely lost. However, they receive significantly more applications due to their performance. While a utility story can be generated that rationalizes each of these findings, we argue that they are suggestive of attention playing an important role in the college admissions process and that more work on distinguishing between these two mechanisms is needed.

Our article relates to a small literature that has previously estimated the effect of college sports success on college applications. In one of the first papers on the topic, McCormick and Tinsley (1987) hypothesized that schools with athletic success may receive more applications, thereby allowing the school to be more selective in the quality of students they admit. They used data on average SAT scores and in-conference football winning percentages for 44 schools for the years 1981-1984 and found some evidence that football success can increase average incoming student quality. Several follow-up studies have also been conducted and have produced mixed results (i.e., Bremmer & Kesselring, 1993; Mixon, 1995; Murphy & Trandel, 1994; Tucker & Amato, 1993). In a recent article (Pope & Pope, 2009), we addressed some of the data and methodological limitations of previous work and gave clearer evidence that sports success influences college choice. However, it left many questions about this process unanswered. This article extends the literature by trying to better explain which students are influenced by sports success and why this influence occurs.

The article proceeds as follows. In the Conceptual Framework section, we provide a conceptual framework for college choice and the potential impact of college sports on application decisions. The Data section describes the data that we use in the analysis. In the Empirical Strategy section, we outline our empirical strategy. The Results section presents our results followed by the Discussion and Conclusion section.

Conceptual Framework

College attendance has been an active area of research in economics and other fields. Most work in economics assumes that an individual makes their actual application decisions by comparing the benefits and costs of all possible alternatives and chooses to apply to the schools that maximize overall utility (Card & Krueger, 2004; Fuller et al., 1982; Willis & Rosen, 1979).[1] However, a significant amount of work has focused on providing a richer context for college application decisions. For example, Perna (2006) argues that "when considered separately, neither rational human capital investment models nor sociological approaches are sufficient for understanding differences across groups in student college choice." Manski (1993) also discusses this point. He argues that economic approaches are limited by failing to assess the importance of available information on decisions while sociologic approaches fail to identify how decisions are made once information is gathered. In her review, Perna (2006) concludes that ". . . college choice is ultimately based on a comparison of the benefits and costs of enrolling, assessments of the benefits and costs are shaped not only by demand for higher education and supply of resources to pay the costs but also by an individual's habitus and, directly and indirectly, by the family, school, and community context, higher education context, and social, economic, and policy context. By drawing on constructs from both human capital and sociological approaches, the proposed conceptual model will likely generate a more comprehensive understanding of student college choice."

Below we provide a simple framework that attempts to combine utility maximization with a more thorough understanding of the search process. Hossler and Gallagher (1987) provide a well-used framework for the search process. They argue that college-choice decisions follow three general stages: (i) Predisposition: deciding whether to continue formal education beyond secondary education; (ii) Search: understanding and searching for college attributes that will affect their choice; and (iii) Choice: constructing a set of schools to apply to and then choosing a school to attend. Most models are essentially reduced-form approximations of the predisposition and choice stages. In fact, a substantial amount of work has been done by researchers in the field of higher education on these two stages (Hossler, Braxton, and Coopersmith [1989] provides a dated but useful review of this literature). Much less has been done on understanding the search stage of the college choice process. By acknowledging that search costs and limited awareness make it unlikely that high school students consider all possible colleges when making their decisions about where to apply, the framework that we outline essentially includes elements of the search stage as well.

In this article, we assume that increasing college sports success weakly increases the utility that a high school student assigns to attending that school.[2] Thus, sports success can increase student applications through the utility channel. Furthermore, sports success weakly increases the exposure that a student has to a given college which can increase student applications through the attention channel.[3] For example, the better a sports team performs, the more applications its school will receive (making it to the Final 4 is better than only making it to the Final 64). Demographic groups that on average care the most about sports (e.g., males, people who played sports in high school, etc.) will be affected the most. Lower profile sports will have a smaller effect on application rates than higher profile sports (e.g., women's basketball success should have less of an impact than men's basketball success). All of these predictions can be utility- or attention-driven.[4] In our results, we look for situations where intuition suggests that attention is the primary channel and we look to see if SAT score sending continues to be responsive in these situations.

Data

SAT Data

The data used in this analysis are obtained from the College Board's Test Takers Database (referred to as SAT database in the remainder of the article).[5] The data are at the individual level and represent a 25% random sample of all SAT test-takers nationwide with high school graduation dates between 1994 and 2001. It also includes a 100% sample of SAT test-takers that are Californians, Texans, African American, or Hispanic. The data are classified by cohorts according to the year in which the students are expected to graduate. For example, the 1994 cohort group contains students who took the SAT who are expected to graduate in the spring of 1994 and apply to begin college the following fall. The SAT database provides demographic and other background information in the Student Descriptive Questionnaire component of the SAT. The data report the SAT score and background characteristics of the most recent test and survey taken. For most students, this is at the beginning of their senior year in high school. The data set identifies the first 20 schools to which a student has requested his or her scores be sent.[6] The median number of schools to which a student requested his scores be sent was 5 across all years in our sample. We restrict the data to students who sent their scores to at least one of the 332 schools that played NCAA Division I basketball or Division I-A football.[7] We also weight the observations so that the data are representative of all SAT-taking, potential college applicants to each of these 332 schools.[8]

Table 1 presents summary statistics for the data. The table shows that schools that participate in Division I sports receive on average 7,801 SAT scores each year. Schools that have done well in sports (those in the top 10 in football or top 8 in basketball at some time between 1994 and 2001) are typically larger schools and receive more SAT scores—13,779 on average. These numbers will be useful when interpreting the size of the results we find later in the article.

In this article, we use sending a SAT score as a proxy for applying to a school. Using this same SAT test-takers data set, Card and Krueger (2004) tested the validity of using sent SAT scores as a proxy for applications. They compared the number of SAT scores that students of different ethnicities sent with admissions records from California and Texas, to administrative data on the number of applications received by ethnicity. They conclude that "trends in the number of applicants to a particular campus are closely mirrored by trends in the number of students who send their SAT

Table 1. Summary Statistics.

Average total number of students submitting SAT scores each year	762,273
Average number of scores submitted per year to each of the 332 schools in Division IA sports	7,801
Average number of scores submitted per year to each school that had a top sports program	13,779
Percentage of score senders	
White	63.9
Black	10.8
Hispanic	8.2
Asian	8.7
Male	45.9
Female	54.1
Played sports in HS	21.1
Did not play sports in HS	78.9

Note. Data spans from the graduating cohort class of 1994 to the class of 2001. "Top sports programs" are considered to be those that placed in the top 10 in football or the top 8 in basketball at one point during our sample. "Played sports in High school" are students that indicated that they either played basketball or football in high school.

scores to that campus, and that use of the probability of sending SAT scores to a particular institution as a measure of the probability of applying to that institution would lead to relatively little attenuation bias."

Since we are using sent SAT scores as a proxy for applications, we obviously do not record students who only take the ACT. Since the ACT is a commonly taken college admissions test, especially in certain parts of the country, it is worth considering whether or not this might bias the effects that we find. If we were to estimate a cross-sectional model, this might be quite problematic. Fortunately, the empirical strategy that we describe in the next section and employ in this article uses a fixed-effects framework. If the majority of students applying to certain colleges take the ACT as opposed to the SAT, this fact will be treated as unobserved heterogeneity in college applications for a given school in the analysis, and will be netted out. Our estimates will only be biased if the percentage of ACT-taking students applying to a given college decreases the year in which the college has a sports victory.

We argue that this type of systematic, large change in the population of ACT-taking students being correlated with sports victories is unlikely to explain the results that we find. However, one might worry that if out-of-state and in-state students respond to sports success differently, then colleges located in SAT areas may experience differential effects than colleges located in ACT areas due to our particular proxy variable. One simple test that we perform to ameliorate this concern is that we split our sample by colleges that are in "SAT states" and colleges that are in "ACT states" and find very little difference in the estimates for the SAT- and ACT-state schools in the data.

Sports Data

We gathered sports data on NCAA basketball and football success for all 332 schools that participate in NCAA Division I basketball or Division I-A Football. We use the Associated Press's college football poll as our indicator of football success. This poll ranks NCAA division I-A football teams based upon game performances throughout the year. We collected the end of season rankings for teams finishing in the top 20 between the years 1991 and 2001.[9] Although this indicator does not incorporate all measures of success (e.g., big wins against key rivals, an exciting individual player on a team, etc.), it probably proxies these indicators for the top 20 teams each year.

For basketball success, we gather data on team performance in the NCAA men's college basketball tournament. It is widely agreed that this tournament provides the greatest media exposure and indicator of success for a college basketball team (particularly on a national level) each year. "March Madness" as it is often called takes place at the end of the college basketball season in March and the beginning of April. It is a single elimination tournament that determines who wins the college basketball championship. Since 1985, 64 teams have been invited to play each year.[10] We collected information on all college basketball teams that were invited to the tournament between 1991 and 2001. From these data, we create four dummy variables that indicate the furthest round in which a team played: rounds of 64, 16, 4, and champion. We also gathered similar data for women's teams that advanced to the Final 4 and championship games in the women's basketball tournament.

In order to better interpret the results, it is important to understand exactly where the variation in sports success is coming from. Of the 332 schools that play Division I-A basketball or football, 145 (44.8%) were never invited to participate in the NCAA Tournament. Given the fixed-effects framework that we use and describe below, these schools will not provide any variation leading to the results that we find for the impact of basketball success on score sending. However, the majority of Division IA schools (187) will provide variation in our analysis. Of these 187 schools, 62 of them made it to the Tournament just once, 48 twice, 21 three times, and so on. Only nine schools (2.8%) participated in the Tournament every year in our data. Since we will be identifying effects for different levels of success within the Tournament (advancing to the round of 16, 4, etc.), even these nine schools provide variation for our analysis since no school advanced to the exact same round in all years.

For football, 51 of the 101 schools that participated during our sample ended the season in the top 20 at some point during our sample. 15 teams did so just once, 13 teams twice, 8 teams three times, and so on. Only three schools (3%) finished in the top 20 all eight seasons. Like basketball, the variation that we use in our analysis will come from the 51 teams that at some point finished in the top 20.

Empirical Strategy

Specification

Many school characteristics cannot be observed by the econometrician, yet these unobservables are likely correlated with both indicators of sports success and the number of applications received by a school. The unobservable component is likely to include information about scholastic tradition, geographic advantages, and other information on the quality of the school. Without adequately controlling for these unobservables, they would likely confound the ability to detect the impact of athletic success on student applications.

Previous studies have pointed to a large number of institutional characteristics that impact college-choice decisions such as tuition, financial aid, location, reputation, selectivity, special programs, and curriculum (see e.g., Abraham & Clark, 2006; DesJardins, Ahlburg, & McCall, 2006; Dynarski, 2000). The nature of the data we have compiled and the econometric specification that we employ takes advantage of the panel design of the data and thereby is able to control for the stationary aspects of a school (e.g., location, curriculum). We use a fixed-effects model where the fixed effects control for year-specific and school-specific unobserved heterogeneity. We also include a linear trend for each school to try to capture heterogeneous trend rates. We include several additional variables on the right-hand side of the equation to further control for quality characteristics of the schools that change across time. The econometric specification we use is the following,

$$Y^j_{i,t} = \alpha_{i,t} + t\lambda_i + S_{i,t}\beta + S_{i,t-1}\delta + S_{i,t-2}\gamma + S_{i,t-3}\theta + X_{i,t}\phi + \varepsilon_{i,t}, \quad (1)$$

where $Y^j_{i,t}$ represents the log number of SAT scores sent to school i in year t from the jth population group. The key covariate $S_{i,t}$ is a vector of dummy variables indicating the level of sports success that school i had during year t. We include up to three lags for each sports variable in our model in order to examine persistence in the effects of a winning season on applications. School- and year-fixed effects are included along with a linear time trend for each school. $X_{i,t}$ is a set of four control variables commonly used in the literature to control for the quality of the school—log total cost to attend school, log average professor salary (lagged one year), log average real income in the state in which the school is located, and the number of public high school diplomas awarded in the state in which the school is located during year t.[11]

Lag Structure

Understanding when prospective students apply to college in relation to the football and basketball seasons is crucial in determining which lags of our athletic success variables should affect the left-hand side of Equation 1. Fall admission application deadlines vary by school. They can occur any time between November and August before the expected fall enrollment period. Furthermore, students often have to send letters of recommendation and SAT scores to the school well before the actual

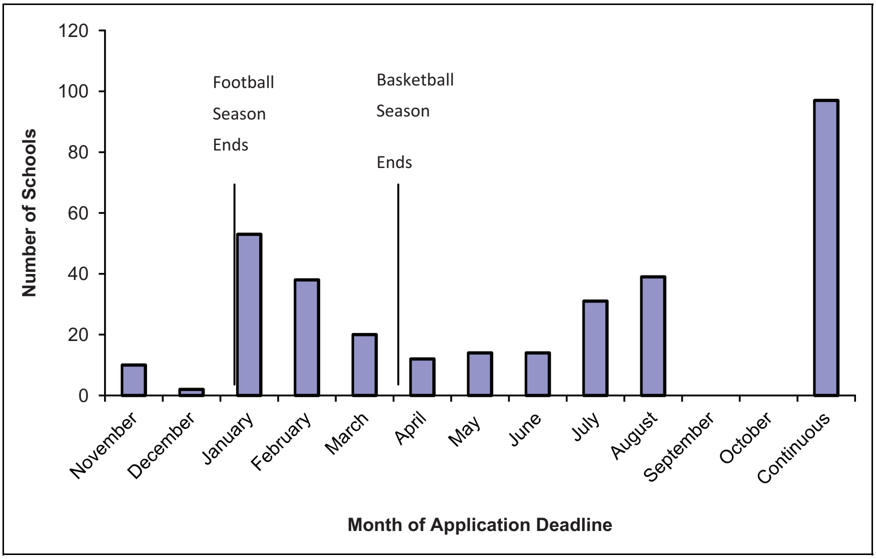

Figure 1. Application deadlines. *Note*. The figure includes all schools that compete in Division I football or basketball. Application deadline data are based on 2003 information from a licensed data set from Peterson's (a part of the Thompson Corporation).

deadlines. Figure 1 illustrates the distribution of application deadlines for our sample of schools in 2003. The label "continuous" in Figure 1 refers to those schools that have a rolling application period rather than a specific deadline. The NCAA Division I-A football season finishes at the beginning of January. The NCAA basketball tournament finishes at the end of March or beginning of April. Therefore, since Figure 1 illustrates that about half of the schools in our sample have application deadlines after April, we might expect some effect on the current year variables. This means that a successful football team that finishes in January or a successful basketball team that finishes in March may still influence application decisions for students enrolling that upcoming fall. However, given the timing of when applications are likely prepared and submitted, one would expect athletic success to have its largest impact when lagged one period (especially for basketball which is 3 months after football). The second and third lags should provide an indication of the persistence of the effect that athletic success has on application rates.

Regression Discontinuity Design

We implement a regression-discontinuity design to analyze the effect of two teams that in a given season show equal sports competence, but receive different levels of attention. It is plausible that teams that just win a NCAA basketball tournament game have similar capabilities to those that just lose. Thistlethwaite and Campbell

(1960) first proposed using an observed discontinuity to estimate causal effects. Nonetheless, the presence of an observed discontinuity does not guarantee one can estimate a causal effect. The identifying assumption in our case is that all observable and unobservable pre-event characteristics between the winning and losing teams are not systematically different. For example, it is possible that better teams have the ability to perform at a higher level at the end of games and therefore, even very close games are usually won by the better team. If this is the case, it is not possible to establish a causal relationship using this discontinuity. Ultimately, it is necessary to look at the observable data to generate a convincing argument that the winners and losers are equivalent ex ante.

To make this ex ante comparability argument, we present two pieces of graphical evidence. First, we gather data on the seed of each team in the tournament.[12] We examine whether or not a discontinuity exists in team seed at the point of just “barely” winning the game. If barely winning is not random, then we might find a significant discontinuity in the average seed for teams that just barely lost compared to teams that just barely won (e.g., better teams are able to “step it up” when a game is close). We also examine whether or not a discontinuity exists in the probability that a team makes it to the NCAA tournament the following year based on whether they barely won or lost in the current year. After analyzing these two tests, we run our baseline regression and compare the increase in number of SAT senders for teams that barely won and teams that barely lost and compare the difference in coefficients.

Results

Overall Results

The main effects with robust standard errors clustered at the school level are presented in Table 2. Column 1 of Table 2 provides the results using all of the data. We find that being one of the 64 teams in the NCAA tournament yields a 2.2% increase in the total number of SAT score senders the following year, making it to the “sweet 16” yields a 3.8% increase, making it to the “Final 4” a 5.7% increase, and being the champion a 9% increase. For football, the results suggest that ending the season ranked in the top 20 results in a 2% increase in score senders the following year, ending in the top 10 yields a 5.2% increase, and ending as the football champion yields an 11% increase in score senders the following year. All but one of these effects is statistically significant at the 1% confidence level.

Looking across the columns in Table 2, we find very distinct responses to athletic success from different groups of students. Blacks are roughly twice as responsive to basketball success as any other race. For example, making it into the Final 4 yields a 13% increase in Black SAT scores sent ($SE = 3.2\%$) compared to a 5.7% increase ($SE = 1.5\%$) for the overall population. The basketball champion in a given year

Table 2. The Impact of Success in Men's Basketball and Football on SAT Score Sending.

Dependent Variable: Log Number of SAT Scores Sent by Subgroup

	Everyone	White	Black	Hispanic	Asian	Males	Females	Sports	No Sports	In-State	Out-of-State
Basketball											
Final_64_lg1	0.022**	0.024*	0.040**	0.016	−0.002	0.028**	0.015	0.041**	0.015*	0.019	0.028**
	(0.006)	(0.011)	(0.012)	(0.016)	(0.028)	(0.007)	(0.008)	(0.009)	(0.006)	(0.012)	(0.009)
Final_16_lg1	0.038**	0.039**	0.091**	0.017	0.017	0.042**	0.040**	0.069**	0.026*	0.031*	0.054**
	(0.010)	(0.011)	(0.022)	(0.019)	(0.030)	(0.013)	(0.013)	(0.014)	(0.011)	(0.015)	(0.013)
Final_4_lg1	0.057**	0.054**	0.130**	0.069*	0.061	0.066**	0.052**	0.075**	0.051**	0.045**	0.072**
	(0.015)	(0.016)	(0.032)	(0.032)	(0.061)	(0.017)	(0.019)	(0.014)	(0.017)	(0.016)	(0.020)
Champ_lg1	0.090**	0.090**	0.188**	0.079	0.094	0.088**	0.101*	0.107**	0.086**	0.092	0.093**
	(0.031)	(0.033)	(0.049)	(0.073)	(0.067)	(0.026)	(0.043)	(0.040)	(0.031)	(0.052)	(0.030)
Football											
Top_20_lg1	0.020*	0.023	0.042*	0.051**	0.028	0.027*	0.014	0.035*	0.016	0.009	0.028
	(0.010)	(0.015)	(0.021)	(0.017)	(0.028)	(0.012)	(0.012)	(0.014)	(0.011)	(0.019)	(0.015)
Top_10_lg1	0.052**	0.052**	0.066**	0.076**	0.029	0.062**	0.042**	0.065**	0.048**	0.011	0.074**
	(0.009)	(0.011)	(0.022)	(0.019)	(0.027)	(0.011)	(0.011)	(0.013)	(0.010)	(0.017)	(0.011)
Champ_lg1	0.110**	0.108**	0.185**	0.179**	0.042	0.126**	0.095**	0.148**	0.098**	0.063**	0.150**
	(0.012)	(0.016)	(0.064)	(0.058)	(0.048)	(0.024)	(0.026)	(0.020)	(0.013)	(0.019)	(0.017)
School F.E.s	X	X	X	X	X	X	X	X	X	X	X
Year F.E.s	X	X	X	X	X	X	X	X	X	X	X
School trends	X	X	X	X	X	X	X	X	X	X	X
School controls	X	X	X	X	X	X	X	X	X	X	X
Observations	2,431	2,427	2,429	2,426	2,411	2,430	2,429	2,428	2,431	2,419	2,430
R^2	.997	.995	.994	.993	.981	.996	.997	.994	.997	.995	.996
Sport R^2	.021	.009	.029	.007	.001	.022	.014	.027	.014	.004	.019

Note. Robust standard errors clustered at the school level are presented in parentheses. Control variables that are included are school- and year-fixed effects, school × year (linear trends), number of high school diplomas given out that year in the school's state, log average professor salary, log average real income in the school's state, and log tuition cost. Sport R^2 is the fraction of score-sending variation after controlling for fixed effects, trends, and school controls that can be explained by the sports variables.
*Significant at 5%. **Significant at 1%.

receives on average 18.8% more Black SAT scores the following year. Hispanics and Blacks are the two races most likely to be affected by football success. Asians are the least likely to be affected by both basketball and football. The results indicate that males respond more to sports success than females. Similarly, the coefficients on the students who played basketball or football in high school are generally at least twice as large as those of students who did not play sports. These findings can be broken down even further. For example, we have looked at the responsiveness of female, non-sports students to college sports success. As expected, the effects for this subgroup are even smaller (however, still significant for the Final 4 and champion in basketball and Top 10 and champion in football). Both out-of-state and in-state students are affected by sports success, but there is a larger average effect for out-of-state students.

(Tables 2 and 3) report two different R^2 values. The first is the standard R^2 that indicates that our model fits the data very well (over 99% of the variation in score sending can be explained by our model). Of course, most of this explained variation comes from the school- and year-fixed effects as well as the school trends and controls. One may also be interested in how much of the remaining variation in score sending (after letting fixed effects, trends, and school controls soak up what variation they can) is explained by our sports success variables. This is what is reported as Sport R^2 in the Tables. For example, the first column in Table 2 indicates that 2.1% of the variation in score sending that remains after all of the other variables are controlled for in our analysis can be explained by sports success.

An important question about these effects is whether they persist across a long period of time. In Table 3 and in Figures 2 and 3, we provide information about the dynamics of this process. While Table 3 provides exact results and standard errors, we will focus on the results that are presented in Figures 2 and 3 which we find easier to digest. The coefficient values and robust standard error bars are presented for the effect of current year sports success on SAT scores sent (the open diamonds), while the closed circles, open circles, and open squares indicate the effects of sports success lagged by 1, 2, and 3 years, respectively. The top panel in Figure 2 indicates the coefficient values for making it into the NCAA basketball tournament (round of 64). The other panels in Figure 2 and Figure 3 present the coefficient values for achieving the different levels of sports success that we have discussed. Column 1 presents the effect of sports success on the log number of total SAT senders. Subsequent columns present the effect of sports success on the log number of SAT senders in different subgroups.

As was expected, there appears to be some effect on the current football sports variables (the football season ends three months before the basketball season) but little effect on the current basketball sports variables. The effects are large and significant on the first and second lags, while by the third lag the effects are usually diminished to a small magnitude and are insignificant. These results suggest that the better the sports team performs, the more applications a college will receive in the year or two following the sports victory, but that these effects fade away fairly quickly.

Table 3. The Impact of Success in Men's Basketball and Football on SAT Score Sending—Lag Structure.

Dependent Variable: Log Number of SAT Scores Sent by Subgroup

	Everyone	White	Black	Hispanic	Asian	Males	Females	Sports	No Sports	In-State	Out-of-State
A. Basketball											
Final_64	0.004	0.012	0.019	0.010	−0.022	0.003	0.006	0.017	0.001	0.003	0.005
	(0.008)	(0.013)	(0.014)	(0.017)	(0.028)	(0.009)	(0.008)	(0.010)	(0.008)	(0.012)	(0.011)
Final_64_lg1	0.024**	0.029*	0.050**	0.016	−0.008	0.031**	0.016	0.050**	0.015	0.022	0.027*
	(0.007)	(0.011)	(0.015)	(0.019)	(0.028)	(0.008)	(0.009)	(0.011)	(0.008)	(0.013)	(0.011)
Final_64_lg2	0.015*	0.016	0.039	0.008	−0.010	0.020*	0.011	0.031*	0.008	0.017	0.007
	(0.007)	(0.009)	(0.021)	(0.020)	(0.027)	(0.008)	(0.011)	(0.013)	(0.008)	(0.009)	(0.011)
Final_64_lg3	−0.001	0.007	0.011	−0.011	0.000	0.002	−0.004	0.008	−0.004	0.005	−0.009
	(0.008)	(0.008)	(0.015)	(0.015)	(0.025)	(0.009)	(0.009)	(0.011)	(0.008)	(0.011)	(0.010)
Final_16	0.011	0.020	−0.008	0.035	−0.020	0.013	0.005	0.024	0.008	0.015	0.007
	(0.011)	(0.011)	(0.027)	(0.025)	(0.048)	(0.012)	(0.016)	(0.015)	(0.011)	(0.017)	(0.014)
Final_16_lg1	0.048**	0.052**	0.104**	0.024	0.019	0.054**	0.047**	0.086**	0.034*	0.043*	0.065**
	(0.013)	(0.014)	(0.023)	(0.024)	(0.036)	(0.016)	(0.015)	(0.016)	(0.014)	(0.018)	(0.016)
Final_16_lg2	0.042**	0.043**	0.078**	−0.006	0.029	0.052**	0.033*	0.052**	0.038**	0.038*	0.052**
	(0.014)	(0.015)	(0.027)	(0.030)	(0.037)	(0.015)	(0.015)	(0.019)	(0.014)	(0.017)	(0.017)
Final_16_lg3	0.011	0.017	0.043*	0.020	0.006	0.013	0.008	0.019	0.010	0.021	0.007
	(0.011)	(0.012)	(0.021)	(0.024)	(0.032)	(0.012)	(0.012)	(0.013)	(0.011)	(0.013)	(0.015)
Final_4	0.019	0.019	0.037	0.026	−0.009	0.020	0.016	0.013	0.021	0.029	0.017
	(0.017)	(0.018)	(0.030)	(0.030)	(0.048)	(0.018)	(0.021)	(0.017)	(0.019)	(0.031)	(0.019)
Final_4_lg1	0.058**	0.057**	0.143**	0.079*	0.056	0.071**	0.047*	0.087**	0.049**	0.049*	0.074**
	(0.014)	(0.016)	(0.033)	(0.031)	(0.062)	(0.014)	(0.022)	(0.018)	(0.016)	(0.024)	(0.018)
Final_4_lg2	0.028*	0.024	0.113**	0.008	0.034	0.045*	0.013	0.075**	0.012	0.020	0.039*
	(0.014)	(0.017)	(0.039)	(0.030)	(0.033)	(0.019)	(0.017)	(0.019)	(0.015)	(0.028)	(0.019)
Final_4_lg3	0.008	0.015	0.035	0.012	−0.007	0.019	−0.004	0.026	0.003	0.025	0.005
	(0.018)	(0.023)	(0.027)	(0.029)	(0.057)	(0.019)	(0.020)	(0.023)	(0.018)	(0.037)	(0.018)
Champ	0.005	−0.001	0.039	0.049	−0.060	0.022	−0.022	−0.008	0.010	0.018	−0.016
	(0.023)	(0.026)	(0.034)	(0.041)	(0.041)	(0.031)	(0.026)	(0.022)	(0.027)	(0.026)	(0.036)
Champ_lg1	0.109**	0.101**	0.233**	0.141*	0.113	0.115**	0.110**	0.118**	0.109**	0.111*	0.102**
	(0.034)	(0.035)	(0.050)	(0.059)	(0.063)	(0.035)	(0.042)	(0.043)	(0.036)	(0.053)	(0.035)
Champ_lg2	0.084*	0.067	0.190**	0.093**	0.148	0.107*	0.068	0.078*	0.087*	0.069	0.082
	(0.039)	(0.036)	(0.056)	(0.035)	(0.091)	(0.047)	(0.044)	(0.034)	(0.044)	(0.036)	(0.049)

(continued)

Table 3. (continued)

Dependent Variable: Log Number of SAT Scores Sent by Subgroup

	Everyone	White	Black	Hispanic	Asian	Males	Females	Sports	No Sports	In-State	Out-of-State
Champ_lg3	0.026	0.005	0.102*	0.046	0.015	0.034	0.021	0.039	0.023	0.057*	0.001
	(0.032)	(0.036)	(0.047)	(0.046)	(0.055)	(0.040)	(0.034)	(0.025)	(0.036)	(0.027)	(0.042)
B. Football											
Top_20	0.010	0.014	−0.007	0.006	−0.027	0.018	0.006	0.015	0.010	0.032	0.003
	(0.011)	(0.012)	(0.020)	(0.024)	(0.037)	(0.011)	(0.016)	(0.013)	(0.012)	(0.017)	(0.016)
Top_20_lg1	0.026*	0.028	0.039	0.057**	0.035	0.034**	0.020	0.044**	0.021	0.018	0.033
	(0.012)	(0.018)	(0.023)	(0.021)	(0.030)	(0.012)	(0.015)	(0.015)	(0.013)	(0.020)	(0.018)
Top_20_lg2	0.022*	0.021	0.001	0.049	0.041	0.030*	0.016	0.034*	0.019	0.021*	0.027
	(0.009)	(0.013)	(0.021)	(0.030)	(0.030)	(0.013)	(0.012)	(0.017)	(0.011)	(0.010)	(0.015)
Top_10	0.022*	0.022	0.005	0.045	0.018	0.027*	0.016	0.024*	0.022*	0.012	0.024
	(0.009)	(0.011)	(0.020)	(0.028)	(0.027)	(0.011)	(0.010)	(0.011)	(0.010)	(0.013)	(0.012)
Top_10_lg1	0.060**	0.059**	0.077**	0.091**	0.040	0.072**	0.048**	0.072**	0.056**	0.012	0.084**
	(0.011)	(0.012)	(0.027)	(0.019)	(0.029)	(0.013)	(0.012)	(0.014)	(0.011)	(0.017)	(0.014)
Top_10_lg2	0.027**	0.027*	0.042	0.036	0.010	0.035**	0.018	0.021	0.029**	0.013	0.037**
	(0.010)	(0.011)	(0.027)	(0.019)	(0.028)	(0.011)	(0.013)	(0.013)	(0.010)	(0.014)	(0.011)
Champ	0.090**	0.090**	0.053	0.088*	−0.006	0.102**	0.075**	0.116**	0.081**	0.071	0.097**
	(0.023)	(0.030)	(0.042)	(0.039)	(0.088)	(0.032)	(0.020)	(0.045)	(0.017)	(0.037)	(0.029)
Champ_lg1	0.118**	0.114**	0.192**	0.190**	0.050	0.137**	0.101**	0.165**	0.102**	0.064**	0.163**
	(0.016)	(0.024)	(0.061)	(0.041)	(0.050)	(0.025)	(0.029)	(0.027)	(0.018)	(0.023)	(0.025)
Champ_lg2	0.017	0.001	0.083	−0.034	0.057	0.047	−0.011	0.015	0.019	−0.011	0.040
	(0.029)	(0.032)	(0.066)	(0.049)	(0.137)	(0.030)	(0.041)	(0.040)	(0.027)	(0.039)	(0.026)
School F.E.s	X	X	X	X	X	X	X	X	X	X	X
Year F.E.s	X	X	X	X	X	X	X	X	X	X	X
School Trends	X	X	X	X	X	X	X	X	X	X	X
School Controls	X	X	X	X	X	X	X	X	X	X	X
N	2431	2427	2429	2426	2411	2430	2429	2428	2431	2419	2430
R^2	.997	.995	.994	.993	.981	.996	.997	.994	.997	.995	.996
Sport R^2	.036	.016	.053	.013	.003	.04	.024	.044	.026	.009	.031

Note. Robust standard errors clustered at the school level are presented in parentheses. Control variables that are included are school- and year-fixed effects, school × year (linear trends), number of high school diplomas given out that year in the school's state, log average professor salary, log average real income in the school's state, and log tuition cost. Sport R^2 is the fraction of score-sending variation after controlling for fixed effects, trends, and school controls that can be explained by the sports variables.
*Significant at 5%. **Significant at 1%.

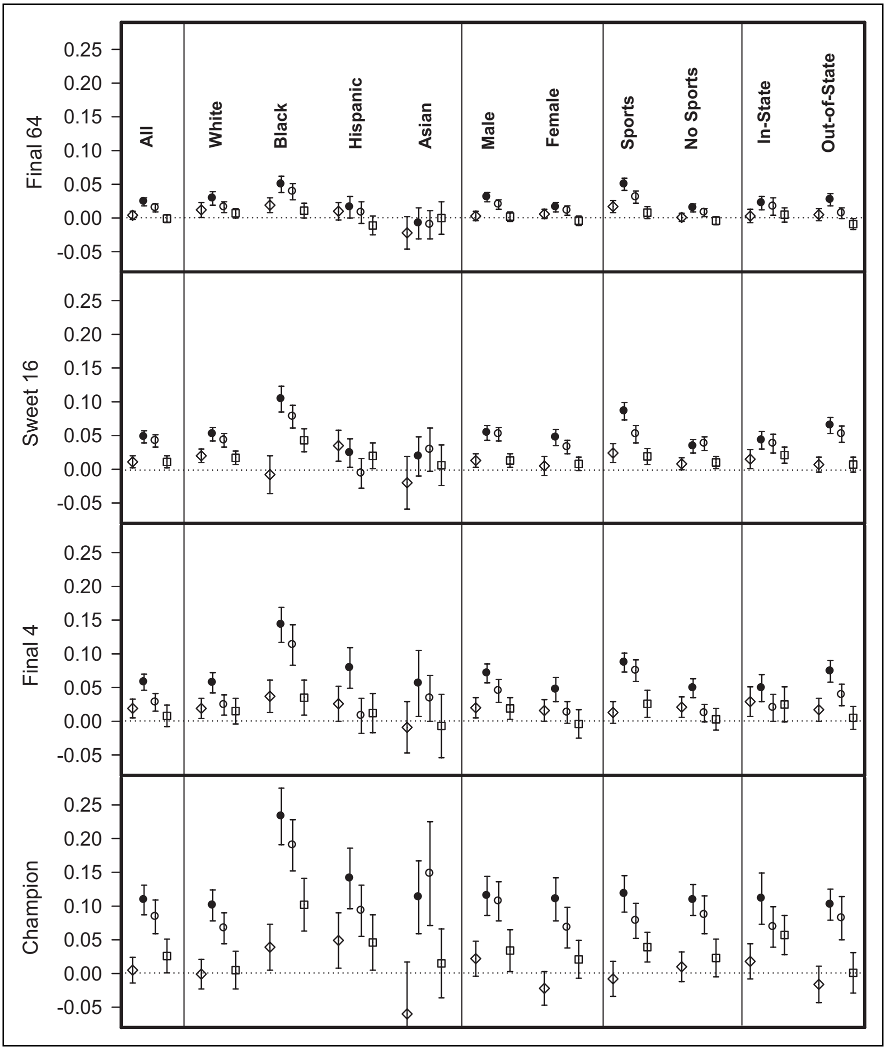

Figure 2. Regression coefficients (and *SE* bars) for basketball success compared across levels of success; across race, sex, high school sports participation, and in- versus out-of-state categories; and for different lags (open diamond denotes concurrent year; closed circle, 1-year lag; open circle, 2-year lag; open square, 3-year lag.

While not reported in the article, we have run several analyses that attempt to identify the impact of "surprise" victories on SAT score sending. Overall, we find suggestive evidence that a surprise victory results in a slightly larger application bump than expected victories. However, the results are often statistically insignificant since very big "surprises" are relatively rare.

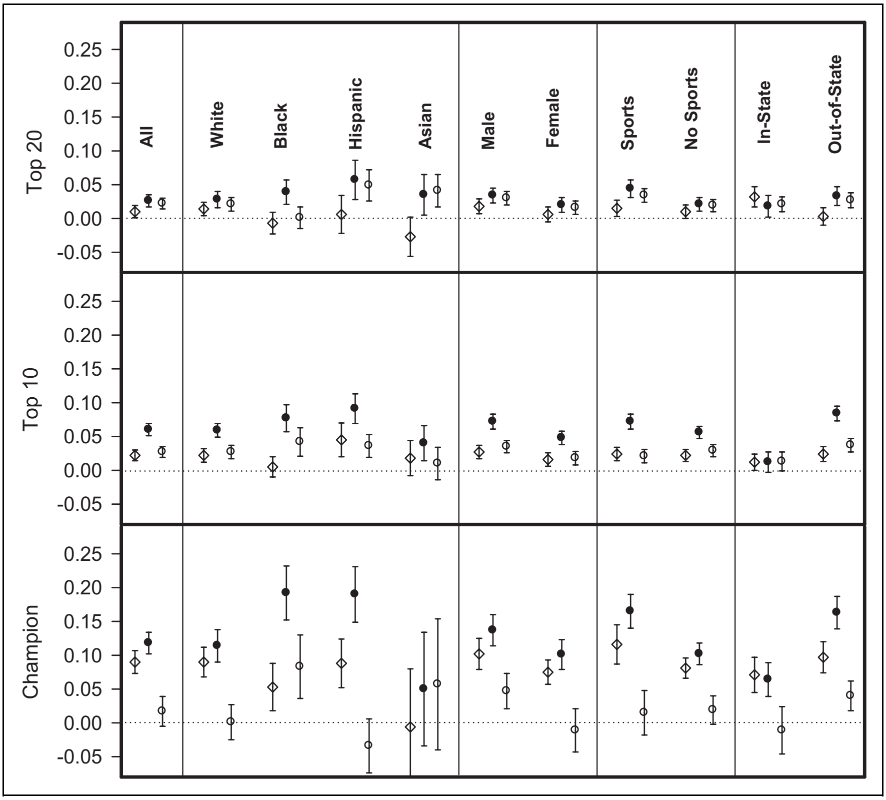

Figure 3. Regression coefficients (and *SE* bars) for football success compared across levels of success; across race, sex, high school sports participation, and in- versus out-of-state categories; and for different lags (open diamond denotes concurrent year; closed circle, 1-year lag; open circle, 2-year lag.

Evidence for Attention

As discussed in the introduction, it is very difficult to disentangle whether the overall effects that we find are driven by a school becoming increasingly desirable (utility hypothesis) or by a school being more accessible to a student (attention hypothesis). However, we provide six pieces of evidence that are at least consistent with and arguably suggestive of attention playing an important role in the application process.

Timing/decay. A key prediction of attention models is that attention to information from a given event diminishes as the time from the event increases (Fiske & Taylor, 1991). Our results clearly show this pattern in that the impact of sports success decays quickly over a 2- to 3-year period. While, of course, a student may care about having a recent victory at the school that they choose to attend, this sharp decay is suggestive of decreasing attention.

In-state versus out-of-state students. High school students are likely to have had substantial exposure to major colleges located in their own state. Thus, when a sports team from a college does well, it is likely to cause a larger shift in awareness for out-of-state students than for in-state students. This is consistent with the results that we find that demonstrate larger effects for out-of-state students. Once again, it is possible to argue that this result is driven by a utility story. For example, maybe students that attend colleges out of state like sports more than students that attend colleges in state. Or, consistent with Curs and Singell (2002), out-of-state students may be more elastic on a large number of dimensions (including sports success) than in-state students. However, this is clearly consistent with an attention hypothesis.

Women's basketball. Perhaps part of our result is driven by the utility associated with students hoping to play on a good college basketball team. If this is the case, then we should find that female applications should be responsive to women's NCAA basketball success. Using the data on the Final 4 and championship rounds of the women's college basketball tournament, we perform regressions again following the specification in Equation 1. The results indicate that women's basketball does not have any impact on the total number of SAT scores sent or on the number of SAT scores sent from women.[13] Thus, women are more responsive to men's basketball success than women's, which suggests that the results are unlikely to be driven by the utility associated with hoping to play for a strong college basketball team.

Demographic subgroups. As presented in the overall results section, we find large and significant differences in the responsiveness of various demographic subgroups. Specifically, males, Blacks, Hispanics, and students who played sports in high school were much more responsive to sports success than their counterparts. These effects can be consistent with the attention or utility hypotheses. The results are also consistent with a model where all groups may pay attention and care about sports to the same degree, but certain groups (e.g., Blacks, males) may be less well-informed about the college admissions process to begin with.[14] Thus, sports success may cause a greater change in their preferences due to lack of outside knowledge.

Demographic subgroup responsiveness across types of success. An interesting pattern in the findings is that while certain demographic subgroups are less responsive overall to sports success, they are especially less responsive to more subtle sports successes. For example, Asians do not appear to be responsive at all to basketball success that propels a team into the Round of 64 or even the Round of 16. However, the point estimates suggest that Asians are actually even more responsive than the overall population to teams that make it to the Final 4 or are champions. Similarly, people who did not play sports in high school are less than half as responsive to

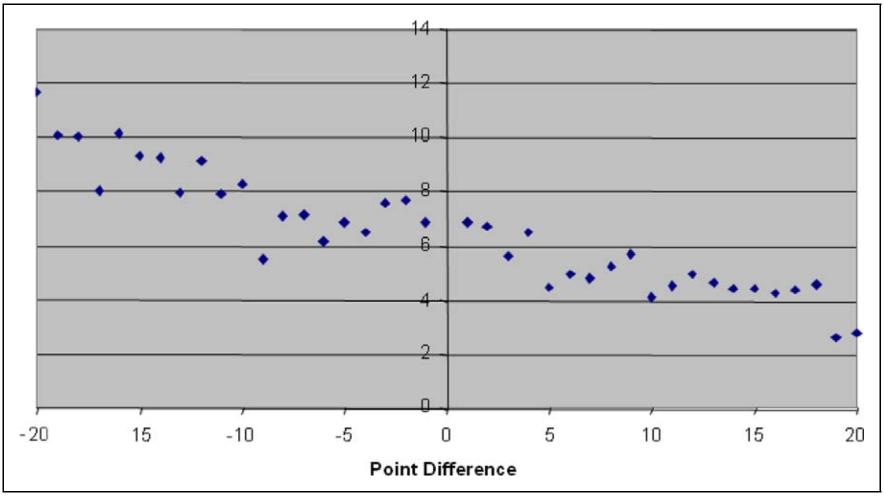

Figure 4. Average seed by point difference. *Note*. The Figure aggregates all NCAA basketball tournament data from 1992-2001. Every game played (in any round of the tournament) is included in the figure. The seed of the team is on the vertical axis (seeds range from 1 to 16) and the final point difference is on the horizontal axis.

low-level basketball success as people who did play sports in high school, but are nearly as responsive to the more high-profile basketball success that comes at the very end of a tournament. This evidence is consistent with the idea that certain subgroups do not pay as much attention to sports but are still affected by the most attention-grabbing victories.

Regression discontinuity results. Finally, we present the results from a regression discontinuity analysis described in the methods section. Figures 4 and 5 are produced by aggregating all rounds of the NCAA tournament and plotting the seed (Figure 4) and the probability that the team makes it to the following year's NCAA tournament (Figure 5) by the point difference in the current year's tournament game. As can be seen in these Figures, teams that have a larger margin of victory have a lower seed (better placement) in the tournament and are more likely to go to the following year's tournament. However, it is important to note that there does not appear to be a discontinuity at 0 points. In other words, if the analyzed margin is small enough (win by less than 1 or 2 points), then the teams that win have similar seeds and are equally likely to make the tournament the following year.

Table 4 shows how students respond to teams that barely win relative to teams that barely lose by running our baseline specification on teams that win and for teams that lose by 1 or 2 points. We aggregate across all rounds of the tournament since the number of observations is too small to break it down by round. As can be

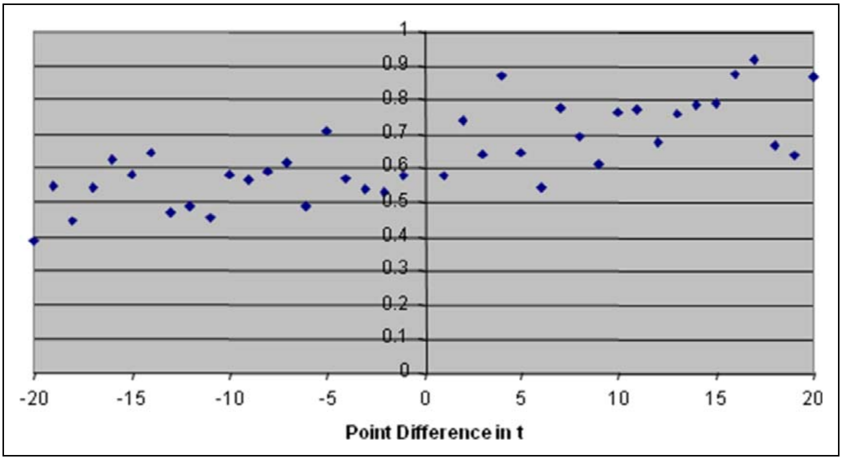

Figure 5. Percent making it to tournament in year $t + 1$ by point difference in Year *t*. *Note*. The Figure aggregates all NCAA basketball tournament data from 1992-2001. Every game played (in any round of the tournament) is included in the figure. The vertical axis indicates the fraction of teams that made it to the NCAA basketball tournament in the following year while the horizontal axis indicates the final point difference in the current year's games.

seen in the Table, teams that barely win and teams that barely lose both see a spike in applications the following year. This is reasonable given that both the winning and the losing teams at least made it to the tournament that year. However, the teams that barely won on average experienced a spike in applications that is approximately twice the size of the spike received by teams that barely lost. This suggests that students were more likely to be influenced by teams that barely won and thus moved on in the tournament than teams that barely lost. If students are solely interested in how well a sports program will perform once they arrive at a school and they have correct beliefs regarding how moving on in the tournament (even by a small margin) is related to future sports success, then teams that barely won should receive the same bump in applications as teams that barely lose according to the classical model. If these assumptions hold, then this evidence suggests that the awareness/attention generated by moving on in the tournament had an impact on student application decisions.

Discussion and Conclusion

Overall, our results provide clear evidence regarding a link between college sports success and student applications. Using a data set that allows us to identify where a student sends his or her SAT score and an identification strategy that controls for school-specific unobservables, we find that a school which has a good sports year

Table 4. The Impact of Close Victories on SAT Score Sending.

	Dependent Variable: Log (Apps Everyone)	
	Margin ≤ 2	Margin ≤ 1
Won	0.022	0.027
	(0.014)	(0.019)
Won_lg1	0.045	0.054
	(0.014)**	(0.016)**
Won_lg2	0.038	0.046
	(0.014)**	(0.020)*
Won_lg3	−0.004	0
	(−0.014)	(−0.019)
Lost	0.013	0.027
	(−0.013)	(−0.015)
Lost_lg1	0.023	0.039
	(0.012)*	(0.015)**
Lost_lg2	0.017	0.021
	(0.014)	(0.020)
Lost_lg3	0.011	0
	(0.013)	(0.019)
School F.E.	X	X
School trends	X	X
Other controls	X	X
Observations	2,431	2,431
R^2	0.997	0.997

Note. Robust standard errors are presented in parentheses. Control variables that are included are school- and year-fixed effects, school × year (linear trends), number of high school diplomas given out that year in the school's state, log average professor salary, log average real income in the school's state, and log tuition cost. Any team that won by the indicated margin during any game in the NCAA Tournament was coded as a team that "won" while the opposing team was coded as a team that "lost."
*Significant at 5%. **Significant at 1%.

receives an increase in sent SAT scores the following year. These increases can be quite dramatic. A school that is invited to the NCAA basketball tournament can on average expect an increase in sent SAT scores in the range of 2% to 11% the following year depending on how far the team advances in the tournament. The top 20 football teams also can expect increases of between 2% and 12% the following year. We are also able to explore which types of students are influenced by sports success. Our heterogeneity analysis shows that there is substantial heterogeneity in these results across different demographic groups with Blacks, males, out-of-state students, and students who played basketball and football in high school being more responsive than their demographic counterparts.

How does the size of the effects that we find relate to more classic economic variables? In the college choice literature, the application elasticity with respect to changes in the price of attending college has been found to range from −0.25 to

−1.0 (see, e.g., Curs & Singell, 2002; Savoca, 1990). Assuming that sending SAT scores is similar to sending an application, these elasticities suggest that tuition/ financial aid would have to be adjusted by 6%–32% to obtain a similar increase in applications as is found by making it to the Final 4 in basketball or being in the top 10 in football. A comparison can also be made to the size of the effect of changes in "school quality" as measured by changes in U.S. News and World Report rankings. Using the estimates and assumptions made in Pope (2007) which looks at the effect of U.S. News Rankings on college choices, making it into the Final 4 in basketball or the top 10 in football is approximately equivalent to the effect that is found on applications when a school's rank is improved by half (e.g., 20th to 10th or 8th to 4th).

Given these large effects, the results presented in this article are likely of importance to college administrators interested in understanding how best to improve the desirability of their school in the eyes of high school students. However, these results also relate to an increasingly important academic debate on modeling how consumers make difficult decisions. Specifically, we discuss two potential mechanisms that could be driving the results that we find. We present several pieces of evidence that suggest that sports success may cause students to simply become more attentive of a school's existence which can increase the number of sent SAT scores. Thus, it is possible that increasing the number of guidance counselors and providing information in other ways may improve student welfare by helping students make better informed decisions on where to attend college. Nonetheless, more work on understanding the role of attention and utility in the application process, as well as a more complete evaluation of the costs and benefits of information-providing policies, is needed.

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Notes

1. There is also a substantial empirical literature on college application decisions and how they are affected by factors such as tuition and costs of attendance (e.g., Abraham &

Clark, 2006; Dynarski, 2000; Ehrenberg & Sherman, 1984), U.S. News and World Report Rankings (e.g., Griffith & Rask, 2007; Monks & Ehrenberg, 1999; Pope, 2009), student characteristics (e.g., Fuller et al., 1982; Weiler, 1990), and exposure to colleges (e.g., Griffith & Rothstein, 2009).

2. It is possible that some people would prefer to attend a school that does poorly in sports, but we think the number of people in this category is small.
3. A more formal model describing the attention and utility channels for sports success influencing college applications was provided in an earlier draft of this article and is available upon request.
4. For example, it could be that a student was largely unaware of a school before watching them on ESPN or it could be that good sports victories enhance utility through networking, a point of conversation, or other "social lubricants."
5. We thank David Card, Alan Krueger, the Andrew Mellon Foundation, and the College Board for help in gaining access to this data set.
6. Less than 1% of students sent their scores to more than 14 schools.
7. Given this data restriction, our results apply to Division I schools. Furthermore, it could be that athletic success also has an impact on the likelihood of applying to Division I schools. We do not investigate this hypothesis in this article.
8. The weight is 1 for observations from students who are included in the sample with probability 1, and 4 for those who are included in the sample with probability .25.
9. Sports data can be obtained at www.infoplease.com.
10. Currently, 65 teams are actually invited, but 2 teams are required to win an additional game before entering the round of 64.
11. The data for these control variables were gathered from the Integrated Post Secondary Education Survey conducted by the national Center of Education and from the Bureau of Labor Statistics' website.
12. The seed of each team represents the rank that they received coming into the tournament. In the current NCAA tournament, teams are seeded between 1 and 16 (1 being the best). Four teams are given each seed number.
13. These results are available from the authors upon request.
14. For example, Avery and Hoxby (2010) show that many high-achieving, low-SES (socioeconomic status) students fail to apply to schools outside of their local geographic area. One explanation for these "missing students" is that they are less well informed about the college admissions process.

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