Does Segregation Create Winners and Losers?
Education and Spatial Segregation on the Basis of Income and Race

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ABSTRACT

This study examines the relationship between spatial segregation on the basis of income and race groups and educational attainment. Data are drawn from 1990 Census Microdata, the October Current Population Survey, and tract-level data from the 1990 Census summary tape files. The results from multilevel modeling indicate that black and poor respondents who resided in more black/white and poor/nonpoor segregated metropolitan areas, respectively, were more likely to drop out of high school and less likely to then continue on into college. But white and nonpoor respondents were not more likely to graduate high school or go onto college in more segregated areas. Results are unchanged by the use of spatial-based segregation measures or instrumental variable estimation.

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Does Segregation Create Winners and Losers?

With the end of legalized segregation in the 1960s and the abandonment of most active effort to desegregate schools through the courts, desegregation has increasing come to be seen as an issue of only historical relevance. Many now believe that enforcing anti-discrimination laws and supporting high standards for all schools are sufficient to ensure a level playing field of equal opportunity. Desegregation today is often regarded as a utopian ideal rather like nuclear disarmament or world government: desirable in principle, but impractical in practice.

While public attention has shifted from desegregation, de-facto segregation on the basis of race and income remains a major feature of American cities and suburbs. Many prominent social scientists—including Kenneth Clark, Thomas Pettigrew, Gary Orfield, and Douglas Massey—continue to argue that spatial segregation of race and income groups remains an important source of disadvantage for members of disadvantaged groups, especially African-Americans and the poor. Surprisingly, this view has been subject to little direct, systematic study. As a result, while demographers have long developed detailed measurements of segregation, there are relatively few careful, systematic studies of the consequences of spatial segregation for inequality. A related empirical literature has considered racial and poverty composition effects on schools and neighborhoods, but these studies have focused on limited aspects of the demographic composition of the immediate local environment without compiling a view of the total effects of the system of segregation on specific outcomes.

This study takes a holistic, macro approach to considering the consequences of spatial segregation for educational achievement of differing group. My focus will be on how spatial segregation on the basis of race and income influences inequality in educational attainment between affluent and less affluent persons and across racial groups: that is, it attempts to understand the total effect of race and income segregation as they differentially affect educational inequality across groups. I use information about the educational attainment of youth in the census and current population survey matched with data from the decennial census on metropolitan segregation by race and income levels.

SEGREGATION, SOCIAL BACKGROUND, AND INEQUALITY

The broad logic for most arguments about how segregation on the basis of income and race may contribute to inequality among racial and ethnic groups is straightforward. In fact, it follows a general logic of how segregation in social life may tend to advantage members of advantaged groups and disadvantage members of disadvantaged groups. Segregation implies that persons with similar social characteristics associate with each other. Although segregation on many dimensions may be important, income and racial segregation have especially been focused on as the major dimensions of residential segregation in American society (White 1986). By grouping like with like, segregation tends to increase the average contact members of advantaged racial and income groups have with advantaged associates and decreases contact of members of disadvantaged racial and income groups with advantaged associates. Correspondingly, segregation is associated with increasing the average degree of exposure of affluent persons to affluent environments (notably neighborhoods and schools) and decreasing contact with less affluent environments. To the extent that having advantaged social contacts or exposure to advantaged social contexts is itself of benefit in generating positive stratification outcomes across a wide variety of domains, segregation is a structural condition that should contribute to the advantage of the advantaged and the disadvantage of the disadvantaged.

There are many specific mechanisms through which segregation may act to increase the advantage of the advantage and the disadvantage of the disadvantaged. Several of these mechanisms are themselves the subject of large social science literature, as I review below. Among the most commonly discussed are the idea that students benefit strongly from attending schools with large number of advantaged students, or possibly suffer from situations which lack a critical mass of high-income students (Rumberger and Palardy 1966); similarly, many argue that students may benefit from growing up in neighborhoods with other high-income students.

The extent to which segregation or homophily advantages the advantaged group depends on the extent of inequality between the advantaged and disadvantaged groups, the degree of segregation in the relevant context, and the advantage that comes from having an advantaged network or social context. While the first two are relatively straightforward to assess, the causal benefits of social context are difficult to determine.

This basic logic is the most common form arguments take about the reasons why segregation or homophily creates advantage for advantaged racial groups or disadvantage for disadvantaged racial groups. A different line of argument, however, turns this logic on its head: some arguments suggest that under certain circumstances, segregation or homophily can be of assistance to the disadvantaged group. Unlike the arguments about how segregation or homophily concentrates advantage or disadvantage, which consider the characteristics of social network members as the outcome, the potential benefit of grouping like-with-like is that it can increase the number and intensity of social ties because of the likeness of the persons brought together, thus increasing the level of social capital of the disadvantaged group. Keeping like-with-like can contribute to dense social networks since persons with like characteristics are most likely to form ties when they are in contact (Quillian and Campbell 2003). Some argue that this results in beneficial "social capital" and the development of strong norms governing behavior. Overall, grouping like-with-like in certain circumstances may have beneficial effects by building group solidarity and harnessing it to achieve group social control and achieve collective goals.

The most common application of this argument is to immigrant ethnic groupings, including both ethnic spatial groupings (enclaves) and high ethnic concentration in particular businesses (ethnic niches or economies). In these situations, grouping like together is thought to help co-ethnic members cooperate and also to use collective control to help motivate individuals to achieve socially valued goals, especially youth. We discuss the case of ethnic groupings further as one of the four principal theories of how social capital may help explain racial poverty gaps, below.

These two mechanisms can potentially operate simultaneously. Whether grouping like-with-like overall hurts or helps disadvantaged groups through these two mechanisms is a question that can only be resolved empirically.

STUDIES OF SEGREGATION AND SCHOOL ACHIEVEMENT

The literature on segregation examines segregation as influencing educational outcomes especially through three mechanisms: by creating inequalities in the funding of locally-financed institutions, notably schools; by creating schools predominately attended by students from impoverished backgrounds; and by creating high-poverty neighborhoods. Although distinguishing these specific mechanisms will not be the focus of this paper, I briefly review some of the major findings from each of these lines of research.

School Resources

Both researchers and litigators involved in Brown v. Board of Education believed that inequality in funding between segregated black and white schools was the major source of black-white inequality in schooling outcomes (Ryan 1999). One of the many unexpected findings of the Coleman report was to upend this conventional wisdom: Coleman found that there was a very weak relationship between educational spending and student achievement (Colemann 1966), suggesting that little of the differences in student outcomes can be explained by spending differences across schools. Since the Coleman report, many studies have examined school spending "effects" on student achievement controlling for student characteristics. These studies have resulted in mixed findings. Reviews by Hanushek (1986, 1996) conclude that there is no compelling evidence that spending more will improve student outcomes. On the other hand, reviews by Hedges and Greenwalk (1996) and Hedges, Laine and Greenwald (1994) criticize Hanushek's review and conclude there is a statistically significant relationship between school spending and student achievement (see also Ryan 1999). Hedges describes the effect as “moderate” and acknowledges that it is substantially smaller than individual-level family background effects. Likewise, Jens and Bassi (1999) find somewhat larger effects using instruments for school spending to deal with omitted variables, concluding that additional resources “typically translate to moderate gains in tests scores.” Ferguson (1998), Mosteller (1995), and Gamoran (1988) have pointed out there is good evidence linking school spending on certain specific interventions, like smaller class sizes, and student outcomes. This suggests that the weak relationship between spending and outcomes may result because higher-spending districts are often not spending the money in ways that facilitate student achievement (Wells and Crain 1997).

In sum, the extensive research literature on school finance suggests that segregation may influence educational outcomes through creating funding inequalities between schools, but the impact of financing is unlikely to be strong. This may be because school districts with higher spending per pupil often spend the money in ways that do not improve student academic outcomes. None of the quantitative studies suggest that variations in spending levels across schools or school districts can explain anything close to most of the achievement gap between poor and nonpoor students.

School Composition

A second explanation has argued that key school-level factors related to the amount students learn in school are the characteristics of other students in school. This view has been especially motivated by reanalysis of the data used for the Coleman report, which find that the school characteristic that was most strongly related to student outcomes after individual controls is the average socioeconomic status of students who attend a school (Jencks 1972). Surprisingly, despite this finding, relatively few studies have investigated the role of student body socioeconomic status composition on student outcomes. Of the studies that do, many have significant shortcomings, notably they lack controls for prior student achievement.

Rumberger and Palardy (2005) provide a recent review of studies that directly consider school composition effects on test scores. Many past studies are case studies of school racial desegregation programs that followed black students who were bussed to more affluent white schools, with most studies finding larger achievement gains for students in the program than for students not bussed (see Crain and Wells 1997; Crain and Mahard 1978). Because the minority students who attend mostly white schools are volunteers, however, serious selection issues remain.

Other than studies of desegregation programs, only a few studies examine the direct effect of student socioeconomic makeup in a school on student outcomes. In a recent reanalysis of data from the National Educational Longitudinal Study, Rumberger and Pallardy (2005) find very large effects of average socioeconomic level of students' schools on test score increases between 9th and 12th grades, with these school effects as large as individual background effects. Most studies prior to theirs have also found at least moderate effects of school composition.

Most authors believe that the benefits of attending a school with high-SES peers may result because these students start out with significant 'home advantage' in learning from their parents, and that attending school with other similarly advantaged children builds on this advantage. The advantages of high-SES school peers could reflect direct co-operative learning among students, although it could also result because schools with high-SES student bodies have school policies and practices that facilitate learning. Rumberger and Pallardy (2005), for instance, argue that policies and practices are the key to the SES composition effect. They present evidence that the benefits of attending a high-SES school result because in higher-SES schools students completed more hours of homework, took more college preparatory courses, and felt safer in school; teachers in high-SES schools also reported higher expectations for their student's ability to learn.

Although the research on socioeconomic composition effects within school is thin, the bulk of studies suggest that the socioeconomic status of school peers is important. It is not clear whether or not there would be zero-sum tradeoffs between more affluent students and less affluent students from reallocating students across schools to reduce segregation; Rumber and Palardy find relatively linear effects of SES composition for students of all SES levels, suggesting that gains to low-SES students might trade off with losses to higher-SES students were schools to be more class integrated. They argue instead that changing policies and practices of lower SES schools can accomplish some of the same gains without the tradeoffs that might result from student reassignment.

The Neighborhood Effect Literature

A closely related line of empirical studies have examined the how neighborhood characteristics—usually demographic characteristics of the tract in which the respondent grew up—are related to schooling and social outcomes. In practice, these studies are to a significant degree also capturing neighborhood effects that operate through schools, since most schools are neighborhood based, and neighborhood effects studies rarely include separate controls for school characteristics.

Most studies of neighborhood effects use observational data to contrast the early adult educational and stratification of children who grew up in more affluent neighborhoods to otherwise similar children who grew up in poorer neighborhood. Duncan (1994) and Brooks-Gunn, Duncan, Klebanov, and Sealand (1993) provide good examples. Although the results have varied across outcomes and studies, many studies find negative effects of poor neighborhoods on educational outcomes that are small to moderate in size; almost all studies find that family background is more strongly associated with student attainment and achievement than neighborhood characteristics.

A major shortcoming of the neighborhood effects literature are concerns about confounding from omitted variables related to neighborhood of residence (Duncan and Raudenbush 1999). Students who reside in many neighborhoods may have unobserved family background characteristics that contribute to academic achievement, such as wealth or parental concern with education. The concern that apparently positive effects of neighborhood are actually capturing one of an array of family background differences has led some to suggest that the results of observational neighborhood effect studies be reinterpreted as upper-bound estimate of the importance of neighborhood (Solon, Duncan, and Page 2000).

More recently, a series of relocation studies with experimental designs have followed public housing tenants moving from poorer to more affluent neighborhoods (see Ludwig, Duncan, and Pinkston 2005 and citations therein). While these designs do effectively address the selection problems for which observational studies have been criticized, they face other concerns about the generalizability of their results. The participants in these studies are a very specific subpopulation: residents of troubled public housing projects who have shown interest in a housing mobility program. The selected subpopulation and the very extreme change in neighborhood environments are very useful for understanding the effect of mobility programs on participants, but less useful for understanding transitions of less extreme forms of neighborhood environments or for the general population.

While important in clarifying the relative importance of neighborhood effects on social outcomes, there are significant limits to what we learn about segregation from this literature. Neighborhood effects studies have focused mostly on the consequences of high contrasted to low poverty neighborhoods for children, but have not examined if the affluent gain from affluent neighborhoods, or the tradeoffs that might occur among groups with rearranging persons to achieve more income balance across neighborhoods. Second, almost all studies use the respondent’s census tract, an area of a few blocks around the respondent’s residence, as the basic unit. This omits the larger spatial context that may be important, such as the influence of the overall geography of segregation on opportunities and schools.

Understanding the Overall Consequences of Segregation

While these studies consider important pieces of the total role of residential segregation, they focus especially on the composition effect of high-poverty environments. My approach will instead aim to understand the total consequences of segregation on the population as a whole.

METHODS

Rather than contrasting the outcomes of children living in poor and affluent neighborhoods, or enrolled in poor and affluent schools, my approach contrasts academic attainment between students in metropolitan areas with varying levels of economic segregation. My approach is similar to Cutler and Glaeser's (1997) study of the effect of black-white segregation on earnings and employment, but extended to different outcomes and different forms of segregation.

One major advantage of this approach is that it is less subject to confounding of estimates due to non-random selection of families into neighborhoods. Contrasting outcomes across entire metropolitan areas has the advantage that individuals are much less likely to be selected into metropolitan areas in a way that is systematically related to child-related outcomes; a family in search of a better neighborhood would likely move within their metropolitan area rather than across metropolitan areas. Although this certainly does not completely resolve problems of non-random selection, these estimates are less likely to be confounded by the high selectivity related to concern about children that dominates intra-metropolitan neighborhood choice.

The analysis uses both aggregate and individual-level data. The aggregate data are used to calculate measures of spatial residential segregation among individuals by levels of race and income in American cities. The individual-level data include information on the educational attainment, family background, and metropolitan residence of a large sample of young adults.

Individual-level Data

Two sources of individual-level data are used in the study: microdata from the 1990 Decennial Census and a pooled series of cross-sections from the October Current Population Survey. The Census allows for very large individual sample size, but is limited by a sampling scheme that excludes individuals not living at home. The Current Population Survey partially solves this problem, and for this reason is the primary sample used for most modeling in the paper (NOTE: This will be truer in the presented paper and in the final version than in this rough draft).

The first source of microdata on individuals is the 1990 Decennial Census. All individuals who are 17, 18, and 19 years and are living at home (in the same household as at least one parent) in an identified metropolitan area are included (residents of some smaller metropolitan areas have their metropolitan code suppressed by the census for confidentiality). The resulting sample includes 256,822 individuals living in 268 metropolitan areas.

The second source is the October Current Population Survey (CPS) surveys, which includes a supplement on school enrollment and attainment. I use a selection from a uniform sequence of October CPS files developed by Robert Hauser and his associates (Hauser, Jordan, and Simmons 2002). The file pools October CPS survey from 1986 to 1994. I selected only individuals who met the sampling criteria described below and who resided in one of the 250 CPS-identified primary metropolitan statistical areas (like the census, the CPS suppresses MSA codes for residents of small MSAs due to confidentiality concerns).

From the CPS, I selected individuals to form two samples. The high-school graduation sample includes all respondents who are ages 18 or 19 and who completed at least 9th grade (entered high school) and were enumerated as living with at least one of their parents. Importantly, because of the CPS enumeration rules, this includes both individuals who are actually living at home and persons in group quarters including college dorms, who are enumerated as if they are living at home by the CPS sampling rules. This sampling criterion makes it possible to use the sample to study college entrance (see Hauser 1993). A total of 14,585 individuals meet the sampling criteria.

The second sample, the college entrance sample, will be used to study how segregation is related to timely entry into college among individuals who have graduated from high school. The sample includes all individuals in the CPS who are age 18, 19, or 20 and who have graduated from high school, a total of 22,088 individuals.

Because of the young age of members of the sample, the dependent variables examined below will essentially be timely high school graduation and college entrance. Age differences within the sample are controlled by dummy variables. Some sample members will, of course, graduate high school or enter college at later ages, although prior studies show that persons who matriculate on-time are much more likely to eventually graduate (Turley xxxx).

Aggregate Level Data and Measures

Aggregate-level measures of metropolitan spatial segregation and other controls are computed for each metropolitan area in the 1990 census from census summary tape file 3, tract-level data. The basic measure used is the index of dissimilarity, the most commonly used measure of segregation. The index of dissimilarity for each metropolitan area is computed by using metropolitan tract-level data and the formula:

$$D = \frac{1}{2}\sum_{n=1}^{N}\left|\frac{x_n}{X} - \frac{z_n}{Z}\right|$$

Where D is the index of dissimilarity, x_n are the number of members of the first group in tract n, X = member of the first group in the metropolitan area, z_n = total number of members of the second group in the tract, Z = total number of members of the second group in the metropolitan area. Higher numbers indicate higher segregation. A common interpretation is that D indicates the proportion of the members of one group that would have to move to achieve an even spatial distribution over tracts of the population of one group relative to the other.

The indexes of dissimilarity are calculated for each of three groups using three group contrasts: poor vs. nonpoor, black vs. white, and Hispanic against non-Hispanic.

DESCRIPTIVE RESULTS

Initially I examine differences in educational attainment achieved among youth living in cities with different levels of segregation, broken down by their family background status (family income below or above the poverty line) or race. Modeling results are presented in the following section.

The initial results using poverty/not poverty segregation are shown in figure 1. The top graph shows results using the Census sample; the bottom graph shows results using the CPS. Each metropolitan area is represented by two dots or circles in different colors, one for poor and one for nonpoor residents of the metropolitan area. The horizontal axis shows the degree of segregation poor/nonpoor for the metropolitan area.

As shown in figure 1, as the metropolitan area's level of poor/nonpoor spatial segregation increases, the average level of education of nonpoor family slightly increases, while the average level of education attained of poor families decreases. The result is quite consistent across Census and CPS. These results suggest that children from poor families are not doing as well in school when they have grown up in metropolitan areas with high levels of poverty segregation.

Figure 2 provides a parallel graph, but this time with the two separate colors of dots/circle and lines shown for blacks and nonblacks. As the average level of white/black segregation in an MSA increases, the degree of difference in education attained between whites and black grows, mostly because the black line goes down.

Finally, Figure 3 shows the same results for Hispanic/non-Hispanic. Again, as the level of segregation Hispanic/non-Hispanic increases, the difference in educational attainment between Hispanic and non-Hispanic students increases. In this case, however, there is more difference than in the other graphs between the census and CPS, where the CPS results show relatively little loss to Hispanic respondents to greater Hispanic segregation.

Overall, the results provide consistent findings that differences in education attained between members of the advantaged and disadvantaged racial or economic group increases with increasing spatial segregation. The main reason for this is because of a decline in achievement of the disadvantaged group, rather than gains for the more advantaged group.

MODELING RESULTS

These initial descriptive results lack basic individual-level controls and may confound different forms of segregation (e.g. racial and economic). Statistical models are used to include controls at the individual and metropolitan levels and to separate the influence of racial and economic segregation.

Approach

I use hierarchical multilevel models, both linear and logistic in form, with variance components at both the individual and metropolitan-area level. The dependent variable (y) is high school graduation or college attendance. In the individual-level model, the independent variables include family poverty, race (black/nonblack), Hispanic origin (hispanic/nonhispanic), and a series of control variables:

$$y_{im} = \beta_{0m} + \beta_{1m}\text{poor}_{im} + \beta_{2m}\text{black}_{im} + \beta_{3m}\text{hispanic}_{im} + \sum_{k=4}^{K}\beta_k\text{controls}_{im} + e_{im}$$

The control variables include other basic demographic characteristics like age and gender and family background controls (parents' education). Expressed in the structural form, parameters from this first-level model then become the dependent variable in a second-stage model:

Intercept equation:

$$\beta_{0m} = \gamma_{00} + \gamma_{01}D_m^{\text{poor/nonpoor}} + \gamma_{02}D_m^{\text{black/white}} + \gamma_{03}D_m^{\text{Hisp/notHisp}} + \gamma_{04}\text{ppoor}_m + \gamma_{05}\text{pblack}_m + \gamma_{06}\text{phisp}_m + \zeta_0$$

$$\beta_{1m} = \gamma_{10} + \gamma_{11}D_m^{\text{poor/nonpoor}} + \gamma_{12}\text{ppoor}_m + \zeta_1$$

Equation for “poor” slope:

Equation for “black” slope:

$$\beta_{2m} = \gamma_{20} + \gamma_{21} D_m^{black/white} + \gamma_{22} pblack_m + \zeta_2$$

Equation for “Hispanic” slope:

$$\beta_{3m} = \gamma_{30} + \gamma_{31} D_m^{Hisp/notHisp} + \gamma_{32} phisp_m + \zeta_3$$

In the equations above, each of the “D” terms represents the extent of segregation on the basis of characteristics between members of the two groups indicated by the superscripted terms (e.g. poor and nonpoor). The slopes predicting each of the characteristics indicate how segregation is related to gain or loss among members of that group. The “D” terms in the intercept equation indicates how each form of segregation influences gain or loss in the dependent variables among persons who are in the not disadvantaged group (e.g. nonpoor, white, or not Hispanic).

Variable “ppoor”, “pblack”, and “phisp” are percent poor, black, and Hispanic in the metropolitan area. These are the most important metropolitan-level controls. Although not shown above or in the tables that follow, in some models I have also included dummy variables for region, which does not alter the basic results.

Results

Table 1 provides a set of initial models for the Census and the CPS using years of education attained as the dependent variable. The model results are very similar to the results shown previously in the graphs: with higher segregation, the education of children in the more disadvantaged group declines, while the education of children in the more advantaged group increases. The losses for the disadvantaged group are substantially larger for income segregation than for each of the racial-ethnic segregation dimensions examined here. The segregation loss results do not hold for Hispanic/non-Hispanic segregation in the CPS, as was true in the descriptive graphs.

Table 2 shows similar results but this time for high school completion among 18 and 19 year olds. The model is a multilevel logistic regression. As we can see, as segregation poor/nonpoor and white/black increases, the likelihood of black and poor children decreases; the effect is clearly strongest for poor/nonpoor segregation.

The second model adds an indicator for the respondent being from an affluent family, defined as a family with income at least five times the poverty line. While children from affluent families on average attain more education than children in other families, their advantage does not increase in metropolitan areas with higher levels of poor/nonpoor segregation.

Table 3 again shows similar models, but this time for college entry conditional on high school graduation. Only the CPS results are used for the analysis, because the census does not enumerate students living in dorms in their parental residence, making it impossible to link most students in college with their parents. By far the largest effects in terms of magnitude, and the only statistically significant interactions, are losses to poor individuals with higher poor/nonpoor segregation.

From all three sets of results, a fairly clear pattern emerges: as segregation increases, the disadvantaged group's educational attainment decreases. By far the strongest effect is for poor/nonpoor segregation, and results for Hipsanic/nonHispanic segregation do not hold in the CPS. These effects are of moderate size, with a one standard deviation change in the MSA nonpoor/poor segregation level equal roughly to 3/4th of a year of parental education.

Equally important, I find that the more advantaged group does not seem to be attaining more education when the extent of segregation increases. Although the interpretation of this finding is discussed at greater length below, on their face these results support the idea that there may be on average gains overall in education attained with a reduction in income segregation.

Individual-level sample selection

The individual-level samples of the census include only individuals living at home, and the CPS includes individuals living at home or in group quarters including dorms. These restrictions result in the loss of about 25% of otherwise eligible individuals in the census sample, 15% of otherwise eligible individuals in the CPS high school graduation sample, and 18% of otherwise eligible individuals in the CPS college sample. These individuals are not included in the models because, although we have information about their characteristics, we lack information about their parents and the metropolitan area in which they last attended school.

In terms of the main results, what is important is how these patterns of missing data are associated with the measures of metropolitan-level segregation. On the face of it, there is no obvious reason why the metropolitan segregation measures should be strongly associated with the rate at which individuals leave home; to the extent there is a relationship, because persons leaving home early are more likely to have dropped out of school, it may weakly suppress the strength of the association between segregation and school dropout if segregation is indirectly increasing dropout rates in some MSAs, and some of those persons are lost to the sample.

Fortunately, since most information about persons who are not living at home is available in the sample (other than family background), we can examine the association between percentage of those otherwise eligible for the sample individuals who are not living at home. Reassuringly, there is almost no correlation between the percent of eligible sample members not at home and the segregation measures.

Another check on this problem comes from estimating the models without controls for family background and poor/nonpoor segregation: the model then only includes the black and Hispanic segregation measures and interactions. The basic results are shown in table 4, and closely mirror the results for these forms of segregation shown elsewhere. Again, this suggests that the exclusion of individuals not living at home or in dorms is not significantly influencing the segregation results.

Using Spatial Segregation Measures

The results to this point have employed the index of dissimilarity, which is the commonly used measure of spatial segregation. One limitation of the index is that it does not account for the spatial positioning of the "neighborhood" units used to compute it relative to each other. The units are treated as nominal and unrelated, rather than positioned in space.

To address this shortcoming, I calculated a spatially modified version of the D index developed by Wong (1993):

$$D^* = D - \frac{\sum_i \sum_j |c_{ij}(z_i - z_j)|}{\sum_i \sum_j c_{ij}}$$

$$c_{ij} = \exp(-d_{ij}) * pop_i * pop_j$$

Where d_{ij} is the distance between tracts i and j, z is the tract-level characteristic (e.g. percent poor) of interest, and c_{ij} is a distance-decay population function. The measure takes the traditional index of dissimilarity (D) and "penalizes" it depending on the dissimilarity of composition in z of tracts that are close to each other. The result is a measure that reduces segregation from the level measured by D to the extent that tracts tend to be near tracts that have dissimilar poverty or racial composition.

Key coefficients of a model using this more refined measure of segregation are shown in table 5. There is only a slight difference from the earlier results using the spatial segregation measure; thus little is changed in this case from better accounting for spatial patterning.

Instrumental Variables Estimation

A final concern is one that is common and difficult to overcome in non-experimental social science research. Suppose, for instance, that poor quality schools for inner-city children are leading more affluent families to move away from inner-city schools, resulting increasing poor/nonpoor segregation in a metropolitan area. In this case, then, omitted characteristics like poor inner-city schools could be driving both spatial segregation and schooling outcomes, rather than representing a causal effect. A broader concern is that there may be some omitted collective-level variables that are causing certain metropolitan areas to have both higher segregation and worse schooling outcomes for children from disadvantaged groups.

To attempt to deal with this problem, I use several instrumental variables to purge this potential endogenous variation from the estimates. One set of instruments used to estimate the models are measures of segregation re-calculated to exclude households with children; this is calculated from the tabulations provided in the census. Since households without children should not adjust locations based directly on schooling concerns, this should significantly reduce the influence of this omitted variable. Indeed, empirically the measure shows that segregation is significantly lower among individuals without children. The first two numeric columns in table 1 show results of a probit model estimated with and without this instrument. As we can see, the results are relatively unchanged when the instrument is used.

A second approach employs the number of rivers in a metropolitan area as an instrument for the segregation variables, following Cutler and Glaeser (1997). Number of rivers is predictive of level of segregation, perhaps because natural boundaries facilitate social segregation. This has the advantage that number of rivers cannot have been caused by other variables in this analysis. The results using this instrument show the same basic pattern of results that we saw earlier. (NOTE: Sorry, have not had time to get these results into the table yet.) Although it is always difficult to disentangle causality in macro-sociological accounts of this sort, this instrument provides some evidence that the results indicate causal processes of segregation on educational attainment.

CONCLUSION AND DISCUSSION

The essential finding of this paper is that spatial segregation worsens the high school graduation and college entrance rates of children from disadvantaged backgrounds without improving the high school graduation and entrance rates of children from more affluent backgrounds. This result is by far the strongest for poor/nonpoor segregation, holds but is a weak effect for black/white segregation, and is inconsistent for Hispanic/non-Hispanic segregation. I never find any evidence that the disadvantaged group gains from their own segregation. To answer the question posed by the title of this paper, for the outcomes considered here, segregation is producing losers but no winners.

In finding that there are some damaging effects of spatial income segregation for lower income students, the results in some ways mirror the findings of neighborhood effects studies on the negative consequences of high-poverty environments, although I have argued that identifying the effect of segregation with between-metropolitan variation is less subject to the problems of selection that have led many to doubt the results of the non-experimental neighborhood effects literature. Like most neighborhood effect studies, the results in this study do not fully distinguish the mechanisms through which these effects operate. Unlike the neighborhood effects literature, this allows us to assess empirically how more affluent groups have fared as well in situations of reduced economic segregation.

The fact that more income-integrated metropolitan areas are educating their less affluent residents better without educational losses to their affluent residents is not a necessary or obvious result. This may be because there are benefits to everyone in a school or neighborhood when the school or neighborhood has a critical threshold of middle-class or affluent students, which is achieved across more often in relatively class-integrated metropolitan areas. Several mechanisms that might explain how this is possible are suggested by discussions in the school and neighborhood effects literature. For instance, schools with a solid base of middle and upper class students may be better able to attract higher-quality teachers, or the teachers in these schools may have higher expectations for students. Or it may be that in schools with a critical mass of more affluent students, more rigorous courses are offered, and students from less affluent background benefit from these course offerings. Better exploring the exact reasons behind this finding is an important topic for future research.

The focus of this research on residence also suggests that solutions that are focused on residence should be viewed as part of the solution to problems of high-poverty schools, rather than focusing on remedies at the school level alone. Indeed, given the unpopularity of busing, reducing barriers to race and class integration of metropolitan areas may actually be a more feasible approach. Although markets forces surely have an influence on spatial segregation, urban space is highly regulated by local governments through zoning laws and conditional finance incentives for developers. In some suburbs, zoning and building laws have been used to restrict the construction of housing that could be within the reach of lower-income residents, keeping lower income residents out through government intervention. The results of this paper suggest there is an economic cost for economically disadvantaged students to this sort of policy. Income segregation produces a sort of “deadweight loss,” to use the language of economics, as one of its products.

To be sure, differentiation between poor and rich schools is only one factor contributing to inequality in educational opportunity, and most of the evidence indicates it is less important than direct family background effects. Yet the effects of metropolitan income segregation are clearly large enough to make a difference in reducing the problems associated with high income segregation for lower-income students at potentially low cost, especially in situations where governments can further this goal merely by removing regulatory barriers to lower income housing. Economically more integrated environments can work for the common good without necessarily involving zero-sum tradeoffs.

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Table 1: Multi-level model of Grades completed on MSA and individual characteristics

Dependent Variable: Grades completed among 17, 18, and 19 year olds living with at least one parent

	Census			CPS	
Family Poverty Status and Race	Coef.	Std. Err.		Coef.	Std. Err.
R's Family Below Poverty Income	-0.327	0.015	***		
Respondent Black	0.015	0.015		(SORRY--No time to type	
Respondent Hispanic	-0.112	0.022	***	these in yet!)	
Segregation Measures (MSA) and Interactions with Individual Characteristics					
Seg., Poor/Nonpoor (D)	0.029	0.129			
Seg. Poor/Nonpoor * Below Poverty	-0.663	0.181	***		
Seg., White/Black (D)	0.011	0.068			
Seg. White/Black * Black	-0.191	0.083	*		
Seg., Hispanic/Not Hispanic (D)	0.170	0.088			
Seg. Hispanic/Not Hispanic * Hispan	-0.543	0.162	***		
MSA % Poor					
% Poor	-0.424	0.209	*		
% Poor * Below Poverty Line	-0.199	0.387			
% Black	0.094	0.085			
% Black * Respondent Black	-0.090	0.126			
% Hispanic	0.273	0.080	***		
% Hispanic * Respondent Hispanic	-0.064	0.150			
Individual-Level Controls					
Age = 17	(ref.)				
Age = 18 (1=Yes)	0.806	0.012	***		
Age = 19 (1=Yes)	1.437	0.023	***		
Male (1=Yes)	-0.229	0.006	***		
Mother's Education 8th grade or less	-0.580	0.026	***		
Mother's Ed, Some High School	-0.334	0.013	***		
Mother's Ed, High School Graduate	-0.094	0.008	***		
Mother's Ed, Some College	-0.011	0.007			
Mother's Ed, College Degree	(ref.)				
Mother's Ed, Master's Degree	0.026	0.012	*		
Mother's Ed, Professional/Doctorate	-0.020	0.019			
Mother not in household	-0.387	0.028	***		
Father's Ed, 8th grade or less	-0.392	0.027	***		
Father's Ed, Some High School	-0.237	0.017	***		
Father's Ed, High School Graduate	-0.095	0.009	***		
Father's Ed, Some College or Assoc	-0.023	0.009	*		
Father's Ed, College Degree	(ref.)				
Father's Ed, Master's Degree	0.000	0.010			
Father's Ed, Professional/Doctorate	-0.017	0.013			
Father Not in Household	-0.251	0.012	***		
Variance Components					
Variance (MSA Intercept)	0.0088				
Variance (Poverty Coefficient)	0.02373				
Variance (Black Coefficient)	0.00944				
Variance (Hispanic Coefficient)	0.03066				
Variance (Individual)	1.38158				

Note: * p<.05; ** p<.01; *** p<.001

Table 2: Multi-level logistic regression model of HS graduation on MSA and individual characteristics, CPS

Dependent Variable: HS completion among 18, and 19 year olds
who have completed 9th grade

Family Poverty Status and Race	Coef.	Std. Err.		Coef.	Std. Err.	
R's Family Below Poverty Income	-0.978	0.091	***	-0.802	0.090	***
R' Family Affluent (5x Poverty Line)				0.849	0.061	***
Respondent Black	-0.598	0.101	***	-0.432	0.100	***
Respondent Hispanic	-0.611	0.120	***	-0.508	0.119	***
Segregation Measures (MSA) and Interactions with Individual Characteristics						
Seg., Poor/Nonpoor (D)	0.740	0.568		0.641	0.598	
Seg. Poor/Nonpoor * Below Poverty	-3.726	1.083	***	-3.395	1.074	**
Seg. Poor/Nonpoor * Affluent				-0.451	0.710	
Seg., White/Black (D)	0.449	0.350		0.474	0.337	
Seg. White/Black * Black	-1.567	0.613	*	-1.640	0.601	**
Seg., Hispanic/Not Hispanic (D)	0.596	0.395		0.657	0.384	
Seg. Hispanic/Not Hispanic * Hispanic	-0.382	0.709		-0.329	0.724	
MSA % Poor						
% Poor	-0.747	1.060		0.632	1.099	
% Poor * Below Poverty Line	-0.116	1.529		-1.331	1.557	
% Poor * Affluent				-0.927	1.173	
% Black	-0.598	0.101	***	-1.623	0.480	***
% Black * Respondent Black	2.642	0.821	**	2.636	0.800	***
% Hispanic	-0.611	0.120	***	-0.414	0.342	
% Hispanic * Respondent Hispanic	0.399	0.414		0.415	0.370	
Individual-Level Controls						
Age = 18 (1=Yes)	(ref.)			(ref.)		
Age = 19 (1=Yes)	1.079	0.045	***	1.067	0.043	***
Male (1=Yes)	-0.233	0.006	***	-0.599	0.048	***
Head of household education (parent)	0.185	0.011	***	0.159	0.011	***

* p<.05; ** p<.01; *** p<.001
Note: Census results similar, but not yet in table.

Table 3: Multi-level Logistic Model of College Graduation on MSA and individual characteristics, CPS

Dependent Variable: College graduation among 18, 19, and 20 year olds
who have completed 9th grade

Family Poverty Status and Race	Coef.	Std. Err.		Coef.	Std. Err.	
R's Family Below Poverty Income	-0.455	0.069	***	-0.408	0.073	***
Respondent Black	-0.429	0.081	***	-0.444	0.082	***
Respondent Hispanic	0.404	0.085	***	-0.418	0.108	***
Segregation Measures (MSA) and Interactions with Individual Characteristics						
Seg., Poor/Nonpoor (D)				-0.341	0.407	
Seg. Poor/Nonpoor * Below Poverty				-2.028	0.902	*
Seg., White/Black (D)	0.370	0.219		0.451	0.220	*
Seg. White/Black * Black	-0.966	0.437	*	-0.767	0.442	
Seg., Hispanic/Not Hispanic (D)	0.403	0.255		0.500	0.291	
Seg. Hispanic/Not Hispanic * Hispanic	0.565	0.789		0.868	0.797	
MSA % Poor						
% Poor	-0.625	0.758		-0.759	0.764	
% Poor * Below Poverty Line	0.744	1.199		0.367	1.281	
% Black	0.739	0.301	*	0.890	0.315	**
% Black * Respondent Black	-0.308	0.608		-0.263	0.614	
% Hispanic	0.230	0.338		0.250	0.329	
% Hispanic * Respondent Hispanic	1.304	0.700		1.230	0.695	
Individual-Level Controls						
Age =18	(ref.)			(ref.)		
Age = 19 (1=Yes)	0.202	0.030	***	0.203	0.030	***
Age = 20 (1=Yes)	0.030	0.040		0.031	0.040	
Male (1=Yes)	-0.330	0.036	***	-0.330	0.036	***
Head of household education	0.212	0.014	***	0.212	0.014	***

* p<.05; ** p<.01; *** p<.001

Table 4: Multi-level model of Average Grades Completed including Respondents not at home (Census)

DV: Average grades completed among all 17, 18, and 19 year olds

Race	Coef.	Std. Err.	
Respondent Black	-0.1	0.02	***
Respondent Hispanic	-0.45	0.03	***
Segregation Measures (MSA) and Interactions with Individual Characteristics			
Seg., White/Black (D)	-0.27	0.11	*
Seg. White/Black * Black	-0.22	0.1	*
Seg., Hispanic/Not Hispanic (D)	0.09	0.11	
Seg. Hispanic/Not Hispanic * Hispanic	-1.22	0.24	***
MSA Composition			
% Black	-0.28	0.16	
% Black * Respondent Black	-0.28	0.16	
% Hispanic	0.02	0.11	
% Hispanic * Respondent Hispanic	-1.45	0.38	***

* p<.05; ** p<.01; *** p<.001

Also included: Individual-level controls for age, gender, mother's education, father's education, not living with parents, interactions of age and not living with parents.

Variance components for MSA intercept, poverty status, black, and Hispanic.

CPS RESULTS ARE SIMILAR: Sorry no time to enter in table yet!

Table 5: Selected Coefficients of Multi-Level Models with Spatial Segregation Measures (CPS)

	HS Graduation			College Entrance		
Segregation Measures (MSA) and Interactions	Coef.	Std. Err.		Coef.	Std. Err.	
Spatially Adjusted Seg., Poor/Nonpoor (D*)	0.874	0.623		-0.303	0.458	
Spatially Adjusted Seg. (D*) Poor/Nonpoor * Poverty	-3.309	1.193	**	-1.969	1.000	*
Spatially Adjusted Seg., White/Black (D)	0.189	0.386		0.535	0.253	*
Spatially Adj Seg. White/Black * Black	-1.334	0.591	*	-0.531	0.441	
Spatially Adj. Seg., Hispanic/Not Hispanic (D)	0.674	0.462		0.364	0.328	
Spatially Adj. Seg. Hispanic/Not Hispanic * Hispanic	0.084	0.814		0.424	0.918	

* p<.05; ** p<.01; *** p<.001
Also included: Controls for age, gender, mother's education, father's education.
Variance components for MSA intercept, poverty status, black, and Hispanic.

Table 6: Probit and Instrumental Variable Probit of HS Graduation and College Entrance

Dependent Variable: High School Graduation

Probit Reuslts (No instruments)			Instrumental Variable	
Segregation Measures (MSA) and Interactions			Seg. Measures w/o Children	
Seg., Poor/Nonpoor (D)	0.541	0.370	0.320	0.348
Seg. Poor/Nonpoor * Below Poverty	-1.845	0.601 **	-1.284	0.620 *
Seg., White/Black (D)	0.360	0.221	0.209	0.176
Seg. White/Black * Black	-1.122	0.360 **	-1.043	0.312 ***
Seg., Hispanic/Not Hispanic (D)	0.274	0.234	0.390	0.264
Seg. Hispanic/Not Hispanic * Hispanic	-0.428	0.438	0.527	0.529

Dependent Variable: College Entrance (Conditional on HS Graduation)

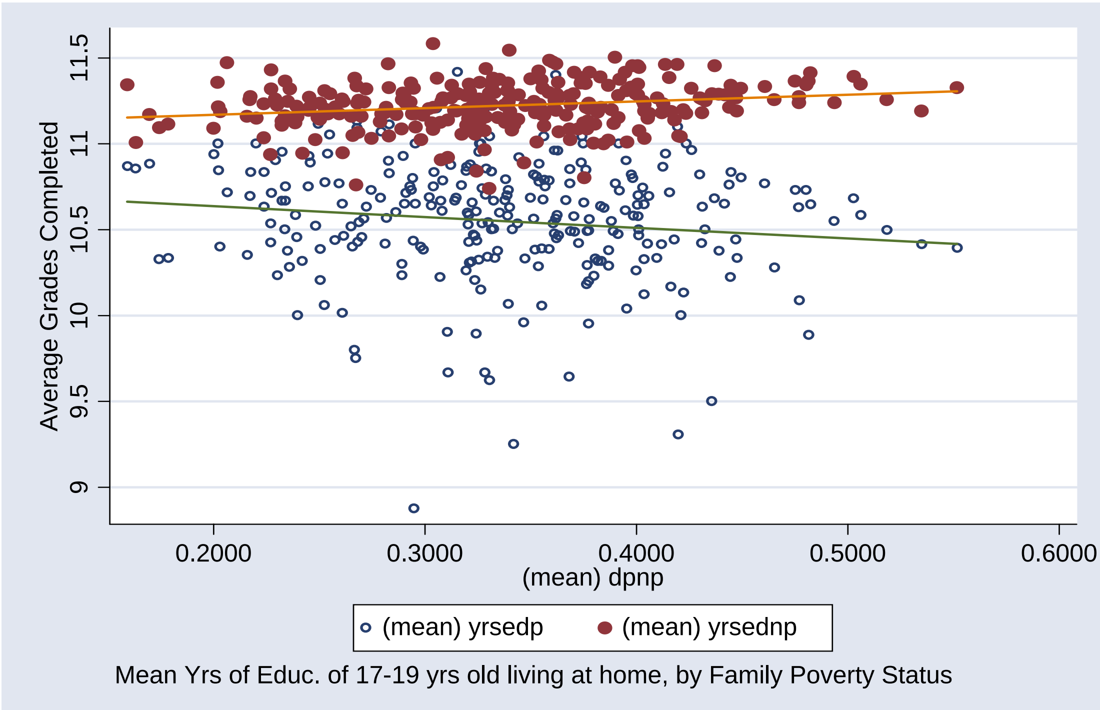
Probit Results (No instruments)			Instrumental Variable	
Segregation Measures (MSA) and Interactions			Seg. Measures w/o Children	
Seg., Poor/Nonpoor (D)	-0.333	0.239	-0.672	0.226 **
Seg. Poor/Nonpoor * Below Poverty	-1.105	0.530 *	-1.157	0.574 *
Seg., White/Black (D)	0.383	0.129 **	0.433	0.115 ***
Seg. White/Black * Black	-0.629	0.230 **	-0.530	0.231 *
Seg., Hispanic/Not Hispanic (D)	0.434	0.167 **	0.571	0.174 **
Seg. Hispanic/Not Hispanic * Hispanic	0.353	0.472	0.130	0.436

Included in models but not shown: all controls shown in table 2.

NOTE: Second Instrument Variable Results Not Yet in Table--SORRY!

Figure 1: Average Grades Completed and Metropolitan Level of Segregation, 17-19 Year Olds Living at Home, By Family Poverty Status

CENSUS:



CPS (size of circle is proportional to number of observations for PMSA):

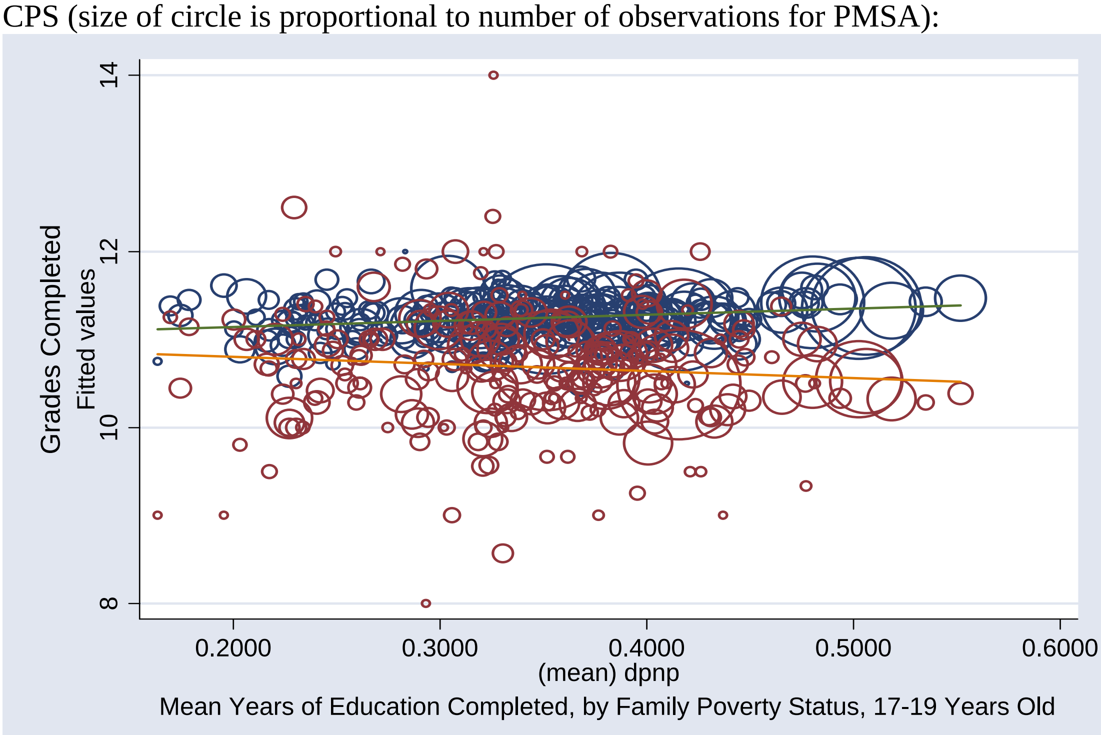
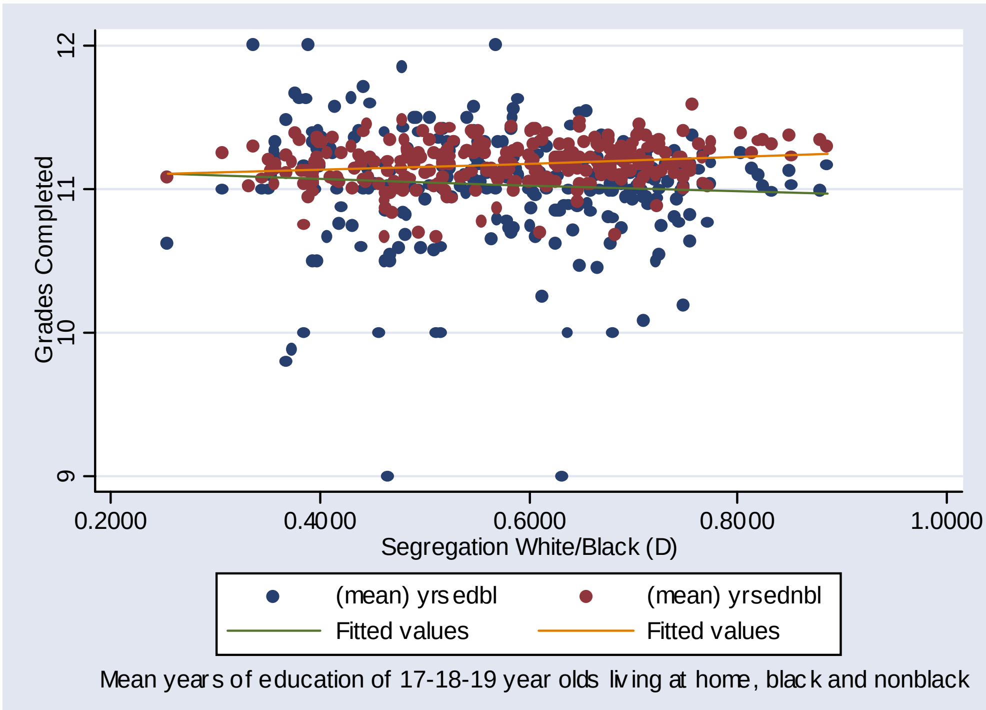


Figure 2: Average Grades Completed and Metropolitan Level of Segregation, 17-19 Year Olds Living at Home, By Race (Black/Nonblack):

CENSUS:



CPS (Size of circle proportional to number of cases in PMSA):

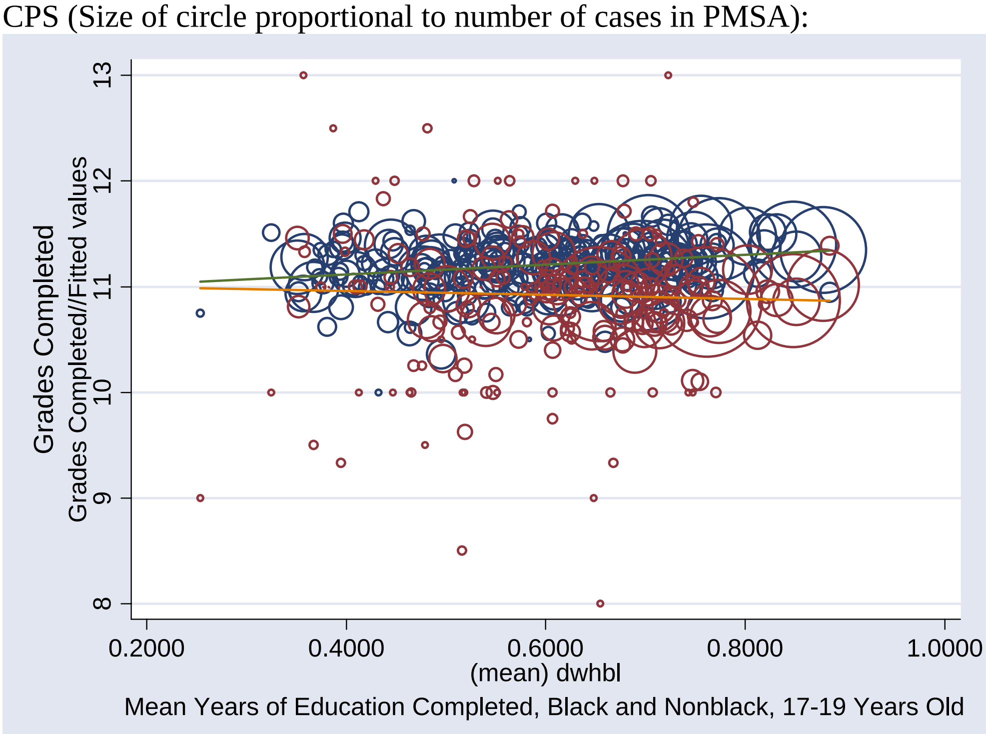
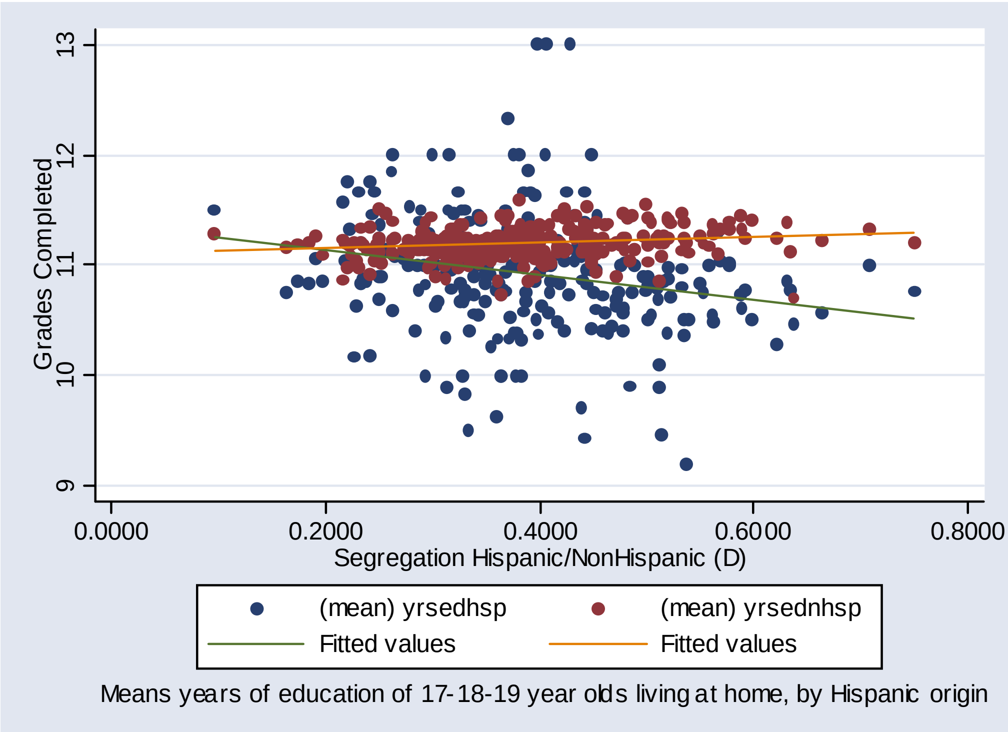


Figure 3: Average Grades Completed and Metropolitan Level of Segregation, 17-19 Year Olds Living at Home, By Hispanic Origin (Hispanic/Not Hispanic):

CENSUS:



CPS (Size of circle proportional to number of cases in PMSA):