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Take Care When Cutting: Five Approaches to Disaggregating School Data as Rural and Remote

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Education research that omits or insufficiently defines geographic locale can impair policy formulation, enactment, and evaluation. Such impairments might be especially detrimental for communities in rural and/or remote areas, particularly when they pertain to gifted education programs that struggle to operate at large scale (e.g., Advanced Placement). To enhance researchers' precision when analyzing school-level data, we developed five statistical approaches to operationalize rurality and remoteness using the Urban-Centric codes from the National Center of Education Statistics. With national data, we found important variations across these statistical approaches in (a) percentage of schools identified as rural and/or remote, (b) effect sizes, and (c) characterizations of schools' relative disadvantage in the breadth of opportunity to learn Advanced Placement content that they provide. These findings challenge prevailing practices of classifying communities dichotomously as nonrural or rural. The authors demonstrate several ways to address policy makers' and practitioners' needs by incorporating geographic locale into analyses of school data, operationalizing geographic locale precisely in theoretically sound ways, and avoiding dichotomies that can obscure meaningful variation.

***Keywords*:** rural schools, remoteness, research methods, educational equity

Precise research on school-level characteristics can help inform policy and practice with essential, contextually specific insights. For example, identifying geographic locale—especially rurality and remoteness—can considerably enhance sampling, analyses, or claims of generalizability about school-centered research. Problematically, popular media continuously harden overstated stereotypes about a nonrural/rural divide (e.g., Zitner & Overberg, 2016). Many celebrated authors, most notably Vance (2016), promulgate the "hillbilly trope", lampooning and further marginalizing the communities, cultures, aspirations, and opportunities of people who live, by most geographic definitions, beyond the metro-normative margins (Peine & Schafft, 2018; Roberts & Green, 2013). Importantly, some scholars counter such ill-informed accounts of rural and/or remote places by eschewing monolithic depictions about places that too many policy makers dismiss as "fly-over country" (see Catte, 2018; Cramer, 2016; Wuthnow, 2019). Consequently, incomplete, deficit-based narratives seep into the work of many researchers and state-level policy makers, who are often "not tuned into rural America" (Jordan & Hawley 2019, para. 3). Fittingly, Johnson (2017) depicts rural America as "deceptively simple" (para. 2).

Presidential polling data illustrate the importance of knowing what “rural” entails. Purportedly, Donald Trump’s popularity varies considerably among respondents from urban, suburban, and rural places (Rakich & Mehta, 2018). We often endorse such claims as truth, neglecting to ask how urban, suburban, and rural are defined. Accordingly, a large-scale review of education research found 91.3% of articles that invoked rurality offered no way for readers to know how rural was being defined (Thier & Beach, 2019). Without precisely operationalizing geographic locale, how can scholars legitimize a study’s context as internally valid, attribute effects about place to its observations, or stipulate limits on its external validity? How useful would research be to consumers without first addressing those core issues?

Although rurality has long been a “stepchild” to other education research pursuits (DeYoung, 1987, p. 140), geographic locale holds all the predictive promise of industry-standard contextual variables, such as race/ethnicity and socioeconomics (Kettler et al., 2015). For example, many studies of opportunity to learn advanced curricula, or high school students’ access to college coursework, such as Advanced Placement (AP), negatively associate this equity-focused construct with rurality and/or remoteness (Gagnon & Mattingly, 2016; Kettler et al., 2016; Mann et al., 2017). Deficit thinking and overgeneralization limit understanding of programs for gifted students in rural and/or remote places, undermining research that aims for precise examinations of how demographic variables operate within rural and/or remote contexts (Azano et al., 2017).

Unfortunately, studies of U.S. K-12 schools often insufficiently define what is rural, remote, both, or neither (Arnold et al., 2005; Coladarci, 2007). Few studies account for geographic locale (about 1 in 7), with far fewer addressing rurality (1 in 33) or remoteness (1 in 500; Thier & Beach, 2019). Second-class status for geographic locale, especially about rurality-remoteness, is curious in a country where more than 1 in 4 public schools exist in areas the National Center for Education Statistics (NCES) identifies as rural (Showalter et al., 2019). Misunderstanding the policy context by failing to precisely define what is rural and/or remote could impede service of rural-specific needs regarding gifted education, just as can failing to develop rural-specific pedagogies to serve gifted students (Lawrence, 2009).

Thus, we designed this study to answer calls for research that better taps into rurality and remoteness (Corbett, 2018; Greenough & Nelson, 2015; Kettler et al., 2016; Koziol et al., 2015; Puryear & Kettler, 2017). Exemplifying possibilities arising from one of many ways to operationalize rurality and remoteness—NCES’s Urban-Centric codes—we have employed an outcome variable of wide-ranging importance for equity-focused gifted education policy: breadth of opportunity to learn AP content (specifically the number of AP courses that a school received College Board authorization to offer). We offer five rival approaches for grouping schools by geographic locale, enabling researchers to better contextualize school settings. Comparing results from our five approaches, we found vital differences in how researchers produce and how consumers might interpret (a) percentages of schools identified as rural and/or remote, (b) effect sizes, and (c) schools’ relative advantages or disadvantages. Ultimately, we show how more precise operationalization of schools’ geographic characteristics can enhance initial understanding about overlapping and separable aspects of rurality and remoteness among researchers and policy makers. We also offer strategies to extend that initial understanding through in-depth analyses that account for local nuances, which coding schemata cannot detect.

Toward Definitional Clarity

Consensus definitions still confound research of place in the United States, where the federal government has recently used more than 20 classification schemata to parse rural areas from other locales (Arnold et al., 2007; Cromartie & Bucholtz, 2008). However, those schemata serve agency missions as diverse as those of the Census Bureau, Department of Agriculture, and Office of Management and Budget. Definitions undergirding those schemata vary from residualizing rural areas as “whatever is not urban” (U.S. Health Resources and Services Administration, 2018, p. 3) to the 12

Urban-Centric codes that NCES has based upon both population and urban proximity (see Table 1). Definitional disagreement is a reason that rural and/or remote schools occupy disproportionately less than their share of the education research landscape (Coladarci, 2007; Thier & Beach, 2019).

Table 1

Metro-Centric Codes and Urban-Centric Codes (see Geverdt, 2015)

Locale Category	Metro-Centric Codes		Urban-Centric Codes	
	Subcategory	**Descriptor**	**Subcategory**	**Descriptor**
City	Large (1)	City/metro area, pop. ≥ 250,000	Large (11)	Inside urbanized area and principal city, pop. ≥ 250,000
	Midsize (2)	City/metro area, pop. < 250,000	Midsize (12)	Inside urbanized area and principal city, 100,000 ≤ pop. < 250,000
			Small (13)	Inside urbanized area and principal city, pop. < 100,000
Urban fringe/ suburb	Large (3)	Within large city/metro area, urban by Census	Suburb, large (21)	Outside principal city, inside urbanized area, pop. ≥ 250,000
	Midsize (4)	Within midsize city/metro area, urban by Census	Suburb, midsize (22)	Outside principal city, inside urbanized area, 100,000 ≤ pop. < 250,000
			Suburb, small (23)	Outside principal city, inside urbanized area, pop. < 100,000
Town	Large (5)	Incorporated place, pop. ≥ 25,000, outside city/metro area	Fringe (31)	Inside urban cluster, ≤ 10 miles from urbanized area
	Small (6)	Incorporated place, 2,500 < pop. < 25,000, outside city/metro area	Distant (32)	Inside urban cluster, > 10 miles but ≤ 35 miles from urbanized area
			Remote (33)	Inside urban cluster, > 35 miles from urbanized area
Rural	Outside metro area (7)	Rural by Census, outside large/midsize city/metro area	Fringe (41)	Rural by Census ≤ 5 miles from urbanized area, ≤ 2.50 miles from urban cluster
	Inside metro area (8)	Rural by Census, inside large/midsize city/metro area	Distant (42)	Rural by Census > 5 miles but ≤ 25 miles from urbanized area, > 2.50 but ≤ 10 miles from urban cluster
			Remote (43)	Rural by Census > 25 miles from urbanized area, > 10 miles from urban cluster

To further address a definitional clarity gap that limits education research, we have added to recent scholarship about variation within geographical locale operationalizations. For example, analyzing science scores from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99, Koziol et al. (2015) showed how parameter estimates differed among (a) the NCES's Metro-Centric codes, the precursor of the Urban-Centric codes; (b) Office of Management and Budget core-based statistical areas; and (c) U.S. Census Bureau classifications to measure geographic locale. Koziol et al. would have preferred to employ the Urban-Centric codes, but the newer iteration debuted seven years beyond their study's data range. Simplifying analyses, Koziol et al. dichotomized schools as urban or rural per the coding schema. In contrast, here we designed our study to examine how dichotomies might limit geographic locale understandings.

Using the Urban-Centric codes, multiple research teams have observed subcategorical differences within their designations of city, suburb, town, and rural for schools (Greenough & Nelson, 2015) and districts (Puryear & Kettler, 2017). Examining schools' enrollment counts and Title I eligibility rates based on the 2010–2011 Common Core of Data from the U.S. Department of Education, Greenough and Nelson (2015) stressed differences within the rural category, where 61.6% of students in rural schools truly attended rural-fringe schools (coded 41). They distinguished this rural majority from students in rural-distant (coded 42, accounting for 28.7%) or rural-remote (coded 43, accounting for 9.6%) schools. They also reported rural-fringe schools' higher enrollments and lower rates of Title I eligibility and free or reduced-price meals than averages both nationally and among rural-distant and rural-remote schools. Seemingly, rural-fringe schools resembled peers in large suburbs, while challenges in rural-distant and rural-remote schools resembled many challenges found within schools in large cities. Accordingly, Greenough and Nelson nominated the Urban-Centric codes to become education researchers' standard geographic locale definition. By contrast, Puryear and Kettler (2017) questioned the Urban-Centric codes' utility for anything other than census purposes after their district-level analysis of gifted education opportunities revealed similar findings: rural-fringe districts resembled urban, suburban, and town districts more so than rural-distant and rural-remote districts. They also called for more research on the Urban-Centric codes to examine associations between opportunities and urban proximity.

In an earlier examination of district data, Kettler et al. (2016) also raised concern about an unqualified embrace of the NCES's schema. They argued that simultaneous emphasis of the Urban-Centric codes on community-level population and urban proximity ignores a potentially relevant confound: student enrollment. So, they dichotomized Texas school districts as rural or not and then filtered schools within districts by student enrollment data. One aim of the present study was to examine the extent to which dichotomizing NCES-coded data (e.g., Kettler et al., 2016; Koziol et al., 2015) restricts the predictive value of the four Urban-Centric categories and 12 subcategories. Kettler et al. (2016) joined Greenough and Nelson (2015) in recognizing that a proximity emphasis better accounts for the rise of exurbs that sit between cities and formerly rural spaces rather than parsing enrollment counts. Similarly, both scholarly groups linked rurality and remoteness. Perhaps Kettler et al. overcorrected for school size, which in their approach supersedes other aspects of rurality. They developed their approach from six qualitative characteristics co-developed by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the Rural School and Community Trust. As an outcome of that collaboration, proximity from urban areas is the primary characteristic that undergirds rural education with school size ranking fourth. We recognize proximity as an essential consideration when approaching geographic locale overall (Puryear & Kettler, 2017), especially for attempting to disentangle rurality from remoteness. We share an understanding that modern-day "rural schools are not necessarily small or remote" (Kettler et al., 2016, p. 248). Meanwhile, an overreliance on broad categorical boundaries can hinder consensus-building efforts among researchers who focus on rural and/or remote places, ultimately thwarting policy and practice (Biddle et al., 2019).

Geographic Precision

Normalizing imprecise geographic locale descriptions undermines researchers' attempts to capture what rurality and/or remoteness mean for school communities and inhibits equity of gifted education opportunities within communities that are geographically marginalized (Howley, 2009; Puryear & Kettler, 2017; Rasheed, 2020). Research often vaguely delineates suburbs, towns, and rural areas (Scribner, 2015). Problematically, in alignment with the NCES Urban-Centric codes, a large suburb, such as Duquesne, Pennsylvania, can be designated "rural" in a study lacking careful operationalization (Carlson et al., 2011). Such distinctions without difference deprive studies of important descriptive contours. In lieu of precise definitions for rural and/or remote places, the field will continue to lack necessary comparisons within and between rural areas (Ali & Saunders, 2006).

Regarding rural and/or remote areas, Burnell (2003) highlighted geographic isolation as a core facet of rural life. Still, researchers who invoke the Urban-Centric codes commonly cluster the three rural subcategories to pit them against all others and ignore fringe-suburb overlaps rather than isolate any possible effects of remoteness (e.g., Glover et al., 2016). Studies that employ the Urban-Centric codes rarely separate fringe from distant and/or remote distinctions in town or rural spaces, with Puryear and Kettler (2017) as a notable exception. Some studies have used the subcategories to sample exclusively in town and/or rural contexts (e.g., Irvin et al., 2011; Petrin et al., 2014), but the field can still benefit from studies that maximize the utility of the Urban-Centric codes to extricate rurality and remoteness as predictors or covariates.

Research Question and Hypothesis

An innovative accounting of the concentric nature of urban proximity in Taiwan (Chen et al., 2017) inspired us to provide U.S. education researchers with more precise approaches to study school contexts as rural and/or remote. Thus, we asked: Do different approaches to NCES' Urban-Centric codes yield disparate interpretations of rurality and/or remoteness for school data? We found in Chen et al. (2017) the most precise education-focused approach to marshal publicly available data in a way that can disrupt the default dependence on a nonrural/rural dichotomy. Sharing their recognition of suburbs encircling cities concentrically, and then towns and rural areas forming fringe, distant, and remote rings, we hypothesized proximity-based variations for our five approaches to geographic locale. To test that hypothesis, we inspected three outcomes: (a) percentages of schools that could be counted as rural and/or remote, (b) effect sizes, and (c) how locale groups should be labeled as relatively advantaged or disadvantaged in terms of the breadth of opportunity to learn AP content that schools provide.

Method

We tested our hypothesis through group mean statistical comparisons. In this section we first detail data sources for these group mean statistical comparisons and explain our choices of the Urban-Centric codes as a definitional schema to examine our outcome variable: breadth of opportunity to learn AP content. Next, we describe our creation of five approaches to defining geographical locale, emphasizing our innovative tactics to account for rurality and remoteness. Then, we describe our analytical procedures.

Data Sources

The Urban-Centric codes can facilitate defensible decisions for analyzing school data based on place (Greenough & Nelson, 2015). Our applications of the Urban-Centric codes recognized rurality as a facet of community identity (Schafft & Jackson, 2010) and reflect a desire to interrupt nonrural/rural and center/periphery dichotomies that blur rural-remote distinctions, shrouding rural and remote places in deficit-based language (Azano et al., 2017, 2019; Kettler et al., 2016; Shils, 1961). Instead, we have treated "remote" as a function of proximity from urban spaces. Thus, our approaches operationalize geographic locale according to classifications that incur the benefits and acknowledge the limitations of quantitative research (Koziol et al., 2015).

Our study endorses upgrades from the Metro-Centric codes, which NCES created in 1980 and remain in use despite the greater partnership with the U.S. Census Bureau and Office of Management and Budget that produced the Urban-Centric codes in 2006. Reflecting better data (e.g., global information systems affording more efficient address identification), the Urban-Centric codes now classify all K-12 schools (public and private) into one of four designations, city, suburb, town, and rural, each with one of two types of three-level subcategories (see Table 1). Cities and suburbs are subcategorized by size. Schools in all three city types and in large suburbs exist within both urbanized areas and principal cities. Midsize and small suburbs exist outside principal cities but inside urbanized areas. By contrast, towns and rural areas are subcategorized by proximity—fringe, distant, or remote—from urban clusters (U.S. Census-defined as 2,500 < residents < 50,000 residents) or urbanized areas (U.S. Census-defined as > 50,000 residents). Towns exist within urban clusters but outside of urbanized areas. Rural areas exist outside of both urbanized areas and urban clusters.

Our outcome variable, the number of AP courses that a school received College Board authorization to offer (i.e., breadth of opportunity to learn AP content), comes from the AP Course Audit (APCA) data set.[1] The APCA enables comprehensive examination of U.S. public high schools that have offered at least one AP course, a measure typically used in studies of geography-based opportunities to learn advanced curricula (e.g., Gagnon & Mattingly, 2016; Kettler et al., 2016; Malkus, 2016; Mann et al., 2017). In our study, breadth of opportunity to learn AP content is a proxy for gifted education that affords an important benefit beyond the typical approach of dichotomizing schools as having offered at least one AP course or not: our count-based outcome provides greater construct validity than dichotomizing opportunity among schools with zero AP offerings and schools with anywhere from 1 to 33 offerings.

Our count came from the APCA data for the 2012–2013 academic year, which features records for *N* = 14,200 U.S. public high schools, including 1,849 that offered no AP courses for that academic year (13.0%) but might have offered AP subsequently. In this instance, our choice of outcome variable benefited from naturally excluding high schools that had not offered AP coursework at the point of data collection. Extending the APCA data set to high schools that had not yet adopted AP, but would in future years, would artificially skew the data, overinflating estimates based on a large percentage of non-occurrences. Substantively, including such schools would invite a host of unknown reasons for why schools had not offered AP coursework by the point of data collection. Instead, we examined variance only among schools that offered AP coursework at least once to that point, affording comparisons of opportunities that schools truly, not theoretically, offered their students. Accordingly, we matched APCA cases to those schools' Urban-Centric codes in the publicly available Common Core of Data for 2012–2013 due to the convenience of that data year for both sets. After cleaning data and ensuring comparability, our analytical sample was *n* = 12,943 high schools. Our outcome offered suitable range: 0–33 AP courses available, in a year when the College Board offered 35 courses (apparently no school offered all 35 in that academic year). On average, schools offered 8.18 courses (*SD* = 6.89) with minimal skew (0.78).

Generating Approaches

First, we reviewed the limited number of studies with a methodological description detailing application of the Urban-Centric codes (Thier & Beach, 2019). Second, we examined those studies' assumptions in defining geographic locale, specifically as they pertained to rurality and/or remoteness. Third, we surmised that five permutations would generate meaningful differences with our outcome of interest. Our decisions produced two different dichotomies and three polytomous approaches comprising 4, 5, or 12 levels. Below we describe each approach, providing a descriptive title, itemizing which Urban-Centric codes fit into each group, detailing how we derived

[1] At the time of writing, the first two authors were employed at Inflexion, an educational nonprofit that holds the APCA data in coordination with the College Board.

the approach, and citing studies that employ each approach where applicable.

Dichotomous Approaches

Approximating colloquial notions of the nonrural/rural divide, the *blunt dichotomy* represents the roughest geographic cut of school data. Using this approach, Jacob et al. (2015) studied school leadership such that all schools in cities (Urban-Centric codes 11, 12, 13) and suburbs (21, 22, 23), regardless of size, were identified as "nonrural." By contrast, town (31, 32, 33) and rural (41, 42, 43) schools, regardless of urban proximity, were identified as "rural," evoking sharp divides that an unsophisticated observer might use to distinguish "city slickers" and inhabitants of "wide-open spaces." Critics might object to the blunt dichotomy's neglect of rural complexities: it cannot detect unique features that towns demonstrate or even conceive of remoteness as a salient characteristic of rural life.

We constructed a rival dichotomy to examine more contemporary views of a nonrural/rural divide. Informed by Greenough and Nelson (2015), the *postsprawl dichotomy* categorizes as "nonrural" all schools in cities (Urban-Centric codes 11, 12, 13) and suburbs (21, 22, 23), regardless of size, plus fringes of towns (31) and rural areas (41). In this approach, "rural" comprises four subcategories, two distant (32 for towns, 42 for rural) and two remote (33 for towns, 43 for rural), accounting for the ongoing absorption of communities at the fringes of rapidly expanding cities. We intended this approach to explore potentially meaningful distinctions within the rural category and to retain the ability to differentiate what many research consumers characterize informally as nonrural versus rural.

Polytomous Approaches

The approach we call *superimposed quartiles* (Urban-Centric codes: city = 11–13, suburb = 21–23, town = 31–33, rural = 41–43) have been used to depict "rural" disadvantages in AP access—viewed dichotomously—compared to peers in cities, suburbs, or towns (Malkus, 2016; Provasnik et al., 2007). Using the superimposed quartiles, Thier (2015) reported students in rural schools faced longer odds of accessing International Baccalaureate programs than peers in cities. Some analysts find the quartiles approach appealing for capitalizing on seemingly intact groups, examining intuitive differences between a small range of locales. However, we refer to these quartiles as superimposed because they do not capture within-category variation, contrary to findings from Greenough and Nelson (2015), who suggested that failing to account for within-category variation can raise as many questions as the superimposed-quartiles approach might answer. The superimposed quartiles parse neither size-related differences for cities or suburbs nor proximity differences for towns or rural areas, the latter making them insensitive to remoteness.

Perhaps more faithfully reflecting intersections of rurality and remoteness, some researchers have begun to employ a *proximity* approach when studying AP breadth (Roberts et al., 2020; Thier et al., 2016) and International Baccalaureate access (Thier & Beach, 2020). Studies sampling only in towns and rural areas have begun to account for remoteness either by distinguishing participants based on fringe, distant, and remote proximity to cities (Irvin et al., 2011) or by excluding cities, suburbs, and fringes (Petrin et al., 2014). A proximity approach assumes concentric rings around cities, increasingly differentiating peripheral levels from urban centers, a model dating to Burgess (1925) but still "the dominant form of class segregation" (Wei & Knox, 2015, p. 52). Keeping city and suburb groups intact, our proximity approach adds three groups to encapsulate fringe (i.e., towns coded 31 or rural areas coded 41), distant (32 and 42, respectively town and rural), and remote settings (33 and 43, respectively town and rural), enabling detection of linear geographic changes in students' opportunity to learn as proximity from urban areas increases. To examine gifted education opportunities, Puryear and Kettler (2017) applied a version of this approach to district-level data in one state, but only for the rural codes (i.e., 41, 42, and 43), not accounting for proximity among town-designated schools.

Although a proximity approach adds nuance, particularly around the developing phenomenon of exurbs, it cannot account for subcategories among cities and suburbs (community sizes) versus subcategories among towns and rural areas (urban proximities). Therefore, our *fully nuanced* approach facilitates simultaneous inquiry about community size and urban proximity, examining 12 groups, each one an Urban-Centric code. We found no prior study that employs this approach, despite it representing the fullest articulation of the Urban-Centric codes. Perhaps the fully nuanced approach introduces greater complexity than is desirable for some analyses or with some data sets.

Analyses

To test the null hypothesis that application of an operational definition of locale does not matter, we compared our five approaches to defining geographic locale with the Urban-Centric codes using the number of AP courses that a school received College Board authorization to offer in the 2012–2013 school year. We assessed dichotomous approaches with independent-sample *t*-tests and polytomous approaches with one-factor, between-subjects analyses of variance (Keppel & Wickens, 2004). To guard against our robust sample size influencing tests for the first four approaches, we set $\alpha = .001$ with 99.9% confidence intervals. For our 12-level approach, we set $\alpha = .05$ with a 95% confidence interval to account for an unbalanced design: 8 of 12 cells held fewer than 1,000 schools, and 3 of 12 held fewer than 500, but some exceeded 3,000. We used the Bonferroni procedure to control for familywise Type I error in post hoc comparisons and interpreted effect sizes as η^2 (Miles & Shevlin, 2001).

Results

As expected, our five approaches to the Urban-Centric codes varied appreciably in percentages of schools classified as rural, in effect sizes, and in the number of AP courses that schools received College Board authorization to offer. In Table 2, we report percentages of schools counted as rural and/or remote; means, standard deviations, and confidence intervals; and effect sizes for both dichotomous approaches and our 4-level and 5-level polytomous approaches. In Table 3, we report corresponding information for the 12-level approach. In Table 4, we have summarized schools' geographic locale-associated degrees of disadvantage, based on our five approaches.

Using the *blunt dichotomy* approach, juxtaposing city and suburb (nonrural) schools against town and rural schools (both indicating rurality), nonrural schools accounted for a narrow majority. Schools in cities and suburbs offered 6.35 more AP courses on average ($M = 11.23$, $SD = 7.14$) than schools in towns and rural areas, $t(12{,}941) = 58.94$, $p < .001$, 99.9% CI [10.94, 11.52], with a large effect ($\eta^2 = 0.21$).

The *postsprawl dichotomy* approach added town-fringe and rural-fringe schools to cities and suburbs, forming the nonrural group. The rural percentage shrank considerably, and the course-offering margin of difference grew slightly. For this more intentionally defined dichotomous approach, reliant on some degree of theory about how rurality operates, the nonrural group included nearly 70% of schools and offered 6.70 more AP courses on average ($M = 10.23$, $SD = 7.00$) than its rural counterpart, $t(12{,}941) = 57.03$, $p < .001$, 99.9% CI [9.99, 10.47]. Still large, the effect size ($\eta^2 = 0.20$) was negligibly smaller than that with the blunt dichotomy approach.

Using the *superimposed quartiles* approach, locale percentages of schools evened out noticeably. Rural schools formed a plurality at 32.4%, towns accounted for 15.6%, and suburbs 29.4% of schools. Suburban schools ($M = 12.33$, $SD = 6.81$) offered 7.70 more AP courses than rural schools on average, holding a pronounced advantage in AP course offering over other groups, $F(3, 12{,}939) = 1{,}290.83$, $p < .001$, 99.9% CI [11.97, 12.69]. Cities ($M = 9.79$, $SD = 7.30$) accounted for 22.6% of schools and held advantages over schools in towns (4.39 more AP offerings on average) and rural areas (5.16). The effect size ($\eta^2 = 0.23$) was larger than for either of the dichotomous approaches.

Table 2

Four Approaches to Parsing Geographic Locale in Examining Advanced Placement Course-Offering Data

Group	Urban-Centric Codes	*N*	Percentage	*M*	*SD*	99.9% CI
Blunt dichotomous approach (η^2 = 0.21)						
Nonrural	11, 12, 13, 21, 22, 23	6,733	52.02	11.23	7.14	10.94, 11.52
Rural	31, 32, 33, 41, 42, 43	6,210	47.98	4.88	4.78	4.68, 5.08
Postsprawl approach (η^2 = 0.20)						
Nonrural	11, 12, 13, 21, 22, 23, 31, 41	8,981	69.38	10.23	7.00	9.99, 10.47
Rural	32, 33, 42, 43	3,962	30.61	3.53	9.79	3.02, 4.04
Superimposed quartiles (η^2 = 0.23)						
City	11, 12, 13	2,927	22.61	9.79	7.30	9.34, 10.24
Suburb	21, 22, 23	3,806	29.41	12.33	6.81	11.97,12.69
Town	31, 32, 33	2,019	15.60	5.40	4.33	5.08, 5.72
Rural	41, 42, 43	4,191	32.38	4.63	4.97	4.38, 4.88
Proximity approach (η^2 = 0.26)						
City	11, 12, 13	2,927	22.61	9.79	7.30	9.34, 10.24
Suburb	21, 22, 23	3,806	29.41	12.33	6.81	11.97, 12.69
Fringe	31, 41	2,248	17.37	7.26	5.61	6.87, 7.65
Distant	32, 42	2,563	19.80	3.79[a]	3.68	3.55, 4.03
Remote	33, 43	1,399	10.81	3.05[a]	3.40	2.75, 3.35
Overall		**12,943**		**8.18**	**6.89**	**7.98, 8.38**

Note: Rounding might prevent percentages from equaling 100%.
[a] Means were not significantly different during pairwise comparisons (p > .001).

Table 3

Fully Nuanced Approach to Parsing Geographic Locale in Examining Advanced Placement Course-Offering Data (η^2 = 0.30)

Urban-Centric Code	*n*	Percentage	*M**	*SD*	*95% CI*
11—City: large	1,591	12.29	8.40[a]	7.25	8.04, 8.76
12—City: midsize	615	4.75	11.24[bc]	7.26	10.67, 11.81
13—City: small	721	5.57	11.62[b]	6.80	11.12, 12.12
21—Suburb: large	3,161	24.42	12.93	6.82	12.69, 13.17
22—Suburb: midsize	402	3.11	10.28[c]	5.95	9.70, 10.86
23—Suburb: small	243	1.88	8.02[ade]	5.72	7.30, 8.74
31—Town: fringe	479	3.70	6.56[dfg]	4.61	6.15, 6.97
32—Town: distant	912	7.05	5.35[fh]	4.26	5.07, 5.63
33—Town: remote	628	4.85	4.60[h]	4.00	4.29, 4.91
41—Rural: fringe	1,769	13.67	7.45[eg]	5.83	7.18, 7.72
42—Rural: distant	1,651	12.76	2.94	2.98	2.80, 3.08
43—Rural: remote	771	5.96	1.79	2.10	1.64, 1.94
Overall	**12,943**		**8.18**	**6.89**	**8.06, 8.30**

Note: Rounding might prevent percentages from equaling 100%.
*Same superscripts indicate means were not significantly different during pairwise comparisons (p > .05).

The *proximity* approach featured fringe, distant, and remote groups regardless of town or rural status, as well as the superimposed quartile's city and suburb configurations. This five-group approach produced significant differences in AP courses offered, $F(4, 12{,}938) = 1{,}149.60$, $p < .001$, with the largest effect thus far ($\eta^2 = 0.26$). All pairwise comparisons showed significant differences in courses offered except between distant and remote schools. When examined as intact groups with the other three approaches, towns and rural schools diverged widely from city or suburban schools. With the proximity approach, differences from city or suburban schools were far less pronounced for fringe schools than for distant or remote peer institutions. Fringe schools (M = 7.26, SD = 5.61) offered 5.07 fewer AP courses than suburban schools and 2.53 fewer than city schools; distant schools (M = 3.79, SD = 3.68) offered 8.54 and 6.00 fewer, and remote schools (M = 3.05, SD = 3.40) 9.28 and 6.74 fewer, respectively. Distinguishing the proximity approach from the three previous approaches, distant and remote schools each averaged less than half the number of AP courses of fringe schools, stressing the importance of disentangling rurality from remoteness.

As expected, the *fully nuanced* approach revealed the widest variation (see Table 3) in percentages and mean differences in AP courses offered, $F(11, 12{,}931) = 493.42$, $p < .001$, $\eta^2 = 0.30$. This 12-group approach allowed for 66 possible pairwise comparisons, 58 of which showed statistically significant differences (87.9%). For example, schools in large suburbs (Urban-Centric code 21) offered an average of 12.93 AP courses (SD = 6.82); thus, students in large suburbs could access 11.14 more AP courses than peers in rural-remote areas. Within-category comparisons also showed important differences. Schools in large cities (M = 8.40, SD = 7.25) offered significantly more courses on average than peer institutions in small and midsize cities, $p < .001$. Within suburbs, relations between course offering and suburb size were significant and negative. In town and rural settings, lower proximity to urban areas was associated with fewer course offerings. That decline was steeper in rural areas than in towns, suggesting more profound remoteness effects in rural spaces than in towns. Among towns, AP offerings dropped from fringe (M = 6.56, SD = 4.61) to distant (M = 5.35, SD = 4.26) to remote schools (M = 4.60, SD = 4.00). However, the distant-remote differential was not statistically significant, $p > .05$. In rural settings, schools at the fringe (M = 7.45, SD = 5.83) neared the national average (M = 8.18, SD = 6.89). By contrast, distant (M = 2.94, SD = 2.98) and remote schools in rural areas (M = 1.79, SD = 2.10) had the lowest means of any group across the five approaches.

Interpretations of the relative degrees of disadvantage that schools provided their students varied widely across approaches (see Table 4). In the *blunt dichotomy* approach, "rural" schools represented a slight minority, with a modest gap in AP courses offered (6.35) compared to nonrural schools. In the *postsprawl dichotomy* approach, the nonrural-rural gap stayed roughly the same (6.70 courses), but the percentage of rural schools shrank from about half to below a third. When applying the *superimposed quartiles* approach, the percentage of rural schools crept up, the leading locale shifted from an amorphous nonrural to a comparatively well-defined suburb, and rural disadvantage increased to 7.70 courses. Removing the blunt nonrural bin—often a misleading label intended as an urban synonym—made towns visible, showing disadvantage relative to peer institutions in suburbs and cities (6.93 and 4.39 courses, respectively), but less so than for rural schools.

Analytical scope and severity of disadvantage became increasingly clear with the *proximity* and *fully nuanced* approaches. The proximity approach raised awareness of percentages of schools distant from cities (19.8%) or in remote areas (10.8%). The suburbs group stood out as the largest (29.4% of all schools) and most advantaged (8.54 > than fringe and 9.28 > remote). Students in distant and remote schools had less access compared to students in schools at the fringes of towns or rural areas. Often swept coarsely into rural designations, fringes accounted for 17.4% of schools and offered significantly more AP courses than distant (by 3.47)

Table 4

Interpretation of Rural-Remote Disadvantage: Percentage, Effect Size, and Gap From Lead

Approach	Rural-Remote Codes	Percentage	η^2	Disadvantaged Group	Gap From Lead Group(s)
Blunt	31, 32, 33, 41, 42, 43	47.98	.21	Rural *M* = 4.88 *SD* = 4.78	6.35 APs < nonrural
Postsprawl	32, 33,42, 43	30.61	.20	Rural *M* = 3.53 *SD* = 3.60	6.70 APs < nonrural
Superimposed quartiles	41, 42, 43	32.38	.23	Rural *M* = 4.63 *SD* = 4.97	7.70 APs < suburbs
Proximity	32, 42	19.80	.26	Distant *M* = 3.79 *SD* = 3.68	8.54 APs < suburbs, 3.47 < fringe
	33, 43	10.81		Remote *M* = 3.05 *SD* = 3.40	9.28 APs < suburbs, 4.21 < fringe
Fully nuanced	42	12.76	.30	Rural: distant *M* = 2.94 *SD* = 2.98	9.99 APs < suburb-large, 4.51 < rural-fringe
	43	5.96		Rural: remote *M* = 1.79 *SD* = 2.10	11.14 APs < suburb-large, 5.66 < rural-fringe

Note. APs = Advanced Placement courses.

or remote (4.21) peer schools. The 12-group *fully nuanced approach* created a rural-remote bin with less than 6% of schools but in which students had extremely limited access: two or fewer AP courses on average overall or 11.14 fewer courses than students in schools in large suburbs. Likewise, students in rural-distant schools (12.8%) had a 10-course disadvantage. Differences in student access materialized between rural-fringe schools and relatively disadvantaged rural-distant (4.51 fewer courses) and rural-remote (5.66 fewer) peer schools.

Discussion

Our study illustrates the drawback inherent in the common practice of education researchers insufficiently describing rurality and remoteness—distinct and overlapping school characteristics that are integral to understanding place. Given vast inconsistencies in how researchers define (or fail to define) school locales, our study exemplifies how poor descriptions of place can confound research-dependent policies (Hawley et al., 2016). A field-level absence of consistency and consensus in operationalizing locale (Thier & Beach, 2019) has reified deficits that are especially salient for rural areas (Kettler et al., 2016), which were home to 19% of the U.S. population but covered *95% of this country's land* area, according to data from the most recently completed U.S. Census (2010). Within this context, our study can contribute a methodological advancement and substantive findings regarding the breadth of schools' AP offerings, one of several proxies for school-based efforts to increase gifted education opportunities.

Methodologically, our findings have shown utility gained and lost by dichotomizing schools' geographic locales (nonrural/rural or urban/nonurban) rather than embracing finer-grained data, as political science and other fields have begun to do (Lichter & Zilliak, 2017). On one hand, we advocate for education researchers' agreement on a definitional framework, an impulse that drew our endorsement of the Urban-Centric locale codes (Greenough & Nelson, 2015), at least to jump-start policy analyses. On the other hand, we recognize the need to specify locale in ways that comport with theory (Koziol et al., 2015) and avoid assuming any single coding schema to be flawless (Puryear & Kettler, 2017; Rasheed, 2020). Thus, we embrace the complexity standardized codes can afford, so long as researchers apply them in theoretically sound ways that add appropriate precision (Chen et al., 2017; Kettler et al., 2016; Puryear & Kettler, 2017).

Our comparative analysis supports descriptive findings regarding schools (Greenough & Nelson, 2015) and inferential findings regarding districts (Puryear & Kettler, 2017). We also capitalized in the domestic context on Chen et al.'s (2017) concentric, proximity-based addition to international literature in defining and measuring locale. Moreover, we compared benefits and drawbacks of multiple dichotomies and polytomies as we employed a data set that enabled us to tap into the NCES Urban-Centric codes, which offer more precision than its Metro-Centric forebears (Koziol et al., 2015). With Kettler et al. (2016), we share a characterization of the Urban-Centric codes as "convenient" but "not complete" (pp. 260–261). Consequently, we designed five approaches to harness the codes' utility and simplicity, seeking to avoid the underestimation of locale effects. Geographically precise examinations are essential for studying opportunity to learn because opportunities exist within places. Studies designed to detect presence or absence of opportunities rely on the most precise understandings of place. Therefore, our approaches offer perspective on previous analyses.

As one example of that additional utility, we provided empirical examples that can answer calls for an accounting of the growing phenomenon of exurbs, which continue to blur long-believed divides among geographic locales (Greenough & Nelson, 2015; Kettler et al., 2016). Furthermore, our proximity-based approach to locale's complexity is conceptually more parsimonious than Kettler et al.'s (2016) "dual analysis" (p. 261). Their approach required both a school's categorical locale and its student enrollment as a continuous variable. We demonstrated a way to contextualize locale further without additional statistical tests of potential interactions among variables. Still, future inquiries might compare our respective approaches to determine whether a more comprehensive or more parsimonious approach is optimal, or at least preferable, under various research design conditions.

Key Findings

Our five approaches to the Urban-Centric codes showed disparate results. Specifically, our polytomous approaches allowed us to observe effects of proximity on opportunities (Puryear & Kettler, 2017), in our case regarding school-based access to advanced coursework. These results emerged from our prior exploration of how operationalizations of rurality and remoteness converge and diverge (Thier & Beach, 2019) and accentuate how inequalities associated with geographic locale weaken democratic ideals that oppose ZIP code predicting opportunity (Rasheed, 2020). Employing more groups of schools revealed remoteness to be increasingly salient: disadvantages within rural and/or remote schools and effect sizes both grew observably as proximity increased from cities in concentric rings. Our proximity approach echoed district-level research on gifted education resources and services, which broadly regarded geographic locale as more predictive of opportunities than ethno-racial variables (Kettler et al., 2015). Our fully nuanced approach maximized the Urban-Centric codes, yielding double-digit differences between AP offerings in large suburbs and those in rural-distant and rural-remote areas.

Moreover, our analyses exposed the potential for underspecified geographic questions to confound policy formulation, enactment, and evaluation. Regarding percentages of schools in which students may be disadvantaged, dichotomous rather than rural-remote groupings can vary up to 42% in terms of the frequency of schools in which students may be disadvantaged. The blunt dichotomy approach indicated that students in 48% of rural schools were disadvantaged. In contrast, the fully nuanced approach showed that students in 6% of rural-distant or rural-remote schools might experience *pronounced* disadvantages; as in prior studies, AP breadth in rural-fringe schools did not resemble AP breadth in rural-distant or rural-remote schools (Greenough & Nelson, 2015; Puryear & Kettler, 2017). Although the fully nuanced approach provided the greatest refinement, it did not offer a panacea. Estimating for 12 groups would require large, likely nation-level samples to avoid potentially severe imbalances. Despite such challenges, we have provided evidence to argue for considering geographic locale as a fine-grained categorization rather than as a dichotomy.

Recommendations for Researchers

We have three recommendations for researchers who intend their findings to inform policies. First, we recommend incorporating geographic locale into analyses, whenever possible: this school characteristic may explain variance in policy- and practice-relevant outcomes. Second, when incorporating geographic locale, it should be operationalized precisely using relevant theory as a guide. Third, a polytomous approach is less likely to obscure inherent variation rather than dichotomizing geographic locale. The latter might confound findings and imperil decision making. We elaborate on each of these recommendations below.

Include locale

Education researchers already recognize the importance of accounting for schools being coeducational/single-sex, day/boarding, publicly/privately funded, and mostly of one ethno-racial group or diverse. They pay far less attention to whether a school is located in a metropolis, a rural area near that metropolis, or a rural area far from a metropolis (Thier & Beach, 2019). Influential texts, such as *Rural Education Research in the United States* (Beesley & Sheridan, 2017), have emphasized the importance of locale but speak mainly to researchers who already spend much of their time thinking about rurality. More precise methodological choices will become typical when the conversation extends beyond self-defined scholars of place. Still, scholars who focus on rurality and/or remoteness can use our findings to keep conversations about place more nuanced than mere categorical discussions. Likewise, Biddle et al. (2019) reminded scholars of a dual responsibility to understand place deeply when making policy recommendations or when interpreting findings. Thus, we encourage the broadest swath of researchers to acknowledge complexities such as rural places being remote or not and remote places being rural or not. When that occurs, studies dispelling myths about rural areas as clones (Biddle & Azano, 2016), rural schools as inherently small (Kettler et al., 2016), and students in rural schools all living in poverty (Greenough & Nelson, 2015) might no longer be outliers.

Likewise, our fully nuanced approach suggests meaningful size and proximity variations within cities, suburbs, and towns. Even though some researchers recognize locale as a consequential predictor for students' social and educational outcomes, few studies have attended adequately to this essential factor (Morris & Monroe, 2009). Such inattention to geographical locale necessarily limits the yield of education research. Therefore, we encourage deep thought about geography, so that both research producers and consumers can all know the places that studies include or exclude, helping policy makers avoid the creation of winners in some places and losers in others.

We can speculate at least one reason that many U.S. education researchers might not focus on rural places. Universities, sites of sizable portions of research, demonstrate considerable geographic disproportionality that favors cities and suburbs. To illustrate, the College Board (2017) lists 2,282 four-year, U.S. universities. Of those institutions, 437 are categorized as rural (19.2%), 975 as suburban (42.7%), and 870 as urban (38.1%), although without defining its categories. Among 116 Research 1 institutions (i.e., doctorate granting, with the highest level of research activity), contrasts are stark. Seven such institutions exist in rural areas (6.0%), 46 in suburbs (39.7%), and 63 in cities

(54.3%). Sears's (1986) social psychology observations seem applicable here. The common practice of convenience sampling might be introducing proximity-based biases: researchers typically recruit participants at or near their universities, undermining representativeness and generalizability. Given misalignment between the vast numbers of schools in rural areas and the paucity of rural-focused research (Coladarci, 2007), it follows logically that university researchers' sampling efforts might be suffering proximity-based biases.

For researchers interested in venturing beyond their urban or suburban campuses, we have discussed several ways to unpack geographic locale. An important improvement on current practice could be wholesale endorsement of NCES's Urban-Centric codes for education research, capitalizing on their flexibility and standardizing a definition for contested terms (Greenough & Nelson, 2015). Relatedly, examining our five approaches to the Urban-Centric codes can help researchers embrace a more sophisticated view of rurality and remoteness. Such analyses might reveal that these categories are wrong-minded entirely, as Puryear and Kettler (2017) suggest regarding district-level data. Perhaps locale is not an interval variable as the codes might suggest. Attending school in any type of geographic locale should not *determine* access to gifted education opportunities, so it might merely mark other variables. Perhaps conditions in rural/remote spaces activate unknown processes that hinder access to gifted education. If so, researchers can examine causal effects that might lurk behind such labels, yielding interrogation of how community norms and social connectedness might vary based on the salience of rurality and/or remoteness.

Meanwhile, locale-informed research remains useful to identify possible gaps in opportunities for students of varying academic potential, but specifically regarding gifted programs that require both additional resources and the benefits of economies of scale (Rasheed, 2020). To curb the latter problem, education researchers can inform policy makers with locale-informed assessments of needs and feasibility for offering gifted education programs to the widest number of "able" students, not just those identified as gifted. Doing so would capitalize on lower per-pupil program expenses in the face of budget shortfalls that can plague rural-distant and rural-remote settings (Greenough & Nelson, 2015; Howley et al., 1988). Furthermore, capitalizing on scale could enable sustainability, largely by generating a critical mass of gifted students who call rural and remote places home, so they would martial their understanding and love of such places to reinvest their talents in locally resonant ways (Lawrence, 2009).

Operationalize Precisely

Apple (2011) called on researchers analyzing cities, suburbs, or rural areas to account completely for implications of such designations, avoiding the typical disrespect embedded in urban-centric narratives (Cramer, 2016). The five approaches that we applied to the Urban-Centric codes can offer a certain degree of flexibility, but we advocate for specifying one's groupings to reveal the utmost complexity. By doing so, one can embrace what many researchers neglect in analyses of place: identifying explicitly which areas are included and excluded (Rasheed, 2020; Thier & Beach, 2019). Ultimately, defining geographic locale should correspond to local, state, and regional contexts for such definitions, which might vary by stakeholders' recognitions of population counts, proximity to urban areas, administrative functions, economic needs, and/or land uses (Thier et al., 2020). Regarding rural complexity, Corbett (2016) noted that if "you have seen one rural community, you have seen . . . well, one rural community" (p. 278).

By including footnotes or methods sections that detail what a study's locale bins contain, researchers can make crucial advancements. Geographic locale definitions, particularly around rurality and remoteness, require methodological and interpretive care (Hawley et al., 2016). In the absence of broad consensus regarding the role and definition of rurality and/or remoteness, Box's (1976) admonishment will continue to describe most research on schools: all models will be wrong, though some might be useful. Group comparison research depends on clear definitions of the groups of interest (Kettler et al., 2016). In describing research on gifted education regardless of location, Callahan et al. (2014) stressed definition, identification, and education leaders' philosophical beliefs. We concur: definitions, identifications, and philosophies are highly relevant considerations for research, especially at the intersection of gifted education and rural education, where metro areas are default norms (Colangelo et al., 1999; Roberts & Green, 2013).

Thus, we suggest researchers should explicitly name the school types within and outside their groups. For this reason, we labeled our groups as blunt and postsprawl dichotomies, superimposed quartile, proximity, and fully nuanced. Differences between blunt and postsprawl dichotomies might seem trivial if comparing relative nonrural-rural access gaps or their negligibly different effect sizes in the current study. Nonrural schools offering 2.30 times as many AP courses in the blunt dichotomy and 2.90 times as many in the postsprawl dichotomy compared to their respective "rural" comparison groups might not raise much concern. But percent differences in sizes of disadvantaged groups can present enormous challenges for making, implementing, and vetting policies. Depending on how locale is defined, "rural" could be a 52%-48% minority, 69%-31% minority, or leading plurality at 32%. Without clear definitions, research consumers would not know whether "rural" accounts for both rurality and remoteness, which might represent as few as 6% of schools.

Moreover, ranging effect sizes suggest a need for policy makers to adjust expectations based on how research operationalizes geographic locale. Simplistic designs might seem intuitive but could lack requisite granularity for important decisions about increasing rigor, adding curricular breadth, or other interventions. We encourage disaggregating school data with the most precision possible to engender the best-informed comparisons, especially amid contested definitional terrain regarding rurality and potentially diverse gifted education needs (Rasheed, 2020). If one aims to mitigate challenges in rural and/or remote settings, it would be inappropriate to allocate funds haphazardly to "rural" schools unless one can detect their relative similarity, and proximity, to cities or suburbs (Puryear & Kettler, 2017).

Polytomous Thinking

Dichotomous urban versus rural thinking obeys unrefined operational definitions—a recipe for misinformed conclusions. Treating communities like they are either a city or a country mouse in an Aesop fable oversimplifies real differences. Binaries might provide a comforting heuristic, but they merely produce rough cuts of data that can blind policy makers from actual needs (e.g., in rural-remote, not rural-fringe, schools). Short-handing "rural" as "poor" is a core reason why policy makers often misinterpret phenomena in rural and/or remote areas (Wuthnow, 2019). In our example, simply funding more AP programs in towns and rural areas might positively alter a nonrural/rural ratio but fail to improve actual opportunities for students in the rural areas of greatest need. Instead, we recommend the most refined cuts of data available, such as the superimposed quartiles (four groups), proximity (five), or fully nuanced (12) approaches we describe here. Using polytomous thinking, researchers can show geographic locale on a continuum, recognizing multiple ruralities rather than one "rural" way of schooling (Green & Corbett, 2013). Specifically, our proximity and fully nuanced approaches can enable context-specific solutions for various needs that gifted students in rural and/or remote areas experience (Rasheed, 2020).

Although a 12-level approach might provide too many comparisons for some circumstances, disregarding complex relations between rurality and remoteness can represent a nonignorable threat to decision making. Despite suggestions that theoretical and practical considerations should govern selection or construction of operational definitions for geographic locale (Koziol et al., 2015), we argue for polytomous approaches in most cases to facilitate good decision making. We fear that policy goals may seek expediency or feasibility based on limited knowledge of geographical locale's complexity. So, we caution against dichotomies that mask the complexity of geography (Cromartie & Bucholtz, 2008, pp. 28–35). Dichotomies can convey powerfully inaccurate narratives. Our study is illustrative for research producers and consumers in showing how to apply increasing complexity to the Urban-Centric codes.

In general, polytomous thinking might prompt both researchers and the policy makers their work can inform to first use quantitative analyses to identify needs and issues of feasibility broadly based on geographic locale. Second, a wide array of stakeholders could collaboratively refine those analyses toward locally resonant policy and practice recommendations. When researchers, policy makers, and practitioners collaborate, they can develop sustainable, localized education policy (Rasheed, 2020) that large-scale analyses can inform based on polytomous thinking. Operating exclusively on large-scale quantitative analyses would relegate education research that considers locale to "geographical grid work" using variables such as proximity or population density (Rasheed, 2020, p. 80). In concert, polytomous quantitative analyses alongside locally resonant collaborations that embrace criticality can respect local culture (Richards & Stambaugh, 2015), resist geographical power asymmetries and traditions of disparaging and marginalizing rural and/or remote locations (Howley, 2009; Kettler et al., 2016), and serve students in areas where gifted education needs often go unmet (Azano, 2014; Rasheed, 2020).

Limitations

Although we conceptualize rurality and remoteness as different traits that overlap in many, but not all contexts, our view is not an industry standard. Some scholars interchange rural and remote, though we vehemently disagree. Others see an unclear correlation "between distance and the evidence of remoteness" (d'Plesse, 1993, p. 13). The concentric rings we envision might overlap in some locations. Still, scholars who sample entirely in rural settings distinguish among communities based on proximities to metropolitan areas (Dierking & Fox, 2013; Irvin et al., 2011; Petrin et al., 2014). We endorse our proximity and fully nuanced approaches because they enable quantitative analysts to emphasize rurality and remoteness jointly and separately while recognizing inherent complexities about schools and their communities. Relatedly, the Urban-Centric codes are working definitions for social constructs. Used without theory or criticality, they can further marginalize rural and/or remote places (Rasheed, 2020, pp. 64–66).

Two other limitations attend our findings. First, breadth of opportunity to learn AP content is a proxy for accessing educational rigor, but AP does not exhaustively capture the opportunities that jurisdictions have offered to serve gifted students. International Baccalaureate, dual-enrollment, and other programs serve similar purposes (Hertberg-Davis & Callahan, 2008). Second, we set different critical values for our first four approaches than our last due to a naturally imbalanced design. In so doing, we inflated standard errors, potentially threatening our comparisons in some readers' minds. Still, relatively large effect sizes may instill confidence regarding the practical and statistical significances of our findings.

Conclusions

Researchers do not hold a monopoly on the lack of rural awareness. One can scarcely access news from print, radio, televised, or digital sources without "urban-centric media and policy elites" confounding rurality or ignoring its nuances (Johnson, 2017, p. 1). Johnson lamented a lack of surprise for this type of neglect despite living in a country that owes most of its food, raw materials, drinking water, and air to rural spaces. Stressing the importance of understanding rural spaces within studies that delve into them, we have provided approaches to operationalizing rurality and/or remoteness in ways that might facilitate generalization and replication, particularly emphasizing the benefits that our proximity and fully nuance approaches can afford.

Specifically regarding gifted education more broadly than just Advanced Placement opportunities, the approaches we examined—especially those that best adhere to project-specific needs for nuance—can aid examinations of myriad issues of policy and practice, such as proximity-based obstacles that schools must overcome in their attempts to provide off-site enrichment activities (Badger & Harker, 2016; Greene et al., 2014; Surface, 2016). Moreover, quantifying complexities of proximity as they pertain to rurality and/or remoteness can be used to critique findings about the choices that gifted education students face when they attend rural K-12 schools but seek to fully actualize their educative/career potential, often pushing them to leave home (Seward & Gaesser, 2018). Thus, proximity-based analyses can add a dimension to phenomena such as learning to leave (see Corbett, 2007). What if the rural area that a gifted student is learning to leave is, for example, Cabarrus County, North Carolina? Coded 41 on the rural-fringe, Cox Mill High School in Cabarrus County is an 18-mile drive, mostly on Interstate 85, from Charlotte, the nation's 15th most populous city. Certainly, some gifted students in rural contexts will not need to learn to leave. For students in that area, many robust opportunities might be immediately accessible.

Addressing concerns about the utility of the Urban-Centric codes and calls for deeper interrogations of proximity (Puryear & Kettler, 2017), our five approaches revealed varied interpretations of school data conditioned on geographic locale. Traditionally, though, education researchers have not balanced theory and practical limitations to understand the intricate geographic traits of communities. Dichotomies that seem expeditious can brand rural spaces as deviant (Roberts & Green, 2013) and mask meaningful distinctions. Perhaps due to project-leaders' perceptions about feasibility rather than their reliance on theory, research designs often hide many complex stories that data might otherwise tell about place. We suggest that too much education research neither regards geographic locale as a crucial characteristic nor applies requisite precision. Bolstered by the findings from the five approaches we compared in this study, we invite our colleagues to do both.

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