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Why Are Ghettos Bad? Examining the Role of the Metropolitan Educational Environment

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Abstract

Relative to whites, blacks that reside in highly segregated metropolitan areas have worse educational and labor market outcomes than those that reside in less segregated areas. Using data from the 1990 U.S. Census combined with measures of metropolitan educational environment created from the Common Core of Data (CCD), we test whether the strong empirical relationship between residential segregation and black outcomes can be attributed to the educational environment in those metropolitan areas. We find that our measures of metropolitan educational environment can explain a substantial fraction of the effect of segregation on educational outcomes and idleness.

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Why Are Ghettos Bad? Examining the Role of the Metropolitan Educational Environment

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On average, minorities that reside in highly segregated metropolitan areas have worse outcomes than minorities that reside in relatively less segregated areas. For blacks, this empirical relationship has been established for educational attainment, labor market outcomes, single parenthood (Cutler and Glaeser, 1997; Ananat, 2007) and standardized test scores (Card and Rothstein, 2007). Further, this relationship appears related to the historical experience of the African-American population in the United States. Collins and Margo (2000) find that the negative relationship between segregation and black outcomes arose during the 1970's and strengthened during the 1980's near the conclusion of the great migration of blacks from the rural south. Similarly, Ananat (2007) finds that the effect of segregation is strongest in metropolitan areas that had substantial migration of blacks during the great migration.[1]

A parallel literature examines the impact of school segregation and minority peers on student outcomes. Using variation in the timing of court ordered desegregation plans in the 1970's, Guryan (2004) finds that desegregation lowered black drop-out rates. Freeman, Scafidi, and Sjoquist (2005) find that increases in school segregation in Georgia during the 1990's were associated with relative declines in teacher quality for black students. Using school administrative data from Texas, both Hoxby (2000) and Kain, Hanushek, and Rivken (2002) examine differences in racial composition across different cohorts of students in the same school

[1] See Cutler, Glaeser, and Vigdor (1999) who describe the evolution of black residential segregation throughout the period of the great migration and afterwards.

and grade and find that increases in black representation among peers reduces scores on standardized tests.[2]

The strong empirical relationship between residential segregation and black outcomes along with the associated concentration of blacks into poor quality urban schools has been very influential in discussions about race in American society.[3] Efforts to explain the relationship between residential segregation and black outcomes, however, have emphasized the role of neighborhood rather than school characteristics. In their earlier study, Cutler and Glaeser (1997) find that residential exposure to college educated neighbors can explain a substantial share of the impact of residential segregation. Also, Cutler, Glaeser, and Vigdor (2006) find that segregation is less harmful to immigrant groups with higher levels of human capital, again pointing to the role of neighbors' education as a mechanism through which residential segregation generates negative outcomes. Most recently, Card and Rothstein (2007) find no impact of school segregation on the black-white test score gap after controlling for residential segregation and conclude that much of the impact of residential segregation operates through neighbors' incomes.

Card and Rothstein's results may appear to rule out school racial composition as an explanation for why blacks do relatively poorly in segregated metropolitan areas. However, several questions remain about the role schools in residentially segregated areas play in generating outcome disparities. Card and Rothstein's analysis is limited to performance on standardized tests, specifically the SAT, and so, it remains an open question what role school segregation might play in generating disparities on other outcomes. Also, Reardon, Yun, and

[2] For an alternative view, see Bifulco, Fletcher, and Ross (2009) who find that the racial composition of school peers has a large effect on school environment, but no effect on academic outcomes like test scores, high school graduation, college attendance or idleness either directly or through the school environment.

[3] For example see the Poverty & Race Research Action Council's (2007) response to the U.S. Government's report to the U.N. Committee on the Elimination of all forms of Racial Discrimination (CERD).

Kurlaender (2006) demonstrate that policies to promote integration of schools by race might not significantly reduce segregation by income, and vice versa. Thus, even when school desegregation policies are able to reduce the racial segregation of schools, black students in areas with high levels of residential segregation might be relatively likely to attend schools with concentrations of poverty.

Further, residential segregation can also influence the amount and distribution of school resources. Ananat and Washington (2007) show that residential segregation has a substantial influence on the political power of blacks, and therefore such segregation might influence levels of spending in urban schools or even metropolitan wide spending levels. If the achievement of black students is influenced more than the achievement of white students by school resources,[4] then across metropolitan differences in funding might contribute to racial disparities in outcomes. In addition, residential segregation may reduce the willingness of experienced, well-qualified teachers to teach in schools with substantial black populations. Clotfelter, Ladd, and Vigdor (2006) document for North Carolina the tendency for well qualified teachers to be matched with schools and classrooms within schools that have more white students, and Jackson (2009) found a change in teacher composition resulting from the resegregation of Charlotte schools that appears related to the residential location patterns of teachers. Residential segregation may also affect the behavior of school administrators who attempt to retain white students in integrated schools by a reallocation of resources within schools, e.g. the provision of and access to honors courses may be related to residential segregation (Card and Rothstein, 2007).

[4] For instance, Krueger (1999) and Krueger & Whitmore (2001) find that black students benefited comparatively more from being assigned to small classes than white students.

This paper examines the extent to which cross-metropolitan differences in school environments can explain the empirical relationship between residential segregation and the relative outcomes of black students. Answers to this question are important for assessing the role that school policies that do not reduce residential segregation, including but not limited to desegregation efforts, might play in reducing black-white outcome disparities in highly segregated metropolitan areas.

We begin by replicating the analysis of Cutler and Glaeser (1997), which is arguably the best known study on the impact of residential segregation, using the 1% Sample of the Public Use Microdata sample from the 1990 U.S. Census.[5] Next, we use data from the Common Core of Data (CCD) of U.S. schools and school districts to create a list of variables that describe school environments within U.S. metropolitan areas. We examine the correlation between our metropolitan school environment variables and residential segregation in order to identify aspects of the school environments that might contribute to the relationship between segregation and outcomes. We find a substantial correlation between residential segregation and school segregation by race, and between residential segregation and racial differences in the exposure to free lunch eligible students in school. Residential segregation is also correlated with the average student teacher ratio and average school district per pupil student spending in the metropolitan areas. We, then, add these four school environment variables to the regression models, and observe how this affects the estimated relationship between residential segregation and the relative outcomes of blacks.

[5] We use the same sample year as Cutler and Glaeser (1997). Results are quite similar using the 2000 Public Use Microdata sample, but we focus on the 1990 sample because the 2000 data identifies the metropolitan area of residence for a smaller number of areas. As will be discussed later in the paper, we follow Cutler and Glaeser's (1997) and Card and Rothstein's (2007) examples and base our analysis on ordinary least squares models of individual outcomes as opposed to Cutler and Glaeser's instrumental variable analyses. The reader is referred to Ananat (2007) for the most recent and best evidence concerning the causal impact of racial segregation on black outcomes.

As in Card and Rothstein, the coefficients on school segregation are always statistically insignificant. However, the coefficients on the interactions between race and the other school variables show a statistically significant association with high school graduation, college graduation, and idleness. Moreover, their inclusion absorbs between 35 and 53 percent of the estimated relationship between residential segregation and these three outcomes, even after controlling for the key neighborhood environment variables used by Cutler and Glaeser (1997). Most of these findings are obtained by including just racial differences in student exposure to free lunch students, but the metropolitan differences in student to teacher ratios and per pupil student spending can explain a significant part of the relationship between residential segregation and high school graduation. We also examine an additional list of educational environmental variables obtained from the National Educational Longitudinal Survey (NELS), but these variables had no additional power to explain the effect of segregation after controlling for the CCD variables.

Several studies have raised concerns that selective migration may drive the strong correlation between residential segregation and the relative outcomes of blacks (Vigdor 2002, Ananat 2007).[6] While resolving the debate about whether residential segregation has a causal effect on outcomes is beyond the scope of this paper, we reestimate our models using a sample of young adults aged 28-33 who migrated between metropolitan areas in the five years preceding the 1990 census. The correlations between the metropolitan attributes for the individual's current and previous metropolitan areas of residence are typically quite low, and so we are able to

[6] Building on the work of Collins and Margo (2000), Vigdor (2002) finds that the attributes of in-migrants from the previous generation, potentially parents of the youth studied, can explain part of the relationship found by Cutler and Glaeser (1997) suggesting that improvements in the overall residential opportunities of blacks may have resulted in low ability or endowment blacks selecting into more segregated metropolitan areas. In addition, Ananat (2007) finds lower rents in highly segregated metropolitan areas suggesting that those areas are less attractive to migrants.

include controls for residential segregation and the mechanism variables for both metropolitan areas.

We find that residential segregation in both the current and the previous metropolitan area is associated with relatively worse outcomes for blacks. Since one of these outcomes, high school graduation, is determined prior to the individuals moving to their current metropolitan areas, this finding provides evidence of bias from selective migration. Selective migration, however, is an unlikely candidate for explaining both the influence of current and previous metropolitan areas. The selective migration story suggests that blacks with high ability and/or greater endowments systematically prefer unsegregated metropolitan areas, and so high ability black migrants will select away segregated metropolitan areas biasing our estimates towards finding a negative relationship between segregation and relative black outcomes. However, if this story holds, our sample of migrants leaving segregated metropolitan areas should be selected towards high ability blacks since other things equal they would prefer moving so that they can choose a less segregated area, biasing our estimates of previous metropolitan area segregation away from worse black outcomes. A second migration explanation is that some individuals are always more likely to reside in segregated metropolitan areas and lower ability black migrants are simply moving between segregated areas, but, in fact, we find a weak correlation between the segregation of migrant's current and previous metropolitan areas.

We also find that the metropolitan neighborhood and school characteristics of both the current and previous metropolitan area predict black-white outcome disparities. Neighborhood exposure to college educated residents for the current metropolitan area, a mechanism variable discussed by Cutler and Glaeser (1997), explains high school graduation outcomes suggesting selective migration. However, the attributes of the previous metropolitan area of residence,

especially racial differences in exposure to free lunch students, are statistically much stronger predictors of black relative outcomes than the attributes of current metropolitan area. Overall, then, this supplementary analysis suggests that although selective migration plays a role in explaining the empirical relationship between residential segregation and black outcomes, racial differences in school environments found in highly segregated residential areas also contribute to this relationship.

Research Design and Data

This analysis examines the educational and life outcomes of young native born adults aged 20-24 and 25-30 from the 1% sample of the Public Use Microdata Sample (PUMS) of the 1990 Decennial Census. Our analysis is limited to 205 metropolitan areas with populations of at least 100,000 people and at least 10,000 blacks that are identified in the 1% PUMS.[7] The resulting samples consist of 98,104 and 139,901 individuals aged 20-24 and 25-30, respectively. Panel 1 in Table 1 presents the means of the outcome variables considered for the white and black subsamples. These measures are graduation from high school, graduation from college, idleness (neither employed nor in school), logarithm of annual earnings, and for females only, whether they were a never married mother. On all measures, blacks have less desirable outcomes than whites.

The first five rows of Panel 2 in Table 1 contain all metropolitan controls used in Cutler and Glaeser's (1997) primary analysis. The first variable in Panel 2 is the black/non-black dissimilarity index, which is a measure of residential racial segregation. The dissimilarity index is calculated as:

[7] The metropolitan area data used by Cutler and Glaeser contains 209 metropolitan areas, but the residents of four of those metropolitan areas only have their residential location identified at the state level in the PUMS. We also estimated models using all metropolitan statistical areas identified in the PUMS and results were similar.

$$D = \left(\frac{1}{2}\right)\sum_{i=1}^{N}\left|\frac{Black_i}{Black} - \frac{Nonblack_i}{Nonblack}\right|$$

where $Black_i$ is the number of blacks in census tract i, *Black* is the number of blacks in the metropolitan area, $Nonblack_i$ is the number of non-blacks in the tract, and *Nonblack* is the number of non-blacks in the metropolitan area. This measure ranges from 0 to 1 where zero indicates that blacks and non-blacks are distributed evenly across all census tracts, and one indicates complete segregation, i.e. each census tract is either exclusively black or exclusively non-black. The measure can be interpreted as the share of the black (or non-black) population that would need to relocate to achieve an even geographical distribution of racial groups.

The figures in Table 1 indicate that residential segregation by race is generally high, but there is little difference between the black and white populations suggesting that on average whites and blacks reside in metropolitan areas with similar levels of racial segregation. The other controls include logarithm of metropolitan population, percent of metropolitan population that is black, logarithm of metropolitan median income, and share of metropolitan employment that is in manufacturing.[8]

Replication Efforts

Following Cutler and Glaeser (1997), we regress outcomes on individual controls for race, ethnicity, gender, and age, as well as metropolitan controls including the residential segregation of blacks and interactions between the metropolitan controls and an indicator variable for whether the individual is black. The coefficient on the interaction between residential segregation and the black indicator variable is intended to capture racial differences in

[8] This data from the Summary Tape files of the U.S. Census is provided on the website of Jacob Vigdor at Duke University for all metropolitan areas in 1990. Several variables are only provided for the 209 metropolitan areas that meet Cutler and Glaeser's (1997) criteria. As noted earlier, we collected this data from original sources for all metropolitan areas and find similar results for the sample of all U.S. metropolitan areas.

the relationship between segregation and the outcomes of young adults, and tells us whether black outcomes relative to the outcomes of whites are better or worse in more segregated areas.

In their work, Cutler and Glaeser (1997) estimate both ordinary least squares (OLS) and instrumental variables models using either historical fiscal variables or geographic variables as instruments. When they examine potential mechanisms behind the effect of segregation, however, they only estimate models using OLS, arguing that instruments could not possibly be developed for the broad set of metropolitan controls being considered as mechanisms through which segregation might operate. Similarly, Card and Rothstein (2007) do not use instruments in their test for whether school segregation can explain the black-white test score gap after controlling residential segregation presumably because instruments that could credibly separate the effect of school and residential segregation are not available. Our analysis closely follows the OLS analysis of Cutler and Glaeser,[9] and can be viewed as a decomposition of the conditional correlation between residential segregation and the relative outcomes of blacks. As such, a causal interpretation of our estimates cannot be made. Nonetheless, the analysis is useful in assessing whether or not school conditions might play a role in explaining the empirical relationship between residential segregation and black-white outcome disparities.

Cutler and Glaeser (1997) examined five variables that describe aspects of the metropolitan environment that might help to explain why black relative outcomes are particularly poor in highly segregated areas. Only three of the five variables correlate with residential segregation by race: residential segregation by income, relative exposure of blacks within census tracts to individuals who attended college, and the relative share of black women 40-60 years old

[9] As in Cutler and Glaeser, we find very similar estimates for residential segregation when conducting the analyses in our paper using the fiscal variables as instruments. However, Ananat (2007) raises concerns with these instruments claiming that they correlate with factors that might be confounded with the effect of residential segregation. Moreover, in our analysis, the fiscal instruments fail the over identification test for two of the ten outcomes considered, and the geographic instruments are somewhat weak predictors of segregation.

who are unmarried and have children. Therefore, those three variables are the only candidates that could potentially explain part of the effect of residential segregation on black outcomes. Of the three, only income segregation and relative exposure to neighborhood education levels have a statistically significant relationship with the outcomes examined by Cutler and Glaeser (1997), and so we add these two variables to Cutler and Glaeser's primary specification as a baseline for our decomposition analysis.[10] This baseline ensures that our analysis captures the additional ability of the metropolitan school environment variables to explain the effect of residential segregation and that we are not simply capturing effects associated with correlated neighborhood environment variables that Cutler and Glaeser have already investigated. The means of these two variables are shown in the last two rows of Panel 2 in Table 1.

Exploring the Role of School Factors in Explaining the Effect of Residential Segregation

Our primary set of metropolitan school environment variables are derived from the Common Core of Data (CCD). The CCD is collected by the National Center for Education Statistics and provides an annual census of U.S. schools and school districts collecting information on student composition information by race, ethnicity and free lunch status, as well as information on student to teacher ratios at the school level and per pupil spending at the school district level. Each of the school environment measures that we examine were computed using the 1990 CCD and these are presented in Panel 3 of Table 1.[11]

[10] We also replicated Cutler and Glaeser's full analysis of potential mechanisms through which residential segregation might influence relative black outcomes, and obtained very similar results for both age samples. Further, we examined a wide variety of specifications including calculating the correlations using the PUMS sample where we obtain very similar correlations to those found using the metropolitan sample. We also added mechanism variables to the baseline specification individually and continued to find no statistically significant relationship between the share single parent in neighborhood and relative black outcomes.

[11] The CCD was first collected for the 1986-87 school year and only included school enrollment and teacher counts. School enrollment counts by race and free lunch eligibility status were first collected in 1987-88. District fiscal information, including expenditures per pupil, was first incorporated into the CCD in 1990.

The first measure in Panel 3 is the dissimilarity measure for school segregation of blacks versus non-blacks, a measure that is analogous to the residential dissimilarity index except this measure is based on the distribution of public school students across schools rather than the distribution of residents across census tracts. The means of this measure presented in Table 1 indicate that levels of school racial segregation are high, but somewhat lower than the levels of residential segregation.

The remaining indicators that we derived from the CCD are each measures of the exposure of white and black students to selected aspects of school environments. These environmental variables include average exposure of white or black students to free lunch eligible students, school level student teacher ratios, and per pupil school spending at the school district level. We calculate these exposure measures as:

$$E = \sum_{s=1}^{S} \left(\frac{Group_s}{Group} \right) (Characteristic_s)$$

where $Characteristic_s$ is some characteristics of school s (percent of students who are free lunch eligible, per pupil expenditures, student teacher ratio),[12] $Group_s$ is the number of students in a group (black students or white students) who attend school s, and *Group* is the number of students in the group in the metropolitan area. An exposure measure is, then, simply a weighted average of the school characteristic with the weights for each school based on the share of the group population in the school, and can be interpreted as indicators of the school environment experienced by the typical member of the group.

Comparing across the columns in Panel 3 of Table 1, we see that black students are more likely than white students to reside in metropolitan areas with higher rates of free lunch

[12] Per pupil expenditure is a school district level variable, and in computing the exposure index, we assign the district per pupil spending figure to each school in the district.

eligibility, slightly lower per pupil spending, and slightly higher student-teacher ratios. Looking across the rows, which allows comparisons of school environments for the black and white students within metropolitan areas, we see that the typical black student is exposed to higher rates of free lunch eligibility and higher student to teacher ratios, but also to higher per pupil student spending than is the typical white student.[13]

There are two ways that the school environment variables derived from the CCD might help to account for the correlation between residential segregation and the outcomes of individual. First, residential segregation is likely to be associated with large differences between the school environments encountered by the typical black student and the typical white student. Second, residential segregation may be correlated with the overall level of social problems and economic circumstances in a metropolitan area, and therefore on average, schools may have higher levels of free lunch eligible students or fewer resources overall in segregated metropolitan areas. If black students are more sensitive to these variables, this may explain why residential segregation has harmful effects on them.

In the analysis below, we again follow Cutler and Glaeser (1997) by first identifying the most likely candidates to explain the effect of residential segregation by calculating correlation coefficients between residential segregation and the school environment variables from the CCD. Given the substantial variation in residential segregation absorbed by Cutler and Glaeser's metropolitan environment variables, we estimate the correlation between the residuals of residential segregation and the school environment variables obtained from regressions that control for the individual and metropolitan variables used in our baseline specification. Due to the relatively large number of correlated metropolitan controls already in our baseline

[13] Additional metropolitan area school environment variables are developed using data from the National Educational Longitudinal Survey (NELS), and those controls are described later in the paper.

specification and the limited number of metropolitan areas, we will use this correlation analysis to identify the candidates for inclusion in our decomposition analysis. Specifically, we add the school environment variables that have a substantial correlation with residential segregation (greater than 0.20) to our regressions and examine the resulting change in the effect of residential segregation on the student outcomes. A finding that the addition of these school environment variables reduces the estimated effects of residential segregation on relative black outcomes suggests that the school environments encountered by blacks play a role in explaining the black-white disparites observed in highly segregated areas.

Considering Selective Migration

We investigate the relationship between segregation and black outcomes for a sample of young adults that migrated between metropolitan areas in the five years prior to the census. The attributes of the current metropolitan area should not influence educational attainment for populations whose attainment has been determined prior to migration. A finding that metropolitan area attributes explain educational attainment for migrants would support Vigdor's (2002) view that selective migration can explain at least part of Cutler and Glaeser's (1997) results.

Further, Ananat's (2007) finding of lower home prices in segregated metropolitan areas suggests a sorting story where the blacks who will likely have the worst outcomes, and therefore have the lowest permanent income, select into the lower priced, less attractive segregated metropolitan areas. Following this logic, selective migration would be an unlikely candidate for explaining a negative relationship between residential segregation in the previous metropolitan area of residence and relative black outcomes. If high permanent income blacks have a greater willingness to pay for low segregation metropolitan areas, then among potential migrants it is

presumably the high ability blacks who are more likely to migrate out of low priced, unattractive segregated metropolitan areas and therefore more likely to be present in our sample of migrants from segregated metropolitan areas. Therefore, based on selective migration, our analysis of black migrants using previous metropolitan area should be biased away from finding a negative effect of segregation. Potentially, blacks with less ability and endowment also may tend to be individuals who reside in segregated areas throughout their lives, but that would require that the migrants who leave segregated metropolitan areas also move to segregated areas and, as is shown in Table 2, below we find only a weak correlation between the segregation of the current and previous metropolitan areas of residence.

In order to obtain a sufficiently large sample of individuals who recently migrated, we pool the 1 and 5 percent samples of the 1990 PUMS and select young adults aged 28 to 33 who resided in one of Cutler and Glaeser's 205 sample metropolitan areas when surveyed as part of the 1990 census and reported having moved from a different one of the these 205 metropolitan areas in the last five years.[14] We focus on individual's aged 28 to 33 in order to assure that most traditional 4-year college students would have completed their undergraduate education more than five years before the census so that our sample of movers is unlikely to contain people who were residing at a residential college within the last five years and have now moved back home to the metropolitan area where they received their secondary education.

Notably, the correlation between the attributes of the current and previous metropolitan areas is quite low (Table 2). The correlation between residential segregation in the current and

[14] The 5 percent PUMS data does not identify all 205 metropolitan areas in Cutler and Glaeser's sample and a few of their MSA's are not present in the 1 percent sample of migrants. In order to achieve a representative sample, we use a weight of 1 for observations from metropolitan areas represented in both samples, a weight of 6 for observations from metropolitan areas that are not represented in the 5% sample, and a weight of 6/5ths for observations from metropolitan areas that are not represented in the 1% sample. Similar weights can be constructed using the last metropolitan area of residence rather than current. Results using those weights and not using weights at all are quite similar to the results presented in this paper.

previous areas is only 0.196, and the correlations are below 10 percent for income segregation, racial differences in exposure to neighborhood education levels, and racial differences in exposure in school to free lunch students. Only the student to teacher ratio and per pupil expenditures had high correlations, between 0.40 and 0.50. These modest correlations allow us to estimate models that include residential segregation, neighborhood and school environment variables, and their race interactions for both the current and the previous metropolitan area of residence. Note that the specific metropolitan attributes considered in table 2 are selected based on their relevance in the estimation results that follow. [15]

Results

Replication Results

Table 3 presents the results of the regressions we used to replicate Cutler and Glaeser. Panel 1 presents the results of OLS regressions that replicate Culter and Glaeser's primary analysis, Table IV in Cutler & Glaeser (1997). Our results are broadly similar to their estimates. The estimated coefficient on the race interaction term is statistically significant and has the expected sign in each regression except for the regression on college graduation using the 25-30 age group.

Panel 2 presents the OLS estimates for the same model after including the two neighborhood composition variables, income segregation and black exposure to neighborhood education levels, and the interaction of those two variables with race. The inclusion of these variables reduces the estimated effects of segregation on relative black outcomes by a substantial amount in most cases; specifically, the effects on high school graduation fall by 18 and 17

[15] The resulting model specifications include the standard controls from the current metropolitan area of residence. Results are robust to drawing those controls from the previous metropolitan area of residence.

percent, on college graduation by 37 and 76 percent, on idleness by 13 and 4 percent, and on earnings by 20 and 11 percent for the 20 to 24 and 25 to 30 age groups, respectively.

Metropolitan-level Measures of School Environment

The next step in our analysis is to examine whether racial differences in various metropolitan measures of the school environment can explain the relationship between residential segregation and black outcomes. Metropolitan variables that do not correlate with residential segregation will not be able to explain the segregation effects identified in our estimates even if those variables correlate with relative black outcomes. Therefore, we begin by examining the correlation between residuals of residential segregation and the residuals of the various measures of school environment derived from regressions that include the independent variables in our baseline specification (Panel 2 of Table 3).

The correlations are shown in Table 4. Panel 1 presents the correlations for the residuals of variables that capture racial differences in the educational environment, and Panel 2 presents the correlations for variables that describe the average educational environment in the metropolitan area. Not surprisingly, school segregation of black and non-black students and racial differences in exposure to free lunch students correlate strongly with residential segregation. These correlations are consistent with the fact that residential location plays an important role in the assignment of students to schools in U.S. school districts. The other two variables that strongly correlate with residential segregation are metropolitan averages of the student to teacher ratio and of the per pupil district expenditures. Specifically, highly segregated metropolitan areas also tend to be metropolitan areas where substantial resources are spent on education resulting in terms of lower student to teacher ratios and higher per pupil spending.

Notably, segregation is uncorrelated with racial differences in the allocation of those resources across schools and school districts.

Table 5 presents estimates of the coefficient on the interaction of residential segregation and individual race for a variety of specifications that control for our school environment variables. Due to concerns about multicollinearity and the growing number of metropolitan controls, we initially add each of our school environment variables individually. For ease of comparison, the first panel replicates the results from Panel 2 of Table 3, our baseline specification. The other panels present results controlling for school segregation, racial differences in exposure to free lunch eligible students, average student to teacher ratio, and average per pupil spending.

Consistent with Card and Rothstein (2007), after controlling for residential segregation, we do not find any relationship between school segregation and black outcomes that is statistically significant at the 5% significance level. In contrast, the relative exposure of blacks to free lunch students has a significant negative effect on black idleness, and results in smaller estimated effects of residential segregation in most of the other regressions. Somewhat surprisingly, additional resources at the metropolitan level are associated with higher dropout rates and lower college graduation rates for blacks. However, the level coefficient on student to teacher ratio for college graduate (not shown) is large and negative suggesting that lower student to teacher ratios in a metropolitan area are associated with higher college graduation rates. Similarly, the level coefficients on per pupil expenditures for high school and college graduation (also not shown) are large and positive. While we make no claims concerning the causal impact of school resources, an explanation consistent with these findings is that additional resources at the metropolitan level are associated with a disproportionate positive effect on white students.

Next, we estimate a composite model that includes black exposure to free lunch students, average student to teacher ratio, average per pupil spending, and the interaction of these variables with race. We do not include school segregation because the estimated coefficients on this variable are never statistically significant at the 5% level and the residual of school segregation that was calculated for Table 4 has a correlation with the residual of black exposure to free lunch students of 0.72.[16] Panel 2 of Table 6 presents the estimates of the coefficient on the interaction between residential segregation and individual race from this model. The race interaction coefficients on free lunch exposure for idleness, on student to teacher ratio for college graduation, and on per pupil spending for high school graduation continue to be statistically significant. Further, the F-tests on the interaction between race and the three educational environment variables are statistically significant for high school graduate, college graduate and idleness, indicating that, taken together, school environmental variables do have a significant effect on the values of these outcomes for blacks relative to whites.

Panel 1 contains our baseline estimates and comparing Panel 1 and Panel 2 of Table 6 allows us to see how much of the relationship between residential segregation and the relative outcomes of blacks can be explained by school environmental variables. Including school environment variables in the regression reduces the estimated effect of segregation on black high school graduation by 25 and 17 percent and on idleness by 34 and 30 percent for the 20 to 24 and 25 to 30 year old groups, respectively, and completely eliminates any remaining effect of segregation on black college graduation. Comparing the results in Table 6 to those in Table 5, we see that most of the reduction in the estimated effect of segregation on the relative outcomes

[16] The unconditional correlation of the school segregation and black exposure to free lunch variables is also above 0.70.

of blacks achieved by adding all the school environment variables can be achieved by adding black exposure to free-lunch by itself, particularly in the case of college graduation and idleness.

Finally, it is notable that the coefficient estimates on the interaction of race and black exposure to neighborhood education levels (not shown) remain statistically significant for all of our analyses. The quality of the neighborhood in which blacks reside can explain a substantial fraction of the conditional correlation between residential segregation and relative black outcomes. Nonetheless, even after controlling for neighborhood environment, racial differences in school environment and the overall school environment more generally can explain a substantial portion of the empirical relationship between segregation and relative black outcomes.

Extended Metropolitan Educational Environment Controls

As a final test, we develop a more detailed set of educational environmental controls using the National Educational Longitudinal Survey of 1988 (NELS:88), which is composed of detailed surveys of 8th grade students, their parents, teachers, and school administrators. The NELS provides a much broader set of variables to characterize schools than the information available in the CCD. For each metropolitan area, we calculate sample averages, as well as white and black exposure to specific school environments, for the set of NELS schools using responses from principals directly or averaging responses of students, parents, and teachers over all survey respondents. The variables considered include racial differences in exposure to and average school composition of English as a Second Language students, students of parents with a college education, students in single parent families, average scores on a standardized mathematics exam, teachers with less than one year experience, teachers with advanced degrees,

teachers teaching in the subject of their college major, black teachers, tardiness problems, and verbal abuse of teachers.[17]

As in the previous section, we examine the correlation between the residual of residential segregation and residuals of the NELS school environment variables obtained from regressions that include metropolitan variables for income segregation, exposure to neighborhood education, free lunch exposure, student to teacher ratio, and per pupil spending (i.e. the independent variables included in the regression presented in Panel 2 of Table 6). Table 7 presents these correlations and even after removing substantial variation in residential segregation several variables have a substantial correlation with it, near or above 0.20. These are racial differences in exposure to students with English as a second language, in exposure to students from single parent families, and exposure to verbal abuse of teachers, as well as the metropolitan average share of students with English as a second language and of teachers with less than one year of experience. However, as shown in Table 8, the inclusion of these variables along with their racial interactions has no effect on the estimated relationship between residential segregation and relative black outcomes. In fact, the coefficients on the race interactions for the NELS variables are all statistically insignificant.

Migrants between Metropolitan Areas

Table 9 presents estimates of the coefficients on the interactions between residential segregation and race for the sample of migrants aged 28 to 33. Panel 1 presents the estimates for this sample using Cutler and Glaeser's (1997) initial specification, and estimates for the sample of migrants are very similar, but somewhat smaller than, the replication estimates presented in

[17] The NELS also allows us to consider within school racial differences in exposure to classroom environment or teacher attributes, but as with the across school NELS variables considered here we found no evidence that these within school variables could explain any of the remaining relationship between school segregation and black outcomes.

Panel 1 of Table 3. The second panel presents the estimates for the model that contains controls for residential segregation of both the current and previous metropolitan area of residence. Focusing first on the residential segregation of the current metropolitan area, the estimates imply that residential segregation can explain the relatively poor outcomes of blacks on high school graduation, idleness, earnings, and single parenthood. The finding for high school graduation provides substantial support for the selective migration story of Vigdor (2002) because high school graduation was determined prior to the individual's move to this metropolitan area.

At the same time, the residential segregation of the previous metropolitan area is also associated with relatively poor outcomes for blacks including for college graduation where evidence based on current metropolitan area segregation is weak. As discussed above, selective migration is an unlikely candidate for explaining both the influence of current and previous metropolitan areas. If high permanent income blacks prefer low segregation metropolitan areas, then it is presumably those high ability blacks who are more likely to migrate out of low priced, unattractive segregated metropolitan areas. However, we find the opposite: worse outcomes for blacks who migrated from segregated metropolitan areas. In addition, it cannot simply be lower ability or endowment blacks migrating between highly segregated metropolitan areas due to the weak correlation between the segregation of the current and previous metropolitan areas (see Table 2).

Table 10 presents the results of our decomposition analysis combining current and past metropolitan attributes in the same specification. The first panel presents the estimates for the attributes of the current metropolitan area. These estimates provide further evidence of selective migration. The F-test on the race interactions for the current metropolitan area is highly significant in the high school graduate model. Neighborhood exposure to college educated

residents has a highly significant positive effect and school exposure to free lunch students has a weakly significant negative effect on the relative likelihood of blacks completing high school. The current metropolitan area attributes also have a statistically significant relationship with idleness primarily through the school environment variables. These results again raise concerns about selective migration since the school environment variables of the current metropolitan area should not affect the outcomes of migrants.

The second panel presents the estimates for the attributes of the previous metropolitan area. Based on the F-statistics, the attributes of previous metropolitan area are statistically much stronger than current area attributes for explaining relative black outcomes, and are statistically significant predictors for all five outcomes considered. The coefficient estimates on these variables each take the expected sign. Income segregation is associated with better outcomes of blacks on high school graduation and single parenthood just as in Culter and Glaeser's (1997) and our baseline (Table 3) analyses. The relative in-school exposure of blacks to free lunch students is associated with worse outcomes for blacks, and high resource metropolitan areas are associated with worse relative outcomes for blacks, which is the same pattern identified in our initial decomposition analysis in Table 5. These findings for previous metropolitan area attributes are unlikely to be explained by selective migration and therefore suggest that school environments may be important for explaining part of the strong relationship between racial segregation and black outcomes.

Conclusion

Our study provides the first comprehensive attempt to examine whether school environment can explain the negative empirical relationship between residential segregation and the relative outcomes of blacks. We find that the inclusion of variables that describe the

metropolitan educational environment reduce the estimated effect of residential segregation on high school graduation and idleness of blacks by between 35 and 53 percent and completely eliminates any effect on college graduation of blacks even after controlling for the effect of neighborhood human capital variables that have been emphasized by Cutler and Glaeser (1997) and Cutler, Glaeser, and Vigdor (2006). While our estimates support a role for neighborhood quality as identified Cutler and Glaeser (1997) and Card and Rothstein (2007), we also find an important role for the school environment.

Notably, racial segregation of schools does not appear to be the central driver behind our findings. As with Card and Rothstein (2007), our estimates of the relationship between school segregation and black outcomes are statistically insignificant. However, alternative education variables appear to explain part of this relationship. The inclusion of racial differences in exposure to free lunch students by itself can account for most of our findings, which is consistent with the results of Bifulco, Fletcher and Ross's (2009) study of peer effects where they find that the socioeconomic status of one's classmates influence both high school graduation and college attendance rates. Further, if we believe earlier findings that exposure of blacks to low income and low human capital environments at the neighborhood level hurt their outcomes, it should not be too surprising that exposure to poverty within schools might have an additional negative effect on outcomes.

Finally, we examine the impact of metropolitan attributes on a sample of migrants between metropolitan areas. As with Vidgor (2002) and Ananat (2007), we find evidence of selective migration. Blacks who are not high school graduates appear to selectively migrate into high segregation metropolitan areas, as well as metropolitan areas where blacks tend be exposed to neighborhoods with a lower than average share of college educated residents. At the same

time, residential segregation from the previous metropolitan area of residence is associated with worse outcomes for blacks, and a substantial fraction of this effect continues to be captured by racial differences in exposure to free lunch students and metropolitan level school resource variables. This last result suggests that selective migration cannot entirely explain the relationship between residential segregation and relatively poor black outcomes, and that the school environments in highly segregated areas are a potentially important part of the story.

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Table 1 Descriptive Statistics

	1990 PUMS 1% Sample Aged 20-24				1990 PUMS 1% Sample Aged 25-30			
	White		Black		White		Black	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Observations	74099		14713		110440		18775	
Outcomes								
High School Graduate	0.886	0.318	0.754	0.431	0.901	0.299	0.779	0.415
College Graduate	0.142	0.349	0.047	0.212	0.284	0.451	0.117	0.321
Idleness	0.12	0.325	0.307	0.461	0.152	0.359	0.298	0.458
Annual Earnings 1989 in 1000's	11.872	10.035	7.231	8.908	19.257	16.486	11.651	12.673
Single Mother	0.092	0.29	0.41	0.492	0.113	0.317	0.467	0.499
Metropolitan Attributes – Cutler and Glaeser Controls								
Residential Segregation by Race	0.63	0.126	0.646	0.12	0.634	0.124	0.646	0.12
Metro Pop in 1,000,000's	2.04	2.112	2.567	2.531	2.129	2.146	2.568	2.503
Median Income in $1,000's	33.343	6.37	32.67	6.055	33.483	6.242	32.758	6.063
Percent Black in Population	0.136	0.084	0.196	0.091	0.136	0.084	0.196	0.09
Share Manufacturing Employment	0.168	0.054	0.159	0.054	0.168	0.053	0.16	0.055
Residential Segregation by Income	0.233	0.033	0.241	0.032	0.234	0.033	0.241	0.031
Racial Difference in Exposure to College Educated Neighbors	-0.094	0.037	-0.100	0.034	-0.095	0.037	-0.101	0.034
Metropolitan Attributes - Common Core Population of Public Schools								
School Segregation By Race	0.567	0.152	0.566	0.154	0.57	0.149	0.569	0.153
White Exposure to Free Lunch	0.159	0.077	0.172	0.088	0.158	0.075	0.17	0.086
Black Exposure to Free Lunch	0.364	0.12	0.392	0.127	0.365	0.12	0.389	0.126
White Exposure to School Spending $1,000's	5.472	1.451	5.428	1.475	5.468	1.426	5.397	1.438
Black Exposure to School Spending $1,000's	5.663	1.379	5.5	1.284	5.665	1.354	5.487	1.252
White Exposure to Student to Teacher Ratio	17.054	3.067	17.423	2.651	17.143	3.06	17.448	2.636
Black Exposure to Student/Teacher Ratio	17.607	2.962	17.742	2.726	17.673	2.958	17.773	2.685

Notes: The samples contain all native born individuals aged 20-24 or 25-30 residing in 205 large metropolitan areas as defined by Cutler and Glaeser and identified in the 1% Public Use Microdata Sample of the 1990 Census. The metropolitan attributes in panel 2 were constructed by Cutler and Glaeser and downloaded from Jacob Vigdor's website http://trinity.aas.duke.edu/~jvigdor/segregation/. Panel 3 metropolitan attributes are constructed from the 1990 Common Core sample. All means are unweighted. Earnings computed only for those that are not enrolled in school and have nonnegative earnings.

Table 2 Correlation between Current and Previous Metropolitan Attributes

Metropolitan Controls	Correlation
School Segregation by Race	0.196
Residential Segregation by Income	0.009
Racial Difference in Exposure to Neighborhood Education	0.082
Racial Difference in Exposure to Free Lunch Students	0.052
Average Student to Teacher Ratio	0.502
Average Per Student School District Spending	0.421
Observations	129267

Notes: Correlations are based on a sample all individuals in the 1% PUMS or 5% PUMS samples aged 28-33 residing in 205 large metropolitan areas as defined by Cutler and Glaeser and resided in a different one of the 205 metropolitan areas in the previous five year with a weight of 1 for observations from metropolitan areas represented in both samples, a weight of 6 for observations from metropolitan areas that are not represented in the 5% sample, and a weight of 6/5ths for observations from metropolitan areas that are not represented in the 1% sample. Correlations are between the same variable measured for both the current metropolitan area and the previous metropolitan are of residence.

Table 3 Cutler Glaeser Replication

Metropolitan Controls	Samples Aged 20-24					Sample Aged 25-30				
	High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother	High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother
					Replication Model					
Residential Segregation by Race	0.019	0.073*	0.022	-0.060	-0.009	0.024	-0.003	0.007	-0.065	-0.036+
	(0.029)	(0.035)	(0.026)	(0.070)	(0.028)	(0.022)	(0.062)	(0.035)	(0.070)	(0.018)
Race*Residential Segregation by Race	-0.321**	-0.090**	0.399**	-0.787**	0.413**	-0.255**	-0.054	0.377**	-0.573**	0.482**
	(0.044)	(0.032)	(0.053)	(0.143)	(0.060)	(0.046)	(0.049)	(0.050)	(0.121)	(0.057)
R-squared	0.04	0.10	0.05	0.10	0.11	0.03	0.05	0.05	0.11	0.12
					Baseline Model for Decomposition Analysis					
Residential Segregation by Race	0.026	0.046	0.046*	-0.069	0.007	0.030	-0.047	0.033	-0.111	-0.024
	(0.029)	(0.037)	(0.023)	(0.078)	(0.029)	(0.022)	(0.057)	(0.029)	(0.073)	(0.019)
Race*Residential Segregation by Race	-0.264**	-0.057+	0.346**	-0.624**	0.330**	-0.211**	-0.013	0.362**	-0.488**	0.429**
	(0.047)	(0.033)	(0.061)	(0.177)	(0.055)	(0.044)	(0.043)	(0.052)	(0.125)	(0.066)
Residential Segregation by income	0.102	-0.090	-0.039	-1.067**	0.127	0.097	0.160	-0.189+	-0.259	0.058
	(0.122)	(0.152)	(0.088)	(0.302)	(0.095)	(0.089)	(0.232)	(0.100)	(0.266)	(0.081)
Race*Residential Segregation by Income	0.403*	-0.010	-0.023	0.153	-0.186	0.619**	-0.006	-0.199	0.159	-0.684**
	(0.200)	(0.131)	(0.229)	(0.616)	(0.226)	(0.190)	(0.215)	(0.174)	(0.465)	(0.226)
Racial Difference in Exposure to College Educated Neighbors	0.079	-0.266*	0.225**	-0.280	0.169*	0.065	-0.404*	0.226**	-0.474*	0.127+
	(0.099)	(0.124)	(0.068)	(0.215)	(0.083)	(0.074)	(0.183)	(0.071)	(0.217)	(0.070)
Race* Racial Difference in Exposure to College…	0.776**	0.281**	-0.529**	1.137*	-0.911**	0.783**	0.449*	-0.311+	0.799*	-0.857**
	(0.183)	(0.106)	(0.189)	(0.538)	(0.228)	(0.179)	(0.175)	(0.176)	(0.375)	(0.256)
R-squared	0.04	0.10	0.05	0.10	0.11	0.03	0.05	0.05	0.11	0.12
F-Test Race Interactions	9.20	4.50	3.93	2.26	7.96	12.45	4.35	1.95	2.33	7.97
P-values	0.0002	0.0123	0.0212	0.1074	0.0005	<0.0001	0.0142	0.1466	0.1000	0.0005
Observations	98104	98104	98104	56716	49099	139901	139901	139901	106157	71622

Notes: The samples contain all native born individuals aged 20-24 or 25-30 residing in 205 large metropolitan areas as defined by Cutler and Glaeser. Each row and panel represents coefficient estimates from an individual regression. All regressions are unweighted and include individual controls for gender, race and ethnicity, as well as Cutler and Glaeser's original set of metropolitan controls and race interactions, see Table 1. Standard errors are clustered by Metropolitan Statistical Area and shown in parentheses. Statistical significance is designated by ** for $p<0.01$, * for $p<0.05$, and + for $p<0.1$.

Table 4 Correlation of Residuals of Segregation with School Environment Residuals

Common Core Metropolitan Controls	Residential Segregation
School Segregation by Race	0.769
Racial Difference in Exposure to Free Lunch Students	0.554
Racial Difference in Exposure to Student/Teacher Ratio	0.044
Racial Difference in Exposure to District Spending	0.107
Percent of Students who are Free Lunch Eligible	-0.101
Average Student to Teacher Ratio	-0.422
Average Per Student School District Spending	0.407
Observations	238,005

Notes: Correlations are based on the 1% PUMS sample aged 20-30 residing in large metropolitan areas as defined by Cutler and Glaeser. Residuals are estimated by regressing all variables on individual controls for gender, age, race and ethnicity, Cutler and Glaeser's original set of metropolitan controls, metropolitan income segregation, and relative black exposure to neighborhood education levels. All metropolitan school environment variables are created using the Common Core of Schools and School Districts samples. All variables except the school district spending variables are defined using data at the school level. There are four MSAs (1088 observations) with missing data on the spending variable.

Table 5 Race Interaction Coefficients for Models that Include Controls for Metropolitan School Environment

Race Interactions (Race*…)	Samples Aged 20-24					Sample Aged 25-30				
	High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother	High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother
Baseline Model										
Residential Segregation by Race	-0.264**	-0.057+	0.346**	-0.624**	0.330**	-0.211**	-0.013	0.362**	-0.488**	0.429**
	(0.047)	(0.033)	(0.061)	(0.177)	(0.055)	(0.044)	(0.043)	(0.052)	(0.125)	(0.066)
School Racial Segregation										
Residential Segregation by Race	-0.264**	0.013	0.227**	-0.442+	0.249**	-0.193**	0.038	0.273**	-0.388*	0.429**
	(0.074)	(0.043)	(0.081)	(0.249)	(0.091)	(0.072)	(0.066)	(0.075)	(0.196)	(0.105)
School Segregation by Race	-0.002	-0.070+	0.118+	-0.180	0.080	-0.020	-0.053	0.087	-0.097	-0.002
	(0.063)	(0.037)	(0.066)	(0.155)	(0.064)	(0.059)	(0.056)	(0.059)	(0.141)	(0.080)
Racial Differences in Exposure to Free Lunch Students										
Residential Segregation by Race	-0.197**	-0.016	0.230**	-0.521*	0.345**	-0.176**	0.016	0.255**	-0.378*	0.394**
	(0.061)	(0.033)	(0.069)	(0.215)	(0.078)	(0.055)	(0.051)	(0.063)	(0.165)	(0.085)
Racial Difference in Exp. to Free Lunch Students	-0.137+	-0.086+	0.202**	-0.202	-0.028	-0.070	-0.058	0.177**	-0.226	0.052
	(0.070)	(0.046)	(0.076)	(0.178)	(0.082)	(0.068)	(0.064)	(0.067)	(0.167)	(0.086)
Average Student to Teacher Ratio										
Residential Segregation by Race	-0.205**	0.010	0.344**	-0.571**	0.326**	-0.161**	0.063	0.332**	-0.483**	0.385**
	(0.050)	(0.039)	(0.063)	(0.180)	(0.059)	(0.045)	(0.045)	(0.052)	(0.127)	(0.067)
Average Student to Teacher Ratio	0.006*	0.004**	0.002	0.002	0.002	0.006**	0.005**	-0.004*	-0.006	-0.004
	(0.002)	(0.001)	(0.002)	(0.006)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)

	Average Per Student School District Spending									
Residential Segregation by Race	-0.183**	-0.008	0.338**	-0.611**	0.342**	-0.149**	0.052	0.352**	-0.486**	0.395**
	(0.046)	(0.041)	(0.065)	(0.177)	(0.057)	(0.042)	(0.049)	(0.052)	(0.118)	(0.065)
Average Per Student School District Spending	-0.023**	-0.009*	0.001	0.012	-0.007	-0.018**	-0.014*	0.005	0.019+	0.009
	(0.005)	(0.004)	(0.006)	(0.016)	(0.005)	(0.004)	(0.006)	(0.005)	(0.011)	(0.006)
Observations	98104	98104	98104	56716	49099	139901	139901	139901	106157	71622

Notes: The samples contain all individuals in the 1% PUMS sample aged 20-24 or 25-30 residing in 205 large metropolitan areas as defined by Cutler and Glaeser. Each row and panel represents coefficient estimates from an individual regression. All regressions are unweighted and include individual controls for gender, age, race and ethnicity, as well as Cutler and Glaeser's original set of metropolitan controls, metropolitan income segregation, relative black exposure to neighborhood education levels, and their race interactions. Dummy variables are included for metropolitan areas in which district per pupil spending is not observed. Standard errors are clustered by Metropolitan Statistical Area and shown in parentheses. Statistical significance is designated by ** for $p<0.01$, * for $p<0.05$, and + for $p<0.1$.

Table 6 Race Interaction Coefficients for Models that Include Controls for Metropolitan School Environment

Race Interactions	Samples Aged 20-24					Sample Aged 25-30				
	High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother	High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother
					Baseline Model					
Residential Segregation by Race	-0.264**	-0.057+	0.346**	-0.624**	0.330**	-0.211**	-0.013	0.362**	-0.488**	0.429**
	(0.047)	(0.033)	(0.061)	(0.177)	(0.055)	(0.044)	(0.043)	(0.052)	(0.125)	(0.066)
					Plus Controls for Average Exposure to Student Teacher Ratio and School District Spending					
Residential Segregation of Race	-0.125*	0.049	0.226**	-0.497*	0.344**	-0.119*	0.096+	0.234**	-0.372*	0.351**
	(0.062)	(0.040)	(0.071)	(0.206)	(0.079)	(0.053)	(0.056)	(0.063)	(0.159)	(0.084)
Racial Difference in Exp. to Free Lunch Students	-0.102	-0.073	0.204**	-0.237	-0.016	-0.044	-0.040	0.170*	-0.283+	0.038
	(0.068)	(0.048)	(0.077)	(0.179)	(0.082)	(0.064)	(0.067)	(0.068)	(0.170)	(0.085)
Average Student to Teacher Ratio	0.001	0.004*	0.002	0.004	0.001	0.003	0.003	-0.004+	-0.004	-0.003
	(0.002)	(0.001)	(0.003)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)	(0.006)	(0.003)
Average Per Student School District Spending	-0.020**	-0.003	0.001	0.018	-0.006	-0.014**	-0.008	-0.002	0.015	0.004
	(0.006)	(0.004)	(0.007)	(0.018)	(0.008)	(0.005)	(0.006)	(0.005)	(0.014)	(0.007)
F-Test Race Interactions	7.94	6.1	2.83	0.8	1.15	8.41	3.08	4.04	1.98	1.16
P-values	<0.0001	0.0005	0.0396	0.4927	0.329	<0.0001	0.0283	0.0081	0.1174	0.3262
Observations	98104	98104	98104	56716	49099	139901	139901	139901	106157	71622

Notes: The samples contain all individuals in the 1% PUMS sample aged 20-24 or 25-30 residing in 205 large metropolitan areas as defined by Cutler and Glaeser. Each row and panel represents coefficient estimates from an individual regression. All regressions are unweighted and include individual controls for gender, age, race and ethnicity, as well as Cutler and Glaeser's original set of metropolitan controls, metropolitan income segregation, relative black exposure to neighborhood education levels, and their race interactions. F-tests are for race interactions on the school environment mechanism variables. Dummy variables are included for metropolitan areas in which district per pupil spending is not observed. Standard errors are clustered by Metropolitan Statistical Area and shown in parentheses. Statistical significance is designated by ** for $p<0.01$, * for $p<0.05$, and + for $p<0.1$.

Table 7 Correlation of Segregation with NELS Based Metropolitan School Environment Variables

NELS Metropolitan Controls	Residential Segregation	Observations
Racial Diff in Exp. English as a 2nd Language Students	-0.2375	215635
Racial Diff in Exp. to Students from Single Parent Family	0.181	214458
Racial Diff in Exp. to Students w/ Parents w/ College Degree	0.0571	215635
Racial Diff Exp. to Average School Math Test Score	-0.0634	214485
Racial Diff Exp. to Teachers with < 1 Year Experience	-0.0622	215635
Racial Diff Exp. to Teachers with Advanced Degrees	0.1144	214236
Racial Diff Exp. to Teachers Teaching in College Major	0.0319	215024
Racial Diff Exp. to Fraction of African American Teachers	0.0333	215090
Racial Diff Exp. to Schools with Tardiness Problems	0.1329	215635
Racial Diff Exp. to Problems of Verbal Abuse	0.2352	215635
Percent Student who have English as a 2nd Language	-0.326	219981
Percent Students from of Single Parent Family	0.1486	219152
Percent Students whose Parents have a College Degree	-0.0631	219981
Average Math Test Scores	0.0374	218831
Average Exposure to Teachers with < 1 Year Experience	-0.183	219981
Average Exposure to Teachers with Advanced Degrees	0.126	219444
Average Exposure to Teachers Teaching in College Major	0.0798	219370
Average Exposure to African-American Teachers	-0.0061	219436
Average Exposure to Tardiness Problems	0.0415	219981
Average Exposure to Problems of Verbal Abuse	-0.1535	219981

Notes: Correlations are based on the 1% PUMS sample aged 20-30 residing in large metropolitan areas as defined by Cutler and Glaeser and residing in the 155 large metropolitan areas that both meet Cutler and Glaeser's criteria and are represented in the NELS sample of schools. Residuals are estimated by regressing all variables on individual controls for gender, age, race and ethnicity, Cutler and Glaeser's original set of metropolitan controls, metropolitan income segregation, relative black exposure to neighborhood education levels plus the three significant Common Core of Data school environment controls. Metropolitan educational environment variables are created using the base year or the Wave 1 NELS sample and the base year weights. Sample size varies since some metropolitan school environment variables are not observed for all metropolitan areas

Table 8 Race Interaction Coefficients for Models that Include NELS Based Controls for Metropolitan School Environment

Race Interactions	Samples Aged 20-24					Sample Aged 25-30				
	High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother	High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother
					Neighborhood and Common Core of Data Controls					
Residential Segregation of African Americans	-0.143*	0.036	0.264**	-0.474*	0.373**	-0.105+	0.073	0.225**	-0.288+	0.340**
	(0.064)	(0.044)	(0.074)	(0.214)	(0.079)	(0.056)	(0.060)	(0.066)	(0.173)	(0.084)
					Racial Differences in Exposure to English as a Second Language Students					
Residential Segregation of African Americans	-0.160*	0.037	0.273**	-0.470*	0.362**	-0.105+	0.072	0.240**	-0.321+	0.344**
	(0.066)	(0.045)	(0.077)	(0.225)	(0.080)	(0.058)	(0.059)	(0.068)	(0.184)	(0.089)
					Racial Differences in Exposure to Single Parent Families					
Residential Segregation of African Americans	-0.147*	0.042	0.254**	-0.443*	0.371**	-0.107+	0.066	0.218**	-0.321+	0.357**
	(0.067)	(0.044)	(0.072)	(0.215)	(0.083)	(0.055)	(0.062)	(0.069)	(0.174)	(0.086)
					Racial Differences in Exposure to Verbal Abuse of Teachers					
Residential Segregation of African Americans	-0.162*	0.021	0.258**	-0.500*	0.387**	-0.115*	0.051	0.230**	-0.303+	0.368**
	(0.067)	(0.044)	(0.080)	(0.214)	(0.083)	(0.058)	(0.061)	(0.068)	(0.174)	(0.093)
					Percent of Students who have English as a Second Language					
Residential Segregation of African Americans	-0.173*	0.040	0.308**	-0.462+	0.369**	-0.142*	0.065	0.282**	-0.329+	0.377**
	(0.069)	(0.044)	(0.083)	(0.239)	(0.086)	(0.061)	(0.058)	(0.070)	(0.195)	(0.092)

	Average Exposure to Teachers with Less than One Year Experience									
Residential Segregation of African Americans	-0.151*	0.033	0.272**	-0.480*	0.383**	-0.096+	0.077	0.224**	-0.316+	0.346**
	(0.066)	(0.045)	(0.076)	(0.222)	(0.080)	(0.057)	(0.059)	(0.067)	(0.173)	(0.087)
Observations	90492	90492	90492	52418	45404	129860	129860	129860	98605	66462

Notes: The samples contain all individuals in the 1% PUMS sample aged 20-24 or 25-30 residing in 155 large metropolitan areas as defined by Cutler and Glaeser that are also represented in the NELS sample of schools. Each row and panel represents coefficient estimates from an individual regression. All regressions are unweighted and include individual controls for gender, age, race and ethnicity, as well as Cutler and Glaeser's original set of metropolitan controls, metropolitan income segregation, relative black exposure to neighborhood education levels, the three significant Common Core of Data school environment controls, and their race interactions. Dummy variables are included to control for metropolitan areas in which the NELS school environment variable is not observed. Standard errors are clustered by Metropolitan Statistical Area and shown in parentheses. Statistical significance is designated by ** for $p<0.01$, * for $p<0.05$, and + for $p<0.1$.

Table 9 Segregation Model for Migrate between Metropolitan Areas Sample

Race Interactions	Current Metropolitan Area: High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother
	Current Metropolitan Area Segregation				
Residential Segregation by Race	-0.209**	-0.090	0.228**	-0.438**	0.307**
	(0.047)	(0.093)	(0.054)	(0.131)	(0.062)
	Previous and Current Segregation				
Residential Segregation by Race	-0.180**	-0.039	0.206**	-0.363**	0.242**
	(0.048)	(0.095)	(0.053)	(0.132)	(0.062)
Residential Segregation by Race in Previous Metropolitan Area	-0.158**	-0.191**	0.118**	-0.290*	0.335**
	(0.027)	(0.052)	(0.038)	(0.112)	(0.056)
Sample Size	129267	129267	129267	101264	63765

Notes: The samples contain all individuals in the 1% PUMS or 5% PUMS samples aged 28-33 residing in 205 large metropolitan areas as defined by Cutler and Glaeser and resided in a different one of the 205 metropolitan areas in the previous five year. All regressions include individual controls for gender, age, race and ethnicity, as well as Cutler and Glaeser's original set of metropolitan controls and their race interactions for either the current metropolitan area of residence. The regressions in the second panel also include controls for metropolitan income segregation for the previous metropolitan area and the associated race interaction. Standard errors are clustered by Metropolitan Statistical Area and shown in parentheses. Statistical significance is designated by ** for $p<0.01$, * for $p<0.05$, and + for $p<0.1$.

Table 10 Mechanism Analysis for Migrate between Metropolitan Areas Sample

Race Interactions	Current Metropolitan Area: High School Graduate	College Graduate	Idleness	Logarithm Earnings	Single Mother
Current Metropolitan Area Attributes					
Income Segregation	0.090	-0.405	-0.058	-0.677	-0.500
	(0.190)	(0.416)	(0.253)	(0.587)	(0.475)
Racial Difference in Exposure to	0.380**	0.032	-0.058	0.270	-0.637*
College Educated Neighbors	(0.130)	(0.289)	(0.171)	(0.398)	(0.288)
Racial Difference in Exp. to	-0.108+	-0.092	0.269**	-0.329+	0.191+
Free Lunch Students	(0.060)	(0.118)	(0.085)	(0.187)	(0.110)
Average Student to Teacher	0.001	0.006	0.006*	0.001	-0.000
Ratio	(0.002)	(0.004)	(0.002)	(0.006)	(0.004)
Average Per Student School	-0.010	0.002	0.019*	-0.003	-0.003
District Spending	(0.006)	(0.011)	(0.008)	(0.017)	(0.013)
F-Test Race Interactions	4.11	0.92	4.82	1.66	1.52
P-values	0.0014	0.4677	0.0003	0.1467	0.1843
Previous Metropolitan Area Attributes					
Income Segregation	0.387**	0.051	-0.267	0.722	-0.550*
	(0.138)	(0.184)	(0.176)	(0.525)	(0.247)
Racial Difference in Exposure to	0.169	-0.161	-0.027	-0.424	-0.220
College Educated Neighbors	(0.114)	(0.137)	(0.126)	(0.297)	(0.207)
Racial Difference in Exp. to	-0.155**	-0.199**	0.133*	-0.531**	0.398**
Free Lunch Students	(0.038)	(0.060)	(0.052)	(0.146)	(0.079)
Average Student to Teacher	0.000	0.004	0.005*	-0.014*	0.005+
Ratio	(0.002)	(0.003)	(0.002)	(0.006)	(0.003)
Average Per Student School	-0.005	-0.016**	0.009*	-0.018	0.010+
District Spending	(0.004)	(0.005)	(0.004)	(0.012)	(0.006)
F-Test Race Interactions	8.61	6.83	4.11	4.15	11.97
P-values	<0.0001	<0.0001	0.0014	0.0013	0.0000
Sample Size	129267	129267	129267	101264	63765

Notes: The samples contain all individuals in the 1% PUMS or 5% PUMS samples aged 28-33 residing in 205 large metropolitan areas as defined by Cutler and Glaeser and resided in a different one of the 205 metropolitan areas in the previous five year. Each column contains estimates from a single regression, but both panels contain estimates from the same regression. All regressions include individual controls for gender, age, race and ethnicity, as well as Cutler and Glaeser's original set of metropolitan controls and their race interactions for the current or previous metropolitan area of residence. The F-tests are for race interactions on the school environment mechanism variables for either the current or previous metropolitan area. Dummy variables are included for metropolitan areas in which district per pupil spending is not observed. Standard errors are clustered by Metropolitan Statistical Area and shown in parentheses. Statistical significance is designated by ** for $p<0.01$, * for $p<0.05$, and + for $p<0.1$.