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The Exception to Women's Advantage: How Rurality, Red Counties, and the Local Economy Shape Gender Gaps in Educational Attainment

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Abstract: Rural communities have lagged urban areas in the economic and sociocultural shifts thought to underlie women's advantage in bachelor's degree (BA) attainment, such as the expansion of high-status professional jobs and increasing gender egalitarianism. Using nationally representative data (ELS:2002), we bridge the gap between the macroscale factors theorized to drive women's educational gains and the local environments shaping youth outcomes by analyzing gender patterns in BA attainment across rural and urban high school students. Women who attended high school in metropolitan areas hold a clear BA advantage, but not women who attended nonmetropolitan high schools, where girls earn higher grades than boys yet attain bachelor's degrees at similar rates. We find that, net of other characteristics, women's BA advantage is most suppressed in rural counties with strong Republican majorities and limited professional employment opportunities. Overall, our study suggests that women's BA advantage is geographically uneven and varies across local sociopolitical and economic conditions.

Keywords: educational attainment; gender gap; rurality; local economy; political conservatism; rural-urban inequality

Reproducibility Package: A replication package, including code, documentation, and links/DOIs to data sources, is available at Zenodo (doi:10.5281/zenodo.17336597). The primary analyses use restricted-access data from the National Center for Education Statistics (NCES) within the Institute of Education Sciences (IES), U.S. Department of Education. These data are available only to approved investigators through the IES/NCES application process (https://ies.ed.gov/about/restricted-use-data). We provide the URLs/DOIs and table identifiers needed to retrieve the publicly available data (e.g., U.S. Census summary files) we used to augment the ELS:2002.

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In the 1980s, women converted their long-standing advantage in high school grades into a "female advantage" in bachelor's degree (BA) attainment, a gap that has continued to widen (DiPrete and Buchmann 2013). Scholars attribute this reversal to economic and sociocultural changes in the latter part of the twentieth century, including expanding higher-status professional occupations, increasing returns to a college degree, and growing gender egalitarianism (DiPrete and Buchmann 2006; Goldin 2006). However, while national in scope, these opportunity shifts have not unfolded evenly across the rural-urban divide.

In fact, at the heart of the popular phrase "left behind" (Wuthnow 2018) is the notion that many rural communities have not kept pace with the rest of the

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country. The rise of higher-status, BA-demanding jobs and the growing payoffs to a four-year degree have occurred primarily in metropolitan areas (Autor 2020; Eckert, Ganapati, and Walsh 2022). Likewise, while more egalitarian gender norms and greater reproductive autonomy broadened women's horizons (Goldin 2006), rural areas remain characterized by more traditional social norms and slower progress toward gender equality, shaped by and reflected in higher levels of religious and political conservatism (Brown and Mettler 2024; Dillon and Savage 2006; Kelly and Lobao 2019; Wuthnow 2013).

Despite a robust literature on rural-urban structural and cultural divides, researchers have overlooked that many rural areas have been peripheral to the macro-scale opportunity shifts believed to have driven women's BA gains. This study addresses that gap. We link the economic and sociocultural macro-level transformations presumed to underpin women's BA advantage to their uneven manifestation across the local contexts that shape youth's educational outcomes. Using a nationally representative sample of high school sophomores in 2002 (Education Longitudinal Study of 2002), we assess whether, to what extent, and why women's BA advantage varies across rural, suburban, and city settings—contexts that have exposed youth to markedly different conditions associated with the "female advantage."

Our first objective is descriptive: Do young women from metropolitan (city and suburban) and nonmetropolitan (rural) areas exhibit a comparable BA advantage over men?[1] This comparison is long overdue. To our knowledge, the last nationally representative study to examine rural-urban gender differences in educational attainment used a 1979 cohort, prior to women surpassing men in BA attainment (Gibbs 1995).[2] Among a cohort of Millennial high school students, we find a pronounced BA advantage among urban and suburban women, whereas men and women from rural high schools obtain BAs at about equal rates.

To investigate this rural exception, we take a two-pronged approach. First, we ask whether rural women lack the proximate academic advantages that contribute to women's BA advantage nationally. We find that women's higher high school GPAs account for most of their advantage in urban and suburban areas, consistent with prior national-level research (Buchmann and DiPrete 2006; DiPrete and Buchmann 2013). We show that rural women also academically outperform rural men in high school, but neither their stronger academic performance nor other educational or sociodemographic factors explain the rural exception to women's BA advantage. This finding raises a broader puzzle: Why, despite their academic edge over men, does the well-known women's advantage in bachelor's degree attainment fail to emerge among rural high school students?

Understanding how women parlayed their higher grades in high school into higher educational attainment requires grappling with key macro-level economic and sociocultural opportunity shifts theorized to facilitate this historic conversion (DiPrete and Buchmann 2013). Although labor market and social norm transformations evolved nationally, their local imprint varies widely across rural America. Some rural communities reflect the "left behind" narrative, where these shifts are less evident, whereas others more closely resemble metropolitan areas (Lichter and Johnson 2025).

We leverage this heterogeneity across rural communities to better understand the rural exception to women's BA advantage, analyzing how local economic and

sociocultural conditions are associated with the presence or absence of women's BA advantage among rural youth. We augment our survey data with contextual data (e.g., U.S. Census, U.S. Religion Census, and MIT Election Data) to bring macro-level accounts of women's BA advantage (e.g., DiPrete and Buchmann 2013; Goldin, Katz, and Kuziemko 2006) into dialogue with the local contexts that influence young men's and women's opportunities and pathways to adulthood (e.g., Elder 1963; Miller and Edin 2022; Morris 2012; Roscigno, Tomaskovic-Devey, and Crowley 2006). We assess variation in gender gaps by (1) the county share of high-status professional occupations and (2) local political and religious conservatism. We find that women attending rural high schools in counties with strong Republican majorities or lower shares of higher-status professional occupations do not enjoy a BA advantage, whereas those in communities more closely resembling metropolitan areas on these dimensions do. Notably, after adjusting for women's stronger academic performance and other factors, young women from politically deep-red rural counties are *less likely* than their male peers to earn a bachelor's degree.

Our findings complicate the taken-for-granted pattern of women's BA advantage, suggesting that it is geographically contingent rather than a foregone conclusion. Among high school students, we show that women's BA advantage develops unevenly—not only across rural-urban lines but also according to local political and economic conditions within rural communities, net of other individual and contextual factors. In identifying communities where women's academic advantage in high school fails to translate into a BA advantage over men, this study advances intersectional understandings of geographic opportunity and contributes a gender lens to renewed scholarly interest in rural youth's educational outcomes. Our analysis of the local environments associated with expression or suppression of women's BA advantage also provides unique empirical evidence for macro-scale economic and sociocultural shifts widely theorized to underlie women's rising college attainment but that are difficult to isolate empirically (DiPrete and Buchmann 2013). Indeed, we find that young women's BA advantage is most constrained in the most politically conservative and economically marginalized rural communities—precisely where these broader transformations have been least evident.

Background

Despite growing interest in rural inequality over the past few decades, post-deindustrialization research on education remains overwhelmingly urban-centric when considering place, focusing primarily on neighborhood- and school-based disparities within metropolitan areas (Carr and Kefalas 2010; Clark, Harper, and Weber 2022). Yet rural-urban comparisons were foundational to classic work in social stratification, status attainment, and life course research, offering early insights into the geography of opportunity and enriching understandings of educational attainment and mobility more generally (Elder 1963; Lipset and Bendix 1959; Sewell 1964; Sorokin and Zimmerman 1929).

Scholars have long theorized that the distinctive economic features of rural communities shape youth's attainment patterns, through influencing the kinds of work they view as desirable and shaping educational opportunities, local educational demands, and the perceived costs and benefits of higher education (Elder

1963; Roscigno and Crowley 2001; Roscigno et al. 2006; Sewell and Orenstein 1965). Rich qualitative studies further emphasize that distinctive rural social norms influence youth preferences, aspirations, and transitions to adulthood (Carr and Kefalas 2010; Miller and Edin 2022; Morris 2012). Such structural and normative features of local environments can also have gendered consequences, shaping both the magnitude and direction of gender inequalities that are often treated as uniform across place (Haller and Sewell 1957; Legewie and DiPrete 2012; Morris 2012; Niccolai, Damaske, and Park 2022; Riegle-Crumb and Moore 2014; Sutton, Bosky, and Muller 2016).

Yet despite long-standing recognition that local environments shape educational outcomes, two relevant literatures have remained largely disconnected since women overtook men in BA attainment. Research on women's BA advantage has overlooked geographic variation within the United States, whereas research comparing rural and urban youth's educational outcomes has paid little attention to gender excepting a small but important set of qualitative studies (e.g., Carr and Kefalas 2010; Miller and Edin 2022; Morris 2012). We bridge these literatures by integrating two key insights: first, that local context shapes youth's educational outcomes, often in gendered ways; and second, that rural and urban communities differ systematically in the conditions thought to drive women's educational gains and BA advantage.

We first set the stage by describing gender gaps in bachelor's degree attainment across rural and urban high school students. Figure 1 shows weighted proportions of men's and women's BA attainment for two nationally representative cohorts of high school sophomores: those surveyed in 1980 (High School and Beyond), just prior to women surpassing men nationally in BA attainment rates, and those surveyed in 2002 (ELS:2002). In 1980, we observe no evidence of a meaningful women-favorable BA advantage: about 29 percent of metropolitan women and men earned BAs, whereas nonmetropolitan women held only a slight, statistically nonsignificant edge (23 percent vs. 22 percent). By 2002, we see that BA attainment had risen for all groups. However, women from metropolitan high schools experienced the sharpest rise in BA attainment, from 29 percent to 40 percent, translating into about a six-percentage-point advantage over metropolitan men (40 percent vs. 34 percent, $p < 0.001$). This pattern closely mirrors the national narrative of women's steeper educational gains relative to men and the reversal of the gender gap during this period (DiPrete and Buchmann 2006; Goldin et al. 2006). The story differs for nonmetropolitan women, whose BA gains largely tracked those of nonmetropolitan men (23 to 30 percent vs. 22 to 29 percent), resulting in a gender gap that remained essentially unchanged between the 1980 and 2002 cohorts of high school sophomores.

To investigate this rural exception, we draw on DiPrete and Buchmann's (2013:53) conceptualization of women's BA advantage as shaped by both structures that "produce the resources to excel in school and thereby gain access to higher levels of education" and those that "produce opportunities and incentives to obtain more education." We begin with the former, examining proximate academic factors alongside school factors that may support or constrain rural young women's academic performance. We end with the latter, describing how the uneven reach of larger-scale economic and sociocultural changes across rural and urban communities may uniquely dampen rural young women's BA attainment rates.

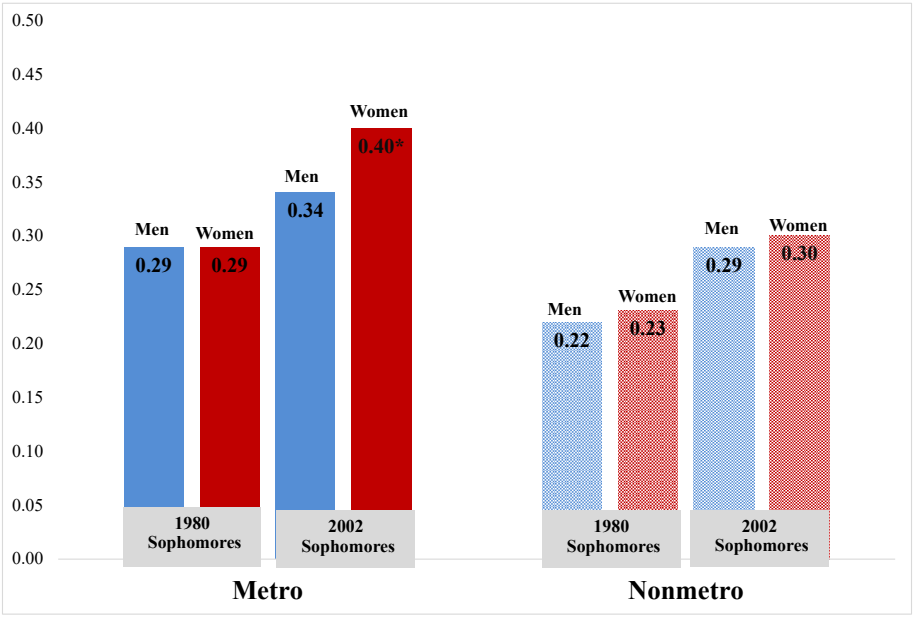

Figure 1: BA attainment[1] by gender and metropolitan status across HS&B:80 and ELS:2002 High School Sophomore Cohorts.
Sources: U.S. Department of Education, NCES, Education Longitudinal Study of 2002 (ELS:2002/2012), and High School and Beyond (HS&B:80/92).
Notes: HS&B: $n = 11{,}880$; ELS: $n = 11{,}940$ (unweighted and rounded to nearest 10 per NCES guidelines).
[1]Earned bachelor's degree within 8–10 years of expected high school graduation. Asterisk indicates that the gender gap within the metropolitan group is statistically significant ($p < 0.05$). Restricted to high school graduates and GED recipients.

Proximate Educational Factors

Women have long been more likely to excel academically in school than men, as reflected in their greater studiousness and higher grades (Carbonaro, Ellison, and Covay 2011; DiPrete and Buchmann 2013; Jacob 2002). It may be that women attending rural high schools do not share these academic advantages over their men peers to the same extent as women from the cities and suburbs. Alternatively, young rural women may experience weaker returns to their academic resources than men, for example, if local structural and cultural features disproportionately affect their perceived costs and benefits of higher education.

More limited educational opportunities and resources among rural youth (Roscigno et al. 2006) may also hinder rural women from realizing a BA advantage. Prior research shows that gender gaps in advanced math and science coursework converged across cohorts as young women responded to expanded labor market opportunities (Cho 2007; Goldin et al. 2006). However, rural students have less access to advanced coursework than their metropolitan counterparts (Irvin et al. 2017; Roscigno and Crowley 2001), potentially limiting rural women's college preparation pathways. Moreover, studies of Millennial cohorts find that young women are more likely than young men to attend private or higher-quality public high schools, and that these differences contribute to women's higher BA attainment (Conger and

Long 2013; Long and Conger 2013). Yet many rural counties offer only one or two public high schools, limiting opportunities for rural women to take advantage of the range of local educational options typically available in metropolitan areas.

We first consider whether possible rural gender differences in the distribution or returns to these academic and educational factors help explain why women from rural communities do not enjoy a BA advantage like their metropolitan counterparts do. Although these proximate factors are important, the challenge to fully understanding women's BA advantage requires making sense of the broader opportunity shifts that enabled women to convert their longstanding academic edge into higher educational attainment (Buchmann and DiPrete 2006; DiPrete and Buchmann 2006, 2013).

Under What Local Conditions Is Rural Women's BA Advantage Suppressed or Expressed?

Despite common conceptions and empirical treatments of a monolithic "rural America," there is significant economic, political, and cultural variation across rural places (Dillon and Savage 2006; Scala, Johnson, and Rogers 2015). In fact, multiple "rural Americas" coexist (Lichter and Johnson 2025). Some exhibit demographic and economic features more commonly associated with metropolitan areas, whereas others align with "left behind" characterizations—places where technology has not replaced earlier economic bases, such as manufacturing and agriculture, and where social norms have increasingly diverged from broader national trends (Brown and Mettler 2024; Wuthnow 2018). We draw on the fact that some rural communities have been "left behind" by the opportunity shifts thought to drive women's rising incentives to obtain a BA and their eventual BA advantage over men. We harness this local heterogeneity across rural communities to gain insight into the rural exception we documented and to advance our understanding of how local opportunity structures are associated with the realization of women's BA advantage.

Local availability of higher-status professional occupations

Beginning in the 1980s, technological changes reshaped the labor market by increasing demand for higher skills and diminishing opportunities to work in middle-skill occupations, thereby strengthening incentives to pursue higher education (Autor, Katz, and Kearney 2008; Autor, Levy, and Murnane 2003). Women disproportionately capitalized on these shifts relative to men, acquiring the credentials required for expanding professional jobs and gaining an advantage in BA attainment (Autor 2019; DiPrete and Buchmann 2013; Goldin et al. 2006).

As Goldin (2006) argues, the expansion of higher-status, BA-demanding professional jobs facilitated women's advantage in BA attainment by increasing their labor market expectations and transforming their life plans. Yet in rural areas, such economic opportunities have remained far more constrained. Growth in baccalaureate-demanding occupations with the highest returns to a four-year degree has been heavily concentrated in metropolitan areas, whereas rural areas have experienced a rising dependence on low-wage service work without a concomitant rise in higher-status BA-demanding occupations seen in metropolitan areas

(Austin et al. 2018). By the 2000s, the share of workers in higher-status, professional occupations such as accounting, engineering, and medicine in rural labor markets resembled those of metropolitan areas in the early 1980s (Autor 2019); thus, rural communities were effectively left behind just as the labor market transformations widely theorized to have contributed to women's steep BA gains were unfolding (DiPrete and Buchmann 2013).

As a result, the higher-status professional career pathways that fueled BA attainment nationally, especially women's, have been less prevalent in rural communities. Indeed, Smith and Glauber (2013) find that rural women with bachelor's degrees are often concentrated in lower-paying, traditionally female-dominated occupations such as teaching and nursing. These occupational options mirror the roles women held nationally before the broader economic shifts widely argued to have spurred women's increased pursuit of higher education. This local variation may matter for young women because the educational demands of locally available jobs shape youth's perceptions of the value of college and their educational choices (Blau and Duncan 1967; Bozick 2009; Bozick, Anderson, and Daugherty 2021; Sutton et al. 2016). Research further suggests that local occupational structures can influence boys' and girls' educational trajectories differently (Haller and Sewell 1957; Morris 2012), shaping different patterns of gender inequality across local labor markets (Riegle-Crumb and Moore 2014; Sutton et al. 2016).

Thus, the limited availability of higher-status professional occupations in rural areas may help explain why rural women do not exhibit the same BA advantage as metropolitan women, to the extent that women's educational decisions are more sensitive to the local share of higher-status, BA-demanding occupations than men's. To assess this possibility, we examine both the overall prevalence and gender composition of high-status occupations given prior evidence of gender-specific occupational role modeling (Xie and Shauman 1997; Riegle-Crumb and Moore 2014).

Local conservatism

DiPrete and Buchmann (2013:375) describe women's BA advantage as "a combination of a long-standing female advantage in academic performance and the development of a more egalitarian society that raised the incentive for girls to obtain higher education." From the 1950s onward, loosening gender norms around labor force participation, marriage, and familial roles increased women's occupational options and expectations, enabling them to capitalize on emerging professional opportunities through postsecondary education (DiPrete and Buchmann 2013; Goldin et al. 2006). Yet gender norms vary widely across places (Scarborough 2023), shaping behavior and reinforcing inequality through "internalized ideologies" and "norm perceptions" (Evans 2019). Rural residents tend to hold more conservative gender beliefs, which are reflected in local patterns of voting and religious affiliation (Brown and Mettler 2024; Kelly and Lobao 2019; Rodden 2019; Wuthnow 2013, 2018). Although we cannot directly measure local gender norms, we use local religious and political conservatism, core features of many rural areas, as an imperfect proxy that may influence women's educational decisions through family and community-level socialization processes.

Religious conservatism. Rural counties have higher concentrations of conservative Protestants (CPs) (Sherkat and Darnell 1999), a group whose religious affiliation is associated with more traditional gender role beliefs and more strongly gendered transitions to adulthood (Fitzgerald and Glass 2014). For instance, CP affiliation is associated with youth taking fewer college-preparatory courses, attaining lower education levels, and enrolling in less selective colleges for women but not men, net of sociodemographic factors (Fitzgerald and Glass 2008; Sherkat and Darnell 1999; Uecker and Stokes 2008; Uecker and Pearce 2017). Even independent of individual religious affiliation, people living in counties with higher concentrations of evangelical Christian adherents tend to form families at earlier ages and attain less education, highlighting the role of local cultural climates in shaping outcomes above and beyond individual characteristics (Glass and Levchak 2014). Thus, we might expect any women's BA advantage to be weaker among youth from rural counties with higher concentrations of evangelical Christian adherents.

Political conservatism. The partisan divide over women's rights crystallized in the early 1980s, coinciding with the gender reversal in BA attainment (Costain 1992; Wolbrecht 2000). Republicans began promoting more traditional gender norms and adopting anti-feminist rhetoric to attract white Southern voters (Maxwell and Shields 2019), whereas Democrats increasingly advocated for greater women's rights. These partisan associations have intensified since (Rodden 2019; Winter 2020) and were followed in the 1990s by deepening rural-urban political divides (Aistrup, Mahato, and Morris 2023; Mettler and Brown 2022).

As McVeigh and Sobolewski (2007:489) argue, local economic traits and cultural orientations are interconnected and contribute to geographic variation in Republican voting. Places with higher Republican vote shares tend to exhibit more traditional gender attitudes, resistance to shifts in gender roles, and greater gender inequality (e.g., occupational segregation) (Lesthaeghe and Neidert 2009; May and McGarvey 2017; McVeigh and Sobolewski 2007). Higher local Republican vote shares are associated with weaker indicators of women's advancement, including "rising symmetry in sex roles, rising female education levels, and greater female economic autonomy" (Lesthaeghe 2014:18113). Other features of the "second demographic transition," such as delayed family formation and fertility decline, are more prevalent in areas with lower Republican vote shares (Lesthaeghe and Neidert 2009). These trends reflect broader shifts in cultural beliefs about gender and family life (Lesthaeghe 2014) that have been crucial for women's rising attainment rates (DiPrete and Buchmann 2013).

Taken together, local political conservatism may shape whether rural young women perceive or experience "expanded horizons" (Goldin 2006:8) through its association with more traditional cultural beliefs about gender and weaker local representations of women's economic and social advancement. If this is the case, we would expect young women attending schools in less politically conservative rural communities—where social norms and women's perceived possibilities may be more like those in metropolitan areas—to enjoy a BA advantage relative to their male counterparts. Conversely, we would expect women in the most politically conservative rural communities to experience the weakest or no BA advantage, net of individual sociodemographic and other local contextual factors.

Data and Methods

The Education Longitudinal Study of 2002 (Ingels et al. 2014) is a nationally representative, longitudinal study of high school sophomores conducted by the National Center for Education Statistics (NCES), Department of Education. The ELS:2002 cohort includes more than 16,000[3] students who were enrolled in 10th grade in 2002. The study followed up with respondents in 2004 (12th grade), 2006, and 2012, about eight years following expected high school graduation (∼26 years old). The ELS:2002 offers data on youth's educational attainment and rich information on students' sociodemographic and academic backgrounds, as well as school characteristics. The restricted-access ELS:2002 dataset includes geographic identifiers for students' schools, allowing us to enhance our data with county-level measures from external sources captured in 2000. These include 2000 presidential election returns from the Massachusetts Institute of Technology (MIT) Election Data and Science Lab (MIT Election Data and Science Lab 2018), religious adherence data from the 2000 U.S. Religion Census (Jones et al. 2002), and demographic and economic data from the 2000 U.S. decennial Census. Our analytic sample includes sophomore participants who responded to the base year and third follow-up surveys (n = 13,130), earned a high school degree or General Educational Development (GED) certificate (n = 12,090), and have valid information on bachelor's degree attainment (n = 11,940).[4]

Measures

Our dependent variable is *bachelor's degree attainment*, which is measured as a dichotomous indicator of whether students had earned a bachelor's degree by around age 26, as self-reported on the third follow-up survey (2012).

High school urbanicity. Selective migration is a potential source of bias when estimating geographic disparities. We use high school location to classify urbanicity, capturing associations between geographic context and bachelor's degree attainment when youth are sophomores in high school, prior to migration decisions in adulthood. We measure high school urbanicity with the NCES-developed eight-category "metro-centric" locales, a detailed typology of school urbanicity constructed by the NCES common core of data (CCD) and provided within the ELS data set. This classification applies the Office of Management and Budget and 2000 Census geographic designations, which align temporally with our county economic measures and indicators of religious and political conservatism. Due to cell size limitations, we construct a trichotomous measure of urbanicity.

The metro-centric scheme's empirical distinction between metropolitan ("city" and "suburban") and nonmetropolitan ("rural") students is important for consistency with previous research on rural-urban disparities in BA attainment (e.g., Byun, Meece, and Irvin 2012; Roscigno et al. 2006) and aligns with our study's theoretical framework by allowing BA attainment comparisons among young women and men from counties with stronger and weaker ties to urban economic centers. Metropolitan statistical areas (MSAs) are collections of counties with one or more urban areas containing at least 50,000 residents and with significant economic and commuting ties to the central county. Among students attending high school within

a metropolitan county, we distinguish between those in "cities" and the "urban fringe" (what we call "suburban" here).[5,6] Our third category includes students who attended high school in counties that do not belong to an MSA—those in nonmetropolitan counties (what we often call "rural").

To assess the representativeness of the nonmetropolitan schools, we compared ELS:2002 nonmetropolitan schools to nonmetropolitan high schools in the Common Core of Data (CCD) (NCES 2003), a national census of public schools. The public schools in ELS and the counties they serve closely match CCD and U.S. Census distributions on key demographic and socioeconomic indicators, including the percentage of students eligible for free or reduced-price lunch, the percentage of ethnoracial minority students, the share of county residents with a bachelor's degree, and the share of workers employed in blue-collar occupations.

Proximate Educational Factors

GPA and achievement. We use transcript-based high school GPA and base-year math achievement, measured using the IRT-estimated number-right score.

Educational opportunities, coursetaking, and noncognitive skills. Research suggests that part of women's BA advantage may stem from gendered sorting across school types and school quality (Conger and Long 2013). We adjust for school type (public, private, and Catholic) and include a measure of school SES, calculated as the average parental SES within a school. Using high school course catalogs, we code whether a student's school offered no, one, or two or more AP/IB courses as a signal for college-going orientation and school-level investments in students' college-preparatory options (McDonough 1997; Roscigno et al. 2006).

Women's greater participation in advanced coursework also contributes to their BA advantage (Cho 2007). We include measures of students' highest math and science courses taken—known predictors of college enrollment and completion (Adelman 2006)—using an abbreviated version of the NCES-produced math and science coursetaking pipeline measures. Finally, we include two *noncognitive composite measures*: an academic disengagement composite (capturing frequency of arriving to school unprepared—without books, pencils, and homework; $\alpha = 0.81$) and a behavioral disengagement composite (capturing lateness, absences, and disciplinary issues; $\alpha = 0.64$).

Sociodemographic background. We use students' self-reports of their biological sex, as the surveys did not ask students questions about their gender identity. Research shows that women's BA advantage is strongest among youth with lower educated or non-present fathers (DiPrete and Buchmann 2013). Thus, we consider maternal and paternal highest levels of education (no college [ref], some college, bachelor's degree, and advanced degree) and whether the student lived with both biological parents. We adjust for parental income, parental religious affiliation, age, race and ethnicity, and whether the student transferred high schools between sophomore and senior year. Means and proportions for city, suburban, and rural students are provided in Table A1.

Local Economic and Sociocultural Context

Derived from the U.S. Census 2000 (Summary File 3) with county occupation information for the employed civilian population age 16 and older, our core local economic measure is the percentage of workers in the county employed in higher-status professional occupations in 2000.[7] We define these occupations using classical occupational definitions (Jonsson et al. 2009). This measure is strongly correlated ($r = 0.90$) with the local proportion of adults holding bachelor's degrees, supporting its use as a proxy for local economic contexts in which higher education is likely more demanded and incentivized.

We also consider the gender composition of higher-status professional workers (number of women in higher-status professional occupations/number of total workers in higher-status professional occupations) given the possibility of gender role modeling processes (Xie and Shauman 1997) at the local level (Riegle-Crumb and Moore 2014).

We proxy *local conservatism* with county political and religious measures, constructing a measure of the number of evangelicals per 1,000 residents in the county in 2000 (U.S. Religion Census) and the proportion of votes cast for the Republican candidate in the 2000 U.S. presidential election (MIT Election Lab).

Local contextual controls. We control for a set of measures that might confound the relationship between our key local contextual measures and gender gaps in BA attainment, including geographic region; the county share of workers employed in agricultural, craft, and manual labor occupations; the county share of unemployed civilians; and county racial (% white) and ethnic (% Hispanic) composition, all drawn from the 2000 Census. We adjust for geographic access to college with two indicators: the number of four-year colleges within commuting distance (see López Turley 2009) and the commute time to the nearest four-year public university. Descriptive statistics for these measures by high school urbanicity are shown in Table A2. We provide more details on these measures in Appendix B.[8]

Analytic Plan

We first describe BA attainment at the intersection of high school urbanicity and gender, disaggregating metropolitan students into city and suburban subgroups (objective 1). Given the importance of high school GPA in explaining women's BA advantage (Buchmann and DiPrete 2006; DiPrete and Buchmann 2013), we also present GPA patterns by gender and urbanicity to assess baseline differences. Second, we examine whether women from rural high schools are disadvantaged relative to rural men in ways that suppress a BA advantage (objective 2), drawing on previous research (Cho 2007; Conger and Long 2013; DiPrete and Buchmann 2013; Goldin et al. 2006). We estimate logistic regression models separately by urbanicity, fully interacted by gender, and add sets of predictors cumulatively: sociodemographic background (model 1), math test scores (model 2), coursetaking and educational opportunities (model 3), and noncognitive skills (model 4) and GPA (model 5).

Finally, we analyze whether our key local contextual measures of interest—the local share of higher-status professional occupations and measures of local conservatism—are associated with variation in women's BA advantage among rural

youth (objective 3). These analyses are restricted to rural students. Models are fully interacted by gender and adjust for sociodemographic background factors, math test scores, and local contextual controls (model 1); cumulative high school GPA (model 2); and educational opportunities, academic coursetaking, and noncognitive skills (model 3). As recommended by Mize (2019), we do not infer statistical significance from overlapping confidence intervals. Instead, we formally test whether adjusted average marginal effects (AMEs) of local contextual measures vary by gender using post-estimation hypothesis testing.[9] We bold AMEs in tables and average predicted probabilities in figures when gender differences are statistically significant.

We report AMEs in the main text and log odds in the appendix. All estimates adjust for school-level clustering using design-based methods and apply appropriate sampling weights. Missing data are addressed using multiple imputation by chained equations, performed separately by each gender and rurality subgroup.[10] Supplemental models with state fixed effects, when analytically feasible, yield consistent patterns.

Results

BA Rates and High School GPA by Gender and High School Urbanicity

In Figure 1, we observed a strong women's advantage in BA attainment among youth from metropolitan but not nonmetropolitan (i.e., rural) high schools. Figure 2 shows gender gaps in BA attainment (gray and black bars) and in high school GPA (red and blue lines), disaggregating metropolitan youth into those from city and suburban high schools. Women from both city and suburban high schools have about a 6-percentage-point advantage in BA attainment over their men peers. Furthermore, we see that women earned higher GPAs than men across high school urbanicity classifications, with young women earning GPAs that are about one-quarter of a grade point higher than young men across these schools.[11] Despite their shared GPA advantage over their men peers, women from rural high schools do not appear to have converted their GPA advantage into an advantage in BA attainment like their city and suburban peers, suggesting other factors are at play.

Proximate Explanations

Rural young women may not exhibit a BA advantage because rural men are more advantaged on key predictors of attainment, or because they benefit more from these resources. Table 1 shows AMEs from logistic regressions fully interacted by gender, focusing on rural students, with city and suburban comparisons for context.

In model 1, adjusting for sociodemographic background, women from city and suburban high schools have a predicted 8-percentage-point advantage in BA attainment, on average, relative to their men peers ($p < 0.001$), whereas rural women's BA advantage is about 1 percentage point and not statistically significant. In model 2, we additionally adjust for math achievement. Women's BA advantage widens to about 10 points among city and suburban youth and 3.5 points among rural youth, though the rural gap remains nonsignificant. After adding educational

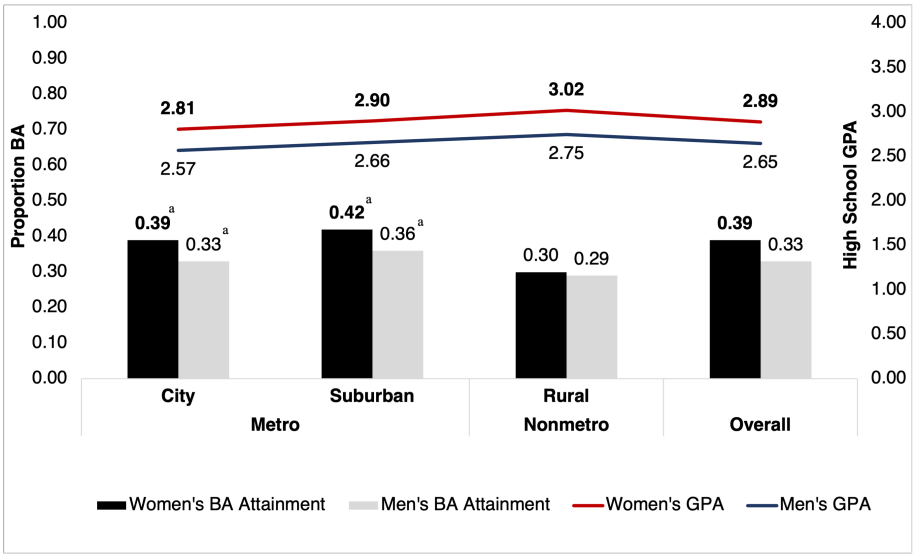

Figure 2: Gender gaps in bachelor's degree attainment and high school GPA by high school urbanicity. *Sources:* U.S. Department of Education, NCES, and Education Longitudinal Study of 2002 (ELS:2002/2012). *Notes:* $n = 11,940$ (unweighted and rounded to nearest 10 per NCES guidelines). Bolded data labels indicate that gender gap within urbanicity group is statistically significant ($p < 0.05$). [a]Proportion BA is statistically significantly different than same-gender rural counterparts.

opportunities and coursetaking (model 3) and noncognitive skills (model 4), the rural gender gap drops to about zero, whereas the women-favorable BA gaps for city and suburban students remain around 6.5–7.7 percentage points.

Adjusting for GPA (model 5) reduces the metro gender gaps further (2.7 points for city and 1.7 for suburb), rendering them nonsignificant. This aligns with prior research showing that women's higher GPAs largely explain their advantage in educational attainment over men (Buchmann and DiPrete 2006, 2013). Among

Table 1: AMEs of gender estimated from logistic regressions predicting women's advantage in BA attainment across high school urbanicity.

	City		Suburban		Rural	
	AME	(SE)	AME	(SE)	AME	(SE)
(1) Sociodemographic background	0.082***	(0.018)	0.076***	(0.014)	0.011	(0.019)
(2) Math achievement test score	0.099***	(0.018)	0.105***	(0.013)	0.035	(0.019)
(3) Educational opportunities and academic coursetaking	0.074***	(0.017)	0.081***	(0.013)	0.000	(0.020)
(4) Noncognitive skills	0.065***	(0.018)	0.077***	(0.013)	−0.005	(0.019)
(5) High school grade point average	0.027	(0.017)	0.017	(0.013)	−0.045*	(0.021)
Observations	3,960		5,900		2,090	

Sources: U.S. Department of Education, NCES, Education Longitudinal Study of 2002 (ELS:2002/2012), and Integrated Postsecondary Education Data System (IPEDS), 2002–2003. U.S. Census 2000; MIT Election Data and Science Lab, Election Returns 2000.
Notes: AMEs are computed from models estimated separately by high school urbanicity and fully interacted by gender.
All models adjust for: maternal and paternal education, family income, parental religious affiliation, race/ethnicity, age, high school transfer, and region.
Models 3, 4, and 5 also adjust for school type, school SES composition, AP/IB course offerings, and math and science coursetaking.
Models 4 and 5 also adjust for academic and behavioral disengagement composite measures.
Full models presented in the appendix Table B1.
Robust standard errors in parentheses. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$ (two-tailed tests).

Table 2: Weighted percentile distribution of key local contextual measures across metropolitan and nonmetropolitan youth.

	Nonmetro			Metro		
	25th	Median	75th	25th	Median	75th
County share employed in higher-status professional occupations (%)	2.7	3.3	3.9	4.6	6.0	7.4
County share of women among higher-status professional workers (proportion)	0.32	0.35	0.41	0.34	0.36	0.39
County Republican vote share (%), 2000 presidential election	50	56	61	38	48	55
Evangelical affiliates per 1000 people in county	83	156	343	54	91	185
Observations		2,090			9,860	

Sources: U.S. Department of Education, NCES, Education Longitudinal Study of 2002 (ELS:2002/2012), and Integrated Postsecondary Education Data System (IPEDS), 2002–2003; U.S. Census 2000; MIT Election Data and Science Lab, Election Returns 2000.
Notes: Sample sizes are unweighted and rounded to nearest 10 per NCES guidelines.

rural students, however, adjusting for GPA reverses the gender BA gap: women's predicted probability of earning a BA is about 4.5 percentage points *lower* than men ($p < 0.05$), on average and after adjusting for their higher GPAs and other factors.

Local Heterogeneity in the Gender BA Gap among Rural Youth

To probe the rural exception, we leverage variation across rural communities in the local expression of macro-level economic and sociocultural shifts thought to facilitate women's BA advantage. We begin by characterizing the widely varying opportunity structures in which nonmetropolitan and metropolitan youth come of age. Table 2 shows percentile distributions of county-level contextual measures for the counties where ELS:2002 sophomores attended high school.

Two key patterns emerge. First, nonmetropolitan and metropolitan youth are embedded in profoundly different opportunity structures. One of the starkest divides appears in the local economy. Students attending high schools in nonmetropolitan counties are in communities where the middle 50 percent (25th–75th percentiles: 2.7%–3.9%) of the local share of workers in higher-status professional occupations does not overlap with the middle 50 percent for metropolitan students (25th–75th percentiles: 4.6%–7.4%), indicating limited local overlap on this key economic indicator. We also see differences in local conservatism: in 2000, the median Republican vote share was about 56 percent in counties where nonmetropolitan students attended high school, compared to 48 percent in counties where metropolitan students attended school.

Second, these distributions highlight substantial heterogeneity within nonmetropolitan students' county contexts. For instance, the 25th percentile for Evangelical adherence is 83 per 1,000 county residents, compared to 343 at the 75th percentile; for Republican vote share, the corresponding figures are 50 percent and 61 percent. We next analyze whether and to what extent this within-rural variation is associated with the size and direction of gender gaps in BA attainment among rural high school students.

In Table 3, we present selected AMEs from logistic regression models predicting BA attainment among rural high school students, fully interacted by gender (full

Table 3: Selected AMEs estimated from weighted logistic regressions predicting BA attainment for rural high school sophomores, 2002.

	(1) Local Context		(2) High School GPA		(3) Full Model	
	Women	Men	Women	Men	Women	Men
Key local economic and sociocultural measures						
County share employed in higher-status professional occupations	**0.031****	0.002	**0.018***	0.008	0.009	0.003
	(0.010)	(0.009)	(0.008)	(0.010)	(0.008)	(0.010)
County share of women among higher-status professional workers	0.231	0.208	0.034	0.080	0.050	0.066
	(0.164)	(0.208)	(0.167)	(0.199)	(0.163)	(0.191)
County Republican vote share (%), 2000 presidential election	−**0.004****	0.001	−**0.003****	0.002	−**0.004****	0.001
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Evangelical affiliates per 1000 people in county	−0.000	0.000	−0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cumulative high school grade point average (GPA)			0.239***	0.203***	0.208***	0.263***
Sociodemographic background and math test achievement score	Yes		Yes		Yes	
Local contextual controls (e.g., racial/ethnic composition and proximity to college)	Yes		Yes		Yes	
Educational opportunities and coursetaking					Yes	
Noncognitive skills					Yes	
Observations = 2,090						

Sources: U.S. Department of Education, NCES, Education Longitudinal Study of 2002 (ELS:2002/2012), and Integrated Postsecondary Education Data System (IPEDS), 2002–2003; U.S. Religion Census 2000; MIT Election Data and Science Lab, Election Returns 2000.
Notes: Sample sizes are unweighted and rounded to nearest 10 per NCES guidelines.
AMEs are calculated from models fully interacted by gender. Bolded AMEs indicate statistically significant gender differences ($p < 0.05$).
Models 1 and 2 also include controls for race/ethnicity, age, high school transfer, family income, mother's and father's highest education, parental religion, family structure, math achievement test score, region, county % white, county % Hispanic ethnic identity, % county unemployment, college proximity measures, and % agriculture and blue-collar employment.
Model 3 also includes school type, school SES composition, AP/IB course offerings, math and science coursetaking, academic and behavioral disengagement composite measures.
Log-odds coefficients for all measures shown in the appendix Table B2.
Robust standard errors in parentheses. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$ (two-tailed tests).

models in Table B2, Online Supplement). In the first model of Table 3, we observe that the county share of workers employed in higher-status professional occupations ($p < 0.01$) is positively associated with women's predicted probability of earning a BA, on average and adjusting for sociodemographic background, math test score, and other local contextual measures. In addition, we observe a negative relationship between the share of the county electorate voting Republican in 2000 and rural women's BA attainment ($p < 0.01$), on average. In contrast, these associations among men are close to zero and statistically nonsignificant. Formal testing indicates that gender differences in these relationships are statistically significant.

Local higher-status professional occupations. To demonstrate how these gender differences translate into differences in gender gaps in BA attainment, we plot the average predicted probabilities of BA attainment (i.e., earning a bachelor's degree by around eight years following expected high school graduation). In Figure 3a, we see that women's predicted probability of earning a BA increases as the local share of higher-status professional workers increases (red lines, circle markers), whereas men's (blue lines, square markers) remains nearly constant across the distribution

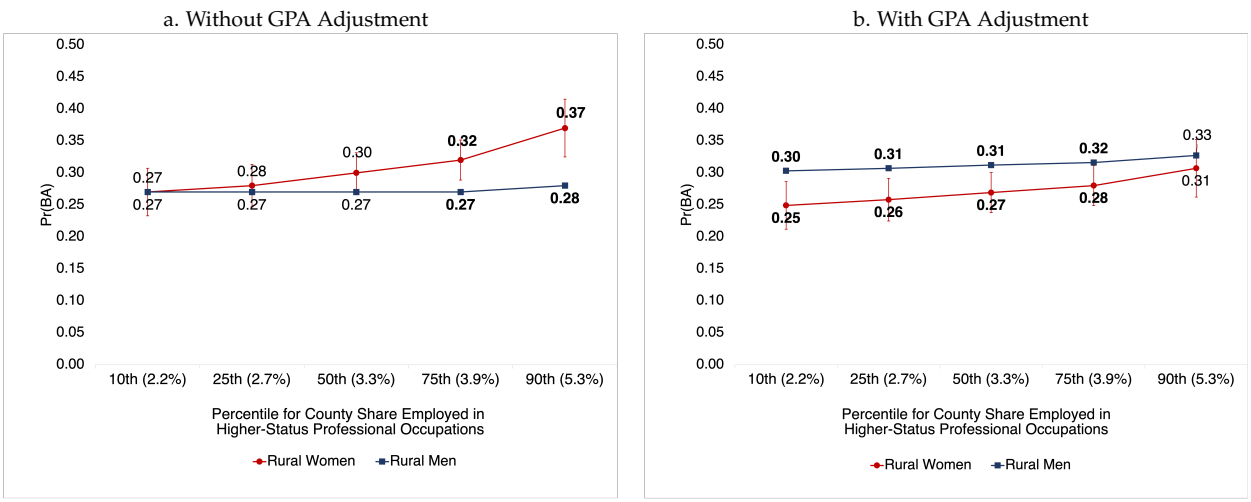

Figure 3: Gender Gap in BA Attainment among Rural High School Sophomores by County Share Employed in Higher-Status Professional Occupations.
Sources: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/2012) and Integrated Postsecondary Education Data System (IPEDS), 2002-03; U.S. Census 2000; MIT Election Data and Science Lab, Election Returns 2000.
Notes: $n = 2,090$ (unweighted and rounded to nearest 10 per NCES guidelines). Average predicted probabilities estimated from logistic regressions shown in Table 3, Models 1 (fig. a) and 2 (fig. b). Percentiles are calculated and weighted based on rural high school sophomores in ELS:2002. 95% confidence intervals shown for rural high school women, for whom the relationship is statistically significant ($p < 0.05$). Value labels are bolded when the gender difference in the predicted probabilities is statistically significant ($p < 0.05$).

of this local economic measure. This gender difference translates into small and statistically nonsignificant gender BA gaps among youth from rural counties within the bottom 50th percentile for the local share of higher-status professional workers. In contrast, women from rural counties with the highest shares of higher-status professional workers have a predicted BA advantage over their men peers—one that is consistent with women's BA advantage among suburban and city youth (shown in Fig. 1 and Table 1). Specifically, we see between a 5- and 9-percentage-point expected women's BA advantage ($p < 0.05$) among youth from rural counties within the 75th and 90th percentiles for this local economic measure, adjusting for other factors.

Turning back to model 2 of Table 3, after adjusting for gender differences in GPA, the magnitude of the positive association between the local share of higher-status professional occupations and BA attainment among rural women remains statistically significant but is reduced by more than one-third (AME = 0.018; $p < 0.05$). Figure 3b shows that after accounting for women's higher GPAs, the direction of the predicted gender gap reverses. On average and net of controls, rural men's predicted probability of BA attainment is now 4–5 percentage points *higher* than rural women's, except in counties with the highest concentrations of professional workers (90th percentile), where the gender gap is small and statistically nonsignificant.

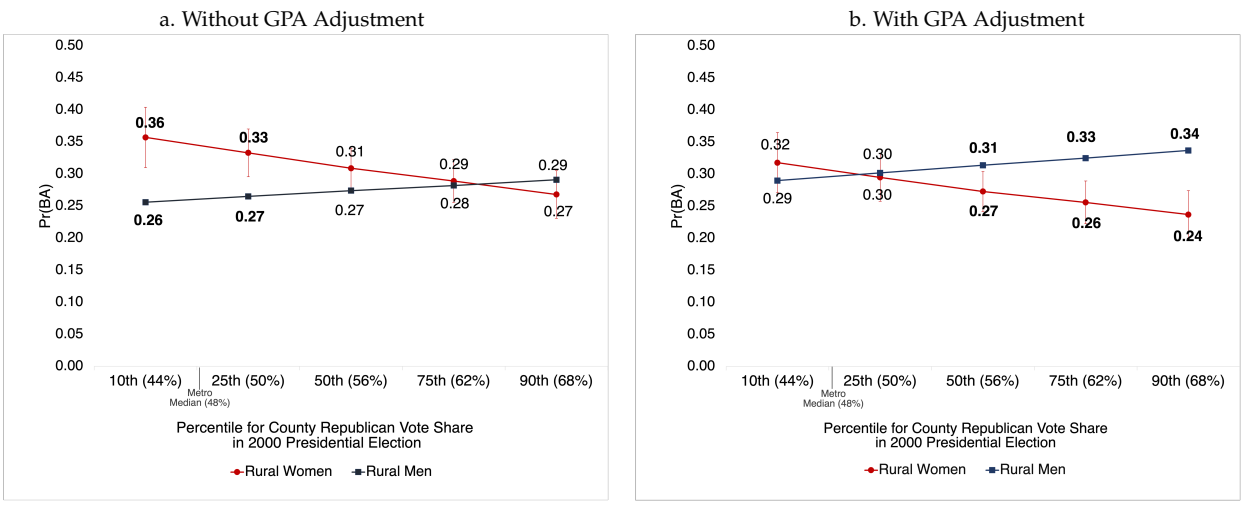

Figure 4: Gender Gap in BA Attainment among Rural High School Sophomores by County Republican Vote Share.

Sources: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/2012) and Integrated Postsecondary Education Data System (IPEDS), 2002-03; U.S. Census 2000; MIT Election Data and Science Lab, Election Returns 2000.

Notes: $n = 2{,}090$ (unweighted and rounded to nearest 10 per NCES guidelines). Average predicted probabilities estimated from logistic regressions shown in Table 3, Models 1 (fig. a) and 2 (fig. b). Percentiles are calculated and weighted based on rural high school sophomores in ELS:2002. 95% confidence intervals shown for rural high school women, for whom the relationship is statistically significant ($p < 0.05$). Value labels are bolded when the gender difference in the predicted probabilities is statistically significant ($p < 0.05$).

In model 3 of Table 3, we adjust for proximate factors, such as educational opportunities (e.g., school type and AP/IB course offerings), math and science coursetaking, and noncognitive skills. Accounting for these factors, the positive association between local professional employment and BA attainment for women diminishes by half and is no longer statistically significant.

Local Republican vote share. In model 1 of Table 3, we see that each additional percentage-point increase in the county Republican vote share is associated with an average decrease of 0.4 percentage points in women's predicted probability of BA attainment ($p < 0.01$), compared to a slight increase for men (0.1 percentage point; ns). Figure 4a shows this gender-specific pattern clearly: as the county Republican vote share increases, rural men's predicted probability of earning a BA rises slightly, whereas rural women's declines sharply. This divergence translates into a substantial women's BA advantage in communities with lower Republican vote shares. In counties between the 10th and 25th percentiles of local Republican vote share, we observe a women-favorable BA advantage ranging from about 10 percentage points (0.36 vs. 0.26) to about 6 percentage points (0.33 vs. 0.27), on average, and net of individual, family, and county-level characteristics. For context, in these counties no more than about 50 percent of voters in the 2000 election supported the Republican presidential candidate—close to the median Republican vote share (48 percent) among counties serving metropolitan students.

However, women's BA advantage narrows as the local share of Republican votes increases. Among rural youth in counties in the top quartile for the county Republican vote share, the predicted BA attainment rates for young women and men converge, and the gender difference is no longer statistically significant. In deep-red counties—those in which more than 60 percent of votes were cast for the Republican presidential candidate—rural men and women are predicted to earn bachelor's degrees at roughly equivalent rates, net of individual, family, and county-level controls.

Returning to Table 3, model 2 reveals similar patterns after accounting for women's higher high school GPAs, and the gender difference in the AMEs of the local Republican vote share remains statistically significant. Figure 4b shows how this gender-specific association shifts after adjusting for women's higher GPAs, again suggesting that rural young women's stronger academic performance masks an underlying disadvantage in BA attainment for women from many rural communities. Among rural youth from counties at approximately the median for the local Republican vote share, women's predicted probability of BA attainment is roughly 4 percentage points lower than their male peers, on average and controlling for other factors (0.27 vs. 0.31). In counties at the 75th and 90th percentiles for the local Republican vote share, women's predicted probability of earning a BA is 7 and 10 percentage points lower, respectively, than that of rural men. Women's BA disadvantage in these strongly Republican and Republican-landslide counties is statistically significant ($p < 0.05$ and $p < 0.01$, respectively). In sharp contrast, among youth from rural counties where no more than 50 percent of the electorate voted Republican, gender gaps in BA attainment are negligible or slightly women favorable. Notably, these small and statistically nonsignificant gender gaps mirror those observed among metropolitan youth, once women's higher GPAs are taken into account (model 5 of Table 1). The pattern holds in model 3, where these gendered associations persist net of differences in academic coursetaking, educational opportunities, and noncognitive skills.

Discussion

Research suggests that the proliferation of higher-status professional jobs and the rising returns to a college degree that accompanied job polarization increased women's incentives to invest in higher education (Autor 2019; DiPrete and Buchmann 2006; Goldin et al. 2006). Cultural shifts toward more egalitarian gender norms and family expectations relaxed constraints on college-going (Goldin 2006), positioning women to take advantage of the changing economic landscape through increased bachelor's degree attainment. However, these structural and cultural changes have unfolded disproportionately in metropolitan areas (Brown and Mettler 2024; Eckert et al. 2022), leaving women growing up in rural America comparatively less exposed to the economic and sociocultural conditions thought to support women's educational gains. Indeed, our analysis reveals that women's advantage in bachelor's degree attainment—a well-documented national pattern—is driven primarily by metropolitan youth and is largely absent among those who attended high school in rural communities.

Although rural women earn higher grades than rural men, mirroring patterns in metropolitan schools and consistent with ethnographic research (Morris 2012), their academic promise does not translate into a BA advantage as it does for metropolitan women. Adjusting for differences in both the distribution of and returns to sociodemographic background, academic performance, noncognitive skills, and school context does not reveal a suppressed BA advantage among rural women. To investigate further, we built on research emphasizing rural heterogeneity (Lichter and Johnson 2025) and analyzed economic and sociocultural characteristics associated with the presence or absence of rural women's BA advantage. We find that women's advantage is small or absent in communities with the lowest concentrations of workers in higher-status professional occupations, places arguably most left behind by the economic transformations widely linked to the national reversal of the gender gap in BA attainment.

This association is attenuated after adjusting for women's higher grades and becomes statistically nonsignificant with additional controls for academic preparation and school context. It is possible that rural communities with more visible professional opportunities foster stronger academic motivation among girls and offer greater access to higher-quality schools. Indeed, research links local labor markets to school resources and educational investments associated with college-going (Roscigno et al. 2006; Sutton 2017). Applying DiPrete and Buchmann's (2013:53) distinction between the structures that cultivate academic success and those that incentivize further education to rural communities, those with higher concentrations of higher-status professional occupations may both better support the educational conditions that facilitate women's high school achievement and more strongly signal the value of postsecondary education.

Most research on local political contexts has focused on gender inequality among adults. Our findings suggest that local political conservatism is associated with gendered educational outcomes among youth, net of demographic and contextual controls, and prior to adult migration. Specifically, we found that women's BA advantage is large in politically balanced or Democratic-leaning rural counties, shrinks in Republican-majority counties, and disappears in the strongest Republican counties. After adjusting for women's higher GPAs, it reverses in deep-red counties, where women are less likely than men to earn a BA net of other controls.

These patterns align with research linking local political conservatism to traditional gender attitudes (Brown and Mettler 2024; Lesthaeghe and Neidert 2009; McVeigh and Sobolewski 2007) and mirror international evidence connecting countries with more egalitarian gender norms to stronger educational attainment among women (McDaniel 2010; van Hek, Kraaykamp, and Wolbers 2016). Indeed, gender norms vary not only across countries but also across communities within the United States (Scarborough 2023). In communities with strong Republican majorities—where traditional gender norms and early family formation are more common (Lesthaeghe and Neidert 2009)—broader gender scripts may be less visible, with fewer women demonstrating alternative pathways to adulthood and weaker institutional supports for them.

Rural-urban differences in family formation may also help explain the patterns we observe. Rural women are more likely to marry and have children earlier than both their male peers and urban women (Brooks and Clark 2024; Sutton, Lichter,

and Sassler 2019), a pattern that aligns with research linking weaker local economic opportunities to lower perceived costs of early childbearing (Wise, Geronimus, and Smock 2017). In these settings, limited occupational options may constrain the college-wage premium for women (Smith and Glauber 2013), and motherhood may be more strongly valued in the absence of alternative pathways (Sherman 2009). These dynamics may be amplified in politically conservative areas, where gendered cultural scripts (Brown and Mettler 2024; Kelly and Lobao 2019) may reinforce early family formation and limit women's BA attainment. Although difficult to test empirically, as educational attainment and family formation often operate as both predictors and outcomes of one another, we find little evidence that pregnancy during high school or marriage during college accounts for our results. However, decisions such as forgoing or dropping out of college may still reflect expectations of early family formation in politically conservative or economically constrained communities.

Collectively, our findings uncover a hidden exception to one of the most consequential achievements for women in the past century, while contributing to a growing body of research revisiting foundational questions about rural young men's and women's social and economic outcomes. Our study carries broader theoretical implications beyond documenting this geographic deviation. First, we advance intersectional understandings of the geography of youth opportunity. We demonstrate how place-specific opportunity structures shape whether, and to what extent, women's academic promise translates into a realized "female advantage." Specifically, we identify structural and cultural features of rural contexts that promote or suppress women's, but not men's, bachelor's degree attainment, net of individual and contextual characteristics and prior to selective migration processes that typically accompany adulthood. In doing so, our research builds upon qualitative insights highlighting the gendered nature of rural youth outcomes (Carr and Kefalas 2010; Miller and Edin 2022; Niccolai, Damaske, and Park 2022), presenting national evidence of how variation in rural opportunity structures shapes gender-specific educational attainment patterns.

The pattern of our findings also challenges portrayals of rural America as a uniform category. As Lichter and Johnson (2025) argue, multiple rural Americas exist: some have evolved alongside metropolitan areas, whereas others have been economically and culturally left behind. Our results underscore what is missed when analyses overlook not only rural-urban differences but also variation within rural America. We show that gender differences in educational attainment depend not only on whether students are from rural versus urban places, but on which rural place they are from. Specifically, our results suggest that greater economic and political "distance" from metropolitan areas is associated with a lower likelihood that rural women realize a BA advantage over their male peers. Conversely, women who attended rural high schools in communities more politically and economically aligned with metro areas are more likely to exhibit a BA advantage over men, net of other factors. This pattern aligns with research highlighting the role of cities in fostering women's economic and social advancement (Evans 2019). Rural-urban polarization has intensified since this Millennial cohort entered adulthood (Brown and Mettler 2024). Future research should assess whether these patterns persist, weaken, or widen among Generation Z and beyond.

Lastly, our investigation offers new insight into the national pattern of women's BA advantage. Prior scholarship has linked the reversal of the gender gap in BA attainment to broad economic and sociocultural transformations. However, much of this evidence rests on the temporal alignment of societal shifts with aggregate BA trends, without directly analyzing how these transformations shaped the reversal of the gender gap in BA attainment (DiPrete and Buchmann 2013; Goldin 2006). Although our evidence is also indirect, it offers corroborating insight from a novel empirical vantage point: rural communities arguably most disconnected from the opportunity shifts presumed to facilitate women's advantage are precisely those where the BA advantage is absent.

Supplemental Analyses

Are the associations between the local characteristics we examine and women's BA advantage specific to rural contexts? We found little evidence that the gender gap in BA attainment systematically varies across metropolitan areas by local shares of higher-status professional workers. However, replicating comparable levels of professional employment across metro and nonmetro contexts is infeasible due to the limited overlap in their distributions (Table 2), precluding a comparable assessment. The lack of comparable cases underscores the distinct local opportunity structures where metro and nonmetro youth make decisions about their future.

To investigate whether the link between the local Republican vote share and the gender gap in BA attainment is distinctly rural, we conducted an exploratory analysis of this relationship restricted to metropolitan students in the South, where the distribution of county Republican vote shares is very similar to the national distribution for our nonmetropolitan students. Indeed, historians argue that the Republican Party has "southernized" over the past half century, reshaping its platform through appeals to white southerners' racial resentment and resistance to women's economic advancement (Alphonso 2016; Richardson 2020). In supplemental analyses, we find a negative association between the local concentration of Republican voters and women's BA attainment across white, black, and Hispanic students attending school in the metropolitan South (Figs. A1 and A2). These findings suggest the link between local Republican vote shares and women's BA advantage is not unique to rural communities, at least in the South, where deep red metropolitan counties are most common.

Do our core findings extend across ethnoracial groups among rural youth? Although rural America is often conflated with whiteness, it is not ethnoracially homogeneous. Rural residents of color frequently face compounded disadvantages (Drescher et al. 2022; Logan and Burdick-Will 2017; Slack, Thiede, and Jensen 2020; Sutton et al. 2019). Although limited cell sizes preclude detailed subgroup analysis, patterns for non-Hispanic white and black rural students—the two largest groups in our sample—reveal minimal or reversed gender gaps in BA attainment, consistent with the overall patterns reported here. As rural America continues to diversify (Lichter 2012), future research should prioritize better representation of rural youth of color, who remain largely invisible in national data sets and scholarship.

Limitations

Selective migration patterns likely reinforce rural-urban disparities in sociocultural and economic characteristics. For these processes to bias our core findings, migration would need to occur in systematically gender-differentiated ways. For example, parents of daughters would need to be more likely than parents of sons to move out of rural areas in ways not captured by our controls. This scenario seems unlikely but not impossible. More generally, as with any observational study, omitted variable bias remains a concern. To reduce this possibility, we adjusted for an extensive set of parental, student, school, and county-level factors, including religious affiliation, college proximity, local employment measures (e.g., share in blue-collar occupations, unemployment rate), and county ethnoracial composition. In ancillary analyses, we also find consistent patterns when accounting for parental occupational and educational expectations of the student, students' preferences to stay close to home, county-level poverty, and other factors.

Beyond these adjustments, supplemental analyses described earlier increase confidence that the patterns we observe are not solely driven by confounding factors specific to rural areas or by processes unique to particular racial groups. Moreover, our findings are broadly consistent with theory and prior research emphasizing the role of cities in women's advancement (Evans 2019), cross-national variation in women's educational advantages (McDaniel 2010; van Hek et al. 2016), and the conditioning effects of local environments on gender disparities in youth outcomes (Legewie and DiPrete 2012; Riegle-Crumb and Moore 2014).

Conclusion

Rural, suburban, and urban communities have converged over time in many respects (Lichter, Brown, and Parisi 2021; Lichter and Brown 2011). Yet when it comes to the economic and sociopolitical forces most relevant to women's BA attainment, many rural places continue to resemble the national landscape prior to the emergence of women's BA advantage. This continuity is evident among rural Millennial youth from places most emblematic of those "left behind" communities, where we observe a men-favorable BA gap comparable to that of 1970s high school graduates after accounting for women's higher grades and other factors (Goldin et al. 2006).

This research unsettles the empirical regularity of women's advantage in BA attainment. We identify key local exceptions to this pattern, showing how the interplay between rurality, the local economy, and political conservatism is associated with the extent to which women's BA advantage is expressed or suppressed. Our findings take on added significance given the continued polarization between and within rural, suburban, and urban places (Brown et al. 2023; Scala and Johnson 2017; Wuthnow 2018). Because most adults from younger generations, including Millennials, remain in or near their childhood communities (Sprung-Keyser, Hendren, and Porter 2022), uneven educational gains between rural- and urban-origin women merit attention as both a reflection and a contributor to widening geographic disparities in economic, health, and sociopolitical outcomes.

Appendix A

Table A1: Sociodemographic and School Weighted Means and Proportions by High School Urbanicity and Gender.

	Metro				Nonmetro	
	City		Suburban		Rural	
Sociodemographic background	Women	Men	Women	Men	Women	Men
Ethnoracial background						
NH White (ref)	0.41	0.47	0.68	0.67	0.80	0.77
NH Black	0.21	0.21	0.11	0.10	0.10	0.09
Hispanic	0.26	0.21	0.13	0.14	0.05	0.04
Asian American/Pacific Islander	0.07	0.08	0.03	0.04	0.01	0.02
Other	0.05	0.04	0.05	0.04	0.04	0.08
Transferred high schools b/w base-year and first follow-up	0.08	0.10	0.07	0.06	0.05	0.06
Parental religious affiliation						
Catholic (ref)	0.36	0.35	0.35	0.37	0.18	0.20
Baptist	0.21	0.18	0.18	0.17	0.28	0.27
Other Christian affiliation	0.29	0.32	0.38	0.35	0.46	0.44
Other/no religious affiliation	0.14	0.16	0.09	0.11	0.08	0.09
Income						
<$35k (ref)	0.42	0.33	0.28	0.24	0.38	0.36
$35k–$50k	0.16	0.19	0.19	0.18	0.24	0.23
$50k–$75k	0.19	0.20	0.21	0.23	0.22	0.24
$75–100k	0.11	0.14	0.16	0.17	0.11	0.10
>$100k	0.12	0.13	0.16	0.18	0.05	0.07
Mother/mother figure highest education						
High school degree or less (ref)	0.63	0.59	0.63	0.60	0.74	0.71
Some college	0.10	0.11	0.10	0.10	0.09	0.10
Bachelor's degree	0.18	0.19	0.18	0.20	0.11	0.14
Advanced degree	0.09	0.11	0.09	0.11	0.05	0.06
Father/father figure highest education						
High school degree or less (ref)	0.59	0.57	0.58	0.56	0.74	0.72
Some college	0.09	0.11	0.09	0.10	0.06	0.07
Bachelor's degree	0.18	0.18	0.19	0.20	0.12	0.13
Advanced degree	0.14	0.14	0.14	0.14	0.07	0.07
Lives with both biological parents	0.54	0.55	0.62	0.65	0.58	0.57
Age = 19 (end of 2004)	0.35	0.41	0.35	0.43	0.39	0.51
Academic Background						
Math item response theory (IRT) achievement score	36.20 (11.53)	38.02 (12.45)	38.97 (11.00)	41.10 (11.74)	37.52 (10.66)	38.7 (11.35)
Overall academic high school grade point average (GPA)	2.82 (0.74)	2.59 (0.74)	2.91 (0.69)	2.67 (0.72)	3.02 (0.68)	2.76 (0.74)

Table A1: *Continued*

	Metro				Nonmetro	
	City		Suburban		Rural	
Sociodemographic background	Women	Men	Women	Men	Women	Men
Coursetaking and noncognitive skills						
Math coursetaking pipeline						
Less than algebra II (ref)	0.25	0.30	0.25	0.29	0.29	0.38
Algebra II	0.24	0.23	0.25	0.21	0.31	0.27
Advanced math (e.g., trigonometry)	0.20	0.18	0.17	0.16	0.17	0.11
Pre-calculus	0.18	0.16	0.20	0.17	0.11	0.13
Calculus	0.12	0.13	0.13	0.16	0.12	0.10
Science coursetaking pipeline						
Less than general biology (ref)	0.31	0.35	0.34	0.38	0.35	0.45
General biology	0.36	0.31	0.33	0.26	0.36	0.27
Chemistry 1 or Physics 1	0.16	0.16	0.16	0.19	0.11	0.13
Chemistry 1 and Physics 1	0.09	0.07	0.10	0.07	0.14	0.11
Chem 2 or Physics 2 or advanced biology	0.08	0.10	0.07	0.11	0.04	0.04
Academic disengagement	1.80 (0.81)	1.96 (0.79)	1.77 (0.76)	1.93 (0.80)	1.67 (0.71)	1.90 (0.80)
Behavioral disengagement	2.02 (0.71)	2.09 (0.80)	1.93 (0.68)	1.97 (0.72)	1.84 (0.62)	1.89 (0.70)
School context						
School type						
Public (ref)	0.88	0.84	0.93	0.93	0.96	0.97
Catholic	0.07	0.10	0.04	0.04	0.01	0.00
Other private	0.06	0.06	0.03	0.03	0.03	0.02
Average socioeconomic status score in school	−0.04 (0.44)	−0.03 (0.43)	0.09 (0.39)	0.11 (0.38)	−0.17 (0.25)	−0.16 (0.26)
AP/IB course offerings						
None (ref)	0.07	0.08	0.06	0.07	0.28	0.24
1	0.11	0.10	0.09	0.09	0.15	0.15
2 or more	0.82	0.83	0.85	0.84	0.56	0.61
Observations	3,960		5,900		2,090	

Sources: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/2012).
Notes: Standard deviations shown in parentheses. Sample sizes are unweighted and rounded to nearest 10 per NCES guidelines.

Table A2: Local Contextual Weighted Means by High School Urbanicity.

	Metro				Nonmetro	
	City		Suburban		Rural	
	Mean	SD	Mean	SD	Mean	SD
Local economic measures						
County percentage of civilians employed in higher-status professional occupations	6.31	(2.16)	6.10	(1.89)	3.51	(1.28)
Gender composition of higher-status professional workers (proportion women)	0.37	(0.04)	0.36	(0.04)	0.36	(0.08)
Local conservatism						
County number of Evangelical adherents per 1000	134.50	(109.47)	125.2	(99.39)	220.97	(155.69)
County proportion of voters who cast ballot for President Bush in 2000	0.44	(0.14)	0.48	(0.11)	0.56	(0.10)
Controls						
County percentage of civilians employed in agricultural, craft, or lower-manual occupations	22.93	(6.42)	23.7	(6.17)	35.66	(6.22)
County percentage of civilians who are unemployed	4.21	(1.22)	3.47	(0.92)	3.69	(1.12)
Commuting distance to nearest four-year public college (minutes)	19.83	(13.74)	28.8	(13.92)	59.56	(32.67)
Number of 4-yr colleges within commuting distance from base-year residence	7.28	(5.47)	8.92	(5.02)	6.39	(4.64)
County proportion White	0.68	(0.16)	0.77	(0.13)	0.85	(0.15)
County proportion Hispanic	0.18	(0.19)	0.11	(0.12)	0.04	(0.06)
Geographic region						
Northeast (ref)	0.15		0.25		0.10	
Midwest	0.19		0.25		0.33	
South	0.35		0.32		0.39	
West	0.31		0.18		0.18	
Observations	3,960		5,900		2,090	

Sources: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/2012) and Integrated Postsecondary Education Data System (IPEDS), 2002-03; U.S. Census 2000; US Religion Census 2000; MIT Election Data and Science Lab, Election Returns 2000.
Notes: Sample sizes are unweighted and rounded to nearest 10 per NCES guidelines.

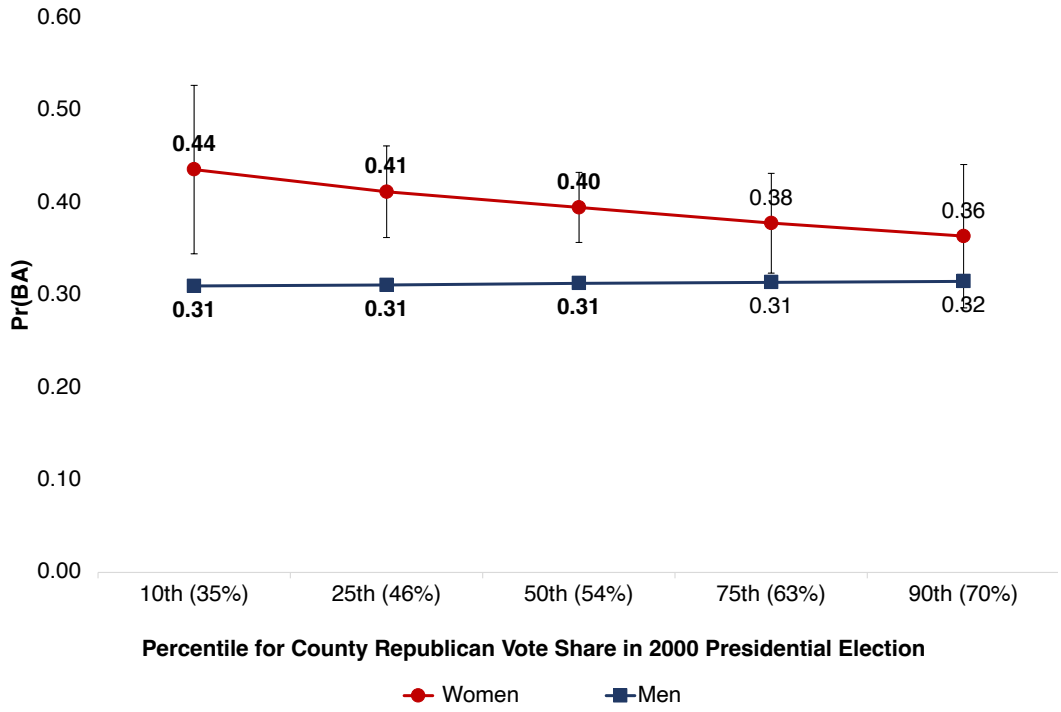

Figure A1: Women's BA Advantage by County Republican Vote Share Among High School Sophomores in the Metropolitan U.S. South.
Sources: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/2012) and Integrated Postsecondary Education Data System (IPEDS), 2002-03; U.S. Census 2000; MIT Election Data and Science Lab, Election Returns 2000.
Notes: Non-Hispanic white: $n = 1,900$; Black: $n = 700$; Hispanic: $n = 470$ (sample sizes unweighted and rounded to nearest 10 per NCES guidelines). Average predicted probabilities are estimated from weighted logistic regression models fully interacted by gender and adjusted for sociodemographic background and local contextual characteristics. Percentiles are calculated and weighted based on metropolitan high school sophomores in the U.S. South (ELS:2002). Value labels are bolded when the gender difference in the predicted probabilities is statistically significant ($p < 0.05$).

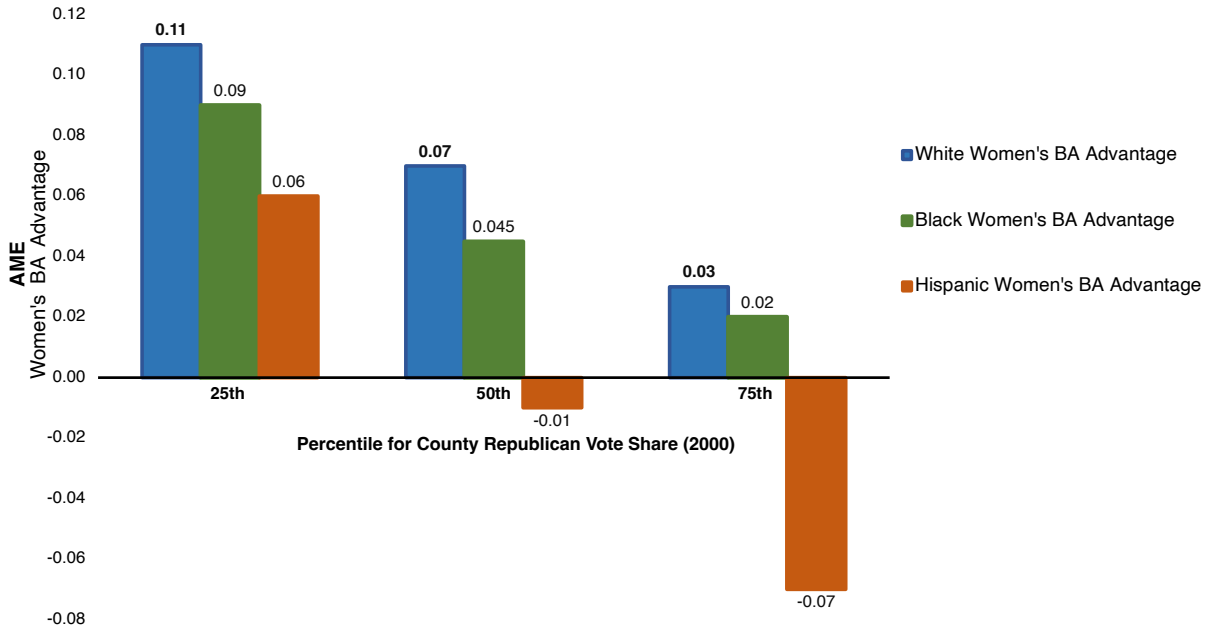

Figure A2: Women's BA Advantage across County Republican Vote Share Levels Among Metropolitan High School Students in the U.S. South, by Ethnoracial Background.
Sources: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002/2012) and Integrated Postsecondary Education Data System (IPEDS), 2002-03; U.S. Census 2000; MIT Election Data and Science Lab, Election Returns 2000.
Notes: Non-Hispanic White: $n = 1,900$; Black: $n = 700$; Hispanic: $n = 470$ (sample sizes unweighted and rounded to nearest 10 per NCES guidelines). Average predicted probabilities are estimated from race-stratified, weighted logistic regression models fully interacted by gender and adjusted for sociodemographic background and local contextual characteristics. Percentiles are calculated and weighted based on metropolitan high school sophomores in the U.S. South (ELS:2002). Value labels are bolded when the gender difference in the predicted probabilities is statistically significant ($p < 0.05$).

Notes

1 For ease of presentation, we sometimes refer to city and suburban students jointly as "metropolitan" or "urban," and to students in "nonmetropolitan" counties as "rural." We also use the term "rural-urban differences" as shorthand for contrasts across our three high school urbanicity categories. Similarly, when referring to women and men who attended city, suburban, or rural high schools, we sometimes use shorter phrasing such as "rural women" or "suburban men."

2 To ensure broad inclusion of relevant literature, we employed a comprehensive Boolean search strategy focusing on rurality, gender, and education generally. We identified peer-reviewed articles whose abstracts contained ("rural" OR "nonmetropolitan" OR "urbanicity" OR "metropolitan") AND ("education" OR "college" OR "youth" OR "adolescents" OR "school") AND ("gender" OR "women" OR "men" OR "girls" OR "boys").

3 All reported sample sizes in text and tables are unweighted and rounded to the nearest 10 per NCES restricted-access guidelines.

4 Consistent with convention, analyses are restricted to respondents with a high school diploma or GED to ensure that only individuals "at risk" of bachelor's degree attainment are included. Men and women from rural communities earn high school degrees or GEDs at nearly comparable rates, and results remain consistent without this restriction.

5 We cannot analyze students classified as rural *within* MSAs separately due to small cell sizes by gender. Thus, our "suburban" category also includes students attending school in rural places *inside of MSAs*.

6 More than 80% of the suburban and city high school students in our sample attend high school in different counties (i.e., less than 20% of suburban and city students attended high schools within the same county).

7 Occupation data in Census 2000 SF3 are tabulated for employed civilians age 16 and older. ELS respondents were in 8th grade ($\sim$ age 14) in 2000 and are therefore not included in these tabulations. Thus, this measure captures the local occupational context students were exposed to, not characteristics of the student cohort itself.

8 All local contextual measures have variance inflation factors below 3 and pairwise correlations below 0.6, indicating minimal concern about multicollinearity (Allison 2012).

9 We test these differences with Wald tests, which are implemented with the mimrgns suite in Stata.

10 Missing data do not exceed 10% for any measure. Formal tests indicate that our data are missing at random conditional on observed covariates, supporting the use of multiple imputation (Li 2013). We average estimates across 20 imputed datasets using Stata's "mimrgns" command.

11 Gender GPA differences by urbanicity are not statistically significant.

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