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POLICY BRIEF

Beyond City Limits: Does Attending a Rural Public High School in Texas Predict College Matriculation, Flagship Attendance, and Graduation Outcomes?

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What We Studied

Rural students in the United States have a lower likelihood of entering and completing college compared with their non-rural peers, despite strong high school graduation rates. Postsecondary attendance and degree attainment gaps observed across geographic regions present equity and access concerns in the high school-to-higher education pipeline. This study uses recent Texas state administrative data to explore descriptive statistics and logistic regression models examining the college matriculation, flagship attendance, and bachelor's degree completion outcomes of students who attend rural and non-rural public high schools in Texas. The estimation strategy involves a stepwise regression model approach to understand which covariates explain rural and non-rural differences.

Results indicate that, after controlling for demographic background, pre-college measures, and college-related factors, rural students experience lower rates of college matriculation, flagship attendance, and bachelor's degree attainment in comparison with their non-rural peers. Findings suggest high school experience predictors (e.g. test scores, school enrollment size) explain away the rural advantage associated with college matriculation. High school experience factors similarly narrow the gap between rurality and flagship attendance. College-related ability measures (e.g. top ten percent, SAT scores) and additional background measures (e.g. parents' highest education, household income) significantly diminish the relationship between attending a rural or non-rural public high school and bachelor's degree completion. The analyses offer insights into this understudied population of rural students in Texas to provide useful policy recommendations to state lawmakers, higher education administrators, and high school educators.

Rural students are just as likely to graduate from high school as non-rural students, yet trends show that rural high school students are less likely to matriculate into college and complete postsecondary degrees (Byun, Irvin, & Meece, 2015; Gavazzi, 2020; Gettinger, 2019; NCES, 2013; Rosecrance, Graham, Manring, Cook, Hardin, & Gibbons, 2019). Geographic college-going disparities threaten higher education's attempts to attract, retain, and educate a broad representation of students from different parts of the country. There are several reasons why this study is important: (1) college serves as the primary training ground for job opportunities, (2) postsecondary education provides demonstrated social and economic benefits to individuals, and (3) college-educated individuals can help state and local governments achieve workforce and collective societal goals throughout the U.S. (60x30TX, 2015; Carnevale, Strohl, & Melton, 2011; Hout, 2012; Ma, Pender, & Welch, 2016). With postsecondary education entrance and completion less common among rural American students today, the necessity to shed light on this often-invisible population of students is of growing importance from an equity and access standpoint (Baumhardt & Hanford, 2017).

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The primary purpose of this study was to examine and understand the high school-to-college pipeline for rural public high school students in Texas compared with their non-rural counterparts using recent state administrative data. Texas educates over 10 percent of all public high school students in the country—more than any other state with the exception of California (NCES, 2018). The distribution of geographic school district types in Texas—showing a majority of rural districts—are included in Table 1 below.

Table 1. TEA District Type by Number of Districts throughout Texas (2011-2012)

TEA District Type	# of Districts
Major Urban	10
Major Suburban	79
Other Central City	40
Other Central City Suburban	161
Independent Town	70
Non-Metro (Fast Growing)	29
Non-Metro (Stable)	192
Rural	448

For comparative purposes, this study collapsed all categories outside "rural" into a non-rural variable (eliminating charter school districts since these schools vary in geographic locations). Table 2 below shows the comparison between the number of rural versus non-rural school districts in Texas.

Table 2. TEA Non-Rural Versus Rural District Types throughout Texas (2011-2012)

TEA District Type	# of Districts
Non-Rural	581
Rural	448

The vast rural landscape of Texas, coupled with its significant public high school student population, creates a suitable and ripe context to study the (1) college matriculation, (2) flagship attendance (i.e. attendance at the University of Texas at Austin or Texas A&M University – College Station), and (3) bachelor's degree completion outcomes of rural students at the state level. While the majority of the literature on college-going patterns among rural students relies on national data, more state-specific studies—such as this Texas-focused exploration—can offer additional insights into the rural and non-rural divide in college outcomes within a state's context.

How We Analyzed the Data

This study explores the relationship between graduating from a rural public high school in Texas and several college-related outcomes by addressing the following research questions:

1) How does graduating from a rural public high school in Texas, compared with graduating from a non-rural public high school, predict college matriculation and how does the relationship change after controlling for demographic and pre-college factors? Which factors explain the differences in outcomes between rural and non-rural students? (RQ1)

2) Among college entrants who matriculated into any postsecondary institution in Texas, how does graduating from a rural public high school in Texas, compared with a non-rural public high school, predict attendance at a Texas flagship institution and how does the relationship change after controlling for demographic and other pre-college and college major factors? Which factors explain the differences in outcomes between rural and non-rural students? (RQ2)

3) Among college entrants who first attended a four-year public postsecondary institution in Texas, how does graduating from a rural public high school in Texas, compared with a non-rural high school, predict successful completion of a bachelor's degree and how does the relationship change after controlling for pre-college and college measures? Which measures explain the differences in outcomes between rural and non-rural students? (RQ3)

This study used Texas statewide data from two recent Texas public high school student cohorts (2011 and 2012 public high school graduates), analyzed through descriptive statistics and regression models. Descriptive statistics highlighted the full versus analytic samples used for each research question (including all Texas public high school graduates in RQ1, Texas college-going students in RQ2, and Texas public university-going students in RQ3), illustrating variable characteristics. This examination provided insights into the intersection of students' descriptive traits and identified patterns between rural and non-rural students (see Table A1 in the Appendix).

In addition, the study used a stepwise binary logistic regression approach, where the empty model revealed the gap in rural versus non-rural students (coded as a dichotomous variable) in relation to the outcome variable, with the high school graduation cohort variable serving as a time indicator control measure. The regression models were informed by Perna's (2006) Conceptual Model of Student College Choice, which helped to conceptualize the forces that influence higher education outcomes for rural students. By adding blocks of variables, the models then examined how additional measures changed the relationship of interest. Overall, this study provides important insights into the role of attending a public rural high school in predicting (1) college matriculation, (2) flagship attendance, and (3) bachelor's degree completion outcomes, while controlling for individual, high school, and college-level factors.

What We Discovered

The results suggest that rural students in Texas experience lower rates of college matriculation, flagship attendance, and bachelor's degree attainment in comparison to their non-rural peers.

Research Question 1: College Matriculation and Rurality

Despite descriptive statistics revealing that rural public high school graduates in Texas are more likely than their non-rural counterparts to matriculate into college, logistic regression results show that graduates who attend rural public high schools lag behind their non-rural peers when statistical controls are added to the models. The empty (first) and second step models illustrate positive relationships between rurality and college matriculation, suggesting that, controlling for demographic characteristics only, rural public high school graduates experience a higher probability of enrolling in any type of college compared with their non-rural counterparts.

However, after adding individual-level high school factors to the model, the significant relationship between rurality and college matriculation disappears, indicating that student-level differences in both background and high school preparation explain away the rural advantage. The subsequent addition of institutional- and county-level high school factors into the full model show a significant 1-percentage-point negative association between rurality and college matriculation—shifting the direction of the relationship to an inverse correlation ($p<.05$). The driving force of high school covariates in the third and fourth models indicate that factors related to high school experiences have a strong association with college-going behaviors.

Given the directional change, these results suggest that components of the high school experience (e.g. academic preparedness, financial resources, teacher-to-student ratios, etc.) are major sources in explaining the narrative around rural and non-rural disparities in college pathways. The implications observed in these results are consistent with national findings asserting that rural students have a lower likelihood of enrolling in college compared with non-rural students (Byun et al., 2015; Lee, Weis, Liu, & Kang, 2017; Means, Clayton, Conzelmann, Baynes, & Umbach, 2016; Pierson & Hanson, 2015; Smith, Beaulieu, & Seraphine, 1995; Tieken, 2016; Wells, Manly, Kommers, & Kimball, 2019).

Research Question 2: Flagship Attendance and Rurality
Findings related to the second research question reveal college-going students who attend rural public high schools are less likely to enter a Texas flagship institution in the subsequent fall post-graduation compared with their non-rural counterparts. While the first and second step models show strong negative associations between attending a rural public high school and flagship attendance, the addition of individual and institutional high school experience factors in the third and fourth models narrows the magnitude of this relationship by more than one-half.

The inclusion of high school factors in these third and fourth models offer evidence that, aligned with the literature, high school curriculum intensity and academic achievement help explain differences in rural and non-rural college attendance patterns (Byun et al., 2015). While still remaining negatively associated with flagship attendance, the reduction in the coefficient on rurality in the final model—a 1.8-percentage-point decreased predicted probability of flagship attendance among rural public high school graduates—is mostly explained by variables associated with college preparedness in high school and academic aptitude (including state standardized test scores, gifted program participation, and dual credit completion) ($p<.001$).

Research Question 3: Bachelor's Degree Attainment and Rurality
The third research inquiry shows public university-going students who attend rural public high schools experience lower probabilities of earning a bachelor's degree in six years compared with those who attend non-rural public high schools. The inclusion of additional background variables available in the dataset for university-going students only (e.g. parents' highest education and family income) coupled with individual college-related ability measures (e.g. top ten percent, SAT scores, full-time college enrollment status, application to a flagship institution) in the full model significantly diminishes the negative association to a 3.2-percentage-point lower predicted probability of baccalaureate attainment among rural students ($p<.001$).

While these covariates do not explain the full extent of why rural students experience lower degree completion rates compared with their non-rural peers, this narrowing coefficient reveals that college experience-related factors and demographic characteristics partially explain the disparity. The findings suggest that socioeconomic background and parents' education are strongly correlated with a student's likelihood to complete a bachelor's degree. Similarly, college preparation and aptitude emerge as core predictors in measuring bachelor's degree attainment gaps between rural and non-rural students.

The finding that attending a rural public high school is associated with a lower probability of completing a bachelor's degree compared with their non-rural classmates is consistent with national findings in the literature (Byun, Meece, & Irvin, 2012; Wells et al., 2019). Likewise, the finding that the rurality gap is partially explained by variables related to the college experience through academic preparation is aligned with the role that high school experience factors play in the relationships between rurality and college matriculation, as well as flagship attendance.

Discussion/Policy Recommendations

These results may help to support high school-to-college pipeline efforts within Texas as policymakers and education leaders seek to achieve the state's 60x30TX plan within the next ten years. The findings suggest that students from rural regions face barriers to entry within certain types of postsecondary institutions (e.g. flagship institutions) and have lower rates of college matriculation and bachelor's degree completion compared with their non-rural counterparts. These insights further indicate that discrepancies in high school experiences may be a significant driver of the rurality differences. In order to provide access and opportunities for all young people regardless of geographic place of residence, high school educators, higher education administrators, state policymakers, and education thought-leaders should consider collaborative ways to support rural students in their college-going experiences and build structures to foster success towards degree completion.

High school-level recommendations include (1) expanding advanced and college-level curriculum opportunities within all high schools, (2) offering equal test preparation across districts, (3) providing accessible and well-supported financial aid workshops and support services for students and families, and (4) conducting consistent evaluations and

assessments of class sizes, teacher-to-student ratios, and counselors to best serve student populations. These high school recommendations are informed by the significant influence academic preparedness, test scores, dual credit, financial resources, and high school institutional characteristics play in driving college-going outcomes.

College-level recommendations include (1) more intentional outreach towards and recruitment efforts of rural students, (2) continued focus on programs to support student persistence at the postsecondary level (especially for first-generation, rural students), and (3) more transparency around the college matriculation and application process (including ways to share resources and provide assistance regarding financial aid, higher education terminology, and general college-going expectations). Supporting the higher education goals of rural students at the institutional level not only will contribute to a stronger workforce for the state's future but also will provide, as research suggests, social returns in the form of civic engagement and life satisfaction.

Lastly, state policy recommendations include (1) further exploration into the structural and systemic gaps in college outcomes across racial/ethnic and socioeconomic differences and (2) efforts to create a more equitable and just higher education system. Based on the research, students identifying as Hispanic or Black are less likely to attend a state flagship institution or earn a bachelor's degree compared with students identifying as White or Asian. Similarly, students from high-to-middle income families show an advantage in college-going outcomes. With respect to existing state policies, the relatively small observed rural and non-rural divide in flagship attendance identified in this research suggests that perhaps policies like the Top Ten Percent Law are helping to drive geographic equity among college matriculants within the state who graduate at or near the top of their class. Such policies indicate that motivated and innovative educators, leaders, and administrators have an opportunity to work together to create a high school-to-college pipeline within the state that will provide benefits for years to come.

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Appendix: Table A1. Sample Means by Rurality Status and Analytic Sample

	High School Graduates		College-Going		Public University-Going	
Variable	Non-Rural	Rural	Non-Rural	Rural	Non-Rural	Rural
College Matriculation	0.530	0.554				
Flagship Attendance			0.081	0.045		
Bachelor's Degree					0.601	0.574
Cohort Year	0.503	0.503	0.498	0.499	0.505	0.504
Female	0.501	0.473	0.541	0.535	0.553	0.547
Race/Ethnicity:						
White	0.360	0.646	0.394	0.690	0.424	0.718
Hispanic	0.447	0.277	0.404	0.234	0.345	0.220
Black	0.132	0.052	0.132	0.050	0.138	0.035
Asian	0.040	0.003	0.048	0.004	0.071	0.006
Other	0.022	0.021	0.022	0.022	0.022	0.021
Economic Disadvantage:						
No Economic Disadvantage	0.551	0.550	0.616	0.635	0.673	0.706
Eligible, Free Meals	0.322	0.347	0.260	0.265	0.208	0.205
Eligible, Reduced Meals	0.066	0.092	0.066	0.090	0.061	0.083
Other Economic Disadvantage	0.061	0.011	0.058	0.009	0.058	0.006
Age	17.130	17.177	17.067	17.110	17.026	17.072
Immigrant	0.007	0.003	0.003	0.0004	0.002	0.001
Parent's Highest Degree[a]:						

Table A1. Sample Means by Rurality Status and Analytic Sample (continued)

	High School Graduates		College-Going		Public University-Going	
	Non-Rural	Rural	Non-Rural	Rural	Non-Rural	Rural
Unknown					0.261	0.269
No High School					0.029	0.020
Some High School					0.043	0.030
HS Diploma or Equivalent					0.122	0.133
Some College					0.134	0.178
Associate/Two-Year Degree					0.038	0.053
Bachelor's Degree					0.227	0.225
Graduate/Professional Degree					0.146	0.092
Household Income[a]:						
Unknown					0.311	0.270
Less than $20K					0.099	0.092
$20K-$39,999					0.146	0.160
$40,000-59,999					0.114	0.123
$60,000-79,999					0.089	0.125
$80,000 and greater					0.241	0.229
Household Size[a]					2.894	3.129
Top 10 Percent					0.289	0.278
TAKS Reading	2250.299	2235.743	2302.119	2299.114	2375.648	2373.333
TAKS Math	2233.586	2211.788	2290.435	2279.826	2379.173	2371.202
TAKS Reading (z-score)	0.321	0.281	0.462	0.454	0.661	0.655

(continued)

Table A1. Sample Means by Rurality Status and Analytic Sample (continued)

	High School Graduates		College-Going		Public University-Going	
	Non-Rural	Rural	Non-Rural	Rural	Non-Rural	Rural
TAKS Math (z-score)	0.323	0.262	0.482	0.452	0.730	0.708
ESL Program	0.022	0.009	0.009	0.003	0.002	0.002
Gifted Program	0.118	0.095	0.153	0.143	0.244	0.245
Dual Credit	0.188	0.295	0.261	0.427	0.350	0.612
Total Days Absent	9.890	8.023	8.065	6.282	6.840	5.031
FAFSA Application	0.071	0.139	0.106	0.203	0.129	0.260
Employed High School	0.529	0.551	0.581	0.569	0.565	0.556
High School Size	1270.161	202.152	1290.602	202.210	1303.628	196.569
Teacher: Student Ratio	12.850	9.410	12.894	9.421	12.953	9.356
Total HS Counselors	4.697	0.932	4.764	0.931	4.866	0.958
Unemployment Rate (by HS County)	7.386	7.173	7.410	7.134	7.454	6.939
Poverty Rate (by HS County)	15.272	17.064	15.430	17.111	15.583	17.398
Major:						
Liberal Arts			0.261	0.222	0.102	0.090
Business			0.089	0.059	0.102	0.075
Social Sciences			0.044	0.035	0.070	0.060
Natural Sciences & Agriculture			0.093	0.120	0.158	0.232
Math			0.009	0.011	0.012	0.015
Education			0.023	0.027	0.004	0.001
Engineering			0.079	0.069	0.119	0.089

Table A1. Sample Means by Rurality Status and Analytic Sample (continued)

	High School Graduates		College-Going		Public University-Going	
	Non-Rural	Rural	Non-Rural	Rural	Non-Rural	Rural
Comm Studies			0.020	0.014	0.030	0.025
Literature/Linguistics, Fine Arts, Music			0.050	0.044	0.065	0.050
Health			0.105	0.148	0.096	0.091
Unknown			0.223	0.250	0.241	0.273
SAT					993.893	907.065
SAT (z-score)					973.466	972.677
Applied Flagship					0.287	0.174
Full-Time Status					0.937	0.950
Faculty: Student Ratio					21.328	20.788
Employed in College					0.820	0.834
N	408,027	18,414	216,065	10,208	88,009	3,594

Notes. Table presents the means for non-rural and rural students for each analytic sample.
[a] *Data only available for public university-going students. Included in RQ3 regression analyses only.*