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Schools at the Rural-Urban Boundary – Blurring the Divide?

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Abstract

Schools mirror the communities in which they are located. Research on school inequality across the rural-urban spectrum tends to focus on the contrast between urban, suburban, and rural schools and glosses over the variation within these areas as well as the similarities between them. To address this gap and provide a richer description of the spatial distribution of educational inequality, we examine the school composition, achievement, and resources of all U.S. elementary schools in 2010–2011. We apply standard census definitions of what areas fall within central cities, the remainder of metropolitan regions, and in rural America. We then apply spatially explicit methods to reveal blurred boundaries and gradual gradients rather than sharp breaks at the edges of these zones. The results show high levels of variation within the suburbs and substantial commonality between rural and urban areas.

Schools vary widely in racial/ethnic composition, poverty concentration, student performance, size, density, and administrative organization. It is well known that these differences have a spatial pattern, especially pronounced in the disparities between many central city school districts and those in the surrounding suburbs. Indeed, many studies of school segregation and educational inequality are limited to metropolitan regions (Reardon and Owens 2014). In this study, we extend the analysis to rural schools, and we examine variation within urban, suburban, and rural areas as well as the similarities between them.

Much research on the rural-urban interface, including studies of rural schools, focuses on the simple dichotomy between non-metropolitan and metropolitan locations, ignoring differences between cities and suburbs (Lichter 2011). Other studies add dummy variables for urban, suburban, and rural locations to test whether rural schools are distinctive, but do not examine variation within each of these categories (Fan and Chen 1999). We believe that variation within and commonalities across these locations are important for two reasons. First their boundaries are arbitrary and changing, so that – as one example – what counted as rural at one time might well be suburban at another. Second people are also in flux. In recent decades, net migration flows between central cities and the suburbs have strongly favored suburban areas, as has migration from rural to suburban areas. Suburbanites now account for more than half of the U.S. population (Lichter 2011). As populations have grown and farmland has been converted into residential developments, many metropolitan areas have

also been expanded and been redefined to include areas previously marked by a rural settlement pattern (see the introduction to this volume for more detail).

These growing suburban population is not homogeneous, and different locations within the suburban ring vary greatly from others. On the outer edge of metropolitan areas, the incorporation of new counties is likely to include some rural communities that maintain a more traditional rural settlement pattern despite the new suburban designation. Closer to the cities, poor and minority families are moving into inner suburban neighborhoods at increasing rates (Allard 2008, Murphy 2007). By 2008, the poor population in the suburbs was growing faster than in the cities or rural areas (Kneebone and Garr 2010). New immigrants are also moving directly to suburban and rural areas without stopping in traditional urban ethnic enclaves (Erenhalt 2012, Lichter 2011, see also the Garcia and Schmalzbauer chapter in this volume).

The heterogeneity of schools located in each part of the metropolis is reflected in the fact that when analysts seek to sort schools into clusters with similar characteristics, these clusters do not neatly divide into urban, suburban, and rural categories. Logan, Minca, and Adar (2013, see also Logan and Burdick-Will 2016) reported one cluster that seems to represent typical suburban characteristics, with large numbers of white students (87 percent on average), low levels of free and reduced lunch eligibility (21 percent on average) and highly ranked schools (averaging at the 68th percentile on test scores compared with others in the same state). However, only 71 percent of schools in this cluster are in the suburbs. The others are split evenly between cities and rural areas. Two clusters have a plurality of schools located in central cities, and their characteristics approximate the city stereotype: they have high shares of minority children, around two-thirds of students are free-lunch eligible, and they are also the poorest performing schools on standardized tests. Yet both suburban and non-metro schools are well represented in these clusters. Even the cluster that was most likely to be found in rural areas (distinguished partly by overrepresentation of Native American students) included just as many suburban and central city schools as it did non-metro schools. Hence there is much overlap in characteristics across these three kinds of locations. Research that only taps the average differences among them risks reifying the boundaries between urban, suburban, and rural locations and transitional zones between them.

Research design

Our purpose is to provide an assessment of variation in schools within and between these locations for all public schools in the U.S. in 2010–2011. Our research design incorporates two critical choices: 1) we identify school locations based on the boundaries of the school district that administers them, and 2) we examine only elementary schools.

There are several reasons to focus on school districts for our main classification of schools. Most students attend a school in the district where they reside and many families, both rich and poor, make housing decisions based on the perceived quality of the schools in each district (Lareau and Goyette 2014). Research on school segregation also shows that there are larger racial and economic differences between districts than among schools within the same

district (Reardon and Owens 2014). School funding is generally allocated at the district level as are decisions about instruction and staffing. While the relationship between expenditures and achievement is complicated and more money does not tend to lead directly to higher achievement, when resources are used appropriately, both scholars and parents expect them to lead to better schooling outcomes and more educational opportunity (Morgan and Jung 2016).

In most of the country school districts are smaller than the counties used by the US Census Bureau to delineate metropolitan location and to distinguish cities, suburbs, and rural areas. Therefore, districts allow for the division of large county-based regions into more finely grained categories. We define a locational gradient from the central city to the suburban fringe and then beyond to rural areas using school district boundaries as dividing lines to distinguish schools in the largest cities, schools in smaller cities within large metropolitan areas, inner suburban, core suburban, and outer suburban schools, and finally rural schools close to the metropolitan boundary and those that are more distant. We also undertake a systematic comparison of pairs of schools that lie near one another on either side each of these regions to test the salience of the boundaries between locational categories. We do find important differences between large and small city schools, suburban schools, and rural schools. But we also show that the boundaries between these types are blurred rather than sharply divided. Schools near one another on either side of each of these boundaries are rather similar, creating gradients where we might have found large differences. The inner and outer edges of suburbia look a lot like the urban and rural areas on the other side. Further, many schools in rural districts have more in common in terms of composition, resources, and achievement with many smaller city districts than with the privileged middle suburban areas that lie between them. By examining the composition of schools along the rural-urban interface, we expose the rather thin line that separates the rural from the urban.

Our second major choice is to focus on elementary schools. They are smaller than other schools and are likely to draw students from a smaller catchment area. Because grade ranges in schools vary greatly across districts, we define an “elementary school” here as one that includes at least one grade between kindergarten and sixth grade. Insofar as possible we consider only data for elementary grade children. We use 4th graders to represent the achievement levels of elementary students because this is the elementary grade level for which test scores are most often available. When test score data are not available for 4th graders we use scores from 5th graders. If there are no 4th or 5th graders we take the scores of 3rd graders.

Data

Data on all public schools in 2010–11 are provided by the National Center for Education Statistics (NCES). NCES provides data on the student body of each school through its Common Core of Data (NCES 2012). Race/ethnicity is reported in the following categories: non-Hispanic white, black, Hispanic, Asian, and Native American/other races. NCES also reports for most schools the number of students who are eligible for free or reduced price lunches, which we use as an indicator of poverty. Eligibility for reduced price lunches is reported for the entire school. We assume that free/reduced price lunch eligibility of students

in each grade mirrors that of the whole school. The Common Core of Data also include the total number of students, student-teacher ratio, and the precise geographic location of each school.¹

The Common Core of Data also provides information on school district finances (NCES 2016). School level funding is not available, but we use the district level measure of instructional salary per student (total district expenditures divided by total number of students in the district) to capture an approximation of the educationally relevant expenditures in each school. It is important to note that equity of funding is important in and of itself, numerous studies have found that financial resources alone are not related to student achievement. (See Morgan and Jung 2016 for a recent analysis of the different ways to measure school financial resources and its relationship with achievement test scores.)

Testing data are calculated from the percent of students who meet state proficiency levels in reading and mathematics on tests administered by each state, reported to and made available by NCES (EDFacts 2013a, EDFacts 2013b). The content and scoring of these tests vary widely across states. However, these are the most comprehensive testing data. The National Assessment of Educational Progress (NAEP) provides scores that are comparable across states, but these are only available for a sample of students within a small sample of U.S. schools. In order to make the state test scores more meaningful, we have recalibrated the percent passing scores as percentiles of school performance within the state (following the approach by Logan, Minca and Adar 2012). A complication in using these scores is that in many cases NCES reported a score range (sometimes a range as large as 15 or 20 percentage points) rather than a specific score. For each reported range we determined the average score among schools in the nation with reported specific scores in that range. We then use the imputed precise scores to calculate a percentile within each state. This creates a rank ordering within every state. From the perspective of a parent who is considering a range of school options, almost always within a state, these percentiles are meaningful. A school at the 20th percentile is much worse than one at the 50th percentile in any state, regardless of differences in the states' test content or proficiency cutoffs that we suspect are considerable.

Table 1 shows the means of each school measure using the traditional urban-suburban-rural categories. Suburban schools educate the largest number of elementary school students. Approximately half of the 25.8 million elementary school students go to school in the suburbs. A little under one third attend urban schools, and 15 percent attend schools in a rural area.

Unsurprisingly, there are stark differences between these groups. Overall, student populations get substantially whiter as schools get farther from the urban core. There is a steep urban-to-rural decrease in Black and Hispanic students and a sharp increase in Native American students. Free and reduced lunch eligibility, on the other hand, is lowest in suburban areas (42.8%) and only slightly lower in rural areas (58.0%) than urban ones (62.5%). The achievement measures follow the inverse trend, with suburban schools scoring

¹Student-teacher ratios were inexplicably missing for the entire state of California in the 2010-11 Common Core data, but were supplemented with values from the California State Board of Education (<http://www.ed-data.org>).

approximately twelve percentile points higher than urban schools and eight percentile points higher than rural schools, on average. The ratio of students to teachers is substantially lower in rural schools (30) than urban or suburban (36). Instructional salary expenditure per student is slightly higher in urban areas than in rural areas, and suburbs fall in between.

Methods of analysis

The focus of this analysis is to understand the differentiation along the boundaries between the traditional large census categories of urban, suburban, and rural. To do this we code every school based on its location and the boundaries of its school district using the school's geographic coordinates (reported by NCES) and maps of school district boundaries provided by the Census Bureau. GIS procedures were used to locate schools within principal cities of Metropolitan Statistical Areas (MSAs), the suburban remainder of the MSA, or outside of an MSA using the Census Bureau's geographic definitions as of 2010. The geographic boundaries of elementary school districts (or unified districts including elementary schools) were then used to determine if the district touched the boundary of a metropolitan area or a principal city. Since the MSAs are defined by county boundaries and school districts do not always align with county boundaries, there are some districts that cross both boundaries. This is especially true in the Southwest. This means that schools in the same district may be placed in different categories.

Every school was given one of the following mutually exclusive codes. All categories are defined by location and all suburban and rural categories are based entirely on adjacency. The distinction between schools in large and smaller city districts is based on their elementary enrollment.

- A. Large urban: schools located in the largest city in a multi-city metropolitan areas. There are 136 cities that fit this category, including the 10 largest cities in terms of student population and most of the top 20.
- B. Urban: schools located within any other principal city, including cities in single city metropolitan areas.
- C. Inner Suburban: suburban schools in a district that touches or crosses the city limit.
- D. Middle Suburban: suburban schools in a district that is does not touch or cross the city limit or the MSA boundary.
- E. Outer Suburban: suburban schools in a district that touches a rural district, but not the city limit.²
- F. Inner Rural: rural schools in a district that touches or crosses the MSA boundary.
- G. Middle Rural: rural schools in a district that touch and inner rural district.

²Not all suburban districts at the edge of their metropolitan area are outer suburban since they are adjacent to another metropolitan area, not a rural district. Suburban districts that touch both rural districts and the city limit are considered Inner Suburbs.

H. Outer Rural: rural schools in a district that is does not touch an inner rural district.

These definitions rely on the adjacency of city, metro, and district boundaries rather than arbitrary distance or density cut offs. Since these boundaries are socially constructed they often are influenced by political and demographic differences between residents, making them likely to represent real social distinctions. If we relied on distance or density criteria, we would have to treat rural districts in the Southwest, where districts are especially large and transportation relies on major highways, as “more isolated” than those in the denser and more politically fragmented Northeast. Our view is that what ounces is not proximity but social differentiation and differences in resources.

These categories of schools are not evenly distributed across the country. Table 2 shows the relative frequency of each category in four major census regions. Here we follow the census designation of regions except for Texas, which we place in the West rather than the South due to its large Hispanic population. In the Northeast, due the high density of adjacent metropolitan areas and fragmentation of districts, nearly one third of all schools are Middle Suburban (that is, in the suburbs but not adjacent either to the central city limits or the outer metropolitan boundary). In the South and West, where districts are much larger, there are fewer metropolitan areas, and city districts are quite large, many fewer schools are Middle Suburban.

Schools and districts vary in different areas of the country in other ways than their locational category. For example, districts in the northeast and rustbelt are much smaller and more densely populated and districts on the coasts tend to have more wealthy residents. In order to remove these overall regional differences, we will make comparisons only between schools in the general area. We do this by creating what we call “metro-plus” zones – metropolitan regions plus the rural schools nearest to them. We define “nearest” by using GIS software to find the nearest metropolitan principal city to every rural school. Rural schools are then considered to be part of that nearest principal city’s metro-plus area. In our multivariate analyses, we calculate the differences between locational categories in the same metro area using regressions with fixed-effects for each metro-plus area. Since many metropolitan areas cross state lines, we also include indicators for each state. The results are weighted by the number of students in each metro-plus area. The general approach is represented in the following equation, where for illustration Y_{ij} is the proportion of non-Hispanic white students in the school:

$$Y_{ij} = \beta_0 + \beta_1 \text{Urban}_{ij} + \beta_2 \text{InnerSuburban}_{ij} + \beta_3 \text{MiddleSuburban}_{ij} + \beta_4 \text{OuterSuburban}_{ij} + \beta_5 \text{InnerRural}_{ij} + \beta_6 \text{MiddleRural}_{ij} + \beta_7 \text{OuterRural}_{ij} + \text{State}_{ij} + \text{MetroPlusArea}_i + e_{ij}$$

By comparing categories within the same metro-plus zones, the focus becomes the relative difference in racial composition between urban, suburban, and rural areas rather than the absolute proportions. For example, in the small metropolitan areas in the Midwest that tend to have very high proportions of white residents, the model is focused on differences within them rather than the relatively high proportions in all the area’s schools. Note that not all metro-plus areas include every category. Some MSAs only have one city and therefore are

not included in the large urban category. Some MSAs do not include enough suburban districts to have middle or outer suburban areas. Many MSAs do not include middle or outer rural areas and some have no rural or outer suburban areas at all because they are completely surrounded by other metropolitan areas. When an MSA does not include a category its schools do not contribute to the estimate of the relative difference. Predicted means for each category are reported in Table 3 below. These means do not represent the characteristics of any specific metro-plus area, but rather the national average of each category controlling for differences in metro area and state.

To examine variations right at the boundaries between location categories, we carry out another series of analyses based on selected pairs of schools on either side of the boundary. Using ArcGIS 10.4 all schools were matched to the closest school in a different locational category within the same metro-plus area. In each metro-plus area we selected one pair of matching schools at each locational boundary – the closest cross-boundary pair regardless of actual distance. For these analyses we do not consider the boundary between the two urban categories (large urban and urban) because there are very few MSAs with adjacent large and small urban cities. Not all potential cross-boundary pairs exist. For example, in MSAs with no middle suburban area, inner suburban schools are paired with outer suburban or even inner rural schools. There are approximately 13,000 schools included in these edge analyses. The average distance between schools in a pair is 3 miles. The average distance is smallest at the urban boundary (1.5 miles) and largest at the rural boundary (7.5 miles) due to the differences in density between urban and rural areas.³

The average value for category edges is then calculated using a regression that includes all cases where one of the pairs forms the edge of a given category and including a fixed-effect for each pair of schools. This means that we estimate the relative difference between schools on either side of the boundary. We also control for the category of the school that falls on the other side of the boundary because not all metro areas have all the middle and outer categories and therefore pairs of schools contain different combinations of categories.

For example, the predicted mean of the outer most edge of Inner Suburban is the intercept of the following equation, estimated with all pairs of schools in which one of the schools is on that edge:

$$Y_{ij} = \alpha_0 + \alpha_1 \text{MiddleSuburban}_{ij} + \alpha_2 \text{OuterSuburban}_{ij} + \alpha_3 \text{InnerRural}_{ij} + \alpha_4 \text{MiddleRural}_{ij} + \alpha_5 \text{OuterRural}_{ij} + \text{Pair}_i + e_{ij}$$

Instead of reporting the coefficients of these models, we present results for predicted means in graphical form (Figures 1–2). In these figures the line from one edge to the mean of all non-edge schools to the other edge is then drawn for each category along the same y-axis with the label for each category in the middle of the line. These graphs show the slope of change within each category as well as any gaps or jumps between categories. If there is a

³Ninety-nine percent of pairs are less than 18 miles apart. In Alaska, however, due to extremely low density, some pairs are as much as 50 miles apart. These pairs represent as closely as possible the idea of adjacency using points that take into account the density of schools, rather than arbitrary distance bands.

smooth gradient in our measure the lines will all connect, but if there are clear categorical differences the lines for each area will appear disconnected.

Results

Table 3 shows the results of the metro-plus fixed-effects regressions and reports the school means in each detailed category (controlling for differences across metropolitan areas and regions of the country).⁴ Any factors that are constant across a metropolitan area are therefore removed from the estimates as schools are only compared to the other schools in their general areas.⁵

Overall, most variables show a steady gradient across categories, rather than clear cut differences between urban, suburban, and rural schools. There are only small differences between inner, middle, and outer rural schools. There are dramatic differences between large and small urban areas and inner, middle, and outer suburbs. The average proportion of white students in a school increases rapidly from large urban (14.8) through the outer suburbs (68.2) and then declines somewhat in rural areas to about the share found in middle suburban schools. The average proportion of black students shows an inverse trend, with a dramatic decline from 35.2 percent in the large urban areas to 3.5 percent in the outer suburbs, but then a substantial jump to around 10 percent in rural areas. The decline in Hispanic residents is less dramatic and is found mainly in declines from the very high shares in large urban, urban, and inner suburban schools. Large central city schools are approximately 41.2 percent Hispanic, on average, and the middle suburbs through the outer rural areas have schools with an average of around 25 percent Hispanic students. Asian students are most likely to be concentrated in small cities (9.2) and inner suburbs (8.3), but they have similar shares in other areas. Native American students have small shares in every zone at a national level because they are so concentrated in specific regions of the country. However, they are clearly over represented in all rural areas.

Free and reduced lunch status and achievement scores all follow a somewhat different pattern than this. Disadvantage is highest and achievement is lowest in large urban areas (73.4 percent are eligible for free and reduced lunch and schools have an average reading percentile of 30.5). These shares reach their minimum in the middle suburbs (33.6 eligible and 55.8 reading percentile), but then rise again in the outer suburbs and rural areas. The suburbs are relatively advantaged, but this conclusion does not hold equally for all suburbs; it is the middle suburbs that are adjacent neither to the city nor to rural areas that are most advantaged. Levels of free and reduced lunch eligible students and achievement are similar in rural areas to those found in smaller urban areas.

One might expect to find urban and rural areas to be similarly disadvantaged in terms of student-teacher ratios and spending. This is not the case. Student-teacher ratios are quite similar in large urban and other urban areas, inner suburbs and middle suburbs. It is in the

⁴The standard deviations in each category are quite similar with no clear trend across categories and will not be discussed in detail.

⁵The results are remarkably similar to the means without any controls for metropolitan area (not shown). The similarity between the raw means and the predicted estimates from the fixed-effects models suggests that the differences along the urban-rural continuum are not driven by solely by regional differences in the prevalence of each category.

more outlying school districts that we find evidence of smaller class sizes. Also, aside from the somewhat lower expenditures on instructional salary in large urban districts, we find only small differences in spending between the other categories of schools. These results point us away from staffing and spending as major differences among schools in different zones.

Table 3 shows that there are important differences among suburban schools' racial composition, class composition, and test performance. Those closer to the city line are more like city schools, and those nearer the metropolitan periphery are more like rural schools. We can measure these differences more precisely by analyzing cross-boundary pairs of schools. Are schools near the edge of categories more similar to those in the adjacent category? Figures 1–2 address this question directly. The x-axis represents each category in descending degrees of urbanicity from left to right. The combined urban category comes first and is represented by a line between the mean for all non-edge urban schools and then the outer urban edge. (Since there is nothing adjacent to the middle of urban there is no point for an inner edge.) Inner Suburban through Middle Rural are all represented by two points: the inner edge (i.e. the mean of schools adjacent to a more urban category) and the outer edge (i.e. the mean of schools adjacent to a less urban category). Outer Rural is represented the inner edge and the mean of non-edge schools because it is the most rural category. If there is a smooth gradient from urban to rural, the start of one line should connect with the end of the next. However, if there are clear changes at the edge of a category, there will be vertical gaps between the categories. The slope of the line for a specific category provides an indication of the geographic variability within that category. Flat lines represent relatively smooth geographic distributions and steep slopes represent dramatic change from one side of the category to the other.

Figure 1 shows the geographic gradient for percent White, Black, and Hispanic. Predicted percentages of Asian and Native American students are not shown because the absolute changes across categories are very small. The highest line represents the average percent of white students at the edge of each category. The line starts on the left at approximately 36 percent, the mean value of non-edge urban schools and increases slightly to 43 percent at the edge of urban areas. In other words, on average, there is some, but not much spatial change in the percent of white students near the edge of cities. To be clear, this does not mean that city schools are not segregated. It just means that the geographic edge of the city is not, on average, much different from the rest of the city. The start of the next section of the line represents the urban edge of the Inner Suburbs. Here the grey line representing percent white jumps to 47 percent, indicating a moderate change in racial composition at the edge of the city. Larger change in the proportion of white students comes within the inner and middle suburbs. By the outer edge of middle suburbs, schools are, on average, 79 percent white. The lines then remain relatively flat with only a slight decline within the outer rural schools.

The proportion of Hispanic residents (dashed line) is also relatively smooth and follows the inverse pattern to that of whites. The line starts in non-edge urban schools at approximately 32 percent and declines steadily to just 10 percent in the outer edge of Middle Suburban. It remains relatively flat through the rest of the categories. Proportions of black students (black line) also decline substantially within the inner and middle suburbs (from 21 percent to just

5 percent), however these lines are somewhat flatter with slightly larger jumps between categories, suggesting a less smooth geographic gradient when it comes to black students. The proportion of black student is also relatively flat after the outer edge of the middle suburbs. Overall, it appears that from the outer edge of middle suburbs through all the rural categories, the racial composition is relatively stable with no clear geographic patterns. The major racial changes happen within the inner and middle suburbs. Note, however, that the discontinuities at the edges of each location are fairly modest compared to the differences within each one.

Figure 2 shows the trends for Math achievement (Reading is almost identical) and the Percent Free and Reduced Lunch. These lines are almost the exact inverse of one another. They form a curve with urban and rural at very similar levels of high eligibility and low achievement and the outer edge of inner suburbs being the least disadvantaged and the highest achieving. Compared to the racial composition there are larger discontinuities between categories, especially between the urban and suburban categories suggesting these categories represent more consequential social boundaries. Nevertheless, the major share of change occurs within each category, especially in the suburbs. There also appears to be a sharp increase in the proportion of free and reduced eligible between middle and outer rural areas.

Figures for student teacher ratio and district level funding are not shown because both mirror the results shown in Table 3. Student teacher ratio shows a very smooth, slow and steady decrease from urban to outer rural. Instructional salary per student is measured at the district level and therefore just represents differences across districts rather than schools that are adjacent to one another. Since district boundaries are used to define the categories and many categories are only one district wide, these lines are quite flat within categories with clear jumps between them. The one exception is Middle Suburban, which often contains many districts in adjacent metropolitan areas. In this category, there is a steep decline from the inner to outer edge.

Discussion & Conclusion

This study has taken the traditional census categories derived from residential and commuting patterns and applied them to the schooling landscape across the country. We have compared the educational characteristics and opportunities for students in urban, suburban, and rural areas, finding stark contrasts in demographics and school quality across these areas. However, the main contribution of this article is to look within these categories at the spatially patterned differences within these larger areas.

First, we divided the traditional three categories into smaller ones based on the spatial pattern of the school districts within them. Within the same metro areas, we examined whether smaller urban areas differ from larger ones, whether the suburbs that are adjacent to urban areas are different from those adjacent to rural ones, and whether rural areas on the edge of the suburbs are different from those farther away from an urban center. While there are some breaks between the large categories, particularly in racial composition, we find that there is much variation within each of the traditional census categories. This variation is not

due to regional differences in the fragmentation of school districts since we only compare categories within the same extended metropolitan area.

We then broke each category down further to examine schools that fall on the more urban versus more rural edges of each zone. Overall, we find that much of the demographic and educational change that exists between suburban and rural schools occurs within the Inner and Middle Suburbs. While there are small breaks between categories, these areas change dramatically from one end to another. In terms of racial composition, these suburban areas serve as a tipping point compared to the relative flat spatial trends in urban and rural areas. Therefore, it will be useful to expand the existing literature on urban segregation patterns to explicitly examine the role of inner ring suburbs as tipping points for racial composition and concentration. In the case of funding, achievement, and free and reduced lunch levels, this change is U-shaped with a peak at the Inner-Middle Suburban boundary and the urban and rural schools ending up at quite similar levels. While inner suburban schools are somewhat more advantaged than nearby urban ones, that advantage increases dramatically as schools move farther from the urban core. Middle suburban schools, in turn, become more disadvantaged as they approach rural areas. In other words, it is a relatively narrow band of schools in the middle suburbs that are the most advantaged in terms of demographics and resources. This means that privilege is far more concentrated and spatially isolated than the large category of suburban would suggest. Understanding the sources of this advantage and its geographic isolation from both urban and rural disadvantage is important for understanding the extent of inequality in the educational landscape.

In contrast, the outer suburbs look a lot like nearby rural areas. The suburban-rural boundary is barely noticeable in many of the figures and tends to be dwarfed by the variation within suburban areas. Together this suggests that perhaps the Census defined Metropolitan areas are not ideal when considering the geography of educational opportunity because they exaggerate the differences between suburban and rural areas in some parts and mask variability within categories in others.

While large cities stand apart in their disadvantage, the results show that the issues faced by smaller urban areas and rural schools may be more similar than previously noticed. Urban areas are more racially diverse, but rural areas experience just as much economic disadvantage and low achievement and have comparable levels of instructional salaries per student. Though it is beyond the scope of these data, other research suggests that poor urban neighborhoods and some rural areas may be experiencing other similarities in disadvantage that have implications for schools. For example, as the suburban population grows at the expense of urban and rural areas, uneven population decline becomes a serious problem in many neighborhoods of Chicago, Baltimore, or Detroit, but also in rural areas. When enrollments decline, schools are forced to make hard decisions about what to do with the physical and social infrastructure of schooling and this can lead to a sense of lost community in both metropolitan locations (Bard, Gardener, and Wieland 2006, Burdick-Will, Keels, and Schubble 2013, Lipman 2011). Similarly, brain drain and the difficulties youth face when they must leave their community to pursue higher education have been documented in both locations (Carr and Kefalas 2009, Wilkins 2014). Highlighting these similarities has important implications for how we think about urban and rural disadvantage and may

provide some common ground to pursue policies that equal educational opportunity regardless of location.

Finally, our approach to understanding the spatial gradient of educational opportunity is only a first step in analyzing spatial patterns. Our fine-grained categories and the differences between their edges shows that there is a linear spatial component to school composition, but these measures do not capture the full extent of segregation within and between different metropolitan locations. Schools may be segregated on a scale that does not fit neatly into the transitional zones between categories. More research is needed to address the extent to which overall segregation patterns are similar or different across the rural-urban interface.

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Figure 1.
Category Edges for Racial Composition

Figure 2.
Category Edges for Math Achievement and Free and Reduced Lunch Eligibility

Table 1

Average characteristics of schools by metropolitan location, public elementary schools, 2010–2011

	All	Urban	Suburban	Rural
Percent White	51.3	30.3	58.1	70.6
Percent Black	15.6	24.2	11.9	10.8
Percent Hispanic	24.3	35.1	21.5	12.0
Percent Asian	4.7	6.4	4.7	1.0
Percent Native American	1.1	0.8	0.7	3.1
Free or Reduced Lunch	51.5	62.5	42.9	58.0
Reading	45.0	37.4	50.7	41.4
Math	44.7	38.0	49.7	41.7
Student-Teacher Ratio	35.7	37.1	36.8	29.6
Instructional Salary per Student	\$4,262	\$4,388	\$4,275	\$3,968
Sample sizes:				
N Students (1000s)	25,760	8,102	13,540	4,118
N Schools	67,977	19,339	32,529	16,109
N Districts	12,842	1,045	6,316	6,291

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Table 2

Regional location of schools by metropolitan category

	Total	Northeast	Midwest	South	West
Total schools	67,977	11,310	17,177	17,836	21,654
Large Urban	52.2%	40.9%	54.1%	53.9%	55.1%
Urban	7.1%	4.2%	7.6%	8.2%	7.2%
Inner Suburban	18.8%	14.1%	13.0%	22.4%	22.9%
Middle Suburban	11.5%	30.0%	13.3%	2.6%	7.6%
Outer Suburban	3.5%	3.0%	3.9%	4.5%	2.5%
Inner Rural	3.8%	3.2%	3.6%	5.6%	2.7%
Middle Rural	2.1%	2.4%	3.1%	1.9%	1.4%
Outer Rural	1.1%	2.1%	1	0.8%	0.5%

Predicted average characteristics of schools by detailed locational category, based on fixed effects model controlling for metro-plus location

Table 3

	Large Urban	Urban	Inner Suburban	Middle Suburban	Outer Suburban	Inner Rural	Middle Rural	Outer Rural
Percent White	14.8	32.4	42.7	59.2	68.2	58.1	54.6	56.0
Percent Black	35.3	23.8	16.4	8.3	3.5	9.3	10.8	10.0
Percent Hispanic	41.2	31.3	29.3	24.5	21.9	24.0	25.0	25.0
Percent Asian	6.2	9.2	8.3	4.7	3.6	4.8	4.9	4.7
Percent Native American	0.7	0.4	0.6	0.7	0.9	2.0	2.8	2.1
Free or Reduced Lunch	73.4	55.9	45.4	33.6	43.8	54.1	56.0	55.4
Reading	30.5	42.5	50.7	55.8	49.8	43.1	42.3	41.5
Math	32.5	42.2	50.1	52.7	48.6	42.5	40.7	41.5
Student-Teacher Ratio	33.4	35.9	36.7	33.8	29.1	26.9	26.3	26.0
Instructional Salary per Student	\$4,914	\$5,420	\$5,218	\$5,311	\$4,936	\$5,211	\$5,402	\$5,452
Sample sizes:								
N Students (1000s)	3,715	4,387	8,118	3,845	1,576	2,182	1,244	693
N Schools	8,853	10,486	17,746	9,900	4,883	7,663	5,055	3,391
N Districts	280	765	2138	2575	1603	2365	2124	1802