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The neighborhood ethnoracial and socioeconomic context of public elementary school closures in U.S. metropolitan areas☆

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ABSTRACT

Public school closures are increasing in number and size in U.S. cities. When public schools close, heated debates typically ensue. A central argument within this debate asserts that schools being closed are more likely to be located in minority, socioeconomically disadvantaged neighborhoods, and thus their abandonment has the potential for widening racial and socioeconomic gaps and exacerbating spatial inequality. Using school attendance boundary data in over 260 U.S. metropolitan areas, we examine the relationship between the locations of traditional elementary public school closures between 2010 and 2016 and neighborhood ethnoracial and socioeconomic composition in 2010 and their change over time. Our overall results indicate that closures are associated with lower neighborhood percent White and percent Hispanic and higher percent Black and socioeconomic disadvantage. While increasing percent White is positively associated with closure, we found little other evidence of a relationship between closure and other changes in ethnoracial and socioeconomic composition. However, the relationship between neighborhood context and closure varies across region and urbanicity, with closures associated with patterns of gentrification in urban areas, and exhibiting differential relationships with neighborhood SES, race and ethnicity across region.

1. Introduction

In recent years, urban public school closures have become increasingly common in the United States (Brazil 2020). Some argue that this increase is associated with city-led urban renewal strategies that couple the closure of underperforming schools with greater school choice options in order to attract higher-income residents and private investment into disadvantaged neighborhoods (Bierbaum 2018a; Billingham and Kimelberg 2013; Davis and Oakley 2013). Others argue that school closures are a consequence of broader gentrification forces whereby the influx of higher-income residents leads to the types of local school reform that promote school closure (Lipman 2011). Civil action lawsuits opposing school closures focus on their racial dimensions, arguing that closures are disproportionately located in racial minority neighborhoods and situated in cities with legacies of segregation (Ewing 2018; Garnett 2014). Collectively, these arguments draw attention to the neighborhood ethnoracial and socioeconomic context of school closures. If school

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closures are more likely to be located in certain types of neighborhoods, particularly those that are minority-majority and socioeconomically disadvantaged, and if schools have consequences not only for the students they educate, but also the residents they serve, then closures have the potential of modifying racial and socioeconomic gaps and reshaping spatial inequality (Good 2019; Rubin et al., 2020; Tieken and Auldridge-Reveles 2019).

The purpose of this study is to investigate the relationship between school closures and the ethnoracial and socioeconomic composition of their neighborhoods. Our study is not the first to tackle this research objective. Case studies of large cities including Chicago (Brazil 2020; Burdick-Will et al., 2013; De la Torre et al., 2015; Weber et al., 2020), Detroit (Green et al., 2019) and Philadelphia (Bierbaum 2020; Caven 2019; Good 2017a) have found that closures are typically located in socioeconomically disadvantaged and majority Black neighborhoods. We contribute to this existing literature in the following ways. First, we use school attendance boundaries (SAB) as our measure of neighborhood. We argue that SABs are a more appropriate measure compared to traditional neighborhood geographies such as census tracts because most school districts base student enrollment on residential location within a SAB. This connection forges a natural link between school and neighborhood context (Candipan 2019). Second, whereas previous quantitative school closure studies have found that neighborhood composition matters for school closures (Caven 2019; Burdick-Will et al., 2013; Weber et al., 2020), this work has largely focused on neighborhood characteristics measured at a single point in time and has not considered that neighborhood trajectories might also matter. To fill this gap, we examine *change* in neighborhood context, which allows us to test arguments related to socioeconomic ascent and the changing ethnoracial composition of neighborhoods.

Third, whereas prior work has focused on one or a handful of cities, we examine the relationship between school closures and neighborhood characteristics in over 260 metropolitan areas. Doing so will allow us to determine whether prior results apply to areas outside the large historically Black-White segregated Midwestern and Northeastern cities typically examined in school closure research (Bierbaum 2020; Brazil 2020; Burdick-Will et al., 2013; Caven 2019; De la Torre et al., 2015; Good 2017a; Green et al., 2019; Nerenberg 2021; Weber et al., 2020). Moreover, our larger sample allows us to examine whether both neighborhood sociodemographic composition and change are associated with school closures differently across regions and urbanicities. As such, this is the first study to document aggregate patterns, geographic variation, and broad associations of school closures and neighborhood context at a large scale.

Using a longitudinal data set of elementary school attendance boundaries and public school closures in U.S. metropolitan areas, we address the following research questions. First, are 2010 neighborhood ethnoracial and socioeconomic composition associated with elementary public school closures between 2010 and 2016? Second, are changes in neighborhood ethnoracial and socioeconomic composition before 2010 associated with subsequent elementary public school closures between 2010 and 2016? And third, does the relationship between closures and neighborhood ethnoracial and socioeconomic composition vary by region and urbanicity? Results from multivariate models corroborate the ethnoracial and SES patterns identified in prior school closure studies: neighborhoods with a greater percent Black, lower percent White, and lower SES are more likely to experience a school closure. We also found that in addition to Black and White neighborhood composition, Hispanic presence also matters, with a greater percent Hispanic negatively associated with the probability of school closure. Furthermore, we identified differences across region and urbanicity, with traditional Black-White and SES patterns explaining closure locations in the Midwest and Northeast, the contrasting roles of increasing Black and Hispanic presence in the West and Black and White presence in the South, and patterns associated with gentrification explaining closures in urban neighborhoods.

2. Background

Public debates and scholarly work on school closures have delineated the potential factors contributing to school closure decisions (see Tieken and Auldridge-Reveles 2019 for a recent summary). There is an emerging literature that quantitatively tests these factors (Caven 2019; Weber et al., 2020); however, in this study, we are concerned exclusively with descriptively understanding the neighborhood ethnoracial and socioeconomic context of school closures rather than their underlying causes. Nevertheless, these factors help establish several predictions of how school closures might be unequally distributed across neighborhoods. In the following sections, we draw on prevailing explanations of school closures to establish predictions of how closures might be associated with neighborhood ethnoracial composition and socioeconomic status (SES).

2.1. School closures and neighborhood context

Existing scholarship on the factors contributing to urban closures tends to focus on either school reform efforts conducted at the school district level or neighborhood reform efforts carried out at the city level (Burdick-Will et al., 2013; Davis and Oakley 2013; Weber et al., 2020). In the case of school reform, if closed schools primarily enrolled minority and socioeconomically disadvantaged students, then they likely drew from catchment zones that also had a large presence of minority and socioeconomically disadvantaged residents given the close match between home residence and school assignment (Snyder et al., 2018). In this way, neighborhood context is linked to closures even though they are not directly factored into the closure decision-making process.

By the same token, lower-resourced neighborhoods tend to have lower-performing and relatively less resourced schools than more affluent school zones (Owens and Candipan 2019b). In the case of academic performance, school district officials often rely on standardized test results to evaluate school quality, justifying the closure of lower performing schools and the reenrollment of their students in better performing ones as a more efficient strategy for increasing academic success than pursuing comprehensive and inclusive school reform (Caven 2019). Schools targeted for closures due to underperformance under school reform initiatives tend to enroll minority and poor students (Burdick-Will et al., 2013; Caven 2019; Kirshner and Pozzoboni 2011). Declining student enrollment

is also a commonly cited contributor to closure decisions because of its direct ties to school district funding. Existing empirical research has provided evidence that urban public schools experiencing declining enrollment tend to be poor and minority (Billingham 2019; Pearman 2020). This decline is driven by White flight out of public schools in reaction to school district desegregation, the expansion of school choice, enrollment into private schools, and White out-migration into suburban neighborhoods (Zhang and Ruther 2020). Given the positive association between student enrollment and catchment zone characteristics, we would predict closures to be disproportionately located in minority and socioeconomically disadvantaged neighborhoods.

Some urban scholars argue that school reform is not strictly based on school or district-level factors, but are also tied to broader city revitalization renewal efforts targeting disadvantaged, historically disinvested neighborhoods, which in many instances have a large presence of minority residents (Cucchiara 2013; Patterson and Silverman 2013). From this perspective, city officials view high-quality schools as important neighborhood amenities that not only contribute to the overall well-being of lower-income residents, but also attract higher-income residents to increase the community income base, which will then lead to private investment in the improvement of other neighborhood institutions and amenities such as locally owned businesses and affordable housing (Lipman 2011; Patterson and Silverman 2013). This perspective is tied to recent place-based efforts that focus on neighborhood schools as community quarterbacks that organize services for disadvantaged residents from a broad array of public and private social service organizations (Dryfoos and Maguire 2019). For example, the Obama-led Promise Neighborhoods program provided funding towards whole community, cradle-to-college initiatives that focused on school improvement as the central strategy to community revitalization (Horsford and Sampson 2014). Other federal and state programs such as HOPE IV are designed to include access to higher-performing schools as a component to the broader objective of improving blighted urban communities (Popkin et al., 2004).

Urban revitalization efforts that involve the closing of local schools are sometimes presented as a form of "benevolent policy" that help improve the life fortunes of disadvantaged students and residents (Davis and Oakley 2013). Some scholars argue that closures are instead driven by political and private interests that exacerbate underlying racial and socioeconomic inequalities (Bierbaum 2018a; Cucchiara, 2013; Ewing 2018; Lipman, 2013; Makris and Brown 2020). According to these arguments, rather than improving the circumstances of longstanding residents, the focus of urban revitalization—which includes closing lower-performing, underutilized neighborhood schools—is to attract higher-income residents and private interests while, at the same time, not instituting protections against the displacement of lower-income residents. Here, renewal efforts target socioeconomically disadvantaged areas, which are often majority minority, for neighborhood upscaling.

The prediction under either the school reform or urban revitalization framework is that school closures are more likely to be located in socioeconomically disadvantaged and minority neighborhoods. Studies examining the neighborhood characteristics of closed schools have found support for this prediction. For example, studies of Chicago's recent spate of closures found persistent positive associations between school closure and the neighborhood poverty rate and other measures of disadvantage (Brazil 2020; Burdick-Will et al., 2013; De la Torre et al., 2015; Lee and Lubienski 2017; Weber et al., 2020). Similar associations were also found for closures in Baltimore (Nerenberg 2021), Detroit (Green, 2019), and Philadelphia (Caven 2019; Good 2017a). Because race and SES are highly correlated, these studies have also found that closures tend to be located in ethnoracial minority neighborhoods, particularly those with large Black populations. These studies have focused primarily on school closures located in a certain type of geographic setting: large, historically segregated cities in either the Northeast or Midwest. Whether their findings apply to other geographic contexts remains unanswered.

Furthermore, prior work has largely focused on Black and White composition when examining associations between closure and neighborhood race and ethnicity. Largely missing is a closer inspection of Hispanic neighborhood composition.[1] On the one hand, the positive relationship between Black neighborhood presence and school closure will apply to all minority residents due to the historical structural disadvantages shaped by the White-nonwhite dividing lines in the United States. Hispanic enclaves with a large presence of foreign-born residents may be particularly susceptible due to their unfamiliarity navigating the U.S. school system (Becerra 2012). On the other hand, the Hispanic presence-closure relationship may follow other phenomena that protect Hispanic populations from negative outcomes such as better health outcomes and lower crime rates (Markides and Eschbach 2011; Martinez 2014). Explanations include greater social capital and access to kin networks in Hispanic enclave neighborhoods, which protect people from stigma and prejudice, may increase social support, and may lower communication costs because of shared culture and language (Burchfield and Silver 2013; Palloni and Arias 2004). Bischoff and Tach (2018) found that White children are more likely to opt out of residentially zoned public schools in majority Hispanic suburban as compared to majority Hispanic urban attendance zones. Maintaining student enrollment in these neighborhoods may protect against school closure. While finding an association between percent Black and closure in Chicago, Burdick-Will et al. (2013) found no association for percent Hispanic. Whether this null finding is true in cities with a greater Hispanic presence has yet to be tested.

2.2. School closures and neighborhood change

The urban revitalization and school reform frameworks described in the previous section emphasize the interaction between closed schools and neighborhood characteristics measured at the time of the closure. However, the trajectories of neighborhoods may also matter— closures may be associated with prior changes in neighborhood ethnoracial and socioeconomic characteristics. There are several competing predictions of how a neighborhood's trajectory might be associated with the likelihood of a local school closure.

[1] Throughout our study, we refer to census designations for race and ethnicity.

Much of the discussion surrounding the link between closures and neighborhood change has focused on gentrification (Lipman and Haines 2007), though the direction of the relationship is unclear. Gentrification is a form of neighborhood change that occurs when higher-income groups move into low-income neighborhoods, altering the cultural and financial landscape of the original neighborhood (Freeman 2011). One prediction under the gentrification framework is that closures are more likely to be located in minority and disadvantaged neighborhoods experiencing an increasing White presence, a declining minority share, and socioeconomic ascent. The association between school choice and the increasing presence of higher SES and White residents partially explains this prediction. Prior quantitative work has observed differences in school choice between Whites and minorities and suggests that White students are more likely to leave local public schools and opt for alternatives as the proportion of minority students increases (Saporito and Sohoni 2006). White and higher-income residents, relative to their minority and lower-income counterparts, often have the necessary social, cultural, and political capital to be able to organize to influence local decisions, including decisions about school policies such as closing a neighborhood school (Butler and Robson 2003; Lareau and Goyette 2014). Prior qualitative work illustrates the variety of ways gentrifier (mostly White) parents navigate past unsuitable neighborhood schools, including intradistrict transfers, private school enrollment, public school choice, the gerrymandering of attendance boundaries, and the creation of new schools (Cucchiara 2013; Cucchiara and Horvat 2009; Hankins 2007; Richards 2014; Siegel-Hawley et al., 2017). In some instances, gentrifiers enter without children but transition into parenthood as the neighborhood gentrifies (Bader et al., 2019) or enter with children but do not factor in local school quality into their decision (Cuddy et al., 2020). Here, they are confronted with the decision of either moving out of the neighborhood to find a better school or staying in the neighborhood but altering or expanding their school choice options beyond the neighborhood school (Candipan 2020). Although not directly involving school closure, these strategies may promote it by, for example, siphoning enrollment (Pearman 2020).

However, other qualitative studies have also found that gentrifier parents with a taste for diversity may actively choose to enroll their children in urban public schools (Kimelberg and Billingham 2013; Posey-Maddox 2014). These parents may be motivated to reform local schools given that gentrifying neighborhoods are in the process of socioeconomic ascent and thus local amenities such as neighborhood schools may still be perceived as unsuitable (Bader et al., 2019; Barton and Cohen 2019; Cucchiara 2013; Posey-Maddox 2016). Once enrolled, these parents will activate their political and social capital to acquire resources for their school. In this sense, the inflow of higher-SES (often White) parents into previously low-income and minority schools may lead to greater investments and lower rates of closure.

Other mechanisms besides gentrification, such as incumbent grading and "new build" gentrification, may help explain the link between closures and increases in neighborhood SES and White presence (Owens 2012). However, other forms of neighborhood trajectories beyond those focused on increasing percent White and SES might also matter in explaining where closures are located. Closures might be more likely to occur in neighborhoods experiencing increasing poverty and concentration of minorities due to the reduced financial resources and the erosion of social and political capital that potentially accompany these changes (Logan et al., 1987). This may reflect the out-migration of higher-SES and White families due to push and pull factors such as school choice, school district desegregation policies and racial preferences for neighborhood and school composition (Billingham and Hunt 2016; Clark 1987; Zhang and Ruther 2020). This could also reflect city-led urban revitalization efforts—although well-off relative to more disadvantaged areas, schools located in middle- or lower-middle class neighborhoods experiencing a socioeconomic downturn may be targeted for closure by city officials attempting to reverse the downward trend (Patterson and Silverman 2013).

The above predictions focus on changes in neighborhood SES and ethnoracial composition, but it might be that stability in these characteristics influence the likelihood of closure. Neighborhoods experiencing stable SES and ethnoracial composition may have better organization (social and political capital) regardless of their current characteristics, which guards against school closures. Finally, there may be no association between neighborhood change and the likelihood of school closure as decisions might be based on reactions to factors measured at any given point in time rather than how schools and neighborhoods have changed. Despite the potential of neighborhood change shaping the geographic landscape of closure locations, the only study we located that examined this relationship found that decreases in neighborhood disadvantage and percent Black, and increases in percent White, were associated with school closures in Chicago (Burdick-Will et al., 2013).

2.3. Does the relationship between closure and neighborhood context vary across geographic context?

Neighborhood studies of school closures have largely been confined to a handful of cities. By focusing on one or a small number of cities, researchers are able to contextualize the political, financial and social landscape surrounding closure decisions. The drawback to this approach is that the findings are specific to the city examined in the analysis. In this study, we expand the geographic reach to examine how the relationship between closures and neighborhood ethnoracial and socioeconomic composition generalizes across a broad sample of cities. Furthermore, beyond simply answering the question of whether neighborhood composition is associated with closure, we also seek to determine how this relationship varies by geographic context. Specifically, we test the moderating association between closure and region, and between closure and urbanicity. While prior work has primarily examined highly urban, racially segregated neighborhoods in the Northeast and Midwest, our study sets out to determine whether neighborhood composition and change vary outside of this context in their relationship with closures.

The emphasis on highly urban areas located in the Northeast and Midwest is partly due to the high-profile mass school closures occurring in cities in these regions, specifically Chicago, Philadelphia and New York. These mass school closures were historic in size and received significant pushback from local communities through citywide protests, teacher strikes, and major lawsuits (Bierbaum 2018b; Burdick-Will et al., 2013; Good 2017b; Green 2017). However, this emphasis overlooks closures located in cities in other regions of the country, including Los Angeles, Oakland, and Sacramento in the West and Atlanta, Dallas, Houston and Memphis in the

South, many of which experienced multiple closures in a single school year (Tilsley 2017). Furthermore, while much of the recent focus has been on closures located in urban areas, and there is an extensive literature on closures in rural areas (Tieken and Auldridge-Reveles 2019), closures in suburban areas have been relatively neglected despite their increasing occurrence (Tilsley 2017). There may be variation in the relationship between neighborhood context and closure across region and the urban-suburban continuum because of differences in school policies and socioeconomic and ethnoracial composition, including levels and trajectories of segregation, size of Black and Hispanic populations, type, presence and pace of school choice expansion, and approaches to school and neighborhood reform (Goyette 2008; Grady et al., 2010; Iceland et al., 2013; Silverman 2014; Stoddard and Corcoran 2007).

2.4. The present study

The quantitative literature on urban public school closures has provided evidence indicating that closures are primarily located in neighborhoods with higher percent Black and greater levels of socioeconomic disadvantage. However, while past work has demonstrated a link between neighborhood composition and school closures, we identified only one study examining the association between closure and *changes* in neighborhood context despite scholarly work and public discourse frequently highlighting this relationship (Bierbaum 2018b; Ewing 2018). Furthermore, the cities examined in school closure studies are typically highly urbanized, historically segregated and located in the Northeast and Midwest. We know little about the relationship between neighborhood composition and school closures in areas outside of these contexts, specifically neighborhoods with a larger Hispanic presence, located in suburban areas, and in cities located in the Southern and Western regions of the country. We contribute to the current literature by examining closures for a large sample of neighborhoods in metropolitan areas located across the country. We examined the association for both current and change in neighborhood context, and analyzed heterogeneity in these associations by region and urbanicity.

3. Data and measures

This study relies on data from three sources: school data from the National Center of Educational Statistics (NCES) Common Core of Data (CCD), school attendance boundary shapefiles from the 2009-10 School Attendance Boundary Information System (SABINS) project, and neighborhood demographics from the 1990 and 2010 decennial Census and 2008-12 American Community Survey (ACS). Census/ACS data were normalized to 2010 boundaries using the Longitudinal Tract Database (Logan et al., 2014). We examined the relationship between public elementary school closure between 2010 and 2016 and neighborhood ethnoracial and socioeconomic composition in 2010 and change over time.

3.1. School attendance boundaries

Most past work investigating neighborhood processes has used census tracts to measure residential context. In our study, we define neighborhoods as SABs (i.e., the catchment areas that a school serves), which we consider a more meaningful geographic unit when considering how school and neighborhood processes relate. Each regular public school is associated with a SAB, which we gathered from the 2010 SABINS project. SABINS provides grade-specific GIS shapefiles for schools in more than 6000 districts, including 324 of the largest urban school districts.[2] For our analyses, we used 4th-grade SABs as a proxy for elementary school zones. This means we limited our sample of elementary school closures to those that enrolled 4th-grade students. We chose elementary SABs in part because they are generally smaller and more comparable in size to census tracts than secondary school catchment areas.[3] We did not examine charter school closures because they are generally without geographically-based enrollment restrictions, and thus often enroll children residing in neighborhoods across a city. We excluded magnet schools, virtual schools, and other nontraditional public schools. While the SABINS project was the first to collect SAB data at such an expansive scale, it does not have full geographic coverage. Roughly 82 percent of metropolitan areas (MSAs) contain at least one SAB that is uniquely served by a single regular 4th-grade traditional public school.[4]

3.2. School closures

We collected data on elementary school status and location from the National Center for Education Statistics' (NCES) Common Core of Data (CCD). To capture which regular elementary schools enrolling 4th-grade students were open and operational in 2010 (2009-10 school year), we used a combination of NCES' internal school status indicator, open and closed dates, and enrollment data to determine a school's open status between 2010 and 2016 (2010–2011 and 2015–2016 school years, respectively). This information allowed us to construct our main dependent variable, a binary indicator of whether the school closed between 2010 and 2016.

[2] The College of William and Mary and the Minnesota Population Center. School Attendance Boundary Information System (SABINS): Version 1.0. Minneapolis, MN: University of Minnesota 2011). See https://www.sabinsdata.org/.

[3] While roughly 95 percent of census blocks nest entirely within SABs, and the remaining blocks "rectified" to be wholly circumscribed, census tracts are frequently bisected by multiple school zones.

[4] Schools and school attendance boundaries have a many-to-many match, with some school serving multiple SABs and some SABs served by multiple schools. Roughly 97 percent of SABs in our database were uniquely served by one school.

3.3. Neighborhood variables

The main independent variables are neighborhood ethnoracial and socioeconomic composition in 2010, as well as changes in those compositional features over time. For ethnoracial composition, we included percent non-Hispanic White (hereafter, White), non-Hispanic Black (hereafter, Black), and Hispanic in 2010. Given our interest in understanding the relationship between closure and neighborhood trajectories of economic improvement, we followed past work on neighborhood ascent to measure socioeconomic composition (Owens and Candipan 2019a). Specifically, we constructed SES scores using factor analysis based on five indicators of housing and economic health: median household income, median rent, median home value, proportion of the population in professional occupations, and proportion of the population with a college degree. Higher SES index values represent greater socioeconomic advantage. We used population weights to reapportion all tract-level variables to the level of SABs (see Saporito et al., 2007 for further details).

We captured change in ethnoracial composition between 2000 and 2010 by taking the difference of each percent race/ethnicity variable. Given that the pace and timing of neighborhood SES change do not always neatly align with Census/ACS data, we examined change in SES over a two-decade period, 1990 to 2010. Given the variegated speed and timing in the trajectories associated with gentrification, urban renewal and other neighborhood SES change phenomena, observing a two-decade period should allow us to capture substantial and longer-term change rather than merely noise in the data (Landis 2016; Owens and Candipan 2019a). Rather than taking the simple difference in the SES index between 1990 and 2010 to capture change over time, we constructed a typology of neighborhood SES trajectories (Candipan 2019). Because tabular census data used to construct SES scores is at the census tract level, we first calculated SES scores in 1990 and 2010 for each tract located in all MSAs. We then computed a percentile rank for each tract in 1990 and 2010 based on where its SES score falls relative to other tracts located within the same MSA, thereby accounting for differences in the absolute values of housing and economic indicators that may occur between metropolitan regions.

After calculating tract-level SES ranks, we used population weights to reapportion tract SES ranks to the level of SABs (see Candipan and Brazil (2020) for further details). We then categorized SABs according to the following SES change groups: (1) *Ascending-SES* SABs are those in the bottom four SES quintiles in 1990 and increased by at least 10 percentage points in SES rank from 1990 to 2010; (2) *Descending-SES* SABs are those in the top four SES quintiles in 1990 and decreased by at least 10 percentage points; (3) *Upper-SES* SABs are those that begin and end in the top quintile; and (4) *Stable Mid- and Low-SES* SABs are those in the lowest four quintiles in 1990, and did not increase or decline in rank by more than 10 points.

We also controlled for SAB-level sociodemographic characteristics, including overall population in 2010, proportion of the under-18-year-old population in 2010, and the change in the under-18-year-old proportion from 2000 to 2010. We included indicators for regional location (West, South, Midwest, Northeast) with the South region serving as the reference category. We also included whether a SAB was located in an urban area according to the NCES locale classification. The NCES urban-centric locale code system classifies territories into four major types: city, suburban, town, and rural. Each type has three subcategories. For city and suburb, these are gradations of size—large, midsize, and small. Towns and rural areas are further distinguished by their distance from an urbanized area. We categorized urban neighborhoods as those residing in a city. Since the availability of non-local school options impacts the educational market for traditional public schools, we also included a binary indicator of whether a charter school is located within a SAB and the proportion of the under-18-year old population enrolled in a private school in 2010. We also accounted for school district level characteristics using 2010 data from the NCES CCD school district non-fiscal and fiscal data files. We included school district total revenues per pupil to measure district fiscal health and student enrollment. To control for positive skewness (e.g. the presence of neighborhoods and districts with very large populations), we logged neighborhood population and school district enrollment size.

4. Methods

We examined the relationship between neighborhood characteristics and the probability of regular school closure using logistic regression models of the following form:

$$\log\left(\frac{P(Y_i)}{1-P(Y_i)}\right) = \mu + \beta_1 R_i + \beta_2 \Delta R_i + \beta_3 SES_i + \beta_4 \Delta SES_i + \theta X_i + \varepsilon_i \quad (1)$$

where Y_i indicates whether SAB i experienced a school closure between 2010 and 2016, R_i is SAB percent race/ethnicity in 2010, ΔR_i is change in SAB percent race/ethnicity from 2000 to 2010, SES_i is the SAB SES index in 2010, ΔSES_i is the change from 1990 to 2010 typology (descending is the reference), X_i is a set of SAB- and district-level control variables, and ε_i is the error term. All coefficients are reported as odds ratios for ease of interpretability. Odds ratios greater than 1 indicate a positive relationship with the probability of school closure. Because neighborhood percent race/ethnicity variables are highly correlated in our sample, we ran separate models for White, Black, and Hispanic. We also performed models that included state fixed effects to account for different accountability policies regarding which schools are permitted to be closed. Because several states did not experience school closures between 2010 and 2016, thus reducing our analytic sample, we consider the state fixed effects specification to be a sensitivity test of our main results. We also tested multilevel models with SABs nested within school districts. The results do not significantly differ from the main results (see Appendix Table 2). Furthermore, Hausman tests reject the null of a multilevel specification (Hausman, 1978). In order to account for the correlation between SABs within districts, we included robust standard errors clustered by school district.

The model in Equation (1) estimates the average association between neighborhood context and school closure. We also tested whether the association varies by geographic context. To do so, we estimated models that included interactions between the regional

(West, Northeast, Midwest and South) and urban indicators and SES and race/ethnicity.

To arrive at the final analytic sample, we employed several filters. First, we eliminated SABs that were served by more than one public elementary school (3% of our sample). Second, we eliminated SABs that were designated as rural according to the NCES locale classification. Third, we eliminated SABs that had missing data on any of our variables. These filters yielded an analytic sample of 14,563 SABs located in 266 metropolitan areas.

5. Results

5.1. Descriptive results

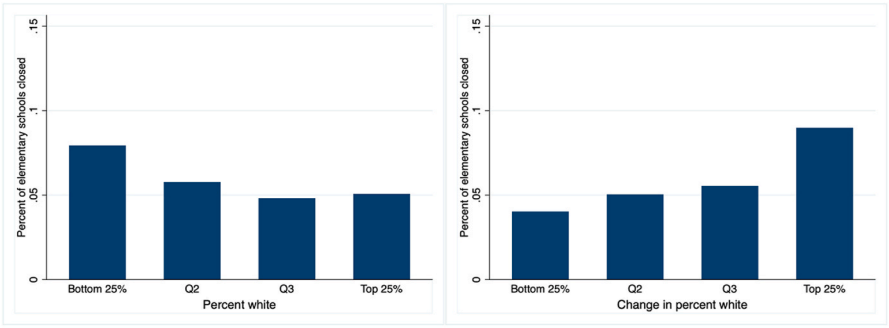
Table 1 shows descriptive statistics for the analytic sample separated by neighborhoods that did (5.8%) and did not (94.2%) experience a school closure between 2010 and 2016. Neighborhoods experiencing a closure have a larger percent Black, and lower percentages of Hispanic and White in 2010, than neighborhoods without closures. In the preceding decade (2000–2010), neighborhoods with closures experienced slightly lower increases in percent Black and Hispanic and a lower decrease in percent White, on average, than neighborhoods without closures. They are also more socioeconomically disadvantaged, more likely to be socioeconomically stable over time, are slightly less likely to be socioeconomically descending or ascending, and are considerably less likely to be an upper-SES neighborhood.

In comparison to neighborhoods without closures, neighborhoods experiencing a closure are more likely to be located in the Midwest and Northeast, and less likely to be located in the South and West. Closures are also more likely to be located in urban areas. Other notable differences include a greater decrease in percent of residents under 18 years old, lower percent of students enrolled in a private school, smaller school district enrollment, and slightly higher district revenues per pupil in neighborhoods experiencing a closure.

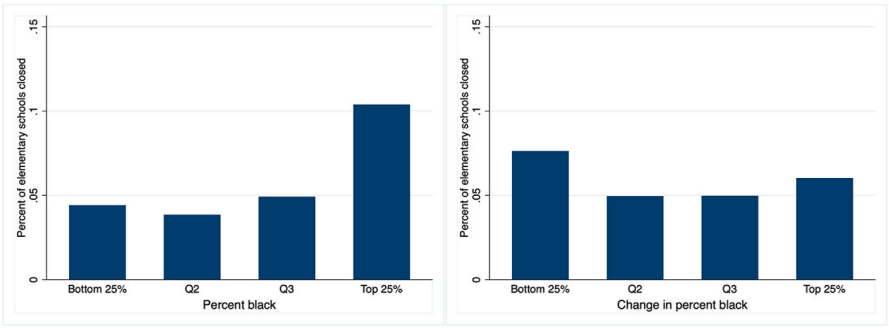
To visualize the associations between school closure and neighborhood ethnoracial and socioeconomic context, we present in Fig. 1 bar graphs showing the probability of closure on the y-axis and quartiles of each variable on the x-axis. Higher percent White in 2010 is associated with a lower probability of closure. A similar trend appears for percent Hispanic, but the reverse relationship is present for percent Black. The probability of closure for neighborhoods in the top quartile of percent Black is approximately 10% whereas it is more than half that percentage in the lower quartiles. Increasing percent White is associated with a higher probability of closure. The reverse is true for percent Hispanic – decreases or smaller increases in percent Hispanic are associated with a greater likelihood of closure. Neighborhoods in the bottom quartile in change in percent Black have a slightly higher likelihood of closure than neighborhoods in the top quartile. Higher quartiles of 2010 SES have lower probabilities of closure, with the probability in the lowest

Table 1
Descriptive statistics.

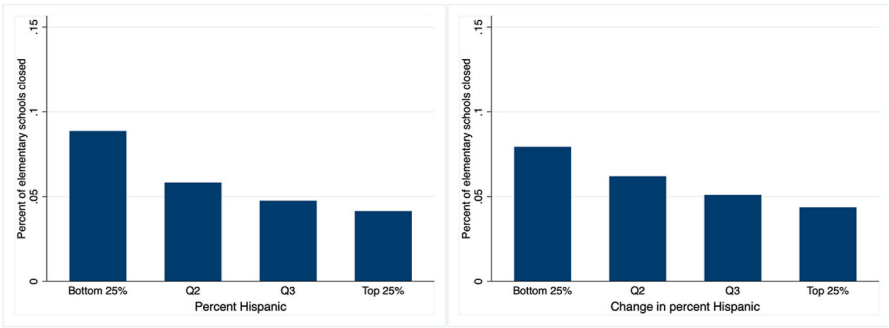
	Not Closed (N = 13,725)		Closed (N = 838)		Total (N = 14,563)	
	Mean	SD	Mean	SD	Mean	SD
Race/ethnicity, 2010						
% Black	17.9	24.0	33.0	33.9	18.8	24.9
% Hispanic	24.3	25.6	17.8	22.0	23.9	25.4
% White	50.1	30.0	43.8	32.0	49.8	30.1
SES Index, 2010	0.1	0.8	−0.3	0.6	0.0	0.8
Race/ethnicity change, 2000-2010						
% Black	3.5	10.5	2.5	11.9	3.4	10.6
% Hispanic	10.0	11.6	7.5	10.6	9.9	11.6
% White	−17.3	15.1	−12.5	15.2	−17.0	15.2
SES change, 1990-2010						
Descending	24.6		20.6		24.4	
Upper-SES	10.2		3.9		9.8	
Stable	48.0		58.8		48.6	
Ascending	17.2		16.6		17.2	
% Charter present in 2010	6.5	24.7	12.9	3.4	6.9	25.4
Log population	8.5	0.4	8.3	0.4	8.5	0.4
% under 18 years old	25.6	6.1	24.4	6.3	25.5	6.1
Change % under 18 years old, 2000–2010	−2.0	3.4	−2.9	3.4	−2.1	3.4
% enrolled in private school	10.5	9.4	9.9	7.8	10.5	9.3
District revenues per pupil	12,063	4,289	12,850	4,323	12,108	4,295
Log district enrollment	10.7	1.3	10.5	1.3	10.7	1.3
% Region						
West	31.6		24.1		31.2	
Midwest	13.3		28.2		14.2	
South	44.4		34.8		43.8	
Northeast	10.7		12.9		10.8	
% Locale						
Urban	54.8		64.2		55.3	
Suburban	45.2		35.8		44.7	



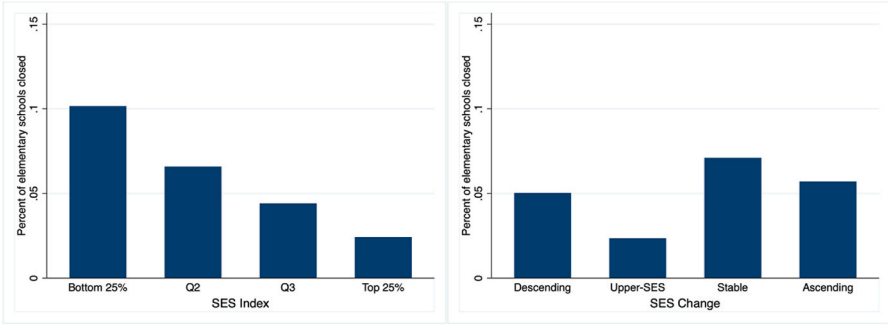
(a) 2010 Percent White (b) 2000-2010 Change in percent White



(c) 2010 Percent Black (d) 2000-2010 Change in percent Black



(e) 2010 Percent Hispanic (f) 2000-2010 Change in percent Hispanic



(g) 2010 SES (h) 1990-2010 Change in SES

Fig. 1. Percent of 2010–2016 elementary school closures by quartiles of neighborhood ethnoracial and socioeconomic variables.

quartile (least advantaged) more than double the probability in the highest quartile (most advantaged). As noted earlier, neighborhoods experiencing stable SES over time have the highest probability of school closure, followed by ascending and descending neighborhoods, and then a significant drop to upper SES neighborhoods.

In summary, our unadjusted descriptive analyses reveal that closures follow traditional Black-White and SES dividing lines. Closures are more likely to occur in Black and low SES neighborhoods and less likely in White, high SES, and stable upper-SES neighborhoods. However, some evidence supports a gentrification or urban renewal prediction, with closures occurring more frequently in neighborhoods experiencing a growing presence of White residents. Moreover, ascending neighborhoods have a slightly higher probability of closure compared to descending-SES neighborhoods. Hispanic presence, whether measured in 2010 or growing over time, appears to be associated with a lower probability of closure.

5.2. Multivariate regression results

We begin the multivariate analysis by examining the relationship between the probability of school closure between 2010 and 2016 and neighborhood characteristics measured in 2010 and their change over time. Table 2 shows coefficients from multivariate logistic regression models reported as odds ratios. Coefficient values less than 1 indicate a negative association with the probability of school closure.

The first column of results draws from a model that includes only 2010 and 1990–2010 change in SES and a set of neighborhood- and district-level controls. We find that higher neighborhood SES is associated with a lower probability of school closure. The adjusted probability that a neighborhood in the 90th percentile in SES (1.1) experienced a school closure is 6.9 percentage points lower than a neighborhood in the 10th percentile (−0.8). Coefficients for the change in SES categorical variables reflect odds ratios relative to the descending SES category. We find that while stable SES neighborhoods have higher odds of closure relative to descending-SES neighborhoods, the odds ratios for ascending and upper-SES neighborhoods are not significantly different. To visualize these results, Fig. 2 shows marginal probabilities of school closure with 95% confidence intervals for all SES change categories setting all other variables to their means. The probability of closure is highest in ascending neighborhoods (6.1%) and lowest in descending neighborhoods (4.9%), but the difference is not statistically significant at the 5% level.

The second set of results includes both 2010 and 2000–2010 change in SAB percent Black. We find that 2010 percent Black is positively associated with closure between 2010 and 2016. Moving from the 10th (1.3%) to the 90th (59.3%) percentile in percent Black increases the probability of school closure by 3.6 percentage points. However, while the absolute share of Black residents predicts closure, changes in their representation does not. We find no association between an increase in SAB percent Black between 2000 and 2010 and the probability of school closure.

The next set of results examines SAB percent Hispanic. In contrast to results for percent Black, we find that higher 2010 percent Hispanic is associated with lower odds of closure. A neighborhood in the 90th percentile in percent Hispanic (67.0%) has a school closure probability that is 2.5 percentage points lower compared to a neighborhood in the 10th percentile (2.5%). However, similar to percent Black, change in percent Hispanic is not associated with closure.

The last set of results show that neighborhoods with higher 2010 percent White have lower odds of school closure. Moving from the 10th (5.3%) to the 90th (87.3%) percentile in percent White decreases the probability of school closure by 3.2 percentage points. In contrast to changes in percent Black and Hispanic, and aligning with the descriptive results, a change in percent White is associated with the probability of school closure—increases in percent White is associated with a higher probability of closure. A neighborhood in the 90th percentile in the change in percent White (0.7%) has a closure probability that is 1.4 percentage points higher compared to a neighborhood in the 10th percentile (−38.2%). Results for 2010 SES and 1990–2010 change in SES largely do not change with the inclusion of measures for 2010 and 2000–2010 change in Black, Hispanic or White composition.

Coefficient results for the control variables indicate that neighborhoods with a larger population size and a higher percentage of residents under 18 years old have lower odds of closure. We also find some evidence that an increasing presence of 18-year-old residents in the neighborhood is protective against closure. School district size is also negatively associated with the probability of school closure. In contrast, the presence of a charter in the neighborhood and the percent of residents under 18 years old who are enrolled in private school are positively associated with closure in most models.

We ran a set of additional models to test the robustness of our main results. First, we tested whether cities experiencing the largest number of closures were skewing the results by excluding neighborhoods in Detroit, Chicago and Philadelphia— cities that account for 13% of closures in our sample. Second, we performed models including state fixed effects in order to control for variation in state school accountability systems and other state-level factors that may be associated with the probability of school closure and neighborhood context. Third, we ran multilevel models with SABs nested within school districts. Fourth, given evidence of the growing mismatch between neighborhood and school demographics, particularly in the context of neighborhood change, we ran models including school-level ethnoracial composition and free and reduced price meals enrollment. Results from these sensitivity tests, which are presented in Appendix Tables A1-A4, do not significantly differ from the results presented here. The only notable difference is that the positive association between change in percent White and closure disappears with the inclusion of school-level characteristics.

In summary, results from multivariate analyses show that current neighborhood SES and ethnoracial composition exhibit important associations with school closures. The associations appear to follow traditional Black-White racial and SES dividing lines: neighborhoods with higher percentages of Black residents, lower percentages of White residents, and lower SES have greater odds of closures. However, neighborhoods with higher percentages of Hispanic residents are less likely to experience a school closure. School closures are also more likely to occur in neighborhoods experiencing an increase in percent White, further supporting the gentrification or urban renewal prediction found in the descriptive analyses. However, we found little other evidence supporting theories of

Table 2
Logistic regressions of regular elementary school closure between 2010 and 2016 on neighborhood characteristics in 2010 and change over time.

	(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p
% Black			1.02***	0.00				
			(0.00)					
Change % Black			0.99	0.08				
			(0.00)					
% Hispanic					0.99**	0.00		
					(0.00)			
Change % Hispanic					1.00	0.66		
					(0.01)			
% White							0.99***	0.00
							(0.00)	
Change % White							1.01*	0.02
							(0.00)	
SES Index	0.40***	0.00	0.45***	0.00	0.38***	0.00	0.44***	0.00
	(0.06)		(0.06)		(0.05)		(0.06)	
Change in SES								
Ascending	1.28	0.06	1.25	0.09	1.28	0.06	1.13	0.36
	(0.16)		(0.17)		(0.17)		(0.15)	
Upper-SES	1.09	0.72	1.10	0.70	1.07	0.78	1.06	0.83
	(0.27)		(0.28)		(0.26)		(0.27)	
Stable	1.25*	0.02	1.22*	0.04	1.28*	0.01	1.15	0.16
	(0.12)		(0.12)		(0.12)		(0.12)	
Charter present	1.58**	0.00	1.51**	0.00	1.59**	0.00	1.54**	0.00
	(0.22)		(0.21)		(0.22)		(0.21)	
Log population	0.43***	0.00	0.58***	0.00	0.49***	0.00	0.47***	0.00
	(0.06)		(0.09)		(0.07)		(0.07)	
% under 18 years old	0.97**	0.00	0.96***	0.00	0.98*	0.05	0.96***	0.00
	(0.01)		(0.01)		(0.01)		(0.01)	
Change % under 18 years old	0.95***	0.00	0.98	0.08	0.95***	0.00	0.98	0.07
	(0.01)		(0.01)		(0.01)		(0.01)	
Urban locale	0.99	0.93	1.11	0.43	0.95	0.73	1.13	0.34
	(0.13)		(0.15)		(0.13)		(0.15)	
% enrolled in private school	1.01*	0.01	1.01*	0.01	1.01	0.32	1.01**	0.01
	(0.01)		(0.01)		(0.01)		(0.01)	
District revenues per pupil	1.00	0.54	1.00	0.64	1.00	0.46	1.00	0.99
	(0.00)		(0.00)		(0.00)		(0.00)	
Log district enrollment	0.88*	0.02	0.80***	0.00	0.91	0.08	0.82***	0.00
	(0.05)		(0.04)		(0.05)		(0.05)	
Region								
Midwest	1.34	0.17	1.04	0.84	1.08	0.72	1.41	0.12
	(0.29)		(0.21)		(0.22)		(0.31)	
South	0.73	0.06	0.53***	0.00	0.64**	0.01	0.70*	0.03
	(0.12)		(0.10)		(0.11)		(0.12)	
Northeast	0.96	0.88	0.71	0.14	0.88	0.57	0.86	0.55
	(0.25)		(0.17)		(0.20)		(0.22)	

Coefficients (b) are in odds ratios. Standard errors clustered by school district are displayed in parentheses below coefficients. Indicators capturing ethnoracial change are measured as 2000 to 2010 decadal change.
***p < 0.001; **p < 0.01; *p < 0.05.

neighborhood change driving closure as change in neighborhood SES, percent Black, and percent Hispanic exhibit no relationship with the probability of school closure.

5.3. Heterogeneity by geographic context

Results from the prior section indicate that certain aspects of neighborhood ethnoracial and SES context have independent associations with closure, but this finding may be masking heterogeneity in these relationships across key geographic variables. Table 3 shows results from multivariate logistic regression models that include interactions between an indicator of urbanicity and neighborhood SES and ethnoracial composition. Rather than the coefficients on the interaction terms, we present the marginal effects of SES/ethnoracial composition on the predicted probability of a school closure (Mize, 2019). For example, the value 0.07 reported under Model 2 for percent Black in urban neighborhoods can be interpreted as a 1% increase in percent Black is associated with 0.07% increase in the probability of a school closure in urban neighborhoods.

We find that percent Black in 2010 (positive), change in percent Black (none), change in percent Hispanic (none) and SES in 2010 (negative) exhibit similar associations with closure in both urban and suburban neighborhoods. However, we find differences in the coefficient results for percent Hispanic, change in percent White, and change in SES. Percent Hispanic in 2010 is negatively associated

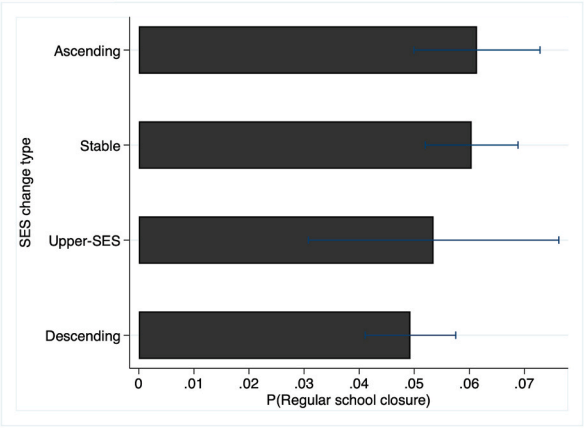


Fig. 2. Regression adjusted school closure probabilities by neighborhood SES change category.

with closure only in urban neighborhoods. Whereas change in percent White has no association in suburban areas, it has a positive association in urban neighborhoods. The results for SES change are presented as the difference in the predicted probability of school closure relative to socioeconomically descending neighborhoods. Socioeconomically ascending neighborhoods are more likely to experience closure than descending-SES neighborhoods in cities, but exhibit no differences in non-urban areas. These results— positive associations between closure and change in percent White and socioeconomic ascent in urban areas, but not in non-urban neighborhoods— support a gentrification prediction of neighborhood context.

Table 4 shows regression results from models that include interactions between region and neighborhood SES and ethnoracial composition. The Midwest and Northeast exhibit patterns that are similar to those shown in the aggregate models: neighborhoods with higher percentages of Black residents, lower percentages of White and lower SES have greater odds of closures, and change in percent Hispanic and percent Black exhibit no relationship. However, in contrast to the aggregate models, change in percent White is not statistically associated with closure in both regions and percent Hispanic is associated with a decreased probability of closure only in the Northeast. Furthermore, whereas socioeconomically ascending neighborhoods have similar closure probabilities as descending and stable SES neighborhoods in the Midwest, they are more likely to experience a closure compared to their non-ascending counterparts in the Northeast.[5]

Results in the West and South noticeably differ from the Black-White and SES patterns found in the Midwest and Northeast, and the traditional ethnoracial and SES dividing lines emphasized in prior school closure research. In the West, although similar to the Northeast and Midwest in that change in percent White is not associated with closure and higher SES and lower percent Black are protective of school closure, percent White is not associated with the probability of closure. Furthermore, change in percent Black is negatively associated with closure whereas change in percent Hispanic exhibits a positive association. That is, although neighborhoods in the West with a larger percentage of Black residents are susceptible to closure, if the percentage has been increasing, they are less likely to experience a closure. In contrast, whereas a neighborhood with a greater presence of Hispanic residents is less likely to experience a closure, it is more susceptible if it has been experiencing an increase in percent Hispanic.

We observe similar ethnoracial patterns in the South, but rather than the Hispanic-Black contrast in the West, we find a White-Black contrast in the South. Similar to the West, neighborhoods in the South with a greater Black presence are more susceptible to a school closure and those experiencing an increase in percent Black are less likely to experience a closure. However, whereas current and change in Hispanic composition in a neighborhood is associated with closures in the West, they have no association in the South. Instead, it is the composition of White residents that matters in the South. Specifically, neighborhoods in the South with a large but decreasing White presence have a lower probability of experiencing a closure.

Additional models that include interactions between neighborhood SES and ethnoracial composition and both region and urbanicity reveal that the associations presented in Table 4 for the Midwest, Northeast and South are primarily applicable for neighborhoods in urban locales.[6] Specifically, we found that while higher SES and lower percent Black are associated with a lower likelihood of closure in both suburban and urban areas, the associations between closure and percent White, change in percent Black, change in percent White, and change in SES in the Midwest, Northwest, and South are not statistically significant in suburban neighborhoods. In contrast, results in the West are largely similar across urban and suburban areas.

[5] While not comprehensive of all schools in the U.S., the SABINS file has representative coverage in all regions except for the Northeast where roughly half of the regular traditional public schools that appear in the Common Core of Data also appear in SABINS. In our sample, the proportion of urban to suburban school is similar across all regions.

[6] Results are available upon request.

Table 3
Marginal effects of neighborhood characteristics in 2010 and change over time on the probability of school closure between 2010 and 2016 by urban and suburban locale.

	Urban (N = 8,054)								Suburban (N = 6,509)							
	(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p	b	p	b	p	b	p	b	p
% Black			0.07***	0.00							0.06***	0.00				
			(0.01)								(0.01)					
Change % Black			−0.03	0.17							−0.04	0.08				
			(0.02)								(0.02)					
% Hispanic					−0.05***	0.00							0.01	0.49		
					(0.01)								(0.02)			
Change % Hispanic					0.00	0.88							−0.05	0.10		
					(0.03)								(0.03)			
% White							−0.04***	0.00							−0.04***	0.00
							(0.01)								(0.01)	
Change % White							0.05*	0.01							0.04	0.10
							(0.02)								(0.02)	
SES Index	−5.23***	0.00	−4.38***	0.00	−5.10***	0.00	−4.83***	0.00	−1.99***	0.00	−1.67***	0.00	−2.17***	0.00	−1.63***	0.00
	(0.81)		(0.71)		(0.73)		(0.81)		(0.49)		(0.48)		(0.49)		(0.46)	
Change in SES																
Ascending	1.81*	0.02	0.59*	0.02	0.20*	0.01	0.45	0.09	0.20	0.78	−0.07	0.85	−0.03	0.97	−0.29	0.89
	(0.74)		(1.41)		(1.24)		(1.51)		(0.71)		(1.03)		(1.09)		(1.03)	
Upper-SES	0.45	0.74	0.75	0.67	1.07	0.87	0.56	0.76	−0.03	0.98	0.78	0.95	0.75	0.98	0.56	0.78
	(1.39)		(0.47)		(0.47)		(0.51)		(1.05)		(0.53)		(0.56)		(0.55)	
Stable	0.93*	0.04	1.66	0.11	1.89*	0.02	1.23	0.27	0.82	0.12	0.13	0.14	−0.02	0.18	−0.10	0.30
	(0.46)		(0.73)		(0.72)		(0.74)		(0.53)		(0.69)		(0.74)		(0.72)	

Coefficients (b) represent the marginal effect of an independent variable on the probability of a school closure. Standard errors clustered by school district are displayed in parentheses below coefficients. Indicators capturing ethnoracial change are measured as 2000 to 2010 decadal change.
***p < 0.001; **p < 0.01; *p < 0.05.

Table 4
Marginal effects of neighborhood characteristics in 2010 and change over time on the probability of school closure between 2010 and 2016 by region.

	South (N = 6,381)								Midwest (N = 2,067)							
	(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p	b	p	b	p	b	p	b	p
% Black			0.04***	0.00							0.13***	0.00				
			(0.01)								(0.03)					
Change % Black			−0.04*	0.02							0.04	0.48				
			(0.02)								(0.05)					
% Hispanic					−0.02	0.10							−0.03	0.35		
					(0.01)								(0.04)			
Change % Hispanic					−0.04	0.21							−0.05	0.54		
					(0.03)								(0.08)			
% White							−0.03***	0.00							−0.16***	0.00
							(0.01)								(0.05)	
Change % White							0.05***	0.00							0.00	0.99
							(0.02)								(0.05)	
SES Index	−3.30***	0.00	−2.69***	0.00	−3.31***	0.00	−2.51***	0.00	−10.11***	0.00	−7.09***	0.00	−9.92***	0.00	−6.60**	0.01
	(0.48)		(0.48)		(0.49)		(0.47)		(3.22)		(2.43)		(3.11)		(2.37)	
Change in SES																
Ascending	1.37	0.06	1.05	0.10	1.14	0.12	0.65	0.34	0.92	0.67	1.91	0.46	0.69	0.74	1.12	0.62
	(0.73)		(0.64)		(0.74)		(0.68)		(2.18)		(2.57)		(2.10)		(2.28)	
Upper-SES	−0.04	0.96	0.05	0.96	−0.13	0.89	−0.37	0.68	1.83	0.63	1.61	0.65	1.69	0.66	1.83	0.64
	(0.94)		(0.95)		(0.92)		(0.89)		(3.77)		(3.51)		(3.80)		(3.87)	
Stable	1.28***	0.00	1.07*	0.02	1.18*	0.01	0.94*	0.05	−0.26	0.85	0.12	0.94	−0.36	0.79	−0.41	0.80
	(0.45)		(0.45)		(0.46)		(0.47)		(1.34)		(1.51)		(1.35)		(1.62)	
	West (N = 4,537)								Northeast (N = 1,578)							
	(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p	b	p	b	p	b	p	b	p
% Black			0.06*	0.04							0.07***	0.00				
			(0.02)								(0.02)					
Change % Black			−0.06*	0.04							−0.04	0.26				
			(0.02)								(0.04)					
% Hispanic					−0.05***	0.00							−0.07*	0.02		
					0.02								(0.03)			
Change % Hispanic					0.04*	0.03							0.11	0.12		
					0.02								(0.07)			
% White							0.00	0.98							−0.05*	0.02
							(0.01)								(0.02)	
Change % White							0.03	0.23							0.04	0.27
							(0.03)								(0.03)	
SES Index	−1.72**	0.01	−1.75**	0.01	−2.04***	0.00	−1.84***	0.00	−5.16***	0.00	−4.26***	0.00	−4.89***	0.00	−5.02***	0.00
	(0.66)		(0.66)		(0.70)		(0.63)		(1.48)		(1.18)		(1.29)		(1.55)	
Change in SES																
Ascending	0.99	0.22	0.67	0.42	1.30	0.11	0.48	0.60	−0.62*	0.04	−0.82*	0.04	−0.43*	0.04	−0.67*	0.04
	(0.81)		(0.83)		(0.82)		(0.90)		(0.31)		(0.42)		(0.22)		(0.33)	
Upper-SES	−0.51	0.74	−0.55	0.73	−0.36	0.80	−0.82	0.56	1.26	0.71	0.98	0.76	1.01	0.74	1.31	0.71
	(1.57)		(1.56)		(1.40)		(1.42)		(3.34)		(3.20)		(3.09)		(3.53)	
Stable	−0.02	0.98	−0.10	0.88	0.54	0.42	−0.05	0.95	1.76	0.15	1.64	0.17	1.81	0.13	1.70	0.14
	(0.69)		(0.70)		(0.66)		(0.71)		(1.23)		(1.20)		(1.21)		(1.16)	

Coefficients (b) represent the marginal effect of an independent variable on the probability of a school closure. Standard errors clustered by school district are displayed in parentheses below coefficients. Indicators capturing ethnoracial change are measured as 2000 to 2010 decadal change.
***p < 0.001; **p < 0.01; *p < 0.05.

6. Discussion

Although much of the attention surrounding the increase in public school closures in U.S. cities has centered on the consequences for displaced students and their families, closures may have important relationships with other stakeholders. In particular, opponents of school closures argue that because schools can assume far-reaching roles in the community, including connecting residents to other neighborhood institutions (Good 2019) and influencing norms and behaviors by serving as organizations of local social control (Warren 2005), their closures will have a negative impact on local neighborhoods that far outweigh the potential benefits of student transfer. Furthermore, critics claim that closures are not experienced equally across all neighborhoods, but are disproportionally located in disadvantaged, minority neighborhoods, which are the types of neighborhoods that rely on local schools to provide services beyond educating local youth (Anderson 2014). We found support for this claim: public elementary school closures are more likely to occur in neighborhoods with a higher percent Black, lower percent White, and lower SES composition. These findings corroborate results from prior studies examining closures in large cities such as Chicago, Philadelphia and Detroit. By examining the relationship between school closures and neighborhood context for a broad sample of cities across the United States, we contribute to this prior work by generalizing their descriptive findings to areas beyond the narrow set previously studied in school closure research.

We also contribute to prior work by examining the relationship between closure and percent Hispanic, an association that is largely neglected in empirical research given the focus in national discussions and by academic scholars on a handful of predominantly Black-White cities. In contrast to percent Black, we found that percent Hispanic is negatively correlated with closure. A potential explanation for this negative association is that the neighborhood conditions in Hispanic communities such as strong socio-cultural ties that have been theorized to be protective of negative phenomena also apply to the closure of neighborhood schools. The association may also reflect different structures of local schooling in Hispanic neighborhoods, such as the underrepresentation of Hispanic students enrolled in charters and different forms of engagement with local school choice, such as the use of charters to primarily serve English Language Learners (Hall and Hibel 2017; Mavrogordato and Harris 2017). Since we found that the association only applied to neighborhoods in urban areas, the interactions between closure, school choice, White flight and enrollment may also explain the protective effect as White children are less likely to opt out of residentially zoned public schools in majority Hispanic urban neighborhoods (Bischoff and Tach 2018). Although our study does not test these mechanisms, the results do suggest that the characterization that closures occur in all minority neighborhood types is inaccurate. The implication of our finding is that Black and Hispanic neighborhoods differ in how they interact with closures, and precisely what those differences are warrant further research.

In contrast to current neighborhood conditions, long-term changes in neighborhood ethnoracial and socioeconomic composition largely did not matter. Changes in percent White is the only neighborhood change characteristic associated with closures, with an increasing percent White associated with a greater probability of closure. However, the aggregate models mask important differences between urban and suburban neighborhoods. In particular, socioeconomic ascent and increasing percent White are positively associated with closure in urban areas but not in suburban ones. The combined results of a closure more likely occurring in urban neighborhoods with lower but increasing percent White, greater percent Black and increasing SES supports a gentrification prediction. This finding may be due to the heightened demand for school choice options in gentrifying neighborhoods, class and race-based conflict that leads to racial preferences in school demographic enrollment characteristics, and the displacement of long-term residents and the accompanying decrease in the local population of children who would have otherwise attended neighborhood schools (Pearman 2020; Zhang and Ruther, 2020). For these potential explanations, the result is a decline in local school enrollment, particularly White enrollment, a finding that has been documented in prior studies examining the link between gentrification and enrollment in neighborhood schools (Candipan 2019; Pearman and Swain 2017; Pearman 2020). As with the percent Hispanic finding, we did not test the underlying mechanisms explaining this result, but note this as an important topic for future work.

We also uncovered regional differences in the neighborhood context of public elementary school closures. We found that the results in the Midwest and Northeast are similar to those found in the aggregate analysis: neighborhoods with higher percentages of Black residents, lower percentages of White, and lower SES have greater odds of experiencing a school closure. This finding corroborates results from prior work, which is not surprising given that closure research has primarily focused on cities located in the Midwest and Northeast regions. We also show that increasing socioeconomic status is positively associated with closures only in the Northeast, and this association is statistically significant in urban but not in suburban areas.

Whereas gentrification and the traditional Black-White and SES dividing lines characterize the neighborhood context of closures in the Midwest and Northeast, the context notably differs for neighborhoods located in the West and South regions. While percent Black is positively correlated with school closure across all regions, increases in percent Black appear to be protective only in the West and South. Offsetting this relationship is the diverging patterns of other race/ethnic groups in the neighborhood, specifically Hispanics in the West and Whites in the South. In the West, a greater percent Hispanic is protective of school closures, but an increasing percent Hispanic is positively associated with closures. In the South, this pattern applies to White residents. Although we do not have the data to properly assess why these patterns exists, the differences underscore the broader takeaway that there is regional variation in the neighborhood SES and ethnoracial conditions that explain school closures. Although some work has investigated closures in cities in different areas of the country (e.g., Davis et al., 2019), more research is needed for a more comprehensive understanding of the regional differences in the neighborhood characteristics associated with closure locations.

We emphasize that although our results suggest that closures occur in multiple contexts, percent Black and change in SES in neighborhoods had statistically significant associations with closures that pointed in the same direction across all models. In the aggregate model, in both urban and suburban neighborhoods, across all regions, and in all sensitivity tests, a greater percent Black and lower SES in neighborhoods are associated with a higher likelihood of school closure. These results are not mutually exclusive to the notable variations we uncovered, such as gentrification patterns in the Northeast, a Hispanic protective effect in urban areas, and the

negative association with increasing percent Black in the West and South regions. For example, neighborhoods in the process of gentrification are often still lower-income with a large presence of Black residents. However, these conditions do not completely overlap. Unlike prior work focusing on single cities, our study relies on a large sample of neighborhoods to demonstrate that closures are not a monolith and that multiple patterns exist. Nevertheless, our results suggest that closures follow familiar patterns of spatial inequality that stratify neighborhoods across traditional Black and SES lines. Whether these patterns exacerbate existing inequalities, or create new ones, will depend on the consequences of school closures on neighborhood outcomes.

Although this study provides the first national evidence on patterns and relations of ethnoracial and socioeconomic conditions with respect to school closure in the U.S., it is not without several limitations. First, it is important to emphasize that the aims of this study were purely descriptive. Consequently, the observed associations between neighborhood characteristics and school closure locations should not be interpreted as causal. Attributing causality to patterns of neighborhood conditions in future work will likely require the use of natural experiments, panel data, and econometric techniques that minimize potential endogeneity. Second, future research should examine other macro-scale contexts associated with school closure besides urbanicity and region, including characteristics of the city and metropolitan area. In particular, prior work has alluded to the role of city and metro segregation patterns influencing where residents live, where resources are geographically distributed, and the spatial pattern of school choice, factors that are potentially associated with closure locations (Ewing 2018; Lichter et al. 2015; Zhang and Ruther 2020). An examination of these and other contexts may reveal greater variation in the types of places that closures occur that is not captured by those examined in this study.

Finally, the use of a national dataset allowed us greater generalizability and the ability to test for heterogeneity, but comes with several tradeoffs. Although we included basic school demographic characteristics in robustness tests, our study did not take into account the wider set of school-level characteristics that may be influencing school closure. Prior work has found associations between closure and school factors such as academic performance and facility utilization, with the inclusion of these factors mitigating the relationship between neighborhood characteristics and closure in some cases (Burdick-Will et al., 2013; Weber et al., 2020). We trade off the school-level specificity afforded to case studies of single cities with the greater generalizability provided by a much larger sample of cities. Future research incorporating a fuller set of school and school-district level characteristics in neighborhood-level models of closure is needed.

We also leave it to future work to examine the mechanisms for why closures are located in certain neighborhoods. In particular, we found that measures of alternative schooling, specifically the presence of a charter school and private school enrollment, were positively associated with closure, and thus incorporating finer measures of school choice context is a valuable avenue for future work. Because finer grained information on school choice and other potential mechanisms is difficult to collect at a national level and over time, future work testing mechanisms will likely focus on case studies of individual cities. Our findings emphasize that although research in cities heavily studied in past work—e.g., Chicago, Philadelphia, and Detroit—should not be ignored, an expanded focus to other cities, particularly those in the West and South, is needed in order to gain a fuller understanding of where closures are located and the potential factors explaining those ecological conditions. Important tasks for future research will include identifying which cities and districts evince the strongest associations between neighborhood conditions and school closure and uncovering explanations for why robust associations may or may not exist. Our study contributes to a more descriptive objective—the neighborhood characteristics associated with school closure—that addresses a key point of debate in public discussions of school closure equity occurring in cities across the country.

By understanding where closures are located in the first place, we can move towards a better understanding of how closures may differentially impact diverse populations. If closures have beneficial ecological effects, they have the potential for decreasing ethnoracial and socioeconomic gaps because they are typically located in minority, socioeconomically disadvantaged neighborhoods. If they have negative effects, closures may instead exacerbate spatial inequalities. Whether positive or negative, these effects may be magnified if closures occur in gentrifying neighborhoods. The evidence on the impact of school closures on neighborhood outcomes is mixed, with some studies finding beneficial effects, such as decreasing local crime rates (Steinberg et al., 2019), and others identifying negative effects, such as decreasing spatial access to schools (Lee and Lubienski 2017) and decreased housing values (Brazil 2019). Moreover, the size and direction of the effects depend on the types of neighborhoods experiencing closure (Brazil 2019). By identifying the neighborhood context of closure locations, our results can inform future scholarly and policy work that examines the ecological consequences of school closures.

Our study is an important step in understanding the complex picture of school closures in the contemporary urban context of school choice, gentrification, and neighborhood revitalization. As school closures continue to dot the urban landscape, whether motivated by school and urban renewal initiatives, expanding school choice options, broader neighborhood change phenomena such as gentrification, or some combination of these processes, more work is needed to understand why schools close, where closures are located, and how closures differentially impact stakeholders including the communities they serve across ethnoracial and socioeconomic lines.

Appendix

Appendix Table A1
Logistic Regressions of Regular Elementary School Closure between 2010 and 2016 on Neighborhood Characteristics in 2010 and Change Over Time (with State Fixed Effects)

	(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p
% Black			1.02***	0.00				
			(0.00)					
Change % Black			0.99	0.08				
			(0.00)					
% Hispanic					0.99***	0.00		
					(0.00)			
Change % Hispanic					1.00	0.76		
					(0.01)			
% White							0.99***	0.00
							(0.00)	
Change % White							1.01**	0.01
							(0.00)	
SES Index	0.38***	0.00	0.46***	0.00	0.34***	0.00	0.47***	0.00
	(0.05)		(0.06)		(0.05)		(0.07)	
Change in SES								
Ascending	1.34*	0.03	1.31	0.05	1.37*	0.02	1.20	0.20
	(0.18)		(0.18)		(0.18)		(0.17)	
Upper-SES	1.10	0.71	1.04	0.89	1.10	0.69	1.00	0.99
	(0.27)		(0.26)		(0.27)		(0.25)	
Stable	1.27*	0.01	1.23*	0.03	1.29**	0.01	1.18	0.10
	(0.12)		(0.12)		(0.12)		(0.12)	
Charter present	1.41*	0.03	1.34	0.07	1.41*	0.03	1.37*	0.05
	(0.23)		(0.21)		(0.23)		(0.22)	
Log population	0.48***	0.00	0.61**	0.00	0.52***	0.00	0.54***	0.00
	(0.07)		(0.09)		(0.07)		(0.08)	
% under 18 years old	0.97**	0.00	0.96***	0.00	0.98*	0.01	0.96***	0.00
	(0.01)		(0.01)		(0.01)		(0.01)	
Change % under 18 years old	0.96**	0.00	0.98	0.18	0.96**	0.00	0.98	0.21
	(0.01)		(0.01)		(0.01)		(0.01)	
Urban	0.89	0.34	1.00	0.98	0.91	0.47	0.96	0.78
	(0.11)		(0.13)		(0.12)		(0.12)	
% enrolled in private school	1.01	0.15	1.02*	0.02	1.01	0.16	1.01*	0.03
	(0.01)		(0.01)		(0.01)		(0.01)	
District revenues per pupil	1.00	0.14	1.00	0.11	1.00	0.08	1.00	0.16
	(0.00)		(0.00)		(0.00)		(0.00)	
Log district enrollment	0.92	0.14	0.85**	0.00	0.96	0.43	0.84**	0.00
	(0.05)		(0.04)		(0.05)		(0.05)	

Coefficients (b) are in odds ratios. Standard errors clustered by school district are displayed in parentheses below coefficients. Indicators capturing ethnoracial change are measured as 2000 to 2010 decadal change.
***p < 0.001; **p < 0.01; *p < 0.05.

Appendix Table A2
Multilevel Logistic Regressions of Regular Elementary School Closure between 2010 and 2016 on Neighborhood Characteristics in 2010 and Change Over Time

	(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p
% Black			1.02***	0.00				
			(0.00)					
Change % Black			0.99	0.06				
			(0.09)					
% Hispanic					0.99***	0.00		
					(0.00)			
Change % Hispanic					1.00	0.86		
					(0.01)			
% White							0.99***	0.00
							(0.00)	
Change % White							1.01*	0.01
							(0.00)	

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Appendix Table A2 (*continued*)

	(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p
SES Index	0.41***	0.00	0.47***	0.00	0.38***	0.00	0.46***	0.00
	(0.05)		(0.06)		(0.05)		(0.06)	
Change in SES								
Ascending	1.02	0.94	0.99	0.97	1.01	0.98	0.95	0.85
	(0.25)		(0.24)		(0.25)		(0.24)	
Upper-SES	1.23	0.04	1.19	0.08	1.24*	0.03	1.14	0.19
	(0.12)		(0.12)		(0.13)		(0.12)	
Stable	1.33*	0.04	1.31*	0.05	1.35*	0.03	1.19	0.22
	(0.18)		(0.19)		(0.19)		(0.17)	
Charter present	1.33	0.08	1.31	0.10	1.34	0.07	1.31	0.10
	(0.22)		(0.21)		(0.22)		(0.21)	
Log population	0.46***	0.00	0.57***	0.00	0.50***	0.00	0.51***	0.00
	(0.07)		(0.09)		(0.07)		(0.07)	
% under 18 years old	0.97***	0.00	0.96***	0.00	0.98**	0.01	0.96***	0.00
	(0.01)		(0.01)		(0.01)		(0.01)	
Change % under 18 years old	0.96***	0.00	0.98	0.23	0.96***	0.00	0.98	0.28
	(0.01)		(0.01)		(0.01)		(0.01)	
Urban	1.09	0.54	1.18	0.25	1.05	0.76	1.22	0.18
	(0.16)		(0.17)		(0.16)		(0.18)	
% enrolled in private school	1.01	0.48	1.01	0.11	1.00	0.60	1.01	0.16
	(0.01)		(0.01)		(0.01)		(0.01)	
District revenues per pupil	1.00	0.62	1.00	0.70	1.00	0.49	1.00	0.89
	(0.00)		(0.00)		(0.00)		(0.00)	
Log district enrollment	0.90	0.06	0.83***	0.00	0.93	0.20	0.84**	0.01
	(0.05)		(0.05)		(0.06)		(0.05)	
Region								
Midwest	1.76*	0.01	1.98***	0.00	1.62*	0.02	1.99***	0.00
	(0.37)		(0.40)		(0.33)		(0.41)	
West	1.58*	0.01	1.95***	0.00	1.83***	0.00	1.60*	0.01
	(0.28)		(0.36)		(0.34)		(0.28)	
Northeast	1.13	0.65	1.13	0.63	1.18	0.52	1.07	0.81
	(0.29)		(0.29)		(0.30)		(0.28)	

Coefficients (b) are in odds ratios. Level 1 units are school attendance boundaries and Level 2 units are school districts. Indicators capturing ethnoracial change are measured as 2000 to 2010 decadal change.
***p < 0.001; **p < 0.01; *p < 0.05.

Appendix Table A3
Logistic Regressions of Regular Elementary School Closure between 2010 and 2016 on Neighborhood Characteristics in 2010 and Change Over Time, School Characteristics

	(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p
% Black			1.01***	0.00				
			(0.00)					
Change % Black			1.00	0.29				
			(0.00)					
% Hispanic					0.99**	0.00		
					(0.00)			
Change % Hispanic					1.00	0.57		
					(0.01)			
% White							0.99**	0.00
							(0.00)	
Change % White							1.01	0.19
							(0.00)	
SES Index	0.52***	0.00	0.53***	0.00	0.49***	0.00	0.55***	0.00
	(0.08)		(0.08)		(0.08)		(0.09)	
Change in SES								
Ascending	1.12	0.39	1.13	0.38	1.19	0.22	1.07	0.64
	(0.15)		(0.16)		(0.17)		(0.16)	
Upper-SES	1.34	0.25	1.27	0.34	1.36	0.23	1.20	0.48
	(0.34)		(0.32)		(0.34)		(0.30)	
Stable	1.22*	0.04	1.21	0.07	1.27*	0.02	1.16	0.16
	(0.12)		(0.12)		(0.13)		(0.13)	
Charter present	1.60**	0.00	1.58**	0.00	1.58**	0.00	1.63**	0.00
	(0.24)		(0.23)		(0.24)		(0.24)	
Log population	0.65*	0.01	0.74	0.06	0.73*	0.04	0.72*	0.05
	(0.11)		(0.12)		(0.11)		(0.12)	

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Appendix Table A3 (*continued*)

	(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p
% under 18 years old	0.97**	0.00	0.97**	0.00	0.98*	0.04	0.97**	0.00
	(0.01)		(0.01)		(0.01)		(0.01)	
Change % under 18 years old	0.97*	0.01	0.98	0.19	0.97*	0.02	0.99	0.30
	(0.01)		(0.01)		(0.01)		(0.01)	
Urban	1.27	0.06	1.26	0.08	1.26	0.07	1.22	0.12
	(0.16)		(0.16)		(0.16)		(0.16)	
% enrolled in private school	1.01	0.11	1.01*	0.04	1.01	0.23	1.01*	0.05
	(0.01)		(0.01)		(0.01)		(0.01)	
District revenues per pupil	1.00	0.28	1.00	0.14	1.00	0.20	1.00	0.20
	(0.00)		(0.00)		(0.00)		(0.00)	
Log district enrollment	0.85**	0.00	0.82***	0.00	0.84**	0.00	0.84**	0.00
	(0.05)		(0.04)		(0.05)		(0.04)	
Region								
Midwest	1.60*	0.05	1.33	0.20	1.29	0.27	1.31	0.23
	(0.38)		(0.30)		(0.30)		(0.29)	
South	0.80	0.18	0.66*	0.03	0.66*	0.02	0.69*	0.05
	(0.13)		(0.13)		(0.12)		(0.13)	
Northeast	1.35	0.26	1.17	0.55	1.21	0.48	1.11	0.67
	(0.36)		(0.31)		(0.33)		(0.28)	
School characteristics								
Log enrollment	1.00***	0.00	1.00***	0.00	1.00***	0.00	1.00***	0.00
	(0.00)		(0.00)		(0.00)		(0.00)	
% White	0.32***	0.00	0.48**	0.01	0.20***	0.00	0.51**	0.01
	(0.08)		(0.13)		(0.06)		(0.13)	
% enrolled in FRPM	1.36	0.29	1.26	0.45	1.14	0.69	2.15*	0.02
	(0.39)		(0.39)		(0.37)		(0.68)	

Coefficients (b) are in odds ratios. Standard errors clustered by school district are displayed in parentheses below coefficients. Indicators capturing ethnoracial change are measured as 2000 to 2010 decadal change.
FRPM: Free and Reduced Price Meals Program.
***p < 0.001; **p < 0.01; *p < 0.05.

Appendix Table A4
Logistic Regressions of Regular Elementary School Closure between 2010 and 2016 on Neighborhood Characteristics in 2010 and Change Over Time, Excluding Chicago, Philadelphia and Detroit

	(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p
% Black			1.02***	0.00				
			(0.00)					
Change % Black			0.99**	0.01				
			(0.00)					
% Hispanic					0.99*	0.01		
					(0.00)			
Change % Hispanic					1.00	0.90		
					(0.01)			
% White							0.99***	0.00
							(0.00)	
Change % White							1.01*	0.02
							(0.00)	
SES Index	0.46***	0.00	0.50***	0.00	0.44***	0.00	0.50***	0.00
	(0.05)		(0.06)		(0.05)		(0.06)	
Change in SES								
Ascending	1.21	0.17	1.13	0.38	1.22	0.16	1.07	0.67
	(0.17)		(0.16)		(0.18)		(0.16)	
Upper-SES	0.98	0.92	0.99	0.97	0.98	0.94	0.94	0.79
	(0.24)		(0.25)		(0.24)		(0.23)	
Stable	1.25*	0.02	1.20	0.07	1.28*	0.02	1.15	0.19
	(0.12)		(0.12)		(0.13)		(0.12)	
Charter present	1.79***	0.00	1.70***	0.00	1.81***	0.00	1.74***	0.00
	(0.21)		(0.20)		(0.21)		(0.20)	
Log population	0.46***	0.00	0.60***	0.00	0.50***	0.00	0.50***	0.00
	(0.07)		(0.09)		(0.07)		(0.07)	
% under 18 years old	0.97**	0.00	0.96**	0.00	0.98*	0.03	0.96***	0.00
	(0.01)		(0.01)		(0.01)		(0.01)	
Change % under 18 years old	0.95**	0.00	0.98	0.25	0.95***	0.00	0.98	0.20
	(0.01)		(0.01)		(0.01)		(0.01)	
Urban	0.99	0.93	1.12	0.39	0.96	0.76	1.13	0.36

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Appendix Table A4 (*continued*)

	(1)		(2)		(3)		(4)	
	b	p	b	p	b	p	b	p
	(0.13)		(0.15)		(0.13)		(0.15)	
% enrolled in private school	1.01*	0.02	1.02**	0.00	1.01*	0.05	1.02**	0.00
	(0.01)		(0.01)		(0.01)		(0.01)	
District revenues per pupil	1.00	0.48	1.00	0.67	1.00	0.43	1.00	0.89
	(0.00)		(0.00)		(0.00)		(0.00)	
Log district enrollment	0.81***	0.00	0.77***	0.00	0.84**	0.00	0.77***	0.00
	(0.04)		(0.04)		(0.05)		(0.04)	
Region								
Midwest	1.11	0.59	1.00	0.99	0.97	0.86	1.23	0.29
	(0.21)		(0.20)		(0.19)		(0.24)	
South	0.80	0.14	0.59**	0.00	0.72*	0.05	0.75	0.07
	(0.12)		(0.10)		(0.12)		(0.12)	
Northeast	0.70	0.16	0.57*	0.02	0.69	0.13	0.64*	0.05
	(0.18)		(0.13)		(0.17)		(0.15)	

Coefficients (b) are in odds ratios. Standard errors clustered by school district are displayed in parentheses below coefficients. Indicators capturing ethnoracial change are measured as 2000 to 2010 decadal change.
***p < 0.001; **p < 0.01; *p < 0.05.

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