Demographic Divergence, School Choice, and the Changing Relationship between Neighborhoods and Schools

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Abstract

Neighborhoods and schools are two primary social contexts influencing child development and well-being. Because of the traditional link between residential location and school attendance, the racial and socioeconomic composition of schools is often highly correlated with neighborhood composition. However, this link may be weakened if the composition of all neighborhood residents differs from that of residents with children, or if some children do not attend the neighborhood public school, either through public school choice or private educational options. Understanding the relationship between schools and neighborhoods is important for neighborhood effects theories, as well as for the distribution of resources across schools. We use newly available school attendance boundary data to investigate the changing link between schools and neighborhoods from 2000-2010 as a function of neighborhood demographics and school choice options. To our knowledge, this is the first multi-city, longitudinal analysis of the relationship between schools and their surrounding communities.
Demographic Divergence, School Choice, and the Changing Relationship between Neighborhoods and Schools

Introduction

Neighborhoods and schools are two of the primary social contexts influencing child development and well being. Access to resources and opportunities through these contexts is steeply stratified by race and socioeconomic status, with children from disadvantaged, minority communities receiving lower quality schooling and neighborhood amenities on average than their counterparts in more advantaged, white communities.¹ Neighborhoods and schools have undergone profound demographic and socioeconomic transformations over the past several decades: Neighborhood racial segregation declined while economic segregation grew, and schools became more segregated along both racial and economic lines. These transformations raise theoretical questions about the role of schools as neighborhood institutions and empirical questions about how the relationship between neighborhood and school context have changed in response to rapidly changing demography and education policy.

Because of the traditional link between residential location and school attendance boundaries, the racial and socioeconomic composition of schools is often highly correlated with neighborhood composition. However, this link between schools and local populations may be weakened if the composition of all neighborhood residents differs from the composition of neighborhood residents with children. This could be the case, for example, if a neighborhood was racially diverse but white residents had fewer school-aged children than non-white residents. In this case, a racially diverse neighborhood could yield a more racially homogenous school. The link between neighborhoods and schools might also be weak if some portion of school-age children does not attend the neighborhood public school, either through public school choice or through private educational options.

The link between schools and neighborhoods has both theoretical and practical importance. Theoretically, schools are an integral aspect of neighborhood effects theories. In addition to their function as educational institutions, schools have also served as community anchors, and as places where both children and parents build social networks and civic capacity. Traditionally, schools have been mechanisms through which neighborhoods might affect individual outcomes, because they were branches of local communities. However, if schools are not tightly linked to their neighborhood populations, the role of schools in neighborhood context may need to be reconsidered.

Practically, the demographic link between neighborhoods and schools has implications for the distribution of resources across schools. If higher-income and white families cluster in schools to a greater degree than residential segregation would predict, certain public schools are deprived of the various forms of capital that these families provide. In addition, demographic changes in

neighborhoods, either through government- or private development-driven revitalization efforts, may not reach educational institutions. The tight or loose coupling of neighborhoods and schools has a potentially powerful role to play in residential decisions, though the conditions that lead to this tight or loose coupling are still largely unknown.

In this project, we seek to understand the changing relationship between schools and their local communities. To do this, we use a neighborhood-focused approach in which we conceive of individual schools as local institutions that have consequences for their proximate communities. Using several data sources, we investigate whether schools reflect the demographic composition of their local neighborhoods, and how this link between schools and neighborhoods changed from 2000-2010 as a function of changes in neighborhood demographics and school choice options. In particular, we examine whether changes in the socioeconomic and racial/ethnic composition of residents equates with changes in the population of public school children. We hypothesize that the association between neighborhood and school populations has weakened over time for two distinct reasons: demographic divergence and school choice. The demographic divergence hypothesis posits that differential migration and fertility patterns have led to growing demographic and socioeconomic differences in the school-aged and adult populations in a neighborhood. Furthermore, we expect that there is a further weakening of the link between neighborhood and school populations in neighborhoods that became more socially and economically advantaged from 2000-2010. The school choice hypothesis argues that a growing number of schooling options beyond the traditional neighborhood public school has led to a weakening of the school-neighborhood link. This research builds on the small body of cross-sectional literature on school attendance areas, which are socially meaningful but understudied geographic areas (Saporito and Sohoni 2006, 2007). To our knowledge, this study represents the first multi-city, longitudinal analysis of the changing relationship between schools and their surrounding communities.

Data and Methods

Data
Our analyses require demographic data for schools and their corresponding neighborhoods in 2000 and 2010. We obtained data on the racial and socioeconomic composition of public schools from the Common Core of Data (CCD) (National Center for Education Statistics) for the 1999-2000 and 2009-2010 school years. The CCD contains basic demographic and descriptive information on every public school in the country. We obtained data on the racial and socioeconomic composition of neighborhoods from the American Community Survey (ACS) and from the 2000 and 2010 decennial Censuses. The 2000 and 2010 censuses both report data on racial composition at the block level, which we use for our analysis, but the block group is the lowest level of geography for which socioeconomic data are available. We use the 2000 census for our first observation of block group poverty rates. After 2000, the long form of the census was replaced by the ACS, so our second observation of poverty rates comes from the 2008-2012 5-year average ACS data, which has a midpoint of 2010 to match the CCD and Census data.

Unit of Analysis
We use school attendance boundaries to construct “neighborhoods” that accurately mirror the population from which a school draws its students. School attendance boundaries are distinct
from school *district* boundaries, for which census data tables are far less complicated to obtain. Because school attendance boundaries are not political jurisdictions, and because they are determined by local school agencies, information on the exact boundaries of school attendance areas has not been readily available in the past. In addition, census data are not tabulated for school attendance areas, which makes it difficult to characterize the demographic or economic composition of the neighborhood from which a school draws its students.\(^2\) For our 2009-10 boundaries, we use the School Attendance Boundary Information System (SABINS)\(^3\), a newly available data product that maps attendance boundaries from a wide range of districts in the United States for recent school years. Our longitudinal sample is defined by the availability of school attendance boundary data in 2000, which includes data for 21 of the 22 largest districts in the United States.\(^4\) After dropping school attendance areas that only contain charter or magnet schools, and that do not exist in both time points due to school openings or closings, our final sample consists of 3,775 school attendance areas.

We use elementary school attendance boundaries as our unit of analysis because they generally encompass smaller areas than middle or high school attendance zones, and therefore are more narrowly “local” institutions. School attendance boundaries vary by grade depending on the range of grades offered in any particular school. We use boundaries for schools that offer the 3\(^{rd}\) grade as a way of capturing most elementary schools.

Following Saporito et al. (2007), we use GIS software to reapportion ACS and census data into the school attendance zones published by SABINS. Virtually all census blocks (95\%) nest perfectly within school attendance zones, so the reapportionment process for block-level data is straightforward – we simply sum the data from the blocks that fall within an attendance zone. Block groups do not nest neatly within attendance zones, however—45\% of block groups in the largest 25 school districts span multiple zones. When a block group spans multiple attendance zones, we use the population-weighting method to apportion the block group population into each zone.\(^5\) We first identify which blocks within the block group fall into each attendance zone. We then construct population weights—the share of elementary-school-aged children in the attendance zone who live in those blocks (the number of children age 5-9 in the blocks divided by the number of children age 5-9 in the attendance zone). Finally, we multiply the block group measure (e.g., the poverty rate) by the elementary-school population weight and sum this across all block groups that have population in the attendance zone. This produces a measure for the attendance zone that is a population-weighted average of the constituent block group measures. (See Saporito et al. 2007; Saporito and Sohoni 2007 for more details on this method.) See Appendix 1 for a depiction of the data procedures.

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\(^2\) The US Census Bureau has released some data tables for school attendance boundaries for select years, but the project is still in development and is not comprehensive.


\(^4\) Salvatore Saporito collected these data and generously shared them with us. This sample of districts was used in Saporito and Sohoni 2006, 2007.

\(^5\) Saporito, Salvatore, Jana Chavers, Laura Nixon, Megan McQuiddy. 2007. From Here to There: Methods of Allocating Data Between Census Geography and Socially Meaningful Areas. *Social Science Research*, 36: 897-920.
Measures

Dependent Variables. We measure the poverty rate of elementary schools using the proportion of students that are eligible for Free Lunch (FL) (children with family incomes below 130% of the federal poverty line). We measure the poverty rate of the corresponding school attendance zone by the proportion of people who live in households with incomes less than 1.3 times the federal poverty line. The census reports poverty ratio data in bins, so we use linear interpolation to estimate the share of people with a poverty ratio of less than 1.3. We measure the racial composition of schools and the neighborhoods that correspond to their attendance boundaries by the proportion of people who are black or African American, non-Hispanic white, Asian, Hispanic or Latino, and American Indian.

Data from the CCD are provided based on a student’s school grade whereas data from the US Census are provided based on an individual’s age. In addition, the age ranges for the race-by-age data and the poverty-by-age data are slightly different. We use school data for students in kindergarten through 4th grade to most closely match the available child age ranges for poverty (6-11 years old) and race (5-9 years old) data.6

Our dependent variables represent the difference in the neighborhood and corresponding school populations. Racial (poverty) differences are measured by the proportion of non-Hispanic white (poor) residents in the neighborhood minus the proportion of non-Hispanic white (poor) children in the school. Larger positive values mean that neighborhoods have greater shares of white (poor) people than schools, while larger negative values mean that schools have greater shares of white (poor) people than neighborhoods.

Independent Variables. We obtain neighborhood-level data for our two sets of explanatory variables in 2000 and 2010—neighborhood demographics and neighborhood schooling options. In terms of neighborhood demographics, we use census and ACS data on the population counts of the adult and child-aged populations by race and poverty status and construct measures of the change in each of these populations between 2000 and 2010. We measure demographic divergence by changes in the share of the child-aged population by race and socioeconomic status. Our measures of neighborhood advantage are median household income, percent of residents who are non-Hispanic white, and percent of residents who have a bachelor’s degree. For schooling options, we use information from the CCD, as well as from the Private School Survey (National Center for Education Statistics), to construct counts of various alternative schooling options within geographic proximity to each school attendance area, including the availability of charter, magnet, and private schools, as well as indicator variables for school closings and changes in school attendance boundaries.

Methods

We estimate four sets of linear regression models for each dependent variable—the neighborhood-school gap in the percent of the population that is non-Hispanic white, and the neighborhood-school gap in the percent of the population that is in poverty. All models include

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6 Age-specific poverty data are only available at the census tract level in the 2008-12 ACS. Thus, we use the age-specific poverty rates at the tract level to construct the poverty rates for 2010.
7 The CCD does not report grade-specific poverty rates, thus we assume that poverty rates are consistent across grades within schools.
school district fixed effects to control for time-invariant features of school districts, as well as robust standard errors clustered at the state level.

Model 1 assesses the relationship between the baseline racial and socioeconomic characteristics of neighborhoods in 2000 and the change in the link between neighborhoods and schools over time. This baseline model will reveal which types of neighborhoods (as defined by their 2000 characteristics) have experienced the greatest decoupling of their neighborhood and school populations between 2000 and 2010.

\[
(\%W_n - \%W_s)_{10} - (\%W_n - \%W_s)_{00} = \alpha + \beta_1(\%Black)_{n00} + \beta_2(\%Poverty)_{n00} + \mu + \epsilon
\]

The dependent variable is the difference in the gap, 2000-2010, between the % non-Hispanic white (poor) in the school attendance area \( n \) and the percent non-Hispanic white (poor) in the school \( s \). \( \mu \) is a vector of school district fixed effects.

Model 2 tests the demographic divergence hypothesis by assessing whether changes in the share of the child-aged population by race and poverty affect the link between neighborhoods and schools over time. We predict that a declining share of white children in the neighborhood will be associated with a growing gap.

\[
(\%W_n - \%W_s)_{10} - (\%W_n - \%W_s)_{00} = \alpha + \beta_1(\Delta%WhiteChild)_{n10-00} + \beta_2(\Delta%PovertyChild)_{n10-00} + \theta(X)_{n00} + \mu + \epsilon
\]

\( X \) is a vector of baseline neighborhood characteristics in 2000.

Model 3 tests whether increases in neighborhood advantage weakens the link between neighborhoods and schools.

\[
(\%W_n - \%W_s)_{10} - (\%W_n - \%W_s)_{00} = \alpha + \beta_1(\Delta%WhiteChild)_{n10-00} + \beta_2(\Delta%PovertyChild)_{n10-00} + \beta_3(\Delta%White)_{n10-00} + \beta_4(\Delta%MedHHInc)_{n10-00} + \beta_5(\Delta%BA)_{n10-00} + \theta(X)_{n00} + \mu + \epsilon
\]

Model 4 tests whether changes in schooling options weakens the link between neighborhoods and schools.

\[
(\%W_n - \%W_s)_{10} - (\%W_n - \%W_s)_{00} = \alpha + \beta_1(\%White)_{n10-00} + \beta_2(\Delta%MedHHInc)_{n10-00} + \beta_3(\Delta#Charter)_{n10-00} + \beta_4(\Delta#Private)_{n10-00} + \beta_5(#Charter) + \beta_6(ChangeSAB) + \theta(X)_{n00} + \mu + \epsilon
\]

\#Charter is the number of charter schools that serve 3rd grade within a given radius of the center of the school attendance area, \#Private is the number of private schools that serve 3rd grade within a radius of the center of the school attendance area, SchClosing is an indicator for the number of schools that closed in the school attendance area between 2000 and 2010, and ChangeSAB is an indicator for a change in school attendance area boundaries between 2000 and 2010.
Preliminary Tables & Figures

Table 1. Mean Neighborhood-School Gap Measures by District

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*We are correcting errors in Chicago's 1999 Free Lunch data
Figure 1. School Attendance Boundary Neighborhood-School Percent Non-Hispanic White Gap, 1999

Figure 2. School Attendance Boundary Neighborhood-School Percent Poverty Gap, 1999
Figure 3. School Attendance Boundary Change in Neighborhood-School Percent Non-Hispanic White Gap, 1999-2009

Figure 4. School Attendance Boundary Change in Neighborhood-School Percent Poverty Gap, 1999-2009
Appendix 1. Depiction of Data Procedure

School Data (Common Core of Data)

Neighborhood Data (American Community Survey and US Census)