The Effect of Cinderella Runs on College Admissions

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1. Abstract

This study investigates how Cinderella runs during the NCAA Division I basketball tournament affect university admissions rates and SAT scores, with a focus on how these unexpected successes reshape prospective students' perceptions of academic quality. Cinderella runs, marked by unexpected success from lower-seeded teams, are hypothesized to significantly influence prospective students by enhancing the university's media visibility and perceived academic stature. Analyzing data from 2049 team-years spanning 2008 to 2018, we employ piecewise regression to assess the relationship between the intensity of Cinderella success and changes in academic metrics. Our findings reveal that while moderate Cinderella success leads to improvements in SAT scores, very high Cinderella ratings do not maintain this trend. Our findings initially did not find any improvements in admission rates due to Cinderella success; however, after employing a stricter, binary definition of Cinderella team based on Collier et al's Cinderella framework, we found a significant decrease in admission for Cinderella teams. This study not only deepens the understanding of the immediate academic implications of sports achievements but also provides strategic guidance for leveraging such successes in university marketing and recruitment initiatives.

2. Introduction

In recent years, the influence of collegiate sports on academic institutions has garnered increasing attention, particularly regarding admissions and the academic caliber of applicants. This study focuses on NCAA Division I basketball teams, exploring how Cinderella runs in the March Madness tournament influence admissions metrics such as admission rate and SAT scores. Admissions rate, also known as acceptance rate, is the percentage of applicants at

university admits. The SAT is a standardized test widely used for college admissions in the United States, whose score measures a student's readiness for college and provides colleges with a common data point to compare all applicants (we adjusted ACT scores to SAT scores to have one metric). Cinderella runs represent unexpected successes by lower-seeded teams, potentially elevating a university's visibility and attractiveness to prospective students. Our research is motivated by the gap in literature concerning the direct impact of such athletic achievements on the academic sphere, particularly for schools less expected to succeed.

Hypotheses

Our study posits two primary hypotheses:

Cinderella Rating and Academic Metrics: Institutions experiencing Cinderella runs, characterized by higher Cinderella ratings (3 or above), are expected to show a significant improvement in both admission rates and SAT scores compared to those with lower ratings or no unexpected success. This hypothesis is driven by the assumption that significant media exposure associated with unexpected sports success enhances a school's profile, making it more attractive to prospective students.

Non-linear Effects in Academic Improvements: We anticipate a non-linear relationship between the intensity of Cinderella runs and improvements in academic metrics. Specifically, we expect that while moderate Cinderella runs could lead to significant improvements in SAT scores and admission rates, extremely high Cinderella ratings could yield exponentially higher improvements to SAT score.

Preliminary findings from our analysis support the first hypothesis, indicating that schools with higher Cinderella ratings indeed show improvements in both admission rates and SAT scores. This suggests that the media coverage and increased visibility from unexpected tournament success play a significant role in enhancing a school's appeal to academically prepared applicants. Additionally, our regression analysis supports our skepticism with a linear relationship between the intensity of Cinderella runs and improvements in SAT scores and admissions rates.

3. Theoretical Framework

The relationship between collegiate athletic success and academic institution outcomes has been extensively studied, with mixed results regarding the impact on admissions and student quality. Specifically some studies showed significant positive effects of athletic success on academic metrics, while others find minimal or context-dependent impacts. This study builds upon two main theoretical perspectives: signaling theory and the media coverage effect. Signaling theory suggests that universities use athletic achievements as a marker of overall institutional quality, attracting prospective students by showcasing a vibrant campus life. Media coverage, on the other hand, enhances a school's profile by highlighting athletic successes, which is believed to indirectly boost interest among potential applicants.[1]

Previous studies have consistently shown that athletic success can increase the quantity of applications and improve institutional visibility. For example, research by Pope and Pope (2009) demonstrated that successes in Division I football and basketball increase application rates and,

[1] Douglas J. Chung, "The Dynamic Advertising Effect of Collegiate Athletics," Marketing Science 33, no. 1 (2013): 66-81.

to some extent, the academic caliber of the applicant pool.[2] Similarly, Toma and Cross (1998) found that athletic success enhances the perceived quality of a university, which can attract more applicants and potentially more donations.[3] This increase in the quantity of applications can allow schools to be more selective, a factor we hypothesize would be reflected in higher SAT scores among incoming students.

However, these studies predominantly focus on well-established athletic programs and their impact over extended periods. There is less understanding of the immediate and short-term academic impacts of unexpected sports achievements, particularly those from lower-seed teams in high-stake tournaments like NCAA March Madness. These events, often termed "Cinderella runs," provide a unique form of intense, short-lived media exposure that might affect academic metrics differently compared to the sustained visibility from traditional athletic success. Unlike well-established sports colleges, which regularly receive substantial media coverage, Cinderella teams experience a new level of exposure that is not typical for them. This heightened media attention can significantly enhance the visibility of these less-known institutions, spreading their name more widely and potentially attracting a larger and more academically accomplished pool of applicants.

While existing research highlights the general benefits of athletic success, there is a notable gap in understanding the specific impact of unexpected successes, such as Cinderella runs, on academic metrics like admissions rates and SAT scores. Most studies have not differentiated between the impacts of expected versus unexpected athletic successes, nor have they focused on the short-term impacts of such unexpected events. Furthermore, there is a lack of

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[2] Devin G. Pope and Jaren C. Pope, "The Impact of College Sports Success on the Quantity and Quality of Student Applications," Southern Economic Journal 75, no. 3 (2009): 750-780.

[3] J. Douglas Toma and Michael E. Cross, "Intercollegiate Athletics and Student College Choice: Exploring the Impact of Championship Seasons on Undergraduate Applications," Research in Higher Education 39, no. 6 (1998): 633-661, https://www.jstor.org/stable/40196314.

detailed exploration into how these effects might vary non-linearly with the degree of unexpected success.

This study aims to fill these gaps by:

1. Focusing specifically on Cinderella runs in the NCAA March Madness tournaments and their immediate impact on academic metrics.
2. Exploring the non-linear effects of these runs, hypothesizing that while moderate unexpected successes could significantly enhance a school's appeal, extremely high levels of unexpected success might not yield additional benefits, potentially due to their rare nature and the unpredictable sustainability of such success.

By addressing these gaps, this study seeks to provide a more nuanced understanding of how high-visibility, short-term events influence prospective students' perceptions and decisions. This will assist academic institutions in better strategizing their marketing and recruitment efforts, leveraging athletic successes in a more informed manner to enhance the quality of their student body and potentially improve their overall rankings.

4.1 Data Source

For our analysis, we focused on NCAA Division I basketball teams that participated in the March Madness tournament from 2008 to 2018. Our primary data sources included tournament records sourced from barttorvik.com, which directly webscraps detailed information

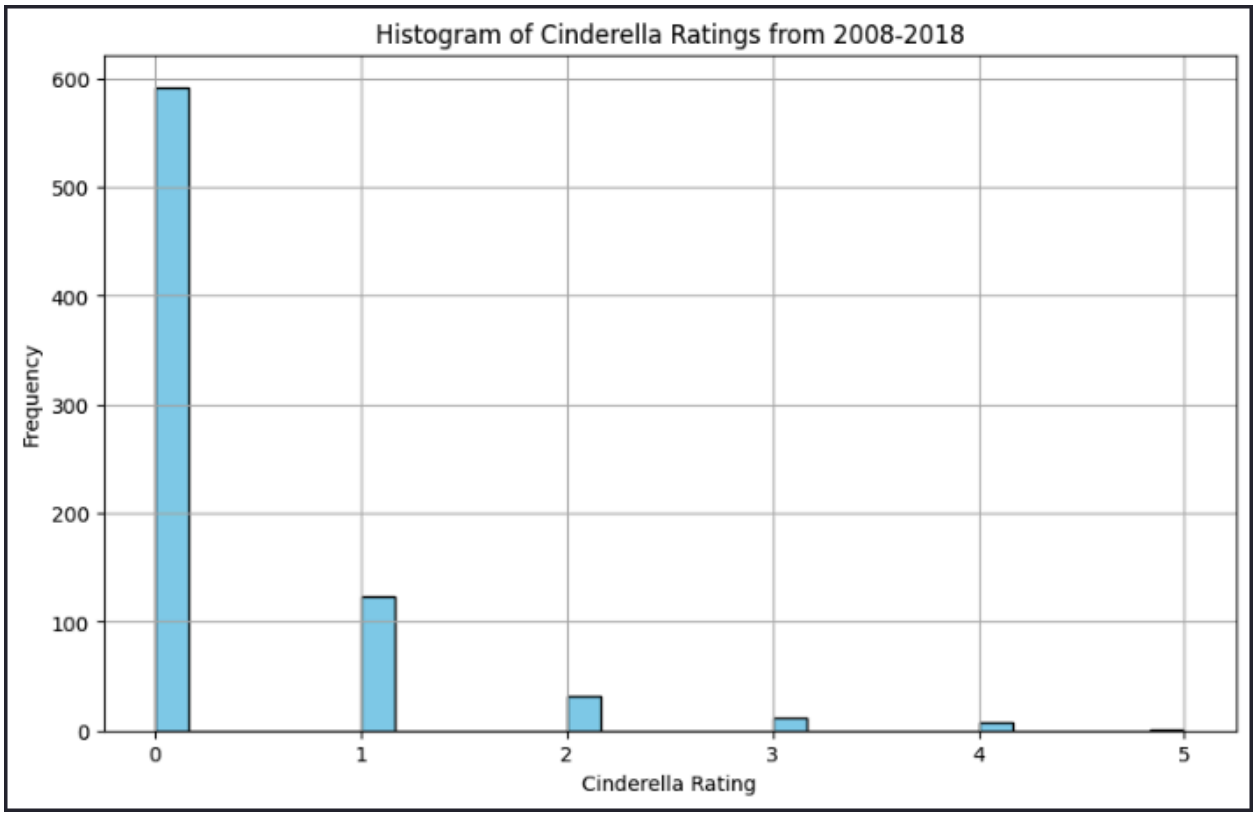
on tournament outcomes and team seeding for each year of March Madness starting in 2008. From this dataset, we created a metric called Cinderella Rating defined by the amount of unexpected tournament wins a team had based on their seed. For example, 9 through 16 seed teams are expected to lose their first round matchup as by tournament design they play a higher seed in the first round. If they won that matchup, they'd get a rating of one; however, if they lost, they'd simply get a rating of 0. It would take a 5 through 8 seed 2 wins to get a rating of 1. Every unexpected win adds to the team's rating. The highest rated team is 2014 Connecticut that won the entire tournament as a 7 seed which earned them a rating of 5.

Additionally, university admissions records were obtained from the U.S. Department of Education, which supplied crucial data on admissions rates, average SAT scores, and enrollment sizes for the corresponding universities. The only missing data came from five schools who did not make their admissions and SAT score data publicly available: Liberty University, Wright State University-Main Campus, Weber State University, University of Akron Main Campus, and University of Arkansas at Little Rock.

We simply decided to drop these 5 schools as we concluded that not sharing your data publicly wasn't linked in any way to our study. On top of this, in the 11 years of our sample none of these teams ever ellipsed a cinderella rating of 0 and rarely participated in the tournament itself. Because we have a surplus of teams in similar situations (which will be evident in sections 4.2) and didn't feel confident trying to estimate the missing values, we felt this was the best way to deal with the missing values. In total, we had 219 unique schools participate in March Madness in sample. And since we measured the schools statistics even in years they missed the tournament, this led to 2049 team-years within our sample.

4.2 Key Explanatory Variable

Figure 1



The primary explanatory variable in our analysis is the Cinderella rating of NCAA Division I basketball teams that participated in the March Madness tournaments between 2008 and 2018. As depicted in Figure 1, the histogram illustrates the distribution of Cinderella ratings across all teams. The majority of teams have a rating of 0, indicating typical performances within

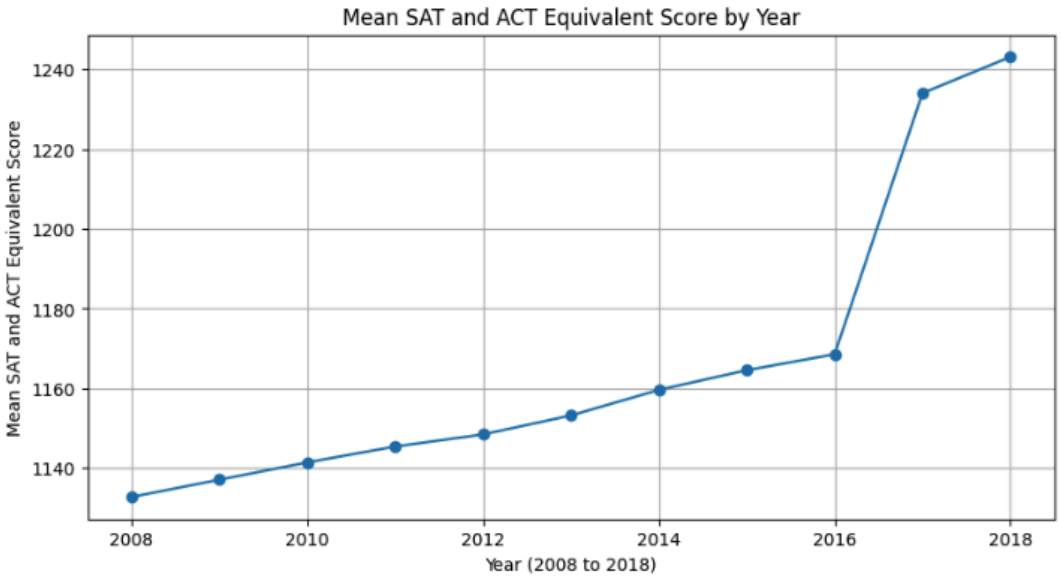
expectations for the tournament. The presence of ratings 1 through 5, with diminishing frequency, captures the rarity and extent of teams' overperformances or Cinderella runs. On top of all the 592 team-years that had a cinderella rating of 0, there are 1712 team-years where schools within the dataset didn't make the tournament and therefore technically also received cinderella rating of 0; however, we have a dummy variable tracking participations which will help distinguish the difference later in our regression analysis.

Due to the non-linear distribution of higher ratings and the scarcity of teams with ratings of 3, 4, and 5, our study employs a piecewise regression analysis. This approach is motivated by concerns over potential non-linear relationships between a team's Cinderella rating and our dependent variables of interest. To address this effectively, we have segmented the ratings into four groups with the highest category encompassing ratings of 3 and above. This decision is also based on the observation from Figure 1 that only 21 teams in total received a rating of 3 or higher, which discourages further segmentation due to the low frequency of extreme Cinderella cases.

4.3 Response Variables

The response variables in our study include the mean SAT and ACT equivalent scores, as well as the admission rates. These metrics are key indicators of the academic profile and selectivity of the institutions and are used to assess the potential impact of athletic success on these aspects.

Figure 2



As illustrated in Figure 2, there is a notable trend in the mean SAT scores over the examined period. Initially, scores show a slight increase until a significant jump occurs post-2016. This change coincides with the SAT scoring adjustment from a 2400-point to a 1600-point scale. Although scores have been adjusted to be equivalent across the changes in testing formats, the sharp increase suggests possible variations in the test's difficulty or other factors that might be influencing these higher averages. This observation, among others throughout section 4, led to controlling for a time trend in our regression analysis.

Figure 3 (see appendix) presents the average admission rate by year over the same period for the same set of universities. The overall stability in admission rates suggests that while

individual years may experience slight variations, there has been no substantial change in the overall admission rates of these institutions throughout the study period.

4.4 Control Variables

To ensure a robust analysis of the impact of Cinderella runs on university admissions rates and SAT/ACT scores, our study controls for undergraduate enrollment size and institution type, each of which is essential to isolate the effect of athletic performance on admission statistics. A time trend variable is also included to adjust for linear trends that might be present over the study period, such as changes in testing standards, undergraduate population, or other systemic changes in higher education. This variable is constructed by indexing each year to the minimum observed year in our dataset, providing a numerical value that increases linearly with time. Including this control helps ensure that any significant findings related to Cinderella runs are not merely artifacts of broader temporal trends but are instead directly associated with the variables of interest.

The average undergraduate enrollment size, as shown in Figure 4, has seen a steady increase from just over 14,250 to nearly 16,000 students per institution from 2008 to 2019. This trend is indicative of the overall expansion of colleges throughout our eleven year sample. By controlling enrollment size, we aim to account for the potential expansion in student bodies that could independently affect admissions rates and standardized test scores as well as allowing the model to differentiate the effects of a Cinderella run between smaller and larger schools. This consistent trend of undergraduate expansion is another reason we included a time trend in our analysis.

Additionally, the distribution of institution types participating in the tournament, detailed in Figure 5 (see appendix), reveals a higher average number of public institutions compared to private ones annually. Public and private institutions often differ significantly in their resources, admission policies, and student body characteristics. Controlling for the type of institution allows us to parse out the effects these structural differences might have on the study's outcomes.

5.1 Results: Model 1 – Impact on SAT Scores

Model 1:

$$SatScore_{y+1} = \beta_0 + \beta_1 Cinderella\_0_y + \beta_2 Cinderella\_1_y + \beta_3 Cinderella\_2_y + \beta_4 Cinderella\_3plus_y$$

$$\beta_5 Type_y + \beta_6 EnrollmentSize_y + \beta_7 Year_y + \beta_8 SatScore_y + \epsilon$$

The piecewise regression Model 1 was designed to evaluate the impact of NCAA tournament participation at various levels of Cinderella runs on SAT scores in the academic year following the tournament, with prospective students aware of these outcomes prior to making admission decisions. This model accounted for a substantial proportion of the variability in SAT scores, with an adjusted R-squared value of 0.968, demonstrating a strong fit and high relevance of the chosen variables.

Table 1: Cinderella Runs Impact on Sat Score Regression

index	Coef.	Std.Err.	t	P>|t|	[0.025	0.975]
const	21.92	4.06	5.4	0	13.96	29.87
Cinderella_0 (Y)	2.81	1.79	1.57	0.12	-0.69	6.31
Cinderella_1 (Y)	5.87	2.61	2.25	0.02	0.76	10.98
Cinderella_2 (Y)	9.49	3.92	2.42	0.02	1.8	17.18
Cinderella_3+ (Y)	3.75	4.82	0.78	0.44	-5.7	13.19
Time_Trend	1.69	0.17	10.19	0	1.36	2.01
Type	3.96	1.63	2.43	0.02	0.76	7.17
SAT_AVG (Y to Y+1)	0.97	0	215.26	0	0.97	0.98
Undergraduate Size (Y to Y+1)	0	0	3.39	0	0	0

Cinderella_0 was nearly significant with a coefficient of 2.81; however, with a p-value of 0.115, we can conclude that making the tournament but not upsetting an opponent has no significant effect on a school's SAT score. Specific levels of performance categorized as Cinderella runs showed varying impacts. Teams that received a Cinderella rating of 1, which indicates moderate unexpected success, are predicted to have SAT scores that are 5.87 points higher than their counterparts that did not make the tournament ($p = 0.024$). Similarly, teams with a Cinderella rating of 2, indicating serious unexpected success, are predicted to have SAT scores that are 9.49 points higher than teams that did not make the tournament the next year ($p = 0.016$). This underscores the stronger influence of substantial over-performance in enhancing a school's academic reputation. However, while changes of approximately 6 and 9 points on the SAT are significant, they are relatively modest in the context of a test scored out of 1600 points. Additionally, schools with the highest level of unexpected success (Cinderella_3+) did not see a statistically significant change in SAT scores. This result was counterintuitive to our initial hypothesis, as well as to the trend present in our regression analysis.

5.2 Results: Model 2 – Impact on Admission Rates

Model 2:

$$AdmissionRate_{y+1} = \beta_0 + \beta_1 Cinderella\_0_y + \beta_2 Cinderella\_1_y + \beta_3 Cinderella\_2_y + \beta_4 Cinderella\_3plus_y + \beta_5 Type_y + \beta_6 EnrollmentSize_y + \beta_7 Year_y + \beta_7 AdmissionRate_y + \epsilon$$

The piecewise regression Model 1 was designed to evaluate the impact of NCAA tournament participation at various levels of Cinderella runs on admission rates in the academic year following the tournament, as these factors can influence prospective students' decisions about where to apply. This model accounted for a substantial proportion of the variability in admission rates, with an adjusted R-squared value of 0.908, demonstrating a strong fit and high relevance of the chosen variables.

Table 2: Cinderella Runs Impact on Admission Rates Regression

index	Coef.	Std.Err.	t	P>|t|	[0.025	0.975]
const	0.027	0.007	3.921	0	0.013	0.04
Cinderella_0 (Y)	0.009	0.004	2.025	0.043	0	0.018
Cinderella_1 (Y)	0.02	0.007	3.082	0.002	0.007	0.033
Cinderella_2 (Y)	-0.006	0.01	-0.565	0.572	-0.026	0.014
Cinderella_3+ (Y)	0.004	0.013	0.283	0.777	-0.021	0.028
Time_Trend	0.001	0	2.509	0.012	0	0.002
Admission Rate (Y to Y+1)	0.957	0.007	136.449	0	0.943	0.971
Type	-0.017	0.004	-4.203	0	-0.025	-0.009
Undergraduate Size (Y to Y+1)	0	0	-3.3	0.001	0	0

Unexpectedly, neither Cinderella_2 nor Cinderella_3 yielded significant results, implying that multiple unexpected tournament wins had no effect on admission rates. Equally surpisingly, teams with Cinderella ratings of 0 and 1 were associated with a significant increase in admission rates. Specifically, teams with a Cinderella rating of 1, indicating moderate unexpected success, saw a predicted increase in admission rates of 2% compared to their counterparts that did not make the tournament ($p = 0.002$). Teams with a Cinderella rating of 0, indicating tournament participation without upsetting an opponent, experienced a smaller but still significant increase of 0.9% in admission rates ($p = 0.043$). This suggests that winning zero or one unexpected game in the tournament can make schools easier to get into the following year. While increases of 2% and 0.9% may seem modest, they are meaningful changes in the context of college admissions.

Discussion

This study examined the impact of NCAA Division I basketball teams' Cinderella runs during the March Madness tournament on university admissions metrics, specifically admission rates and SAT scores. Our analysis indicates that moderate and more serious Cinderella runs (Cinderella_1 and Cinderella_2 ratings) positively influence SAT scores, affirming the hypothesis that increased media exposure from unexpected tournament success enhances a university's appeal. Schools with moderate unexpected success (Cinderella_1) saw a statistically significant increase in SAT scores (coef = 5.87, $p = 0.024$), and those with more substantial unexpected success (Cinderella_2) observed an even larger increase (coef = 9.49, $p = 0.016$). Although statistically significant, these increases are relatively modest within the context of SAT scores out of 1600 points. Unexpectedly, schools with the highest levels of unexpected success

(Cinderella_3+) did not experience significant changes in SAT scores, suggesting a threshold effect where the benefits of media exposure and increased visibility do not continue to rise with higher levels of success. Even disregarding the results of Cinderella_3+, the data appears to reject our hypothesis that there is an exponentially increasing relationship between the intensity of Cinderella runs and improvements in SAT score.

Regarding admission rates, we also found more unexpected results. Moderate Cinderella runs (Cinderella_1) were associated with a significant increase in admission rates (2%, $p = 0.002$), indicating that these schools became easier to get into. Schools with no unexpected tournament wins (Cinderella_0) experienced a small but still significant increase in admission rates (0.9%, $p = 0.043$). However, for more substantial Cinderella runs (Cinderella_2 and Cinderella_3+), the p-values were not significant, implying that we cannot confidently assert a difference from zero. These results directly contradict our hypothesis as substantial Cinderella ratings did not make universities more competitive. It is specifically difficult to interpret the reverse relationship for cinderella ratings 0 and 1; however, our best guess is that lack of unexpected wins turned off potential applicants from applying.

Limitations

A critical limitation of our study was our relatively broad and non-specific criteria for defining Cinderella teams. Unlike studies such as those by Collier et al, which employ stricter definitions of unexpected athletic success, our criteria may have inadvertently included teams with well-established reputations in collegiate basketball.[4] For instance, teams like Connecticut or Michigan State, known for their strong basketball programs and multiple March Madness

[4] Trevor Collier, Nancy Haskell, Kurt W. Rotthoff, and Alaina Baker, "The 'Cinderella Effect': The Value of Unexpected March Madness Runs as Advertising for the Schools," Journal of Sports Economics (2020): 1-25, https://doi.org/10.1177/1527002520944437.

titles, were classified under our Cinderella criteria despite their widespread recognition and consistent media exposure. This inclusion is problematic because such teams do not experience the novel surge in media attention typical of true Cinderella stories, teams that defy expectations and gain sudden prominence. This contrasts with true Cinderella teams, which are not typically in the national spotlight and thus receive a significant boost in visibility when they perform unexpectedly well in tournaments.

The inclusion of these well-known teams in our "Cinderella" category likely diluted the observed effects of media exposure on academic metrics. Their consistent media presence means that any incremental increase in media attention from tournament success does not significantly alter public or prospective student perceptions. This is a crucial distinction because the Cinderella effect is hypothesized to stem from a sudden increase in positive media exposure, which may enhance a school's attractiveness to prospective students and possibly affect admission rates and SAT scores.

Sensitivity Testing and Analysis

To address the limitations identified in our initial analysis, particularly the inclusion of teams that traditionally would not be classified as Cinderellas, we implemented a stricter framework for identifying Cinderella teams. Specifically we employ the methodology used in Collier et al's study, which specifically looks at media exposure and public perception to assessing whether a run is classified as a Cinderella (specifically referred to as a "Cinderella" in media).

In this revised analysis, we utilized the 19 teams highlighted as "Cinderellas" by Collier et al from 2008 to 2017.[5] Since their dataset only goes up to 2017, we added two teams from 2018, Loyola University Chicago and Syracuse, using the revised definition of "Cinderella," giving us a total of 21 team-years (see Table 7)[6][7][8]. We applied logistic regression to explore the impact of a binary Cinderella variable on SAT scores and admission rates. This approach allows us to isolate the effect of being a Cinderella team, defined strictly by significant and unexpected success in the tournament, from other factors like a school's strong existing reputation. By categorizing teams more accurately according to their Cinderella status, we aimed to provide a clearer picture of how unexpected sports achievements influence academic metrics.

Revised Version of Model 1:

$$SatScore_{y+1} = \beta_0 + \beta_1 Cinderella_y + \beta_2 Type_y + \beta_6 EnrollmentSize_y + \beta_7 Year_y + \beta_8 SatScore_y + \epsilon$$

Table 3: Strictly Defined Cinderella Runs Impact on SAT Score Regression

[5] Trevor Collier et al., "The 'Cinderella Effect': The Value of Unexpected March Madness Runs as Advertising for the Schools," Journal of Sports Economics (2020): 1-25, 6-7, https://doi.org/10.1177/1527002520944437.
[6] NCAA, "Cinderella Loyola Chicago's Three Straight Game-Winners 2018 March Madness," January 11, 2022, https://www.ncaa.com/news/basketball-men/article/2022-01-11/cinderella-loyola-chicagos-three-straight-game-winners-2018-march-madness.
[7] ESPN, "March Madness: Cinderella NCAA bracket busters George Mason FGCU VCU St. Peters Davidson," https://www.espn.com/mens-college-basketball/story/_/id/39742636/march-madness-cinderella-ncaa-bracket-busters-george-mason-fgcu-vcu-st-peters-davidson.
[8] Bleacher Report, "Breaking Down Syracuse's Improbable Cinderella Run," https://bleacherreport.com/articles/2765988-breaking-down-syracuses-improbable-cinderella-run.

index	Coef.	Std.Err.	t	P>|t|	[0.025	0.975]
const	24.34	4.58	5.31	0	15.35	33.32
cinderella	1.88	5.49	0.34	0.73	-8.89	12.64
Time_Trend	1.68	0.17	10.14	0	1.35	2
Type	3.97	1.64	2.43	0.02	0.77	7.18
SAT_AVG (Y to Y+1)	0.98	0	215.76	0	0.97	0.98
Undergraduate Size (Y to Y+1)	0	0	3.48	0	0	0

In the updated regression models focusing on SAT scores, the Cinderella variable turned out to be statistically insignificant (coef = 1.88, p = 0.34), indicating that under a stricter definition of Cinderella status, unexpected sports success does not translate into measurable improvements in SAT scores. This absence of significant impact contrasts with our initial findings, suggesting that the inclusion of teams with well-known athletic prowess or media presence might have previously skewed the results.

Revised Version of Model 2:

$$AdmissionRate_{y+1} = \beta_0 + \beta_1 Cinderella_y + \beta_5 Type_y + \beta_6 EnrollmentSize_y + \beta_7 Year_y + \beta_7 AdmissionRate_y + \epsilon$$

Table 4: Strictly Defined Cinderella Runs Impact on Admission Rates Regression

index	Coef.	Std.Err.	t	P>|t|	[0.025	0.975]
const	0.036	0.007	5.235	0	0.022	0.049
cinderella	-0.03	0.015	-2.069	0.039	-0.059	-0.002
Time_Trend	0.001	0	2.548	0.011	0	0.002
Type	-0.016	0.004	-4.118	0	-0.024	-0.009
Admission Rate (Y to Y+1)	0.958	0.007	136.483	0	0.944	0.971
Undergraduate Size (Y to Y+1)	0	0	-3.206	0.001	0	0

The regression analysis for admission rates presents an interesting turn. With the Cinderella status strictly defined, the model shows a significant change. Cinderella runs were associated with a significant decrease in admissions rates (-3%, $p = 0.039$). Unlike our earlier findings where admission rates slightly increased or remained statistically insignificant, the refined analysis shows a significant decrease in admission rates for true Cinderella teams. This finding suggests that true Cinderella events, where lesser-known teams gain sudden prominence, may lead to an increase in the competitiveness of admissions, making these institutions more selective due to heightened interest and perceived prestige.

Conclusion

Our study provides a nuanced exploration into the academic impacts of Cinderella runs in NCAA Division I basketball on university admissions metrics, specifically SAT scores and admissions rates. We found that the definition of a Cinderella team is critical to accurately assessing the impact of unexpected sports success. The original broad criteria included teams that were already well-known, which likely diluted the effects of media exposure attributed to true Cinderella runs. Our refined analysis, which applied a more stringent definition of Cinderella status, reveals a complex relationship between media exposure from unexpected tournament success and its impact on academic metrics.

The findings indicate that while moderate Cinderella runs lead to a positive but modest increase in SAT scores, the highest levels of success did not show a significant effect, suggesting a threshold beyond which additional exposure does not translate into measurable academic benefits. This could be because such success is short-lived or because the media impact has reached its limit. On the admissions front, true Cinderella runs, when strictly defined, were

associated with a significant decrease in admission rates, suggesting that unexpected sports achievements can enhance a university's desirability and selectivity among prospective students.

This study contributes to the broader discourse on the role of athletics in shaping perceptions of academic institutions. It highlights the importance of strategic marketing and recruitment efforts that can leverage athletic successes. Future studies should continue to refine these strict definitions while considering the broader implications of media exposure by finding a way to differentiate the severity of a run: a balance between our initial framework and Collier et al's framework. In sum, our research underscores the complex interplay between athletic success and academic outcomes, providing strategic insights for universities looking to capitalize on their athletic programs' high-visibility successes. As the landscape of college sports and media continues to evolve, understanding these dynamics will be increasingly crucial for academic institutions aiming to enhance their appeal and competitiveness in a crowded educational marketplace.

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Appendix

Figure 3

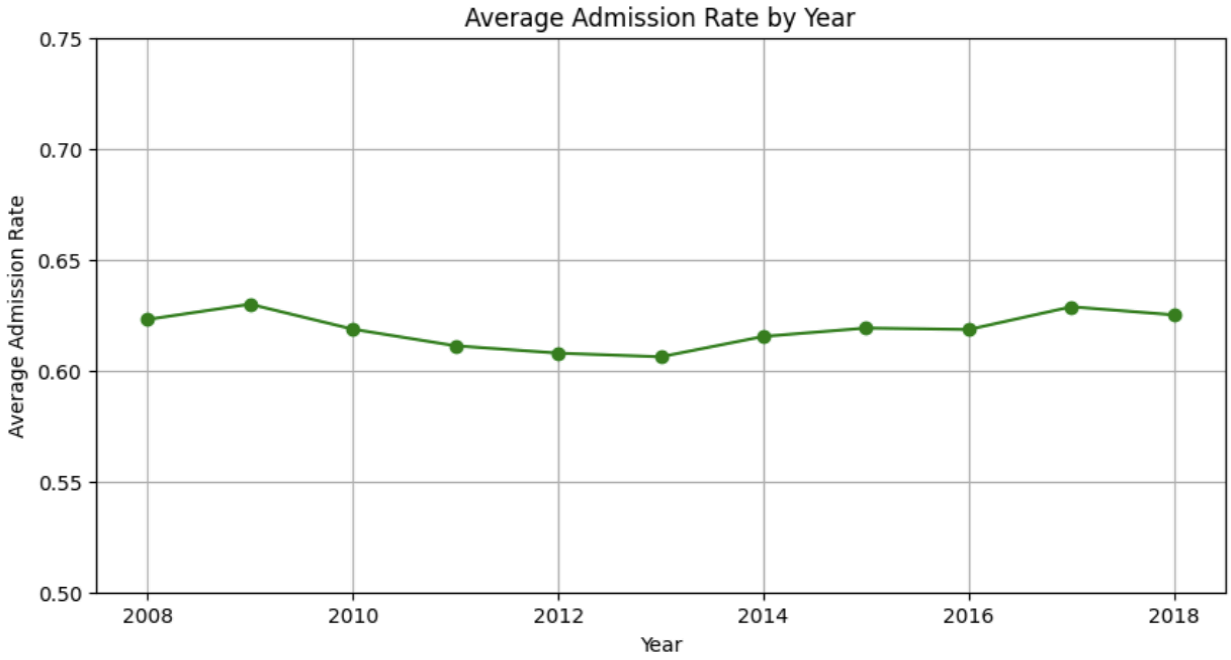

Figure 3: Average Admission Rates by Year: This figure illustrates the stability of average admission rates across the set of universities from 2008 to 2018. Despite slight annual variations,

the trend shows that overall admission rates have remained relatively stable, indicating no substantial long-term changes in the competitiveness of admissions at these institutions.

Figure 4

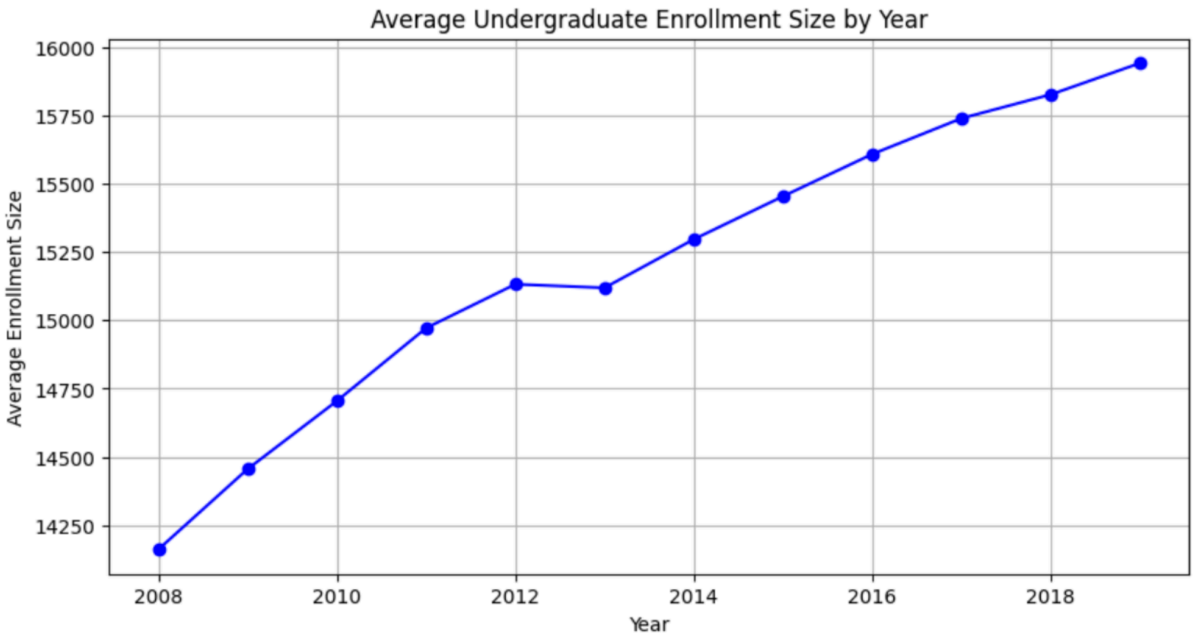

Figure 4: Trend in Average Undergraduate Enrollment Size: This figure depicts the steady increase in average undergraduate enrollment size per institution from 2008 to 2018. The consistent upward trend demonstrates broader demographic or institutional growth patterns, which are important control variables in our analysis of the impact of Cinderella runs on academic metrics.

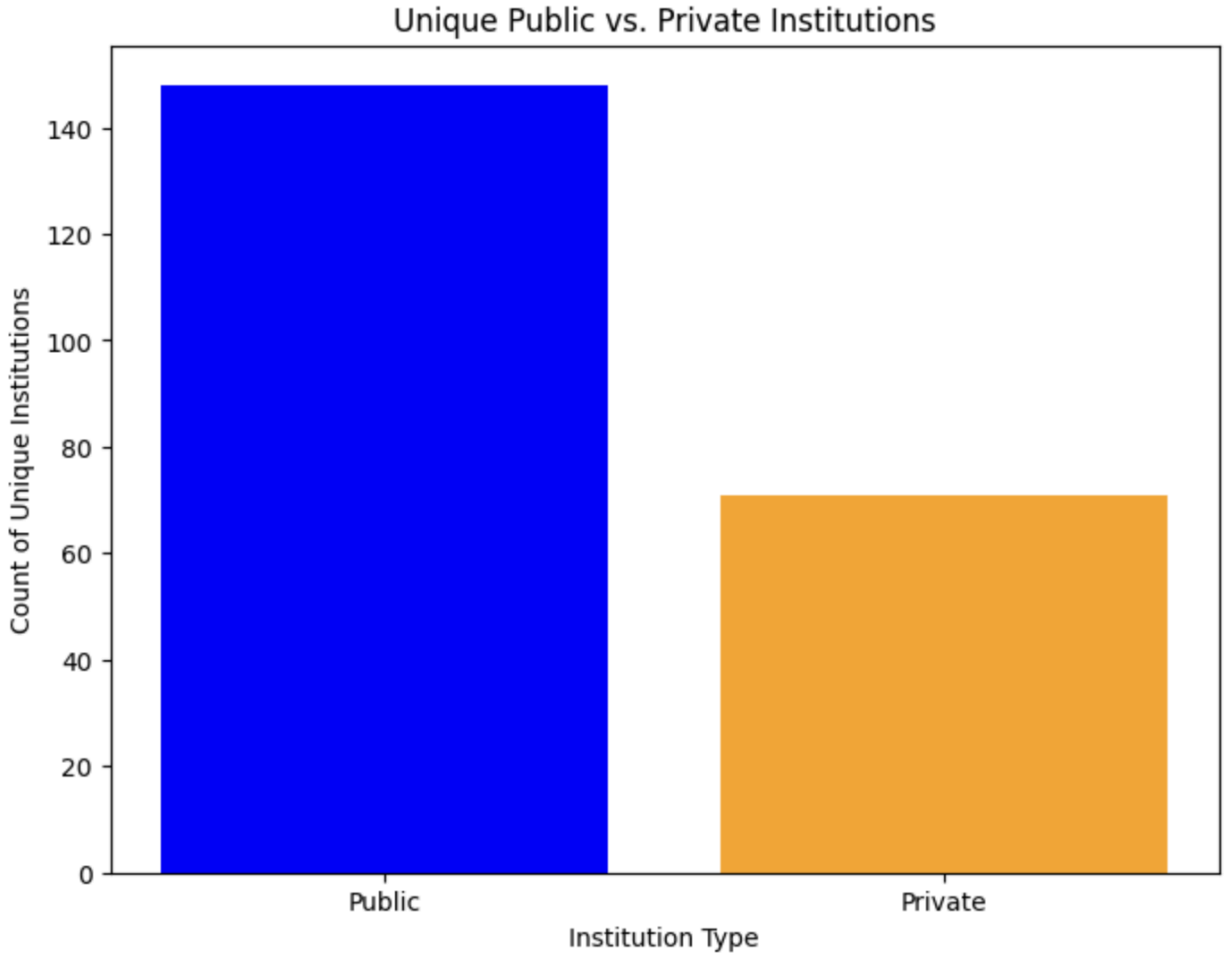

Figure 5: Distribution of Institution Types in the NCAA Tournament: This figure shows the annual distribution of public versus private institutions participating in the NCAA March Madness tournament. The graph highlights a higher average participation rate of public institutions compared to private ones, underscoring structural differences that are accounted for in our regression analysis.

Table 5: Teams Classified As Cinderella Under the Strict Definition

Team	Year

Davidson College	2008
University of Arizona	2009
Butler University	2010
Cornell University	2010
Saint Mary's College of California	2010
University of Northern Iowa	2010
Butler University	2011
Virginia Commonwealth University	2011
North Carolina State University at Raleigh	2012
Ohio University-Main Campus	2012
Xavier University	2012
Florida Gulf Coast University	2013
La Salle University	2013
Wichita State University	2013
University of Dayton	2014
Syracuse University	2016
University of Michigan-Ann Arbor	2017
University of South Carolina-Columbia	2017
Xavier University	2017
Loyola University Chicago	2018
Syracuse University	2018

Additionally Sensitivity Testing

Table 6: Cinderella Runs Impact on SAT Score with Yearly Fixed Effects Regression

Variable	coef	std err	t	P>|t|
const	18.33	2.93	6.26	0
Cinderella_0 (Y)	1.85	1.35	1.37	0.17
Cinderella_1 (Y)	3.16	1.96	1.61	0.11
Cinderella_2 (Y)	6.57	2.95	2.23	0.03
Cinderella_3+ (Y)	6.75	3.61	1.87	0.06
Type	1.64	1.23	1.33	0.18
SAT_AVG (Y to Y+1)	0.99	0	286.08	0
Undergraduate Size (Y to Y+1)	0	0	3.09	0
Year_2008.0	-3.6	1.23	-2.93	0
Year_2009.0	-3.87	1.23	-3.15	0
Year_2010.0	-3.09	1.23	-2.52	0.01
Year_2011.0	-4.84	1.23	-3.93	0
Year_2012.0	-4.19	1.23	-3.4	0
Year_2013.0	-2.96	1.23	-2.4	0.02
Year_2014.0	-3.74	1.24	-3.02	0
Year_2015.0	-4.02	1.24	-3.24	0
Year_2016.0	56.02	1.24	45.18	0
Year_2017.0	0.91	1.3	0.7	0.49
Year_2018.0	-8.3	1.31	-6.36	0

The sensitivity analysis replacing the linear time trend with yearly fixed effects provides a refined understanding of the impact of Cinderella runs on SAT scores. While the initial regression suggested that making the tournament but not upsetting an opponent (Cinderella_0) had no significant effect, the fixed effects model reveals that the impact remains insignificant, with a p-value of 0.17. This indicates that even minimal tournament success does not have a statistically significant influence on SAT scores. Similarly, Cinderella_1 shows a positive effect but remains statistically insignificant ($p = 0.11$). Interestingly, Cinderella_2 continues to show a significant positive impact on SAT scores, with a coefficient of 6.57 and a p-value of 0.03, suggesting a strong influence of moderate unexpected success on academic appeal. Cinderella_3+, which showed no significant effect in the initial model, remains insignificant in the fixed effects model ($p = 0.06$). However, this is on the edge of significance, with a coefficient that is not only now positive but slightly larger than Cinderella_2. While this isn't an increasingly exponential effect, potentially with more years of data we would see that both forms of long Cinderella runs have a positive effect on SAT score.

Table 7: Cinderella Runs Impact on Admission Rate with Yearly Fixed Effects Regression

Variable	coef	std err	t	P>|t|
const	0.029	0.006	4.585	0
Cinderella_0 (Y)	0.01	0.004	2.171	0.03
Cinderella_1 (Y)	0.021	0.007	3.164	0.002
Cinderella_2 (Y)	-0.005	0.01	-0.503	0.615
Cinderella_3+ (Y)	0.003	0.013	0.272	0.786
Type	-0.017	0.004	-4.173	0
Admission Rate (Y to Y+1)	0.958	0.007	136.756	0
Undergraduate Size (Y to Y+1)	0	0	-3.27	0.001
Year_2008.0	0.008	0.004	1.871	0.061
Year_2009.0	-0.01	0.004	-2.298	0.022
Year_2010.0	-0.006	0.004	-1.403	0.161
Year_2011.0	-0.002	0.004	-0.396	0.692
Year_2012.0	-0.001	0.004	-0.142	0.887
Year_2013.0	0.01	0.004	2.377	0.018
Year_2014.0	0.005	0.004	1.24	0.215
Year_2015.0	0.001	0.004	0.179	0.858
Year_2016.0	0.012	0.004	2.745	0.006
Year_2017.0	-0.002	0.004	-0.336	0.737
Year_2018.0	0.012	0.004	2.793	0.005

For admission rates, the sensitivity analysis with yearly fixed effects largely confirms the initial regression findings. Cinderella_0 and Cinderella_1 continue to show significant positive impacts on admission rates. Cinderella_0 exhibits a modest but significant increase in admissions, with a p-value of 0.03, indicating a small but meaningful positive impact. Cinderella_1 maintains a significant positive effect, with a coefficient of 0.021 and a p-value of 0.002, reinforcing the idea that weak Cinderella run actually worsened the schools admission rate. Consistent with the initial findings, neither Cinderella_2 nor Cinderella_3+ shows a significant impact on admission rates, with p-values of 0.615 and 0.786, respectively. This confirms the unexpected observation that higher levels of unexpected tournament success do not significantly affect admission rates.

These findings suggest that the impact of Cinderella runs on admission rates and specifically SAT scores may be more complex than initially thought, and that yearly variations play a crucial role in shaping these outcomes.