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Schools, Neighborhoods and Selection: Outcomes Across Metropolitan Los Angeles

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Abstract What is the relationship between school segregation and neighborhood segregation across school districts in Los Angeles County, and are school district outcomes on reading and mathematics scores related to levels of school segregation across these districts? We compute segregation scores using US tract level data for 2000 and use reading and mathematics scores from California State tests. Data from the Los Angeles family and neighborhood survey are used to track individual residential changes and differences in the associated Woodcock Johnson scores. We show that there is a close link between levels of school segregation and neighborhood segregation and that many suburban school districts are relatively integrated across both neighborhoods and schools. When we examine average school district outcomes on reading and mathematics scores we do not find any relationship with levels of segregation. At the same time there is clear evidence of spatial sorting with poorer and lower scoring children moving into school districts (or zones with poorer achieving schools). The multi-level models of segregation and achievement show that the variance in achievement levels across districts is significantly greater than across schools within districts.

Keywords Segregation · Schools · Neighborhoods · Selectivity

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Introduction

School segregation continues to be a contentious issue across school districts in the United States as the recent Supreme Court case Parents v Seattle School District No. 1 (2007) demonstrates. Issues of school quality and the delivery of education especially to ethnic and minority populations continue to be at the center of debates about schooling both in Europe and the United States (Brannstrom 2008; Harris and Johnston 2008; Clark and Ledwith 2007). Included in those debates are questions about whether segregation influences school outcomes and whether the return to neighborhood schools has affected educational outcomes more generally (Clark and Ledwith 2007; Frankenburg et al. 2003). The historic concern with integrating schools in the United State has been replaced with questions about what gains accrue from ethnic and racial mixing. Are there gains to society as a whole from ensuring some form of pupil mixing in schools? Clearly, this is an important policy issue as there are strongly held views in favor as well as against attempts to provide ethnic and racial mixing in school districts. But, is there a relationship between ethnic mixing and school outcomes or does it in fact not matter? It comes back to a fundamental issue of whether minority students can do well without ethnic and racial mixing.

In this paper we examine school-neighborhood interrelationships and plot the levels of mixing across urban and suburban school districts in Los Angeles County, the second largest school district in the US. We ask are the school district outcomes on measures of education attainment related to the levels of segregation across the school districts. If levels of segregation, and by extension, mixing, are unrelated to school outcomes we can suggest that the focus on segregation per se will not change school outcomes. Rather the attention must be redirected to just those situations where residential sorting may be creating and sustaining poor school outcomes. If the outcomes in the urban core school districts are a function of the inability of some households to leave while others similar to those there move in, it raises the question of selective migration (Finney and Simpson 2009). Then we must question whether schools can take on the role of providing social mixing for a modern society. In turn, it raises a larger scale question about how we can intervene in the migration and selection process in the urban fabric, a far different question than simply creating mixing in schools.

In 1954 the ruling by the United States Supreme Court in Brown versus Board of Education that separate schools for blacks and whites (de jure segregation) was unconstitutional ushered in five decades of federal intervention in United States school districts (Armor 1995). While the initial rulings dealt largely with how to provide equal access for both white and minority students, the philosophy slowly shifted from one in which there was an affirmative duty to change from a segregated school system to one in which the vestiges of past racial discrimination have been eliminated (a so called unitary system). To achieve these ends in 1971 the Supreme Court ordered assignment of pupils (using school busing) to achieve racial balance. As the philosophy shifted from eliminating separate schools, to one in which there was a conscious decision to balance schools according to racial and ethnic formula, the issue of school integration became contentious at the local and national levels.

As we also know at the same time that federal courts began their intervention in local school districts, significant demographic changes were underway within the United States. At the time of the Brown decision, the US was still essentially a black and white society. There were few members of other minorities, although there were significant numbers of Hispanics in Border States and small numbers of Asians in some of the large West Coast cities. The changes in the ethnic composition of the US population which began in the 1970s accelerated in the 1990s and the first decade of the 21st century. The 203 million people in the US in 1970 were nearly 89 % white and 10 percent black. By 2000 the 281 million persons in the United States could be classified as about 68 % white, 14 % Hispanic, 12 % African American (Black) and 4 % Asian. During the three decades at the end of the 20th Century there were equivalent changes in the spatial patterns of the white and ethnic populations. When the Brown decision was handed down in 1954 the white population was distributed roughly in thirds across the central city, the metropolitan suburbs and areas outside the metropolitan area proper, and the black population lived in the central city or in rural areas. By 2000 more than 54 % of whites were in suburban areas and only 22 % lived in central cities. In the central cities of large metropolitan areas whites have been replaced by the inflow of Hispanics and a multiplicity of other ethnicities from Asian, African and Middle Eastern nations. The demographic change altered the school district playing field. Within urban areas and across big city school districts the US has become a multiethnic society in which Hispanics and Asians and African Americans are significant proportions of the total population but often a larger proportion in central city school districts.

It is not difficult to understand how this changing distribution would affect the ability of school districts to balance schools within their systems. Declining numbers of whites both in proportional and absolute terms means fewer white pupils to attend the public schools (Clark 2002). Recall too, that the differential birth rate for blacks and Hispanics further complicates the feasibility of balancing the races and ethnicities in schools. These racial/ethnic composition changes, and changes in the spatial distributions have made it increasingly difficult to bring about Court mandated racial balancing and eventually led to the recognition that school districts could not be held accountable for demographic changes created by immigration, and local mobility. Court rulings beginning with Freeman v Pitts (1992) reflected both the notion that School Districts cannot control demographic change and the changing philosophy about race as a basis for court intervention. In 1992 the US Supreme Court ruled that the school district was not responsible for racial imbalance that occurred from demographic change (Freeman v Pitts 1992). The decisions that followed Pitts emphasized that while school districts must be mindful of the effects of discriminatory practice that at the same time they could return to neighborhood schools. In 2007 the court ruled in essence that race could not be used in student assignment.

Now that most school districts are no longer under court jurisdiction and many have returned to neighborhood schools or have an open enrolment policy what is the intersection of race, ethnicity and neighborhoods and schools? Are the predictions of separate and unequal (and by implication poor school outcomes) truly an issue? The analysis in this paper asks three questions: (1) what is the relationship of

schools and neighborhoods, (2) how are school educational outcomes related to levels of segregation controlling for the socio economic status of the school districts, and (3) how do households negotiate choices within the school context? We use data from the school districts in Los Angeles County and survey data from the Los Angeles family and neighborhood survey (2001) (LAFANS) to test the levels of separation and the associated outcomes in educational achievement.

Previous Research on Neighborhoods Segregation and Schools

The research literature which has reviewed the school desegregation process and its outcomes is voluminous and contentious. That literature has been reviewed from opposing viewpoints by Orfield and Montfort (1992) and Armor (1995). After Coleman et al. (1966) questioned the gains from school desegregation a substantial literature grew up around the possible gains and costs from school desegregation. The research examined a wide range of issues including white loss (white flight), black gains in school achievement, changing race relations and attitudes, and long term gains in college entry from participating in desegregated schools (Clark 1987, 1988; Clotfelter 1999, 2001; Fairlie and Resch 2002; Rossell 1990, 1995). One view is that white racism and prejudice led to white flight and white abandonment of the public school systems (Orfield 1978; Yinger 1995). But clearly, demographic changes affected schools and the potential for integration and an alternative plausible explanation for the changes in neighborhood and school composition invokes residential choices and residential sorting (Rossell et al. 2002). We know from studies of preferences and residential sorting that restructuring of urban areas has proceeded in parallel with compositional changes, and demographic changes have reworked the urban mosaic and it occurred just as schools were being mandatorily integrated (Clark 2002). Given the very large expansion of the housing stock in the 1970s in the areas outside of the central city and the increase in homeownership it is not surprising to find rapid growth in what were smaller cities outside the urban core and a resulting redistribution of the urban population as people migrated from inner city areas.

The existing residential mosaic is now the most important determinant of school composition. As school districts have returned to neighborhood schools studies find that the levels of segregation after decreasing during the period of mandatory student assignment have begun to increase again (Frankenburg et al. 2003). A number of studies in the US and Europe find relatively close associations between school and neighborhood ethnic compositions but far from an exact replication of the neighborhoods in the schools (Johnston et al. 2004; Ledwith 2009; Clark and Ledwith 2007; Saporito 2003, Saporito and Sohoni 2006). The explanations for the differences between neighborhood and school composition focus on two forces—private school enrolment and in the United States charter and magnet school programs which allow students to select schools other than those in their neighborhoods (Saporito and Sohoni 2006). The latter authors conclude that public schools would be less racially segregated if all children living in a school district attended a local neighborhood school. Ledwith and Clark (2008) also show that

there is a decrease in white enrollment as minority attendance increases and that private school opportunities decrease white enrolment. This finding is consistent with the arguments about sorting by income and peer group which leads to white avoidance of public schools (Nechyba 2003). But we do not have any feeling for how much this process matters in school outcomes or how it is being affected by current mobility patterns.

The issue of economic and social class sorting and school composition has also been of concern in United Kingdom studies of school outcomes (Oberti 2007). The concern is part of a more general focus in the UK on issues of polarization and rising inequality across the residential mosaic. These issues were highlighted when UK educational policy was redesigned to create greater autonomy for local schools. To enable greater choice by households and greater autonomy in the delivery of education at the local level the UK school system funding was shifted to a per pupil basis and gave more control to schools and less to the local government authority (Sibieta et al. 2008). It also created a more competitive market in which schools can compete for pupils. This policy decision generated a debate between those who worry that competitive markets will advantage middle class families and disadvantage poor families and eventually lead to increased segregation, and others who argue that choices determined by location alone are equally likely to generate inequality and differential outcomes (Harris et al. 2007). Whether or not school choice will lead to greater separation, is an ongoing debate, but one on which we can also provide some insight within the context of open enrollment in the Los Angeles context.

One of the dimensions of the school neighborhood relationship is how greater or lesser diversity in the school mix is in turn related to minority student achievement and how it is related to barriers to increasing positive school outcomes. A pair of papers, (Hamnett et al. 2007; Webber and Butler 2007) examine the relative role of social background and ethnicity in school performance. That research suggests that while ethnicity is important, social background is much more important. Webber and Butler (2007) demonstrate that the composition of fellow pupils is important in the educational outcomes in schools. The social peer group effect on the school children themselves, and the homes that they come from, appear to be important variables in generating school outcomes. Hamnett et al. (2007) conclude that the social composition can have positive or negative cumulative effects over and above the characteristics of individual pupils. This is relevant if the outcomes of social sorting are to concentrate particular groups in particular school districts.

Studies in Sweden find similar results to the work in the UK. Where children go to good schools they do much better than those who go to poor schools, even when individual and family background factors are controlled for (Andersson et al. 2010). In Sweden, the changes across areas seem to be linked to increasing immigration and the increase in visible minorities. The differences across schools are significantly greater in regions where there are high proportions of visible minorities and in contrast there are smaller differences in outcomes across schools (lower variance) in the regions with smaller shares of minority students. Again the nature of sorting can be seen to play an important role in the school outcomes.

The evidence suggests that the socio economic status of the school matters and new decisions in the US legal context have re-emphasized these possible impacts. Now the US Supreme Court has ruled that race is no longer to be a deciding test in school attendance, and that schools and school districts can return to a neighborhood based pupil assignment policy. In fact many school systems had already returned to a neighborhood school policy or an open enrolment policy before this ruling. But, in a concurring opinion Justice Kennedy raised the issue of the role of diversity in education and society. For Justice Kennedy, schools should reflect the cultural diversity of the society at large "The nation has a moral and ethical obligation to fulfill its historic commitment to creating an integr'ated society that ensures equal opportunity for all its children … a compelling interest exists in avoiding racial isolation" (Parents v Seattle School District No. 1 2007).

The ruling has led to debate about diversity in society and schools. As summarized by one advocate "Where we can have diversity in public schools, where it's possible to integrate those public schools, that's something that should be done. To walk away from that is a tragic mistake, because… we live in a global economy in the twenty-first century. To be walking backwards toward segregation in public schools in the twenty-first century is madness. It undermines our credibility in the world, and, in fact, it undermines the capacity of students of color, particularly poor students of color, to access quality education" (Shaw 2007). At the same time there is a strongly held view that the pursuit of racial diversity is a distraction from providing equal educational opportunities to minority students and by equating diversity with educational opportunity the pursuit of racial diversity may be a distraction from providing equal education (Black 2008; Nelson 2009).

The question is then, does diversity matter in school achievement? Is there a relationship between levels of integration, or mixing and school outcomes? The question that follows then, is, whether in fact the school systems are becoming more segregated and in particular whether the shift to neighborhood schools has undone the past gains in integrated schooling? That question is an important part of the empirical analysis of the paper, in fact the hypotheses that must be tested are (a) does ethnic/racial mixing predict school outcomes, and whether neighborhood schools have decreased educational outcomes and (b) how do residential choices impact school outcomes? We turn now to our empirical analyses of school and neighborhood relationships.

Testing Hypotheses About School Neighborhood Links

In the introduction to this paper we laid out three questions. One, what is the relationship between schools and neighborhood composition and does enrollment vary with neighborhood composition? In essence this question asks whether we are 'sleep walking "backwards" to segregation'. Second, how are pupil outcomes affected by school and neighborhood segregation, controlling for school district characteristics? Is separation related to scores on mathematics and reading tests? Third, what are effects of school outcomes from residential mobility? We take up

the first of these questions in the next section, and the issues of school outcomes and residential mobility in succeeding sections.

School and Neighborhood Relationships

To investigate the relationship between school and neighborhood mixing/segregation we compute dissimilarity indices (as measures of levels of segregation, or mixing, across all racial and ethnic groups, and over the 61 elementary school districts in Los Angeles County (Fig. 1).[1] Most districts have a full range of schools, elementary middle and high schools but in a few cases elementary schools are combined into larger high school units. We have chosen to focus on the patterns of the elementary schools as they most closely reflect local patterns of school attendance. We have school data on enrollment for all school districts in Los Angeles County for 2000–2001 from which we have developed school-level dissimilarity measures.[2] We divide the Los Angeles Unified School district (LAUSD) into eight 'local district' sub-regions, using boundary definitions provided by the district. We do this to overcome the disproportionate size of LAUSD as it enrolls about 40 % of all students in Los Angeles County. To some extent these regions within LAUSD function as regions within the city. We use 2000 census data on race and ethnicity as it is closely comparable with the Los Angeles and Family survey data which we use to track students in the analysis. We cross matched census tracts to school districts in Los Angeles County to develop neighborhood-level dissimilarity measures.

We compute measures of association between the dissimilarity scores for the total population in neighborhoods and for the school age population (5–14 years of age) in neighborhoods. As expected there is a relatively close relationship between the levels of neighborhood segregation/mixing and levels of school segregation/mixing. The correlations between the dissimilarity indices for schools and dissimilarity indices for neighborhoods for the total population range from 0.87 to 0.69. For the school age population 5–14, they range from 0.65 to 0.80 (Table 1a). The indices suggest substantial reflection of the neighborhood in the schools. The relationships are stronger for African American (Black) and Hispanic populations which reflect the relatively high levels of intermixing between Black and Hispanic populations in much of the central administrative regions of the Los Angeles unified school district. There is greater separation for the total Hispanic and White population than there is for the school age population. We can interpret this as an outcome of the increasing movement of African American families out of inner city neighborhoods and to residential locations in much of the urban mosaic of Los Angeles. The old patterns of segregation are changing as status improves and African American households move from inner city locations.

The plots of the scatters and the fitted regression lines portray the relatively good fit of schools to neighborhoods (Table 1b; Fig. 2). Clearly, schools and

[1] Los Angeles is representative of a growing range of metropolitan districts which have diverse populations of Hispanics, Blacks, Whites and Asians as well as Native American and Pacific Island groups.

[2] We use dissimilarity indices because of their broad familiarity and their previous use in similar research (Saporito and Sohoni 2006). Sample sizes preclude the analysis of other comparisons between groups.

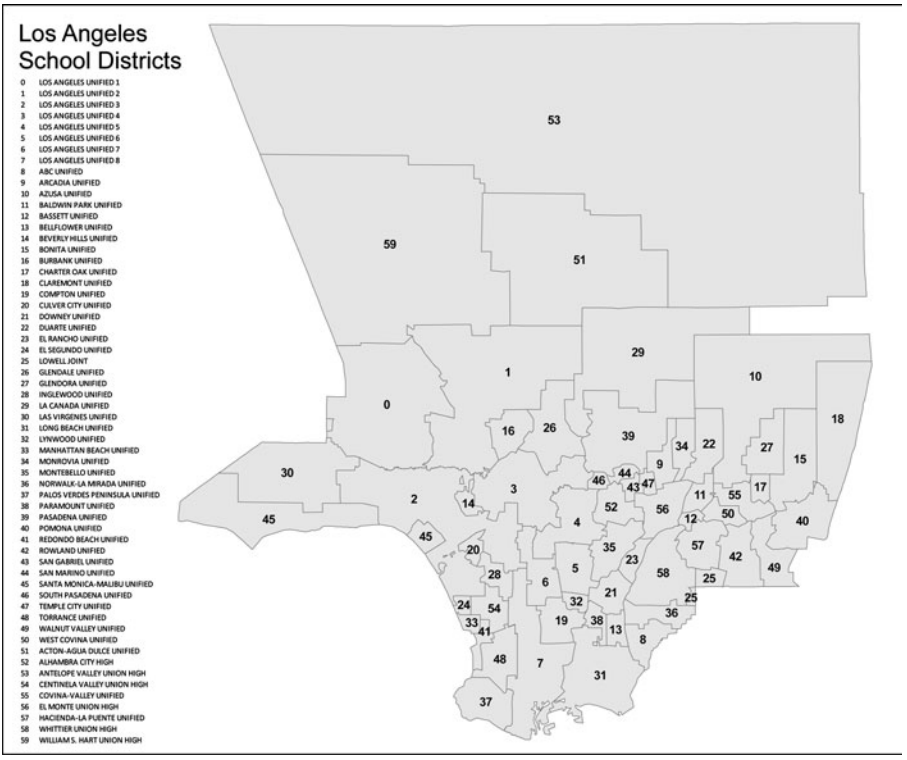

Fig. 1 Elementary and sub regional Los Angeles unified school districts in Los Angeles County

Table 1 Correlations and regressions of dissimilarity and total population and 5–14 age population across school districts

a: Correlation coefficients

	Total population	Population (5–14)
Black/white	0.79	0.65
Hispanic/white	0.87	0.75
Asian/white	0.69	0.77
Black/Hispanic	0.81	0.80

b: Regression coefficients and *t* values

	Total population			Population 5–14 years		
	Coefficient	*t*	r^2	Coefficient	*t*	r^2
Black/white	0.776	9.85	0.62	0.645	6.53	0.42
Hispanic/white	1.058	13.85	0.76	0.865	8.69	0.56
Asian/white	0.974	7.45	0.48	0.913	9.29	0.59
Black/Hispanic	0.761	10.64	0.66	0.849	10.18	0.64

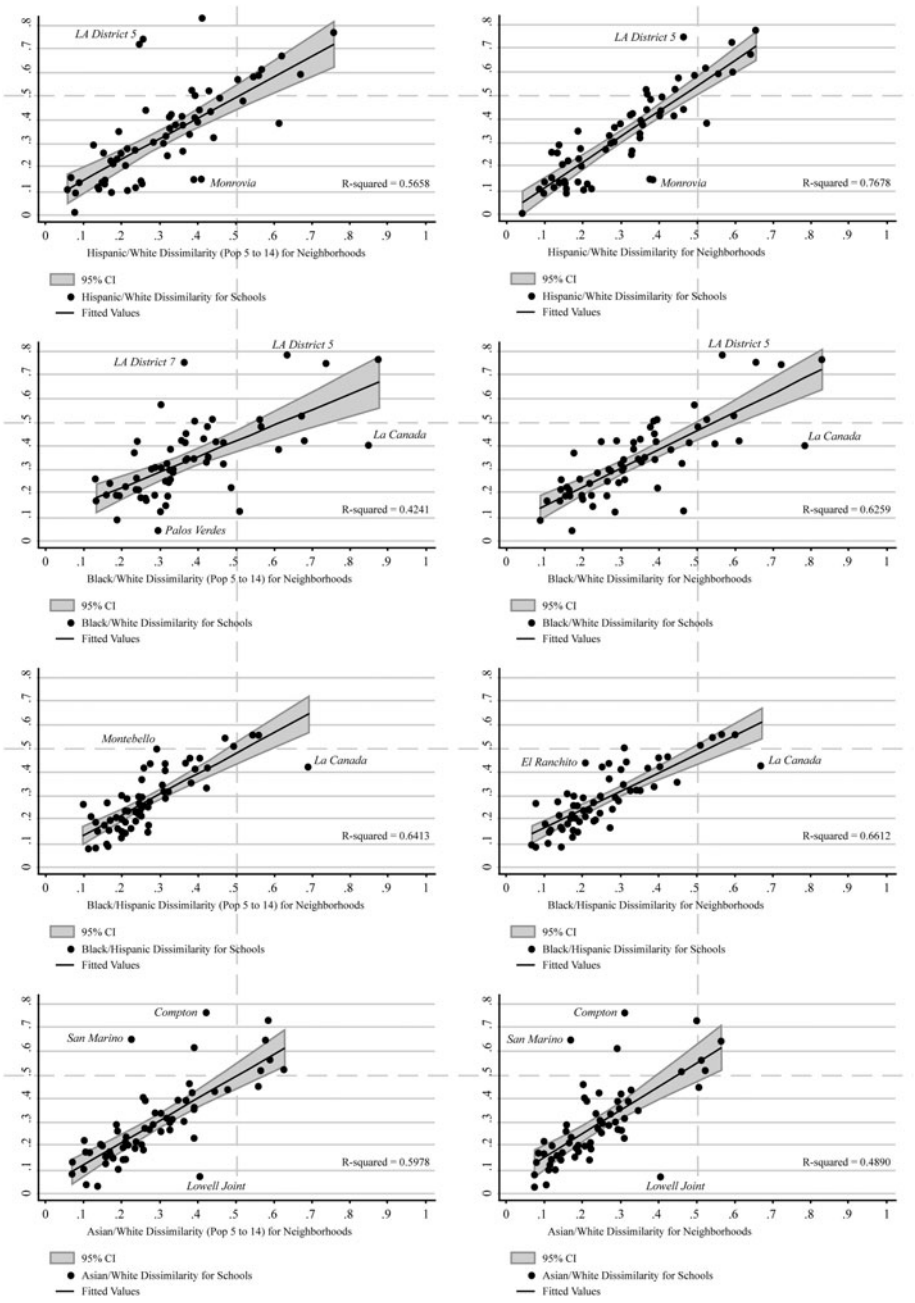

Fig. 2 Relationships between school segregation (*vertical axis*) and neighborhood segregation for school districts in Los Angeles County

neighborhoods reflect each other as would be the expectation from an overall return to neighborhood schools and open enrollment policies. At the same time, the finding that more than two thirds of schools districts have both low school dissimilarity indices and low neighborhood dissimilarity indices suggests that there is both considerable diversity across these areas and that the diversity is being reflected in the schools. From this evidence alone we would view with caution the notion that we are sleep walking to segregation. The fact that the relationship is stronger for the total population and lower for the 5–14 population emphasizes the power of the underlying demography. To explain the difference we have only to note that there are many fewer white students in the 5–14 age group, a function of lower fertility in the aging white population in general, and the higher fertility and larger families of the Hispanic population, especially the younger immigrant Hispanic population. Again we see the power of demography in the outcomes in both schools and neighborhoods.

At the same time there are districts with considerable segregation both in schools and neighborhoods and a small number of districts where the schools are more mixed than the neighborhoods and the opposite. The table identifies all cases with extreme values and scores greater than 0.5 in specific instances (Table 2). The addition of separation lines for above and below 0.5 on the dissimilarity scales reveals that it is mostly the sub-districts within the core of the metropolitan area which have high levels of separation. Only 7 districts have indices above 0.5 on the school segregation/mixing measure for Black/white segregation and 4 of these

Table 2 Dissimilarity indices for schools and neighborhoods for school districts with dissimilarity values of greater than 0.5 for either school districts or neighborhoods

School district	School district dissimilarity				Neighborhood dissimilarity			
	B/W	H/W	A/W	B/H	B/W	H/W	A/W	B/H
Centinela	**0.51**	0.49	0.30	0.41	**0.53**	0.41	0.25	0.37
Compton	0.41	0.44	**0.75**	0.31	0.48	0.47	0.31	0.36
Culver city	0.32	0.27	0.17	**0.54**	0.46	0.33	0.10	**0.56**
El Monte	0.34	**0.52**	0.39	0.43	0.35	0.45	0.32	0.27
Long Beach	**0.52**	**0.59**	**0.51**	0.29	**0.60**	**0.60**	**0.53**	0.20
Los Angeles								
1	0.33	**0.61**	0.26	0.37	0.36	**0.52**	0.31	0.28
2	0.41	**0.59**	0.35	0.45	0.40	**0.56**	0.35	0.40
3	**0.75**	**0.77**	**0.51**	0.45	**0.83**	**0.66**	0.47	0.43
4	0.47	**0.67**	**0.63**	0.35	**0.51**	**0.64**	**0.57**	0.45
5	**0.77**	**0.74**	**0.72**	**0.55**	**0.57**	0.47	**0.50**	**0.60**
6	0.32	0.35	**0.60**	0.29	0.30	0.19	0.30	0.29
7	**0.74**	**0.72**	0.42	0.29	**0.66**	**0.59**	0.25	0.25
8	**0.73**	**0.58**	0.44	**0.55**	**0.72**	**0.50**	**0.51**	**0.57**
Pomona	0.42	**0.57**	0.28	0.40	0.29	0.45	0.27	0.30
San Marino	**0.57**	0.15	**0.64**	0.42	0.49	0.38	0.17	0.25

Values >0.50 are in *bold*

districts have relatively high neighborhood segregation as well. Almost all the high measures of segregation and low mixing are in the core areas, those represented by the divisions of the Los Angeles Unified School District (Table 2). Even in these cases of high levels of separation there is considerable parallelism between the neighborhoods and schools. There are exceptions, for example where there is large school separation for Asian and whites in Compton but where there is relatively low neighborhood separation. In fact few Asian children attend school in Compton. The results for San Marino are influenced by the fact that the indices of separation are based on only 2 schools and thus are marginally relevant for assessing mixing. At the same time it is true that in general Black/white and Hispanic/white separation is greater than for Asian/White and Black/Hispanic. But even this finding is not universal which suggests considerable complexity in the patterns of mixing in the growing number of multiethnic metropolitan areas. To reiterate it is sub-districts 3, 5, 7 and 8, with concentrated Hispanic and Black populations that have the highest levels of separation and thus the least mixing.

The results of this descriptive analysis of the relationship between school and neighborhood segregation is a classic example of whether we view the glass half full or half empty. The very large number of districts with relatively low levels of segregation, on both neighborhood and school levels, provides a strong case to argue that far from sleepwalking to segregation, in fact, multiethnic districts in the suburban schools of Los Angeles County show that, by and large, children are going to their neighborhood schools and to schools that are, relatively speaking, providing evidence of integrated learning environments. Alternatively, from a more negative perspective, segments of the Los Angeles Unified School District, especially those in the inner city regions provide evidence of high levels of both school and neighborhood segregation. Clearly these environments are very different from those of the school districts outside of the urban core both within Los Angeles City and the surrounding County.

Do Neighborhood Schools Affect Pupil Outcomes?

The view that—"segregation in public schools…undermines the capacity of students of color, particularly poor students of color, to access quality education" (Shaw 2007) is widely accepted but what is the evidence that segregation per se leads to lower achievement levels. We construct two tests of this hypothesis in which sixth grade math and reading scores are regressed against two standard socioeconomic measures (income and proportion of students receiving free lunch) and known functional aspects of teaching, namely pupil-teacher ratios and we use multi-level modeling for further explore the relationship between segregation and school outcomes. In effect we are asking, after controlling for factors which affect student outcomes are there additional effects of segregation. The counter of course is that higher scores would be associated with lower levels of separation and greater mixing.

Across all Los Angeles County school districts, math and reading scores increase with increasing median household incomes, decline with the percentage of students receiving free lunch and increase with increasing pupil teacher ratios (Table 3).

Table 3 Models of math and achievement scores controlling for segregation—all LA districts

	Math achievement scores		Reading achievement scores	
	Marginal coefficients	*t* values	Marginal coefficients	*t* values
Household income	0.8832	4.06**	0.8469	4.48**
% Free lunch	−0.5263	−3.78**	−0.3818	−3.16**
Pupil teacher ratio	7.0318	5.47**	5.9219	5.30**
Adj. R^2	0.75		0.74	
B/W segregation	32.7651	0.66	49.8030	1.14
H/W segregation	40.5751	0.83	38.5410	0.89
A/W segregation	80.0348	2.07*	42.7380	1.25
B/H segregation	180.4802	4.20**	105.1406	2.76*
Adj. R^2	0.07		0.05	
Expanded model				
Household income	0.6668	2.95**	0.6821	3.60**
% Free lunch	−0.4500	−3.24**	−0.2785	−2.39*
Pupil teacher ratio	5.2738	4.15**	4.2995	4.03**
B/W segregation	−16.2330	−0.74	−2.9380	−0.16
H/W segregation	−42.9409	−2.45*	−46.2712	−3.15*
A/W segregation	−4.3065	−0.28	−6.4778	−0.50
B/H segregation	14.0135	0.69	5.8289	0.34
R^2	0.79		0.80	

* $p < 0.05$, ** $p < 0.001$

However, the correlation between the pupil teacher ratio and reading and math scores is spurious. There are two distinct clusters of pupil teacher ratios—a cluster with relatively low scores and high teacher ratios in the Los Angeles central districts and a suburban cluster with higher pupil teacher ratio and higher scores.[3] The pupil teacher ratio is not significant in either cluster. The main question to be answered in this analysis however is the relationship between reading and mathematics scores and levels of segregation/mixing. Is there a relationship between segregation and achievement levels after controlling for income and poverty as measured by free lunch? In general the answer is no, there is no pattern of segregation and lower scores except in the instance of Hispanic/White segregation. As separation between white and Hispanic pupils increases both math and reading scores show declines. That said the effect is small to negligible. Income and free lunch explain about 75 % of the variance in the scores and the additional measures of segregation add only 4 % to the level of variation. The table also provides coefficients for the relationship of segregation measures and reading and math scores without controls. Across all schools in the metropolitan area there are only weak relationships.

Multi-level modeling provides further insights into the relationship of mixing and reading and math scores (see Tabachnick and Fidell 2007 for a discussion of multi-level modeling). The procedure provides greater clarity on the differences in

[3] The scatter plot is available from the authors.

achievement scores across schools versus districts. From the null model, which considers district effects on school level achievement scores without explanatory variables, we determined that the overall mean achievement scores across all districts are 643.12 and 653.31 respectively for reading and math (Table 4). The between-districts variance in reading achievement was estimated at 669.79 (1029.87 for math) for the null model. Conversely, the within-district between-schools variance is estimated at 269.84 (267.20 for math). The variance partition coefficient or VPC calculated on this model indicates that an estimated 71 % of the variance in reading scores (79 % for math) can be attributed to differences between-districts. This provides strong evidence that variance across the school-level is much smaller than at the district level and gives support to our previous models run at the aggregate district level. Likelihood ratio tests comparing the null multilevel model with an equivalent single-level null model for both reading and math provide strong evidence for the noted effects of district on achievement. Plotting simple math (Fig. 3a) and reading (Fig. 3b) scores as a function of district, reveals considerable variability both within but especially between districts.

The addition of school level explanatory variables individually into random intercepts models of both reading and math scores resulted in reductions in between-district and within-district variance across nearly all variables, suggesting that the distributions of schools as a function of each variable differ from district to district. The only exception to this pattern is that of Black-Hispanic (BH) dissimilarity (Table 4). BH dissimilarity, when included in the single variable model, resulted in an increase in between-district variance of 63 for reading and 104 for math scores. A full random intercepts model with all eleven explanatory variables resulted in within-districts variance reductions of 184.82 and 169.05 for reading and math scores respectively (Table 4 Model 3). This reduction is expected as the variables are all school-level measures. However, this full model also resulted in a 414.03 and 543.22 unit reduction in between-district variance in reading and math achievement, respectively, again suggesting significant differences in population distributions between districts.

Likelihood ratio(LR) test comparisons of fixed versus random effect models for each of the eleven variables provide evidence that most variable effects on scores do not differ across districts. For example, the relationship of increasing percent free lunch with increasing math and reading scores remains constant across districts. With this line of thinking and using our original simple linear regressions (Table 3) we would expect an inverse relationship between BW and HW dissimilarity. However, BW dissimilarity [5 % LR, 2 df = 24.50 (Reading), 17.62 (Math)] and HW dissimilarity [5 % LR, 2 df = 17.29 (Reading), 12.56 (Math)] random effects models provide evidence that these measures vary in their effect on math and reading scores across districts. In order to determine the nature of these differing effects on achievement between districts, we extended the models to include both random intercepts and slopes for these two variables (Table 4).

The covariance estimates of these two models (Table 4, Model 4) provide insight into the variability of these relationships from district to district. The random slopes model for reading scores shows a negative covariance between BW dissimilarity and the intercept constant, providing evidence that districts with high average

Table 4 Multi-level coefficients for reading and math achievement scores

	Reading achievement scores				Math achievement scores			
	Model 1: null model	Model 2: single variable random intercepts (constant)	Model 3: multiple variable random intercepts	Model 4: multiple variable random slopes	Model 1: null model	Model 2: single variable random intercepts (constant)	Model 3: multiple variable random intercepts	Model 4: multiple variable random slopes
β_i								
Percent black		−0.14**	−0.49***	−0.50***		−0.24***	−0.50***	−0.50***
		(644.66)				(655.82)		
Percent Asian		0.84***	−0.19*	−0.20**		0.99***	0.11	0.09
		(635.78)				(644.74)		
Percent hispanic		−0.53***	−0.53***	−0.52***		−0.47***	−0.42***	−0.42***
		(671.45)				(678.47)		
Percent white		0.74***	−0.28**	−0.28**		0.66***	−0.25**	−0.25*
		(625.22)				(637.33)		
Pupil-teacher ratio		2.66***	0.58**	0.36		2.81***	0.71**	0.46
		(588.73)				(595.67)		
Percent free lunch		−0.62***	−0.32***	−0.34***		−0.57***	−0.27***	−0.29***
		(680.21)				(687.29)		
Average HH Inc		0.67***	0.12**	0.11**		0.60***	0.11**	0.11**
		(608.25)				(622.47)		
BW dissimilarity		0.72***	0.16	−0.25		0.61***	0.17	−0.05
		(638.63)				(649.16)		
BH dissimilarity		0.72***	0.15	0.19		−0.65**	0.04	0.18
		(638.63)				(655.15)		

Table 4 continued

	Reading achievement scores				Math achievement scores			
	Model 1: null model	Model 2: single variable random intercepts (constant)	Model 3: multiple variable random intercepts	Model 4: multiple variable random slopes	Model 1: null model	Model 2: single variable random intercepts (constant)	Model 3: multiple variable random intercepts	Model 4: multiple variable random slopes
HW dissimilarity		0.62***	0.15	0.02		0.53***	−0.001	−0.17
		(639.43)				(649.83)		
AW dissimilarity		1.01***	0.13	0.19		1.06***	0.03	0.09
		(638.52)				(648.02)		
Constant	643.12	n/a	685.10***	691.04***	653.31***	n/a	680.92***	688.04***
σ_i								
Variance in BW dissimilarity				1.60				0.60
Variance in HW dissimilarity				0.68				0.26
Variance in constant				294.55				526.51
Covariance in BW/HW dissimilarity				−1.03				−0.35
Covariance in BW dissimilarity/Constant				−8.51				−0.004
Covariance in HW dissimilarity/Constant				3.49				−5.34

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

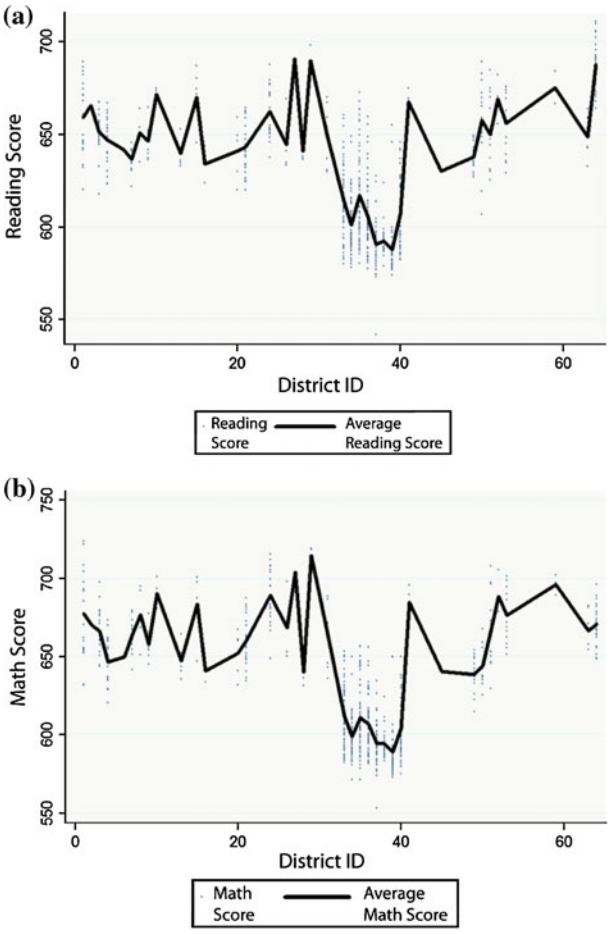

Fig. 3 Plots of reading and math scores across districts. Each *dot* represents a school. The "districts" within LAUSD have the lowest means and the greatest range

reading achievement scores (in general high SES) have very flat slopes. Therefore, there is no meaningful relationship between BW dissimilarity and achievement in these districts. However, districts with low achievement scores have very steep slopes, providing evidence that BW dissimilarity has a strong effect on reading scores in low achieving areas (although there are very few white students in these districts). This relationship holds true for math scores as well, although the BW dissimilarity covariance estimate is rather weak. The opposite can be stated regarding the relationship between HW dissimilarity and reading achievement. Districts with high average scores have steeper slopes and a stronger relationship between increasing HW dissimilarity and increasing reading achievement. In contrast, in districts with low average reading scores the relationship flattens. In essence, HW dissimilarity in low scoring districts has no notable relationship to reading achievement. These variable relationships provide credence to our

hypothesis that although segregation can be detrimental it is not necessarily so. BW dissimilarity has a negative effect in low achieving areas, whereas HW dissimilarity has a positive effect in high achieving areas. These results suggest greater caution in general statements about the effect of segregation in the school system. They are consistent with other studies of school achievement which stress the role of social background and of teaching and teachers (Lee and Burkam 2002; Hamnett et al. 2007; Ledwith 2009).

How Does Residential Mobility Change Educational Outcomes?

Residential mobility is often motivated by school choice decisions and desires for greater access to 'better' school systems. At the same time it is motivated by a complex set of reasons related to age, income and family status so that school choices is often a by-product of the move rather than the main motivating force. Still, it is unknown whether these moves result in actual measureable changes in school achievement for the individual students. Studies to date have suggested that there are detrimental effects for frequent movers though that is not our focus in this paper (Reynolds et al. 2009).

For this analysis we construct two tests of the assumption of "move to improve" by examining the outcomes for children when they change school districts. Specifically, we address the question of whether achievement scores are higher in the districts to which households choose to move. We also use mobility records from the Los Angeles family and neighborhood survey wave 1 (LAFANS) to track the movement of approximately 900 individuals from 1999 to 2001 and correlate this with district-level achievement scores for the origin and destination districts of this sample. We also examine the scores of individuals who move to and from the inner core schools, those which have higher levels of segregation and greater percentages with free lunch.

As we expect moving from inner city to suburban districts brings gains. Reading and math scores are higher in suburban districts and students who move to these districts are moving to schools with on average higher scores. In contrast the movers from suburban districts who go to inner core districts are going to districts with lower average scores. Two sample tests of means for moves to urban districts from suburban districts over the time period show drops in district-level achievement scores from 62 to 72 points on average. In contrast for moves to suburban districts two-sample tests of means show that math scores are on average 65 points higher in the suburban districts to which individuals move (Table 5). There are similar outcomes for reading scores. Clearly, moving out to suburban districts brings better schools as measured by average scores (and lower levels of segregation) and moving into inner core areas brings lower performing schools (and higher segregation). We can view these moves as the outcomes of structural differences. The gains and losses (in school quality) are ancillary to the moves and not primary as we would not expect households to rationally choose poorer performing schools. If a household makes these moves, either into or out of inner city schools there are associated structural outcomes.

Table 5 Two-sample test of mean scores for origin–destination school districts in Los Angeles County, from 1999 to 2000

Measure	Moved to suburban district (out of LAUSD)			Moved to urban District (into LAUSD)		
	N	Origin	Destination	*N*	Origin	Destination
Math scores	87	600.4506	665.6586*	53	671.7642*	599.3207
Reading scores	87	653.9186	657.2494*	53	663.6189*	600.8623
Black/white dissimilarity	87	0.5983*	0.3738	53	0.3325	0.6580*
Hispanic/WHITE DISSIMILARity	87	0.6347*	0.4105	53	0.3401	0.7002*
Black/hispanic dissimilarity	87	0.4412*	0.2898	53	0.2784	0.4216*

Source: Data from Los Angeles and family neighborhood survey

* $p < .05$

We can now ask what are the outcomes, for individual students who make changes between districts? Is it better performing students who make the outward move and poorer performing students who move into inner city schools? Specifically we ask whether students from LAFANS with higher Woodcock-Johnson scores move to suburban districts and lower scoring students move into inner core school regions. Regardless of where students move, be it to suburban districts or urban districts, students who move display statistically higher individual Woodcock–Johnson scores (on passage reading comprehension testing) than those students who did not move (Table 6a). However, individual scores for movers either to the suburb or in opposite directions to the urban area from the suburb remain similar. At the aggregate level of moves from the Los Angeles Unified School District and to the district there is no difference in the performance level of the students. However, because we know that there is considerable diversity within the Los Angeles school district we examine the smaller sub-sample of moves from the inner city sections of Los Angeles Unified (regions 3, 6 and 7, Fig. 1).

Table 6 Individual Woodcock–Johnson Comprehension scores for movers and non-movers, and by locality and income

Group	*N*	Mean	95 % Confidence	
(a)				
Non-movers	1,433	83.696	82.752	84.641
Movers	401	88.596***	86.803	90.389
Moved to suburb	39	89.949	85.648	94.249
Moved to urban	21	89.095	82.255	95.935

Group	*N*	Mean	Mean income
(b)			
To downtown/central from suburbs	13	80.92	$24,235
To suburbs from downtown/central	37	88.97	$43,508

Source: Data from Los Angeles and family neighborhood survey

The differences in scores and household incomes tell an important story of sorting and selectivity. Students who move into the inner city districts score 8 points lower on the comprehension test than students who move from these districts to suburban districts (Table 6b). Even more telling is the selectivity effects on income where households moving to the suburban districts have nearly twice the income of households moving into the inner city districts. We know that some of this movement is generated by family change but whatever the underlying reason the differences generated by selective mobility have a direct impact on the outcomes in the schools they choose. This sorting is behind much of the difference across districts and is not a function of levels of segregation per se but rather is an outcome of specific household behaviors. We can see lower levels of achievement as a function of the geographic concentration of poverty and the specific disparate levels of school funding which are often coincident with higher levels of racial segregation.

Conclusions and Observations

The effect of school segregation on educational outcomes continues to be central in the national debate about providing the best education for America's children. There is a strongly held belief that segregated schools do not deliver an equal education (Frankenburg et al. 2003) and now that issue has been complicated by the argument that diversity should be a condition of achieving educational opportunity (Shaw 2007). There are indeed arguments for avoiding racial isolation and providing equal education but the evidence that segregated schools are a primary cause of poor school outcomes is not supported by the analysis in this study. The research from this investigation supports what others have suggested, that pursuing diversity or mixing per se may be a distraction from providing equal education opportunities (Black 2008; Nelson 2009). Certainly there is little support for the notion that segregation creates the negative outcomes that we see in large school districts.

In this study as in the Saporito and Sohoni (2006) study we demonstrated that school composition reflects the neighborhood composition but what is important in this presentation is the finding that for most school districts both neighborhoods and schools have relatively low levels of segregation. It is correct that in the inner city districts of the region there are segregated schools and segregated neighborhoods but the proportion of such schools across the County is low and there is little evidence that we are "sleep walking to segregation" (Shaw 2007). In fact in the dynamic neighborhoods of metropolitan Los Angeles there is evidence for the opposite outcome. Even in the inner city neighborhoods there are schools which are more mixed than the neighborhood and neighborhoods that are more mixed than the schools, a reflection of the differential ethnic attendance in these districts.

The research in this paper demonstrated that math and reading scores are tied to socio-economic status—that scores increase with household income and decrease with increasing proportions of students receiving free lunch. The finding confirms and stresses other findings about the importance of social background for the way in which school outcomes are generated as Webber and Butler (2007) have shown in

the United Kingdom context. The paper demonstrated that for the most part the outcomes on reading and math scores were unrelated to levels of segregation. And, the very small explanatory contribution of Hispanic White segregation to lower scores suggests that the focus should be on other factors than separation per se. These findings remind us that disconnecting the link between SES and student outcomes will be difficult and at the heart requires attention to social contexts as well as school contexts.

The weak links between segregation and school outcomes is bolstered by the findings from the multi-level analysis which provides new findings that the variation in school outcomes is driven more by district outcomes than school outcomes. There is more variance across districts than schools within districts. This finding suggests that the attention for changing outcomes might better be directed to whole districts than to specific schools. Certainly the finding requires us to think about how we can improve district outcomes as a whole.

The above finding is bolstered by the research on the actual mobility of individual households in the metropolitan area. We know that for the most part people move for reasons other than school selection per se (Clark 2002), but when they do move there are outcomes in school achievement. Families and their children who moved to suburban and higher performing school districts made gains in the school they attended. Overall, individual children who moved to districts outside of the urban core reported higher scores on reading and math than did children who moved from suburban to inner city schools. Additionally, those children came from substantially poorer households than those who moved outward.

With the caveat that some of the results are based on small samples, this paper provides clear evidence that choice matters in school outcomes and that the lower scores in the most segregated schools and neighborhoods are much more about selection than they are about segregation. Future research that explores the way in which sorting occurs over time and the outcomes for families and children will be possible with the second wave of the Los Angeles Family and Neighborhood survey. Further research on just why some districts are more successful than others may provide a basis for overall improvements to the provision of education in urban settings. The more intractable problem is how to redress the negative outcomes of sorting into low income neighborhoods.

References

Andersson, Eva., Östh, John., & Malmberg, B. (2010). Ethnic segregation and performance inequality in the Swedish school system: A regional perspective. *Environment and Planning A, 42*, 2674–2686.

Armor, D. (1995). *Forced justice: School desegregation and the law*. New York: Oxford University Press.

Black, D. (2008). The uncertain future of school desegregation and the importance of goodwill, good sense and a misguided decision. *Catholic University Law Review, 57*, 947–990.

Brannstrom, L. (2008). Making their mark: The effects of neighborhood and upper secondary school on educational achievement. *European Sociological Review, 24*, 463–478.

Clark, W. A. V. (1987). School desegregation and white flight: A re-examination and case study. *Social Science Research, 16*, 211–228.

Clark, W. A. V. (1988). Does school desegregation policy stimulate residential integration: Evidence from a case study. *Urban Education, 23*, 51–67.
Clark, W. A. V. (2002) School desegregation and demographic change. In C. Rossell, D. Armor, & H. Walberg (Eds.), *School desegregation in the 21st Century* (pp. 119–145). New York: Greenwood Press.
Clark, W. A. V., & Ledwith, V. (2007). How much does income matter in neighborhood choice? *Population Research and Policy Review, 26*, 145–161.
Clotfelter, C. T. (1999). Public school segregation in metropolitan areas. *Land Economics, 75*, 487–504.
Clotfelter, C. T. (2001). Are whites still 'fleeing'? Racial patterns and enrollment shifts in urban public schools, 1987–1996. *Journal of Policy Analysis and Management, 20*, 199–221.
Coleman, J. S., Campbell, E., Mood, A., Hobson, C., McPartland, J., Weinfeld, F., & York, R. (1966). *Equality of educational opportunity*. Washington D.C.: Government Printing Office.
Fairlie, R. W., & Resch, A. M. (2002). Is there "White flight" into private schools? Evidence from the national educational longitudinal survey. *The Review of Economics and Statistics, 84*(1), 21–33.
Finney, N., & Simpson, L. (2009). *Sleepwalking into segregation: Challenging the myths about race and migration*. Bristol: Policy Press.
Frankenburg, E., Lee, C., & Orfield, G. (2003). *A multiracial society with segregated schools: Are we losing the dream?* Cambridge, MA: The Civil Rights Project, Harvard University.
Freeman v Pitts (1992). 118 l. Ed 2nd 108.
Hamnett, C., Ramsden, M., & Butler, T. (2007). Social background, ethnicity, school composition and educational attainment in East London. *Urban Studies, 44*, 1255–1280.
Harris, R., & Johnston, R. (2008). Primary schools, markets and choice: Studying polarization and the core catchment areas of schools. *Applied Spatial Analysis, 1*, 59–84.
Harris, R., Johnston, R. J., & Burgess, S. M. (2007). Neighborhoods, ethnicity and school choice: Developing a statistical framework for geodemographic analysis. *Population Research and Policy Review*, *26*, 553–579.
Johnston, R. J., Wilson, D., & Burgess, S. (2004). School segregation in multiethnic England. *Ethnicities, 4*(2), 237–265.
Ledwith, V. (2009). Open enrolment and student sorting in public schools: Evidence from Los Angeles County. *Environment and Planning A, 41*, 1109–1128.
Ledwith, V., & Clark, W. A. V. (2008). The effect of the residential mosaic and white flight on public school composition: Evidence from Los Angeles County. *Urban Geography, 28*, 1–20.
Lee, V., & Burkam, D. (2002). *Inequality at the starting gate: Social background differences in achievement as children begin school*. Washington: Economic Policy Institute.
Los Angeles family and neighborhood survey. (2001). Rand Corporation, Santa Monica, CA. Retrieved from http://www.lasurvey.rand.org.
Nechyba, T. (2003). School finance, spatial income segregation, and the nature of communities. *Journal of Urban Economics, 54*, 61–88.
Nelson, E. (2009). Examining the costs of diversity. *University of Miami Law Review*, *63*, 577–603.
Oberti, M. (2007). Social and school differentiation in urban space: Inequalities and local configurations. *Environment and Planning A, 39*, 208–227.
Orfield, G. (1978). *Must we bus?*. Washington, DC: Brookings Foundation.
Orfield, G., & Monfort, F. (1992). *The status of school desegregation: The next generation.* Alexandria, VA: National School Boards Assn.
Parents v Seattle School District No. 1. (2007). 551U.S. 701, 2007.
Reynolds, A., Chen C., & Herbers, J. (2009). School mobility and educational success: A research synthesis and evidence on prevention. Paper at the Workshop on the Impact of Mobility and Change on the lives of Young Children. National Research Council, June 2009, Washington, DC.
Rossell, C. (1990). The carrot of the stick for school desegregation policy. *Urban Affairs Quarterly, 25*, 474–499.
Rossell, C. (1995). Controlled choice desegregation plans: Not enough choice and too much control. *Urban Affairs Review, 31*, 43–76.
Rossell, C., Armor, D., & Walberg H. (2002). *School desegregation in the 21st century* (pp. 119–145). New York: Greenwood Press.
Saporito, S. (2003). Private choices, public consequences: Magnet school choice and segregation by race and poverty. *Social Problems, 50*(2), 181–203.
Saporito, S., & Sohoni, D. (2006). Coloring outside the lines: Racial segregation in public schools and their attendance boundaries. *Sociology of Education, 79*, 81–105.

Shaw, T. (2007). In landmark ruling supreme court strikes down voluntary desegregation in public schools, June 29, 2007 (www.democracynow.org).
Sibieta, L., Chowdry, H., & Muriel, A. (2008). Level playing field. The implications of school funding. London: CfBT Education Trust (www.cfbt.com).
Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Boston, MA: Allyn and Bacon.
Webber, R., & Butler, T. (2007). Classifying pupils by where they live: How well does this predict variations in their GCSE results. *Urban Studies, 44*, 1229–1253.
Yinger, J. (1995). *Closed doors, opportunities lost*. New York: Russell Sage Foundation.