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Reconsidering Rural-Nonrural College Enrollment Gaps: The Role of Socioeconomic Status in Geographies of Opportunity

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Abstract
Rural students enroll in college at lower rates than nonrural students. This has been partially attributed to lower average socioeconomic status (SES) in rural areas. However, this assertion tends to ignore heterogeneity that may mask how SES shapes rural students' college-going experiences. Utilizing a geography of opportunity framework, this study investigated how rural-nonrural differences in college-going vary based on SES. Analyses reveal that (a) rural and nonrural students in the High School Longitudinal Study (HSLS) had very similar mean SES; (b) rural status still predicted lower college enrollment rates overall, as well as four-year enrollment specifically; (c) the overall rural-nonrural enrollment gap was primarily a gap for low- and middle-SES students; and (d) there was greater socioeconomic inequality in college access in rural geographies than in nonrural geographies. These findings reinforce the fact rural students are not a monolithic group and emphasize the continued importance of SES between and within geographies. Given these findings, recommendations are provided with the intent of making college enrollment more equitable by the joint consideration of rurality and SES.

Keywords Rural students · Socioeconomic status · College enrollment · Geography of opportunity · Inequality

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Introduction

Ana, Maria, and Hugo are three high school seniors attending high school in the same county in southern Texas and finalizing post-graduation plans. Ana is the daughter of migrant farm workers, neither of whom attended college. Maria lives with her mother, a single parent with a bachelor's degree, who works as a paraprofessional at the high school where Maria attends and qualifies for free lunch. Hugo's father is a high-level manager at an oil and gas company, where he draws frequently on his MBA degree. All three students live in the same rural county, attend rural high schools, and can be considered rural students. Yet, few would assume that their college access and choice processes would be the same. Parental income, education, and occupation have long been recognized as important for students' postsecondary pathways (Hurst, 2010; Jack, 2019). Nonetheless, inequality within rural areas is rarely recognized or fully considered (Soffen, 2016). Educational research often masks nuance by collapsing diverse rural experiences into one category to document trends, without consideration of socioeconomic differences.

This type of research has consistently shown that rural students in the United States enroll in college at lower rates than nonrural students (Byun et al., 2012; Koricich et al., 2018; Wells et al., 2019). While rural students have increasingly enrolled in college over the last few decades, enduring gaps remain (Wells et al., 2019). Lower postsecondary enrollment rates are part of the reason for lower average educational attainment rates for rural populations in the U.S. (USDA, 2017). For rural students who do enroll in postsecondary education, additional disparities have existed across types of credentials. Rural students are more likely than nonrural students to obtain a certificate or associate degree and less likely to obtain a bachelor's degree (Wells et al., 2019) which corresponds to rural students being over-represented at two-year colleges (Koricich et al., 2018).

Past research has attributed part of the difference in college enrollment rates between rural and nonrural students to lower average socioeconomic status (SES) in rural areas (Byun et al., 2012; Koricich et al., 2018). Without more nuance through continued research, such findings may reinforce the tendency to homogenize rural people as having a lower social class or the conflation of rural designations with working-class status (Ardoin & McNamee, 2021). Income inequality in rural areas is more significant than many realize, largely due to "home grown" inequality, rooted in existing systems such as the oil and gas industry, and "flown in" inequality, largely from people building wealth elsewhere, and then moving to rural areas (Soffen, 2016; Sommeiller et al., 2016).

Inequalities across geographic regions have been theorized by scholars via the geography of opportunity framework, whereby distinctive locations facilitate access to different opportunity structures (Galster & Killen, 1995; Galster & Sharkey, 2017). One variation between different geographies is the opportunity to attend postsecondary education (Hillman, 2016). Yet the ability to access higher education relies on more than proximity. Students with greater socioeconomic status most often have access to the types of economic and/or cultural capital that society values (Bourdieu, 1986), and are therefore likely to navigate more freely within and between given geographies, facilitating access to greater opportunities. In the context of postsecondary enrollment, these forms of capital may shape the opportunity to attend college at all, or to attend a four-year institution in pursuit of a bachelor's degree specifically. In short, rurality is likely related to college

enrollment differently across the range of students' SES. However, this is an as-yet uninvestigated claim suggested by prior research (e.g., Adelman, 2002; Koricich et al., 2018).

To support efforts to counter assumptions of a homogenous, lower-SES rural population (Ardoin & McNamee, 2021) and better understand the diversity within rural communities, this study uses High School Longitudinal Study (HSLS) data to understand the role of SES in moderating rural-nonrural differences in college enrollment. Specifically, we address two research questions:

- To what extent do rural-nonrural gaps in any postsecondary enrollment vary by socioeconomic status?
- Among those who attend postsecondary education, to what extent do rural-nonrural gaps in four-year college enrollment vary by socioeconomic status?

Influences on College Enrollment for Rural Students

Despite the well-documented role that SES plays in college enrollment patterns across various demographics, research that examines both SES and rurality is sparse. Prior research highlights factors that are important to consider when examining the rural-nonrural enrollment gap, four of which—proximity, academic preparation, race and ethnicity, and economic factors—are reviewed below. Research on rurality is further complicated by multiple operational definitions, which can lead to different results or conclusions (Dunstan et al., 2021; Isserman, 2005; Manly et al., 2020; Ratcliffe et al., 2016, Thier et al., 2021). Any one way of considering rurality, such as the federally provided definition used in this study, will not provide a comprehensive understanding of the issues. Rurality is closely related to categorizations of metropolitan and non-metropolitan regions of the country, but not identical. When reviewing literature, we attempted to make clear how geography was defined, to make sense of related findings using differing definitions.

Proximity

Proximity is among the most important considerations for students when deciding whether and where to attend college, with evidence demonstrating that most students remain local (Ali & Saunders, 2006; Hillman, 2016; Turley, 2009). Between 6 and 13% of students reside in education deserts—areas with no colleges or universities or with one community college as the only public broad-access institution (Hillman & Weichman, 2016). These education deserts, most of which are nonmetropolitan, are further categorized as access deserts and match deserts (Klasik et al., 2018).[1] Access deserts are defined as commuting zones without two public two-year colleges or at least one public four-year college that admits over 75% of its applicants, and match deserts are defined as a commuting zone with no nearby institutions that are a reasonable academic match for students' credentials. About 12% of students live in access deserts and 15% live in match deserts (Klasik et al., 2018), leading to constrained college choice processes and in some cases no real "choice" at all. In contrast, the term college oasis describes an area with "higher numbers of colleges and

[1] While we use the terms rural and nonrural in our research, if prior literature used the related but distinct definition of metropolitan vs. nonmetropolitan, we use the original authors' terminology.

high concentrations of education and economic attainment" (Dache-Gerbino, 2018, p. 98), facilitating college access for wealthier students.

The concentration of postsecondary institutions nearby not only has a significant influence on students' access to higher education, but also the type of institution they attend. Students who attend high school close to a two-year institution are less likely to attend a four-year institution (Hirschl & Smith, 2020), and two-year colleges enroll the majority of students residing in education deserts (Hillman & Weichman, 2016). Fewer institutions in close proximity to students result in a more constrained choice for postsecondary enrollment, ultimately suppressing rural college access (Hillman, 2016; Turley, 2009).

High Schools

Although rural high school students have increased their GPAs and standardized test scores over time relative to their nonrural counterparts, evidence demonstrates that discrepancies in academic preparation remain (Carr & Kefalas, 2010; Wells et al., 2019). These persistent gaps may be a result of structural differences between rural and nonrural schools in terms of their resources, such as expenditure per pupil and teacher-student ratios (Burdick-Will & Logan, 2017), and the resulting opportunities available to students. There may be differences in the college counseling that is able to be offered in rural high schools, which are important factors in predicting college enrollment (Engberg & Gilbert, 2014). Counselors in rural areas have challenges of opportunities and resources (Grimes et al., 2019) even as they have more responsibility for college advising relative to other locales because many colleges do not visit rural schools (Salazar et al., 2021) and college access organizations and related activities like FAFSA workshops are more often in urban or suburban areas. Rural schools, many of which are small and have high proportions of low-income students, are less often able to provide a robust college-preparatory curriculum (Brown & Schafft, 2011; Koricich et al., 2018). Rural schools have limited Advanced Placement and advanced STEM offerings as well (Gagnon & Mattingly, 2015, 2016; Saw & Agger, 2021), which not only are factors considered in the college admissions process as measures of academic rigor, but also are positive indicators for four-year college enrollment (Engberg & Wolniak, 2010).

Students from under-resourced schools with fewer curricular options who experience lower levels of academic achievement are less likely to enroll in college and more likely to enroll in two-year institutions (Byun et al., 2012; Coca et al., 2017; Koricich et al., 2018). Beyond structural differences between rural and nonrural schools and corresponding measures of academic achievement, there may also be differences in how rural students perceive their academic preparation and their ability to succeed in college that are related to their postsecondary enrollment decisions. For example, despite strong academic achievement, some rural students have experienced feelings of doubt about their ability to obtain a college degree and did not believe that they had the support or resources necessary to successfully navigate higher education (Morton et al., 2018). This may be in part due to rural students perceiving their teacher's expectations for them as lower than other students (Chambers et al., 2019). However, despite a common narrative of low expectations in rural areas, rural students' college expectations are nuanced and complicated, and for four-year education are not any lower on average (Li, 2019). Students' expectations for college may also tend to focus more on practical skills

and employability relative to the rural economy (Tieken, 2016), which likely affects their consideration of two-year versus four-year colleges.

Race and Ethnicity

In addition to being socioeconomically heterogeneous, rural students are increasingly diverse based on race and ethnicity. This challenges a common misperception of rural America as white, which can hide the experiences of students of color and the interpersonal and institutional racism they may face. One in four rural students identifies as a student of color, and in four states the majority of rural students identify as nonwhite: New Mexico (85.6%), Alaska (63.9%), Arizona (58.5%), and California (57.5%) (Showalter et al., 2017). In addition, the majority (54%) of American Indians and Alaska Natives (AIAN) live in rural and small-town areas (Dewees, 2017). AIAN students are one of the most underrepresented student groups in higher education and have the lowest high school graduation and college enrollment rates of all racial and ethnic groups (Hussar et al., 2020). In general, rural communities of color have higher poverty rates than rural white communities (USDA, 2018).

Recent studies exploring the intersection of rurality and race have found that rural students of color experience heightened barriers in accessing and completing postsecondary education compared to their white peers (Griffin et al., 2011; Means et al., 2016; Sansone et al., 2020; Strayhorn, 2009). Barriers include lower expectations from teachers and counselors compared to white students, confusion surrounding financial aid and student loans, and high concentrations of poverty (Griffin et al., 2011; Irvin et al., 2016; Means et al., 2016). These factors may be part of the reason that rural students' racial and ethnic identities are often more salient for them than a rural identity (Cain & Willis, 2022). Communities of color have consistently exhibited the highest poverty rates in rural America, with the Black poverty rate at 32%, followed by AIAN (31%) and Hispanic (24.5%) poverty rates, compared to the white poverty rate of 13.5% (USDA, 2018). The geography of opportunity is stratified by race and class, as wealthier areas with predominantly white or Asian populations and higher educational attainment have more selective four-year colleges and universities nearby (Dache-Gerbino, 2018; Hillman, 2016). Indeed, Sansone and colleagues (2020) found that for nonmetropolitan students, "spatial and racial postsecondary opportunity and equity are working collectively, not independently, to [their] disadvantage" (p. 12). This stratification results in additional constraints on college choice for rural students of color.

Economic Factors

Two notable studies—Byun et al. (2012) and Koricich et al. (2018)—demonstrated that socioeconomic status (SES) is associated with the college-going behavior of rural students, and that differences in rural-nonrural college enrollment were at least partly explained by lower average SES in rural areas. This rural-nonrural SES difference is consistent with other measures of economic well-being. While the gap in rural and nonrural poverty rates has narrowed over time, rural areas have remained more impoverished than their nonrural counterparts since the Census Bureau first began documenting poverty rates in the 1960s (USDA, 2021). As of 2018, the nonmetropolitan and metropolitan poverty rates nationally

were 16.1 and 12.6%, respectively, and this gap persists across regions (Cromartie et al., 2020).

While rural areas have exhibited higher rates of poverty and lower levels of SES on average, it does not tell the full story of how rurality and SES may influence college enrollment in varied ways. For example, nonmetropolitan recreation counties—rural areas that attract newcomers and tourists due to their natural and recreational amenities—have the highest average personal income rates in nonmetropolitan counties (USDA, 2006). The fastest-growing type of nonmetropolitan county in the U.S. are recreation counties, which have the most adults with at least a bachelor's degree (USDA, 2006). When studied separately, these rural tourist communities (relative to rural college communities or other rural communities) did not differentially impact college students' persistence (Hudacs, 2020), but could impact initial enrollment decisions. In addition, rural students from higher-income families, whether residing in nonmetropolitan recreation counties or not, are more likely to leave their hometown for college (Howley & Hambrick, 2014).

The idea that SES and rurality interact in complex ways is not wholly new. Past research (e.g., Byun et al., 2012; Koricich et al., 2018; Wells et al., 2019) has been suggestive of how SES might behave, yet no studies have fully considered how the rural-nonrural gaps in college enrollment operate differently across socioeconomic levels, or how patterns differ for two-year versus four-year enrollment. While factors such as proximity to postsecondary education, academic preparation, and race and ethnicity are linked to SES, research rarely explores the variation of SES in rural and nonrural communities. The purpose of this study is, therefore, to examine in more nuanced ways how SES is related to college-going behaviors differently for rural and nonrural populations.

Conceptual Framework

We examine the opportunity to pursue postsecondary enrollment for rural students through the framework of geography of opportunity. The geography of opportunity outlines the idea that different geographic locations facilitate access to different opportunity structures (Galster & Killen, 1995), as aligned with economic research on the relationships between geographic locations and social mobility (Chetty et al., 2014). Galster & Sharkey (2017) conceptualized opportunity structures as mediating the ways that individual attributes lead to socioeconomic outcomes, but also showed how the opportunity structures can directly affect individual attributes in the first place. Hillman (2016) applied the concept of geography of opportunity to higher education to note that "educational opportunities are constrained not simply by their preferences and dispositions but also by their community's educational infrastructure. If there is only one college nearby that is available to students, then the choice of where to enroll is predetermined for students who need to stay close to home" (p. 3). Resultantly, geographic context accounts for much of the variation in college attendance, including approximately 30% that had been mistakenly attributed to school effectiveness in prior research (Hirschl & Smith, 2020). Geographic factors can help to explain why rural students express a positive perceived value of higher education even though many do not have plans to continue their education or training (Kelly & McCann, 2021). For example, youth in areas with strong local labor markets that do not require a college degree may choose to work over pursuing higher education (Bozick, 2009; Hirschl & Smith, 2020). The geography of opportunity repositions traditional college access and

choice models that tend to focus on individual processes alone (Galster & Killen, 1995), illuminating the importance of available opportunities.

Varied opportunity structures can lead to different outcomes between geographies, such as between commuting zones (Hillman, 2016; Klasik et al., 2018), which are statistically derived geographic regions that share labor markets and economic activity (Tolbert & Sizer, 1996). Such structures also create differences within those geographies. Individual decisions are shaped by structural factors, individual characteristics, and family backgrounds (Galster & Killen, 1995; Galster & Sharkey, 2017). Students' background characteristics are important for college choice in general, but for this study we focus on how they likely interact with rural and nonrural geographies of opportunities in different ways.

Here, we leverage the geography of opportunity framework by examining how SES facilitates access to higher education differently in varied geographies. We further consider that differences by SES are often explained by differences in access to the types of economic and/or cultural capital valued by postsecondary institutions. Economic capital can be directly converted into money for college expenses, whereas cultural capital is often institutionalized as educational qualifications (Bourdieu, 1986). For example, both family income and education level play important roles in rural students' college choice processes (Nelson, 2016). Therefore, low SES students rely on local postsecondary options to lower barriers to getting information (e.g., visiting campus) as well as lessen college costs (e.g., commuting from home, in-state tuition) (Turley, 2009).

When considering cultural capital specifically, children are socialized by the families, peers, and others in their social settings to a set of norms, expectations, and behaviors—one's habitus (Bourdieu, 1986; Bourdieu & Passeron, 1977). This is the context through which students interact with schools and colleges. Whether and how the cultural capital students have acquired aligns with the expectations and norms of those institutions—i.e., the "rules of the game" (Lareau, 2015)—is a factor in successful college enrollment. Applications, financial aid forms, standardized exams, essays, transcripts, letters of recommendation, interviews, all require specific knowledge that higher-SES students and families, with correspondingly highly valued cultural capital, are more likely to have.

Further, postsecondary institutions tend not to recruit rural students (e.g., a lack of information sessions in rural communities), and instead focus on higher-SES urban and suburban schools (Salazar et al., 2021). Rural students may self-select out of institutions that they are interested in attending due to location, resulting in some students who would be eligible for four-year institutions instead choosing a local two-year college (Skinner, 2019). In contrast, students with college-educated parents (a marker of higher SES) are more likely to consider out-of-state options (Niu, 2015) and have families who help them search for colleges with fewer restrictions on their choices (Hamilton et al., 2018; Nelson, 2016).

Overall, students whose families have higher incomes, more parental education, and/or greater parental occupational prestige (i.e., higher SES) are more likely be able to activate their valued forms of economic and/or cultural capital to navigate their geographies of opportunity, leading to greater college access, including to four-year institutions specifically. Still unexamined, however, are the ways these factors operate within rural geographies differently than they operate within nonrural geographies. For this study, we hypothesize that for higher SES students rural-nonrural gaps will be smaller (or nonexistent) and for lower SES students rural-nonrural gaps will be larger.

Data & Variables

We used data from the High School Longitudinal Study (HSLS), which collected data from 9th graders in 2009 with longitudinal data gathered at regular intervals. A follow-up in 2016 collected data from students concerning their enrollment in postsecondary education. These are the most recent national data that include information about college enrollment, whether a student attended a rural high school, and their family SES (for more information, see Duprey et al., 2020).

Sample

Our analytic samples are restricted to students who completed high school by the spring of 2014. After restricting the sample in this way, nearly 50% of cases had missing data on the variables used for this study, primarily due to missing data on school-level variables. We concluded that data were missing at random based on missing data analyses and used multiple imputation to address this missingness (Manly & Wells, 2015; van Buuren, 2012). We created 20 imputations using the "mi impute chained" command in Stata v.16. All variables were included in the imputation models, as well as the primary sampling unit, strata variables, and the appropriate weights (Heeringa et al., 2010). After imputation, we had a weighted analytical sample of 13,010 high school graduates – 5320 from rural or town locations, and 7690 from suburban or urban locations. (All reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license.) For our second research question, we further restricted that sample to only those who attended postsecondary education (10,510 students), to examine enrollment in two- vs. four-year institutions.

Variables

We used two dependent variables, corresponding to the two research questions. The first was enrollment in any type of postsecondary education by 2016. The second was enrollment in a four-year college specifically, relative to any other kind of enrollment including two-year institutions such as community colleges, as well as institutions that offer certifications and skill training in programs that are shorter in duration than two years.

The key independent variables for our analyses were SES and rural status. SES was a measure aggregated from family income, parental education, and parental occupation, standardized with a mean of zero and a standard deviation of one. While examining the components of SES separately would also be worthwhile, a composite measure is statistically preferable in some ways and may correspond better to a student's overall college orientation (Adelman, 2002; Perna, 2006; Terenzini et al., 2001).

Rural status was operationally defined based on the location of the student's school in a rural area or in a town, as opposed being in a suburban or urban area. This operationalization may or may not correspond to the geographic location of the student's residence and is imperfect for a nuanced look at rurality. However, using school location is the most common measure of rurality used in similar recent studies (e.g., Byun et al., 2012; Koricich et al., 2018; Wells et al., 2019), likely because this is how NCES has captured geographic locale in their datasets. In fact, despite their limitations the NCES federal schema for rurality are the mostly commonly used in empirical literature on rural education (Thier et al., 2021) making our study comparable to a significant amount of past research.

In the HSLS data, there were four primary locales (rural, town, suburban, and urban) whereas past data collections only had three (rural, suburban, and urban). Students from towns have been categorized as rural at times (in NELS data), as suburban at other times (in ELS data) and now have their own category (in HSLS data), which may cause confusion when making comparisons over time (Manly et al., 2020). Our decision to group rural and town students together is consistent with operational definitions used in the past (e.g., Byun et al., 2012, with NELS data) as well as with recent work using HSLS data (Saw & Agger, 2021), but has the tradeoff of losing some comparative nuance between the four locales (Chambers et al., 2019; Li, 2019). To partially address this, we conducted sensitivity analyses with the town locale categorized as nonrural, to examine the robustness of our results relative to this operational definition.[2]

Key predictors of college enrollment are used as covariates. We adjusted for demographic factors by including variables for race/ethnicity. Specifically, we used effect coding for the racial/ethnic categories provided in HSLS, such that results do not have students of color compared to a white reference group, but instead allow comparisons to an overall average value (Mayhew & Simonoff, 2015). We also included a gender variable that NCES operationalized as binary, not allowing consideration of non-binary gender identities. High school academics were accounted for by including overall high school GPA, whether the student met minimum academic readiness course requirements, and their SAT score (or converted ACT score if SAT was unavailable). Given the important role of expectations in predicting enrollment, we included whether a student expected to attain a bachelor's degree.

We included school context variables given their importance for college enrollment as well as possible differences by geography. We accounted for the college-going opportunities that a high school provides by including a summative composite variable of whether the school (a) has a designated college counselor, (b) holds college fairs, (c) consults with postsecondary representatives, (d) organizes college visits, (e) hold college information sessions, and (f) assists with financial aid (Engberg & Gilbert, 2014). We also included the percent of the student body enrolled in AP as an indicator of a college-going climate, and the percent of students on free or reduced lunch as school socioeconomic factor.

Methods

We first examined means and standard errors for all variables, comparing these values for the subpopulations of rural and nonrural students. This analysis revealed possible disparities in college enrollment, as well as other characteristics of the sample and how they differed between rural and nonrural students.

Subsequently, we conducted a parallel set of analyses for each of the two research questions, which differed only by their analytic samples and dependent variables. We used logistic regression to predict college enrollment (first for any postsecondary enrollment, then for four-year enrollment specifically). The first regression model included only SES and rural status as independent variables. The second model was adjusted by all covariates described above. We calculated average marginal effects (AME), which are interpreted as

[2] Sensitivity analysis details can be found at the online supplement at http://works.bepress.com/ryan_wells/39/.

the average change in the probability of enrolling in (four-year) college, given a standard deviation change in continuous independent variables, or a one-unit change for categorical variables.[3]

To directly address the research questions, we ran fully interacted regression models, interacting each other variable in the model with the rural variable. In other words, we investigated the extent to which rural status moderated the relationship between SES and college enrollment. We used these regression results to calculate predicted probabilities of college enrollment across the range of SES, for both rural and nonrural students, and then tested differences in those probabilities (Long & Mustillo, 2018). Simply comparing coefficients across models stratified by rurality is not an appropriate way to compare groups, given that rural and nonrural students may differ in their unobserved heterogeneity. Among other complications, one cannot separately identify the mean and the variance of a non-linear dependent variable (Breen et al., 2018; Mize, 2019), meaning that a naïve coefficient comparison may be biased. Additionally, we calculated fit statistics (log likelihood and adjusted McFadden's $R^{2)}$ of our regression models for each imputed dataset separately and provide the median of those values with the results. Clustered standard errors were calculated in all models given the nature of the data.

Limitations

As with any study, the data and methods we chose have limitations. While the federal schema concerning rurality used by NCES is the most common in empirical literature on rural students' education (Thier et al., 2021), the choice to use the variables provided in HSLS for rurality nonetheless has tradeoffs. More nuanced and detailed conceptualizations of rurality can consider factors that this definition of rurality cannot (e.g., Burdick-Will & Logan, 2017; Dunstan et al., 2021; Hudacs, 2020; Isserman, 2005; Thier et al., 2021). Similar studies with these alternate definitions of rurality could very well lead to different conclusions.

Even within HSLS data, the subsequent choice we made to operationalize a dichotomous rural-nonrural variable has limitations. While the binary nature of the rural variable provided a direct comparison with past studies on rural students' college enrollment that also used a rural-nonrural dichotomy (e.g., Byun et al., 2012, 2015; Koricich et al., 2018; Wells et al., 2019) this choice also loses important nuance of the comparisons with suburban and urban students separately. Lumping suburban and urban students together as the comparison group likely masks differences that should not be ignored. The way to include the designation of a town is also contested and has changed over time, even within NCES datasets (Manly et al., 2020). While we conducted sensitivity analyses by using towns in both rural and non-rural definitions, we did not examine towns as their own category, which limits our findings and obscures important findings related to towns (Chambers et al., 2019; Li, 2019).

We chose to operationalize socioeconomic status for this study also using the variable provided by NCES—an aggregate measure of parental education, parental occupation, and family income. This type of variable has been critiqued for its limitations (American Psychological Association, 2007; Dickinson & Adelson, 2019) and can lead to findings or

[3] We provide a sensitivity analysis using a linear probability model. Results can be found in the online supplement http://works.bepress.com/ryan_wells/39/.

Table 1 Means and standard errors of the estimates, for all variables

Variable	All students		Rural students		Nonrural students		Difference
	Mean	SE	Mean	SE	Mean	SE	
Attend college	0.75	(0.01)	0.72	(0.01)	0.77	(0.01)	−0.05***
Four-year college	0.50	(0.01)	0.48	(0.02)	0.52	(0.02)	−0.04*
SES	−0.04	(0.02)	−0.06	(0.02)	−0.04	(0.03)	-0.02
Expect to attend PSE	0.81	(0.01)	0.80	(0.01)	0.81	(0.01)	−0.01
GPA	2.74	(0.02)	2.80	(0.02)	2.70	(0.02)	0.10**
Min. academic preparation	0.74	(0.01)	0.73	(0.02)	0.75	(0.01)	−0.02
SAT score (std)	−0.33	(0.03)	−0.34	(0.03)	−0.33	(0.04)	−0.01
Race/ethnicity							
White	0.52	(0.02)	0.66	(0.02)	0.43	(0.02)	0.23***
Black	0.13	(0.01)	0.10	(0.01)	0.16	(0.01)	−0.06**
Latinx	0.22	(0.01)	0.13	(0.01)	0.28	(0.02)	−0.15***
Asian/Pacific Islander	0.04	(0.00)	0.02	(0.00)	0.06	(0.01)	−0.04***
Amer. Indian/Alaska Native	0.01	(0.00)	0.01	(0.00)	0.00	(0.00)	0.01
Multiracial	0.08	(0.00)	0.08	(0.01)	0.08	(0.01)	0.00
Female	0.50	(0.01)	0.49	(0.01)	0.51	(0.01)	−0.02
College-going structure	5.03	(0.04)	5.03	(0.06)	5.04	(0.05)	−0.01
% students in AP (std)	−0.12	(0.03)	−0.40	(0.04)	0.07	(0.05)	−0.47***
% students on free lunch (std)	0.23	(0.05)	0.17	(0.05)	0.27	(0.07)	−0.10
Observations	13,010		5,320		7,690		

All reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license

Significant differences between rural and nonrural indicated

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2009-16 High School Longitudinal Study (HSLS:09/16)

*p < .05;, p < .01;, *p < .001

conclusions that may differ from other ways of capturing economic circumstances, such as poverty.

Results

Descriptive results confirmed that rural high school graduates enrolled in college less often than nonrural high school graduates: 77% of nonrural students and 72% of rural students (see Table 1). Estimates show that rural students also enrolled in four-year institutions at lower rates than nonrural students (48% vs. 52%).

Unexpectedly, the mean SES values of the two subsamples were very similar, differing by only a few hundredths of a standard deviation. This is not aligned with past research, which typically showed a lower average SES for rural students (Koricich et al., 2018; Wells et al., 2019) and may indicate a difference in the distribution of SES across geographies with these newer national data. The difference may also reflect a changed definition of rurality in the HSLS dataset compared to past NCES datasets (Manly et al., 2020).

However, a very similar result occurs with an alternate operational definition of rurality.[4] In any case, essentially equal mean values of SES between the rural and nonrural groups means that SES is unlikely to "explain" the existing gap in postsecondary enrollment with these data, as past research has suggested.

Our findings in Table 1 also challenge assumptions of lower academic achievement in rural areas, showing that rural students have slightly higher average GPAs than nonrural students, are similar in terms of their attainment of a minimal level of college preparation, similar in average SAT scores, and have similarly high expectations for attending postsecondary education. The rural cohort of high school graduates was also comprised of more white students and fewer Latinx, Black, and Asian/Pacific Islander students compared to the nonrural student cohort. While rural areas had fewer students of color overall, one third of rural high school graduates were students of color, confirming the increasing diversity in rural areas and challenging common assumptions of rural areas being overwhelmingly white.

Model 1 of our regression results in Table 2 confirms that rural students had a probability of attending postsecondary education, even when adjusted by SES, that was about 6 percentage points lower than nonrural students. These findings also confirm that SES was strongly and positively related to college enrollment, consistent with decades of research. Model 2 shows that academic factors and college expectations were all strongly, positively related to enrollment. When statistically adjusted by model covariates, Latinx students were more likely to attend college relative to the overall average of college attendance, and white students were less likely. Even in the presence of these covariates, rural students continued to have a lower probability of enrolling in college, by approximately five percentage points.

Models 3 and 4 in Table 2 examine enrollment in a four-year institution, relative to enrollment in a community college or vocational school. Model 3, with only SES and rural variables, shows a small and statistically nonsignificant difference between rural and nonrural students, and also shows that students with higher SES were much more likely to enroll at a four-year college. When including covariates for demographics, academics, educational expectations, and high school context in Model 4, being a rural high school student predicted a lower probability of four-year college enrollment, by about five percentage points. Additionally when adjusted by these covariates, Black students had a higher probability of enrolling in a four-year college, while white and Latinx students had a lower probability relative to the overall average.

The main rationale for this study was not simply to examine how rurality was related to college enrollment, but how those relationships differ across students' SES. We converted regression results to predicted probabilities separately by rural and nonrural status and examined the differences between those probabilities across the range of student SES values.

In Fig. 1, the gap between the rural and non-rural lines is the difference between the probabilities of college enrollment shown in the top panel of Table 3.[5] The figure clearly shows a pattern of variation in the gap between rural and nonrural students' probabilities of enrollment across SES values. In the adjusted model at the lower end of the SES distribution, nonrural students had higher probabilities of enrolling than rural students, by

[4] For these and other sensitivity analysis results see the online supplement at http://works.bepress.com/ryan_wells/39/. Overall, results are substantively similar and would lead to similar conclusions.

[5] Figs. 1 and 2 with confidence intervals included are located in the online supplement http://works.bepress.com/ryan_wells/39/.

Table 2 Average marginal effects on enrolling in postsecondary education

Independent variables	Any postsecondary enrollment				Four-year college enrollment			
	Model 1 (unadjusted)		Model 2 (adjusted)		Model 3 (unadjusted)		Model 4 (adjusted)	
	AME	(*SE*)	AME	(*SE*)	AME	(*SE*)	AME	(*SE*)
Rural	−0.06***	(0.01)	−0.05***	(0.01)	−0.03	(0.02)	−0.05**	(0.02)
SES	0.17***	(0.01)	0.08***	(0.01)	0.20***	(0.01)	0.07***	(0.01)
Expect to attend PSE			0.14***	(0.02)			0.13***	(0.02)
GPA			0.14***	(0.01)			0.20***	(0.01)
Min. academic preparation			0.02	(0.02)			0.04*	(0.02)
SAT score (std)			0.04***	(0.01)			0.11***	(0.01)
Race/ethnicity								
Black			0.03	(0.01)			0.11***	(0.02)
Latinx			0.04*	(0.01)			−0.08***	(0.02)
Asian/Pacific Islander			0.00	(0.03)			−0.08**	(0.03)
Amer. Indian/Alaska Native			−0.03	(0.05)			0.13	(0.07)
Multiracial			0.01	(0.02)			−0.02	(0.02)
White			−0.05***	(0.01)			−0.06**	(0.02)
Female			0.02	(0.01)			0.00	(0.01)
College-going structure			0.00	(0.01)			0.00	(0.01)
% students in AP (std)			0.01	(0.01)			0.03**	(0.01)
% students on free lunch (std)			−0.02*	(0.01)			−0.01	(0.01)

Table 2 (continued)

Independent variables	Any postsecondary enrollment				Four-year college enrollment			
	Model 1 (unadjusted)		Model 2 (adjusted)		Model 3 (unadjusted)		Model 4 (adjusted)	
	AME	(*SE*)	AME	(*SE*)	AME	(*SE*)	AME	(*SE*)
Observations	13,010		13,010		10,510		10,510	
Log likelihood	− 2,062,938		− 1,663,763		− 2,514,076		− 1,928,891	
McFadden's R^2 (adjusted)	0.081		0.259		0.095		0.306	

All reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license

Significant differences between rural and nonrural indicated

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2009-16 High School Longitudinal Study (HSLS:09/16)

*p < .05; **p < .01; ***p < .001

Table 3 Probability of enrolling in postsecondary education at representative values of SES, by rural vs. nonrural status

	Unadjusted (Model 1)			Adjusted (Model 2)		
	Rural	Nonrural	Diff	Rural	Nonrural	Diff
Any postsecondary enrollment						
SES = −2	0.25	0.38	−0.13**	0.48	0.63	−0.15**
SES = −1	0.51	0.61	−0.10***	0.61	0.70	−0.09***
SES = 0	0.76	0.80	−0.04***	0.73	0.77	−0.04**
SES = 1	0.90	0.91	−0.01	0.82	0.83	−0.01
SES = 2	0.97	0.97	0.00	0.89	0.87	0.02
Four-year college enrollment						
SES = −2	0.20	0.16	0.04	0.36	0.37	−0.01
SES = −1	0.36	0.35	0.01	0.41	0.44	−0.03
SES = 0	0.56	0.60	−0.04	0.47	0.51	−0.04*
SES = 1	0.74	0.80	−0.06*	0.52	0.58	−0.06*
SES = 2	0.87	0.92	−0.05*	0.57	0.65	−0.08

Significant differences between rural and nonrural indicated.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2009-16 High School Longitudinal

Study (HSLS:09/16).

*p < .05; **p < .01; ***p < .001

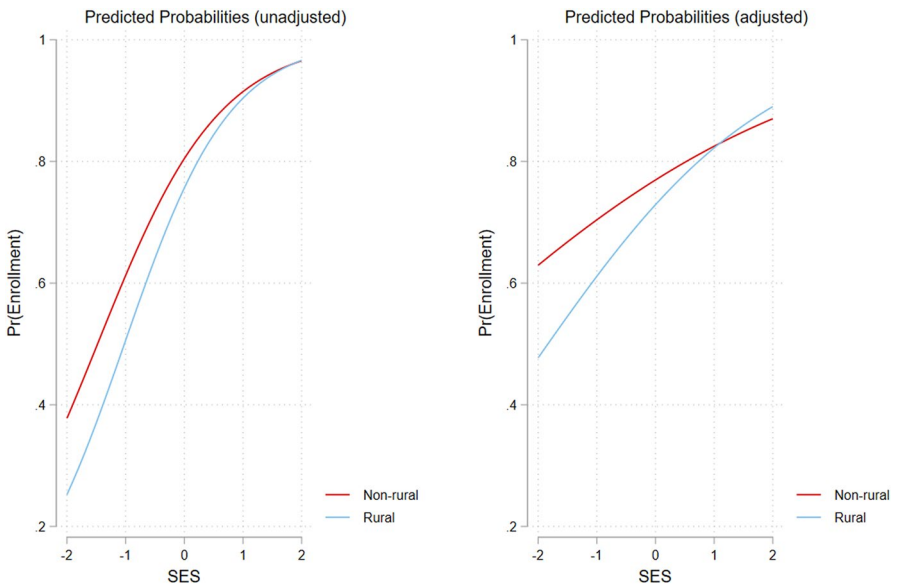

Fig. 1 Probabilities of enrolling in postsecondary education across SES, by rural vs. nonrural status

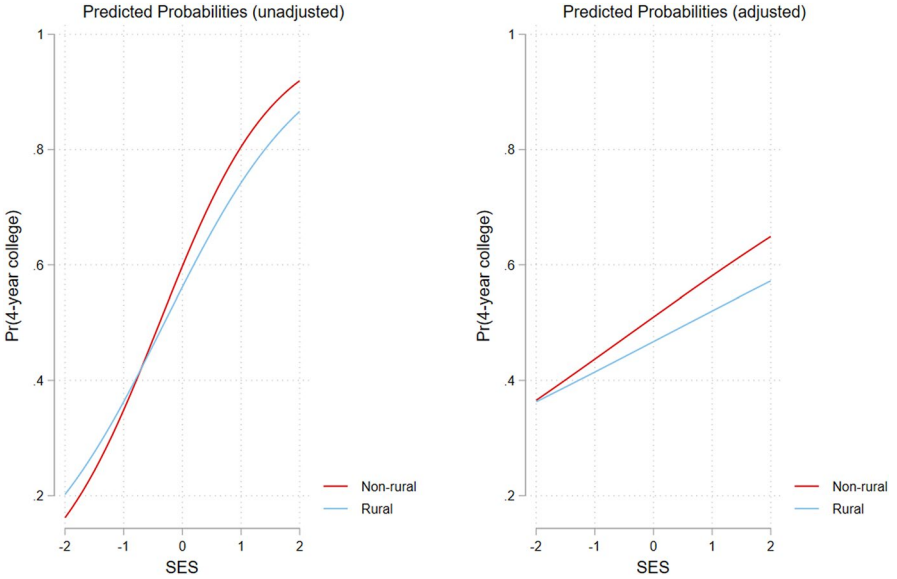

Fig. 2 Probabilities of attending four-year college across SES, by rural vs. nonrural status

15 percentage points (63% vs. 48%). This gap steadily declined as students' SES increased, with the middle of the distribution representing a four-point gap, and with no gap effectively remaining at the highest SES values. It appears that higher SES can counteract many of the challenges that lead rural students to have lower average college enrollment.

Similar analyses in the bottom panel of Table 3, corresponding to Fig. 2, show the predicted probabilities of enrolling in a four-year college specifically, for the subsample of college enrollees. There are variations across the values of SES in the ways rural and nonrural students access four-year colleges, but they are different than overall college enrollment. For instance, the adjusted model suggests that there are similarly low probabilities of attending four-year college for those in the bottom half of the SES distribution regardless of whether they are rural or nonrural. However, there is a trend toward nonrural students at higher SES levels having significantly greater probabilities of enrolling than rural students with similarly high SES. At the top of the SES distribution, nonrural students are 8% points higher than rural students in their probability of attending a four-year institution.

Discussion

We set out to reconsider the role of SES in college-going for rural students. Many of our results confirmed past studies, showing disparities in rural students' overall postsecondary enrollment when compared to nonrural students, including at four-year institutions specifically. Our findings expand prior research by showing how rural-nonrural disparities vary by SES. These findings enhance and complicate our understandings of college enrollment for rural students and the role of SES within a geography of opportunity framework.

Rural Student College Enrollment

The 72% rate of immediate college enrollment for rural students in this study, most of whom were high school graduates in 2013, is nearly identical to research findings using similar NCES data from the early 2000s (Koricich et al., 2018). This is the case despite towns being included in the suburban category in those data, whereas we included towns in the rural category. However, the rural-nonrural gap in college enrollment from the more recent time period—about five percentage points—is less than the eight-percentage-point gap identified using those earlier data (Koricich et al., 2018). When combined with past results showing diminished rural-nonrural gaps from the 1990s to the 2000s (Byun et al., 2012; Wells et al., 2019), it appears that the enrollment gap between rural and nonrural students has diminished over time. (Though caution is also warranted here, because the HSLS dataset cannot be treated as a true repeated cross-section of previous NCES datasets given different data collection procedures [Duprey et al., 2020]). While this progress is promising, the remaining gap is still important for college access. A five-percentage point difference in enrollment translates to approximately 60,000 rural high school graduates each year in the US not attending college. The impact on students and their communities is substantively significant.

To confirm or complicate our findings, however, researchers will need to examine alternate measurements of the key variables. First and foremost, similar research should be conducted with alternate conceptualizations of rurality. For example, in addition to the binary rural-nonrural distinction examined here, 3- and 4-category examinations of rural locales in HSLS should also be used for more nuanced understanding (e.g., Chambers et al., 2019; Li, 2019). Other data sources that use fundamentally different ways of examining rurality should also be leveraged to confirm or challenge our results (e.g., Dunstan et al., 2021; Hudacs, 2020; Isserman, 2005; Thier et al., 2021). Research should also examine the disaggregated components of SES. In doing so, scholars may be able to determine the relative influence of economic and cultural forms of capital, between rural and nonrural areas, that are likely to be drivers of differential enrollment.

Additionally, we considered overall college enrollment to be any postsecondary enrollment that occurred between 2013 and 2016, for students who graduated in 2013 as well as later graduates. In comparison, the National Student Clearinghouse (2016) examined immediate enrollment in fall 2015 for students who graduated the prior spring and reported that 59% of rural students enrolled, compared to 62% of urban students and 67% of suburban students. Alternatively, when the enrollment of anyone between the ages of 18–24 was considered in 2015, 29% of rural students were enrolled, compared to an overall average of 42% (NCES, 2015). These discrepancies may in part be due to differences in variable definitions but may also be partially due to the inclusion of late graduates and delayed enrollees in our sample.

Our findings suggest similar diminishing gaps when examining four-year vs. non-four-year enrollment. In the 2000s, a greater proportion of rural students attended two-year institutions relative to nonrural students by about seven percentage points and correspondingly attended four-year schools at lower rates (Koricich et al., 2018). Here, we found a four-percentage point difference between rural and nonrural students, which is surprising given that rural geographies are more likely to be education desserts with fewer four-year options (Hillman, 2016). However, this finding somewhat aligns with recent state-level research showing higher-than-expected rural four-year enrollment trends (Hirschl & Smith, 2020). It may be that because rural students who live in access deserts often leave to pursue

postsecondary education (Klasik et al., 2018), they are more likely to pursue four-year institutions, which are less available in their local areas. Importantly, when adjusted by academic factors including GPA, which was higher on average for rural high school graduates, there was a relatively lower probability of four-year enrollment. In other words, more rural than nonrural students who were predicted to attend a four-year institution (based on academics, expectations, and demographics) actually attended a two-year institution.

Such institutions play an important role in rural communities. More than half of rural students enroll in two-year institutions initially, and nearly two-thirds of students access a two-year college at some point in their educational career (Byun et al., 2017). A diminished gap in four-year enrollment would be a positive finding not because more rural students "need" to enroll in four-year institutions, but because disparate rates of enrollment are a part of the lower average rates of degree attainment among rural populations (USDA, 2017). This may lead to fewer opportunities in the labor market, lower rates of social mobility, and continued higher rates of poverty. When there is strong alignment between community college offerings and rural labor markets, they may indeed be the best choice for some students (Rios-Aguilar et al., 2018). Koricich et al. (2018) noted, however, "if rural students are being concentrated in these [two-year] institutions because they represent the only, as opposed to best, opportunity, then this represents a great source of educational inequality" (p. 302). Thus, while two-year institutions are valuable entities within the higher education landscape, having these colleges as the only viable option for rural communities reinforces inequity.

Socioeconomic Status and Geographies of Opportunity

We found that among the high school graduates in this study, the SES of rural students differed relatively little from that of nonrural students. This is different than past studies, including recent research with NCES data (Koricich et al., 2018), which showed rural students to have a lower average SES than nonrural students. When parental education and income have been examined separately, rural and nonrural populations have also differed significantly on each (Byun et al., 2012). There have been signs, however, that parental education trends are changing. The average parental education levels increased more for rural students in the 2000s than for nonrural students, resulting in a decreasing number of potential first-generation college students in rural areas (Wells et al., 2019). It is possible this trend has contributed to the lack of a difference in SES for this newest cohort. As a caution, however, the lack of an SES difference is specific to the measurements of variables in this dataset. Other measures of individual or geographic economic conditions, may not show a similar shift between rural and nonrural. For example, during this same period rural areas had continued higher rates of poverty than nonmetropolitan areas (USDA, 2021).

We not only examined how rural and nonrural students' college enrollment differs between different geographies of opportunity, but also looked at how SES operated differently within those geographies, which is an under-considered aspect of the geography of opportunity framework (Galster & Killen, 1995; Galster & Sharkey, 2017). Our analysis demonstrated that the overall postsecondary enrollment gap between rural and nonrural students is primarily a gap for low- and middle-SES students, whereas the highest SES students do not differ much from one another. Higher-SES students and families are likely to be able to use their valued forms economic and cultural capital to alleviate any disadvantage or maneuver barriers unique to rural geographies of opportunity. Put differently, the conversion of those societally valued forms of capital into supposedly meritocratic educational credentials (Bourdieu,

1986) seems to occur regardless of geographic factors. However, we find there is greater socioeconomic inequality in college access in rural geographies than in nonrural geographies (see Fig. 1). While it manifests differently (see Fig. 2), this is also the case with four-year enrollment specifically. This empirical evidence is a clear reminder that there is not a homogeneous SES experience among rural students, and a more nuanced approach in research and practice is needed. We also do not find evidence that academic factors, expectations, or demographics are able to "explain" rural-nonrural gaps, countering some past research.

Implications

Policies and interventions aiming to address rural-nonrural college-going differences should consider SES as a key factor. For example, state and federal governments might consider offering small grants to rural high schools to support field trips to four-year institutions. As these schools receive lesser outreach from postsecondary institutions and admissions officials (Salazar et al., 2021), this funding might help provide key exposure to college information to rural students. Outreach efforts should consider familial income and education as well; high SES students are unlikely to need the same support that middle- and lower-SES students do.

Postsecondary admissions processes should also be aware of these dynamics. Some version of SES is usually considered, through financial status and/or parental education, and some schools are starting to recognize rurality as a key part of the admissions process as well (Pappano, 2017). Higher education institutions can develop targeted recruitment efforts that invite rural college students to campus, such as the Emerging Rural Leaders program at the University of Chicago. For institutions with limited resources, increasing levels of family education in rural areas may have created new alumni networks to tap into that can serve as local ambassadors to rural students.

Given the relevance of proximity for college enrollment, institutions might consider how to support students in navigating challenging geographic distances between their home communities and colleges. For example, transportation might be considered a basic need in some cases. Similar to the ways institutions have begun to address basic needs insecurity related to food or housing, measures such as travel grants that low-SES rural students can access might enable them to be present on campus and in their home communities. COVID-19 has opened up new possibilities for hybrid and virtual learning while amplifying national attention on the need for consistent internet access, which postsecondary institutions could also take more proactive step to improve for rural students.

In addition to proposed measures regarding policy and practice, more research is needed to confirm, expand, or complicate these findings related to SES and rural students' college enrollment. While we show how socioeconomic inequality is important for rural students, additional research might further illuminate the nuances across students' experiences and help shape appropriate interventions. For example, there are regional differences in how these factors operate which we have not taken into account that may shape the opportunities available within rural communities (e.g., career prospects, culture) (USDA, 2021). Given that the COVID-19 pandemic changed students' plans to stay closer to home and often to attend two-year rather than four-year institutions (Flanagan et al., 2021), sometimes in response to changed SES, additional research should further investigate the effects of macro-level factors and unique contexts. Additionally, we did not disentangle two-year community colleges from institutions that offer only less-then-two-year credentials, nor did

we examine how for-profit status may play into these phenomena (Beamer & Steinbaum, 2019). Future research should do so.

Tate's (2008) case studies of urban geographies of opportunity are a reminder than industry and labor markets are a major influence on opportunity structures across different geographies. Indeed, recent studies have shown that unemployment and the percentage of local working-class jobs are influential to college-going (Bozick, 2009; Hirschl & Smith, 2020). We did not incorporate that part of the puzzle in this study, and it should be investigated in future studies that examine rural educational pathways. These labor markets could also influence enrollment in a two-year program rather than a four-year institution. Many in rural areas may derive as much benefit from technical or specialized training aligned with the labor market in their particular geography of opportunity. More research on these institutions is warranted by examining who is attending sub-baccalaureate programs, where they are located, how they are (or are not) aligned with local labor markets, and whether they are non-profit or for-profit.

Race and ethnicity are the bases for another vector of inequality in the educational system that we did not thoroughly examine in this study. The ways that race and SES interact, as well as the way race may operate differently between rural and nonrural areas is worthy of more study. Connecting the work of Sansone et al. (2020) focused on race and rurality in college going, with this work on SES, would be a useful next step. More broadly, future inquire could have an explicit focus on what SES "means" across rural and nonrural geographies, and fundamentally, how to make comparisons across multiple definitions of rurality. In doing so, future research can help to better understand the nuances of rural college-going and provide actionable evidence that can make college enrollment more equitable by rurality and SES, as well as other vectors of inequality.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11162-023-09737-8 .

Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

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