Race and the Reproduction of Educational Disadvantage*

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Abstract

Research has uncovered many mechanisms that exacerbate racial inequalities in achievement. Due to specialization within the field, however, little focus has been devoted to the multitiered and often interconnected institutional nature of these processes. Matching data from the restricted-use National Educational Longitudinal Survey and the Common Core of Data, I hierarchically model the influence of family/peer and educational institutional processes simultaneously on the black-white gap in achievement. The modeling strategy used offers a more comprehensive understanding of the reproductive interinstitutional dynamics at work, suggesting strong linkages between family/peer group attributes and access to educational resources. I conclude by suggesting the need to extend this line of inquiry a step further still, developing a theoretically driven contextual and spatial understanding of educational opportunity and achievement.

The fortieth anniversary of the Brown vs. Board of Education decision was witness to enduring inequalities in educational opportunity and, consequently, educational outcomes. Substantial gains have indeed been made, and racial gaps have declined, yet disparities persist. The high school dropout rate for African Americans remains nearly double that of whites (U.S. Dept. of Education 1994a). The racial gap in achievement has likewise declined somewhat, although some evidence suggests that

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it may be increasing in rural and urban disadvantaged areas and among younger groups (Jaynes & Williams 1989; U.S. Dept. of Education 1994b). These inequalities are troubling, not to mention relevant to current debates on poverty, homelessness, and crime, given their implications for employment opportunity and economic well-being over the life course (e.g., Farkas 1996; Tomaskovic-Devey 1993).

Research has identified significant factors in the black-white educational gap and achievement differences in particular. One is family background. Socioeconomic status of the student's household, for instance, most often operationalized as family income or parents' education, is consistently influential for achievement (e.g., Alexander, Entwisle & Thompson 1987; Lareau 1989; Mehan 1992; Parcel & Menaghan 1994). This relationship is critical to the racial educational gap, as African American students continue to be disproportionately from lower socioeconomic households (Tienda & Jensen 1988; U.S. Bureau of the Census 1988). Family structural differences are likewise important, having implications for the availability of resources, parental time and supervision, and socialization (Downey 1995a; Menaghan 1996; Powell & Steelman 1990; Sandefur, McClanahan & Wojtkiewicz 1992). Some ethnographic research extends the focus on families to peer group influence, suggesting possible racial variation in peer group support for educational achievement (Fordham & Ogbu 1986; Hare & Castenell 1986; Mickelson 1990).

Another line of research focuses on the institution of education itself and the ways in which it perpetuates, rather than reduces, already existent societal inequalities. The consequences of de jure and de facto race and class segregation of schools has garnered considerable attention (Bankston & Caldas 1996; Coleman et al. 1966; Crain & Mahard 1983; Entwisle & Alexander 1994) as has material resource and funding differences between poor and nonpoor schools (Monk 1981; Roscigno 1996; Sutton 1991; Wise & Gendler 1989). A subset of this literature details stratification processes within the school, including ability grouping (Gamoran & Berends 1987; Hallinan 1994; Oakes 1985) and differences in teacher expectations (Alexander, Entwisle & Thompson 1987; Rist 1970), both of which have consequences for general and race-specific achievement patterns.

One tendency in this research, and in the discipline as a whole for that matter, has been specialization. Specialization in empirical focus is valuable in that it has allowed researchers to flesh out causal ordering, explore mediating mechanisms, and tease out ways in which a particular variable (e.g., socioeconomic status, number of siblings, ability grouping) is important. I am of the position, however, that a broader, more integrated examination of these patterns and of inequality is useful and necessary, especially when group disadvantage persists over time (Mills 1959, 1963). In the case of racial educational disadvantage, a broad study of relations at various institutional levels may help uncover linkages between reproductive

stratification processes, inform policy discussion, and counter the resurgence of overly simplistic, biologically determined arguments.

Institutional Linkages and Reproductive Tendencies

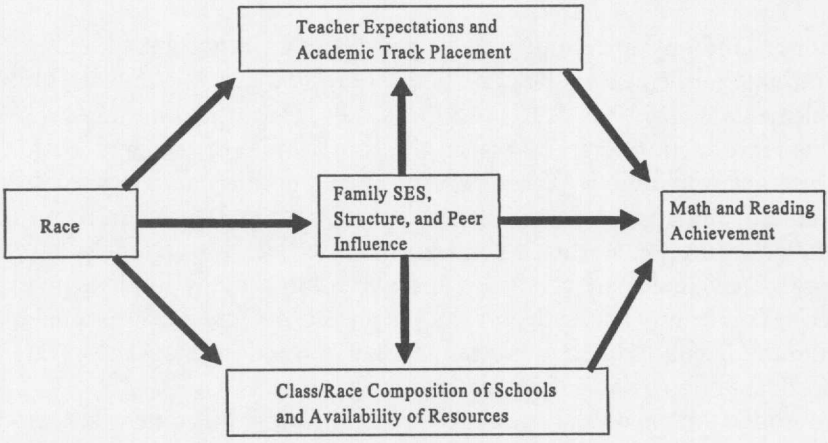
To understand any social outcome or process, it is important to identify the institutions and elements at play and potential relations among those institutions and elements (Form 1990; Mills 1960). This is also true for the study of inequality and its reproduction, especially given the complexities of contemporary social organization. Application of this approach to race and education specifically entails conceptualizing and modeling disparate outcomes as a function of multiple institutional processes and attributes, and at various levels (e.g., family and school). Unfortunately, few analyses of race and education actually implement such a strategy. Even fewer explore the possibility of relations across institutional levels, despite the likelihood that important family and school mechanisms are not independent but overlap and intrude on one another.

Although limited on the question of disparate racial outcomes, there is some general work on institutional connections and reproductive tendencies in education from which we can draw. Some research, for instance, highlights the connection between student background and teacher expectations. In general, teachers expect poor students to do less well than their middle- and upper-class counterparts regardless of ability (Alexander, Entwisle & Thompson 1987; Beady & Hansell 1981; Gay 1975; Rist 1970; Simpson & Erickson 1983). Similarly, students of low socioeconomic status are more likely to be placed on academic tracks less conducive to achievement (Dauber, Alexander & Entwisle 1996; Gamoran & Berends 1987; Oakes 1985). These patterns should ultimately translate into black student disadvantage given the disproportionately lower socioeconomic status of African American households and children in the contemporary U.S.

Resource availability and school class/race composition also tend to be tied to a child's family background. Limited evidence suggests that poorer and minority students are more likely to be in classrooms and schools that have fewer important educational resources (Bowles & Levin 1968; Ginsburg, Moskowitz & Rosenthal 1980; Sutton 1991). These students are also quite likely to face de facto race and class educational segregation that not only provides them fewer important educational resources but also may have a dampening effect on achievement in and of itself (Bankston & Caldas 1996; Coleman et al. 1966; Crain & Mahard 1983; Roscigno 1996).

The argument is that institutional processes in the classroom and in the school at large are permeable and especially vulnerable to patterns of family stratification. Institutional connections and their hypothesized association with educational achievement are displayed in Figure 1.

FIGURE 1: Conceptualization of Race and Its Influences on Achievement through Family Background and Classroom/School Attributes and Processes



Race differences in family socioeconomic status and structure are conceptualized here as influencing educational outcomes at least partially through their influence on expectations and track placement. Family background also has implications for the race/class context of the school a student attends and, therefore, level of access to important educational resources. Although some research touches upon family-school links, systematic and generalizable analyses of such relations as they pertain to racial disadvantage in particular are few. Given considerable spatial and school variation in segregation/resources and quite profound racial inequalities in family socioeconomic status and structure up through the 1990s, institutional linkages and their consequences for racially disparate educational outcomes certainly warrant further attention. The matching of data, described next, allows for such modeling.

Data

I draw from the (restricted-use, first follow-up) National Educational Longitudinal Study (NELS) and the Common Core of Data (CCD) in testing the ideas presented above. NELS represents a nationally representative sample of U.S. high school students and includes principal, teacher, and parent component surveys along with

information on student achievement. Sampling was first conducted at the school level and then at the student level within schools. I focus on and use the first follow-up (1990) of the study, in which all respondents are tenth graders.[1] The restricted-use version allowed me to match students to school and district data provided in the CCD.

Public school attendees represent 90.8% of the total weighted sample. The remainder attend various private educational institutions. Educational processes in public and private schools may differ. Private schools have a positive influence on achievement due to greater school, classroom, and social resources (Coleman & Hoffer 1987). Due to the matching required and because private schools are absent from the CCD, private school students are not included in the analyses. Before excluding them, however, I compared test scores of private school students with those of public school students (see Appendix A). The comparison suggested the need for a sample bias control.[2] The control, reported in the models, was computed using logistic regressions of pubic versus private school attendance on the social class position and race of students, as well as the region of the country in which they live.[3] From these regressions, the predicted probability of public school attendance for each student (i.e., the sample bias control) was generated. Where findings depend on including the predicted probability of public school attendance, the fact is reported in endnotes.

Of the total sample, 6.4% dropped out of high school and therefore did not complete the tests. Since these tests represent the outcomes under investigation, dropouts are excluded. This poses a potential problem given that many of these students were at the lower end of the educational outcome continuum before dropping out and the rate of dropout for African American students nationally is higher than that of white students (U.S. Dept. of Education 1994a). I make use of a sample weight computed by National Center for Education Statistics (NCES) that attempts to control for this sample attrition.[4]

Given that expectations posed previously deal with educational achievement differences only between white and black students, students falling into other racial and ethnic categories (i.e., Latino, Asian American, Native American, etc.) are omitted. On a more substantive level, it is likely that educational processes and issues for these excluded groups differ from those explicated earlier.[5] The remaining sample consists of 11,058 students across 971 schools. European American students comprise 85.2% of the sample and African American students make up the remaining 14.8%.

The CCD, from which school and district data is drawn, is the primary database dealing with public elementary and secondary education used by the National Center for Education Statistics. Specifically, it is a comprehensive, annual (1986-87 through 1991-92), and national statistical database of all elementary and secondary schools and school districts in the U.S. with comparable data by districts

and schools. It is from this source that I draw important indicators pertaining to racial composition and educational spending.

Measurement and Background

Univariate descriptives and race comparisons are offered in Table 1. The reader will note significant racial disparity on all indicators of family background and educational resources.

The key outcome is achievement, as measured by standardized tests. NELS administered these tests, developed by Educational Testing Service (ETS), to each of the students. Despite the limitations and biases related to examining test scores, there is a strong benefit to using those examined here — they are standardized across school and locality, thus increasing the generalizability of findings having to do with local and national patterns. Previous research on achievement and differences by race tends to focus on patterns of reading and mathematics achievement, since differences in performance may persist across subject area, and I do the same (e.g., Alexander, Entwisle & Thompson 1987; Hallinan 1994).

Family and Peer Group Influences

I offer two indicators of family socioeconomic status, family income and parental education. Family income is the surveyed parent's response to what the yearly family income is. Responses fall into a 15-category ordinal income scale ranging from 1 (none) to 15 ($200,000 or more). This variable has been recoded to reflect the median dollar value of each category (see Table 1) and the natural log is used in the hierarchical analyses given its skewed distribution.

Parental education is measured in dummy fashion, indicating whether the student's parent(s) hold only a high school degree (or its equivalent) or a college degree. The reference category is families in which the parent(s) do not hold at least a high school diploma. Among students from natural, two-parent families, the highest level of parental education is used. For those in single-parent families and stepfamilies, the level of education of the natural, custodial parent is used.

Some research suggests that families can pass along household cultural tendencies to children that may influence educational achievement and that may vary by social class and race (e.g., Bourdieu 1977; DiMaggio 1982; Teachman). Thus, I supplement family socioeconomic status with an indicator of cultural capital — whether the student's household has in it 50 or more books.

There are two clear family structural influences pointed out in previous research, that having to do with parental presence and that having to do with siblings. Single-parent and parent/stepparent families can exert a negative influence on

educational outcomes and the magnitude of this influence may vary, at least to some extent, depending upon the alternative parental structural form about which we are speaking (Downey 1995b; Krein & Beller 1988; Mulkey, Crain & Harrington 1992; Sandefur, McLanahan & Wojtkiewicz 1992). Parental structural form is measured as single-parent family and parent/stepparent family, with the natural, two-parent family as the referent. These two variations from traditional parental structure represent families that may have experienced turmoil or disruption (Hetherington, Cox & Cox 1978; Sandefur, McLanahan & Wojtkiewicz 1992), that may not have the same resources (Thompson, Alexander & Entwisle 1988; Zill 1996), and that may not have as balanced a socialization environment (Hess & Camara 1979), each of which might translate into depressed achievement (for elaboration, see especially Downey 1995b; McLanahan & Sandefur 1994; Menaghan 1996).[6] Past findings also indicate that number of siblings can have a negative impact on educational performance, presumably because it relates to levels of parental attention, family resources, and educational supervision (Cicerelli 1978; Downey 1995a; Powell & Steelman 1990).

NELS offers a number of potentially relevant questions dealing with the student's peer group and their feelings toward misconduct, extracurricular activities, and education in general. I limit myself to three such questions, each of which taps into a distinct aspect of educational importance (how important to your friends is doing homework, is finishing high school, is attending college?). Responses are combined to form an additive scale of peer aversion to education, ranging from 1 to 7. The interitem correlations range from .80 to .84, with a mean of .81. The resulting alpha statistic for the items is .87. Notably, white peer attitudes are more averse, on average, than those of blacks. Although this seems somewhat contrary to what one might expect, it is in line with the findings of Coleman et al. (1966) (see also Ainsworth-Darnell & Downey 1998). These patterns seem to reflect a greater abstract ideological appreciation among blacks of education as an avenue for upward mobility (see especially Mickelson 1990).

Educational Influences

Teacher expectations are crucial to educational performance (Alexander, Entwisle & Thompson 1987; Irvine 1986; Rist 1970). The indicator used, coded 0 for no and 1 for yes, touches upon whether the teacher thinks that this student will probably go to college.

Ability grouping, on average, has a negative effect on students in the lower tail of the distribution due to its corresponding relation with peer groups, teacher expectations, resources, and climate (Gamoran & Berends 1987; Oakes 1985; Vanfossen, Jones & Spade 1987). The teacher component of the NELS survey offers a measure of track placement. Referring to the class in which the student

TABLE 1: General and Race-Specific Means for Variables Used

	Overall		White Student		Black Student	
	Mean	(S.D.)	Mean	(S.D.)	Mean	(S.D.)
Dependent Variables						
Mathematics achievement test score	50.607	(9.982)	51.762	(9.707)	43.961	(8.175)
Reading achievement test score	50.548	(9.885)	51.502	(9.742)	45.055	(8.863)
Family/Peer Variables						
Family income[a]	$47,470	(43,275)	$50,408	(44,242)	$30,558	(32,414)
50+ books in household	.909	(na)	.925	(na)	.817	(na)
Parental education						
High school degree or equiv.	.591	(na)	.578	(na)	.670	(na)
College degree	.338	(na)	.360	(na)	.209	(na)
Family structure:						
Single-parent household	.159	(na)	.131	(na)	.316	(na)
Parent/stepparent household	.130	(na)	.136	(na)	.093	(na)
Number of siblings	1.380	(1.150)	1.335	(1.106)	1.638	(1.345)
Peer aversion to education	2.399	(1.376)	2.440	(1.386)	2.168	(1.297)
Classroom/School Variables						
High teacher expectations	.517	(na)	.535	(na)	.410	(na)
High academic track	.560	(na)	.575	(na)	.476	(na)
Student/teacher ratio	15.871	(4.035)	15.740	(4.153)	16.624	(3.171)
Per-pupil expenditure (in 1,000s)	$4.617	(1.380)	$4.592	(1.368)	$4.761	(1.440)
Percentage of students on free/reduced lunch	19.400	(18.100)	17.013	(15.920)	33.470	(22.808)
Black segregated school (>75%)	.033	(na)	.011	(na)	.213	(na)
White segregated school (>95%)	.552	(na)	.637	(na)	.063	(na)
N	11,058		9,421		1,637	

Note. All race differences reported above are statistically significant below the .01 level. Standard deviations are reported for continous measures.

[a] Values reported here reflect median of income categories. Natural log is used in the actual analyses.

respondent is located, the teacher was asked, "Which of the following best describes the 'track' this class is considered to be?" Response options include "academic," "advanced/honors," "general," "vocational/tech/business," and "other." Given that the focus is not on tracking per se, but rather on broad institutional effects, I simplify this somewhat by collapsing "academic" and "advanced/honors" into one category and similarly combining the lower track categories.

Student/teacher ratio, shown to have a negative influence on student performance, is measured straightforwardly as the number of students in the school, divided by the number of full-time, accredited teachers (see Bidwell & Kasarda 1975; Fitzpatrick & Yoels 1992). Educational spending too may influence achievement, not only because of its potential influence on the student/teacher ratio, but also through its influence on physical facilities, the availability of school equipment, and the availability of a more diverse set of classes. I draw from the district-level data of the CCD in measuring this as the current level of spending per pupil, from all (federal, state, and local) sources. This value is, on average, slightly higher for black students.[7]

My operationalization of school class composition as the percentage of the total student body in the school that receives free or reduced-price lunch is consistent with past and current research (e.g., Coleman 1966; Hallinan 1994). This indicator was obtained from the principal (school) component of NELS. The racial composition of schools is likewise straightforward. The CCD reports racial breakdowns of the student body. I use indicators of integration/segregation in the models that follow.[8] In particular, I examine the effects of black and white segregated schools relative to integrated schools.

Controls

Gender has been shown to influence achievement, particularly in mathematics and science and especially in older grades (Entwisle, Alexander & Olsen 1994; Pallas & Alexander 1983). It is treated as a control variable in this examination of the racial gap, although an exploration of intersecting family and school effects on achievement by gender is certainly warranted.

Along with dropouts, there are students in the sample who, given their grade status two years prior, should be in the tenth grade but who were not in 1990. Since these students are not dropouts, the suggestion is that they are not making normal educational progress and were held back in eight, ninth, or tenth grade. I control for this category of student.

Finally, in computing the parental structural measures (single-parent, parent/step) already discussed, a group of students emerged who live with neither natural parent or have missing data on parental structure. Since there is no way to distinguish those with missing data from those who live with neither parent, I do

not treat it as a particular parental form. I do, however, control for this category of student once other parental structural forms are introduced to the modeling of achievement (see also Downey 1995b).

Analytic Strategy and Results

The argument that general and race-specific achievement are a function of both family/peer attributes and more structural educational processes necessitates multilevel analysis techniques. I use hierarchical linear modeling (see Bryk & Raudenbush 1992; Garner & Raudenbush 1991) to estimate effects on general and race-specific achievement given that OLS techniques may produce biased slopes and standard errors, due to correlated errors and group-specific error variances (DiPrete & Forristal 1994; Kaufman 1995). Parameter estimates and significance levels are analogous to those in OLS regression for student race and family/peer group equations since these are measured at the individual level. The school-level portion of the model focuses on the variance in average test scores across schools.[9] The percentage of baseline individual variation explained and the percentage of between-school variation in average achievement explained are estimated for each equation, and these statistics are reported at the bottom of each table.[10]

First, mathematics achievement scores are regressed on student race. This equation, along with corresponding variance components reported at the bottom of the table, serves as a baseline model of achievement controlling for race. The race coefficient, reported on the top of the table, offers evidence of the black-white gap and its magnitude. The second equation introduces family and peer group attributes. Not only does this addition allow for an exploration into how families and peer groups matter, but it also helps assess the extent to which the black-white gap (captured by the race dummy variable) is created through family and peer group structures and processes.

Educational institutional attributes are brought into the model in equation three. Their addition indicates the extent to which the average racial gap is explained by differences between classrooms, schools, and districts. Changes in the relative magnitude and statistical significance of family and peer group coefficients, once educational measures are introduced, offer insight into whether family and peer groups influence achievement directly or indirectly through educational institutional mechanisms. The same analyses are then performed for reading.

Achievement Processes and Mathematics Outcomes

Table 2 reports hierarchical linear modeling estimates of mathematics achievement on student race, family and peer group influences, and educational characteristics for 11,058 U.S. tenth graders in 1990.[11] The race variable and its estimate, shown under equation 1 of Table 2, serves as a baseline indicator of the black-white gap in mathematics achievement. Here we see that the average racial gap between black and white students across the sample is approximately 6.7 standardized test score points. This is statistically significant at the .001 probability level.

The reduction in the race coefficient size that is observed in equation 2 with the introduction of family and peer group indicators suggests quite clearly that a portion of observed racial difference in mathematics achievement is a function of these background attributes. The decrease in race coefficient size from equation 1 to equation 2 is 2 standardized test score points, suggesting that approximately 30% of the racial gap in mathematics achievement is accounted for by family and peer group differences. As the reader will recall, statistically significant racial differences exist across all family and peer group indicators presented in equation 2 (see Table 1).

Each of the family and peer group effects observed, with the exception of parent/stepparent household, is significant and in a direction consistent with expectations and past empirical findings. There is a .4 point increase in mathematics scores, on average, for a 1% increase in family income.[12] Students reporting that there are fifty or more books in their household are observed to have a 2.6 point advantage relative to their counterparts who lack such a household resource. Thus, household or cultural capital, at least as it is measured here, strongly influences educational achievement controlling for other socioeconomic attributes.

Parental educational levels, the other two indicators of family socioeconomic status, have a very strong general effect on mathematics achievement relative to the other family and peer group indicators. Students whose parents have at least a high school diploma or equivalent exhibit a 2.1 point advantage in mathematics achievement, on average, relative to their counterparts in families where neither parent has attained a high school education. Advantages associated with parental education are even more pronounced for those whose parents hold at least a college degree. This suggests that the intergenerational transmission of educational skills, and possibly even the types of skills, varies even between those whose parents have a high school education and those whose parents hold a college degree. This is certainly in accordance with what one might expect, as is the influence of nontraditional family structure.

Students coming from single-parent households are observed to have a .7 point disadvantage relative to their counterparts residing with both natural parents. Such an influence may be a function of resource and socioeconomic differences across family types, some of which I have controlled for here. It may also be the case that

socialization tension and psychological distress among children who experience familial disruption may dampen achievement. It is interesting that coming from a parent/stepparent family has no discernible influence, perhaps due to greater tangible resources (i.e., income) or less tangible advantages (i.e., supervision) relative to single-parent households. Number of siblings who reside with the student depresses levels of mathematics achievement. This influence is weaker than the others presented thus far but is significant at the .05 level.

Though families are indeed the principal overseers and socializers of children, by the teen years many adolescents turn to their peer groups for support, guidance, and direction. Ethnographic accounts have suggested the importance of peer group pressure and influence for educational achievement. Quantitative research, however, has been more limited in this regard. I have computed a peer influence (aversion to education) measure and include it along with family considerations in equation 2 of Table 2. Consistent with expectations, peer aversion to education negatively influences achievement in mathematics.

The control pertaining to the probability of attending public school, shown at the bottom of the table, is statistically significant. When it is not included in the model, the effects of family attributes, especially family income and parental education, on mathematics achievement are much stronger. This suggests that the potential advantages of high family socioeconomic status on achievement are at least partially a function of where one attends school as well as corresponding issues related to the quality of education one receives. The fact that the influence of family attributes remains, even with this control introduced, reflects the substantial variation in family structure and socioeconomic status even among students attending public school.

Reported at the bottom of the table are component estimates of the degree of baseline individual variation and variation between schools explained by family and peer background characteristics. Of baseline variation in mathematics test outcomes controlling for race, 8.5% is explained by family and peer group attributes. These characteristics explain a much greater degree of between-school variation in mathematics achievement (46.7%), highlighting the fact that families and peer groups of different attributes are not randomly distributed across schools in the U.S. Rather, those of a certain advantaged or disadvantaged background are likely to attend schools with those similar to themselves.

Equation 3 of Table 2 adds educational attributes to the model of mathematics achievement. The race coefficient reported at the top of the table declines .9 test score points further, suggesting that about 14% of the average racial gap in mathematics achievement is accounted for by educational processes not tied to family and peer group attributes measured in equation 2. An additional 15% of general baseline variation and 16.1% of between-school variation in average mathematics achievement is accounted for with this addition.

TABLE 2: Hierarchical Linear Modeling Estimates of Mathematics Achievement on Race, Family/Peer Group Attributes, and Classroom/School Characteristics for Black and White Tenth Graders, 1990

	Mathematics Achievement Test Score		
	Equation 1	Equation 2	Equation 3
Student race (1=black)	-6.685 (.185)***	-4.682 (.345)***	-3.758 (.304)***
(Ln) Family income		.349 (.069)***	.156 (.060)**
50+ books in household		2.558 (.306)***	1.881 (.269)***
Parental education			
High school degree or equivalent		2.050 (.335)***	1.064 (.295)***
College degree		5.083 (.382)***	2.853 (.338)***
Family structure:			
Single-parent household		-.711 (.247)**	-.096 (.217)
Parent/stepparent household		-.428 (.262)	-.130 (.230)
Number of siblings		-.155 (.074)*	-.084 (.065)
Peer aversion to education		-.396 (.061)***	-.009 (.054)
High teacher expectations			6.825 (.174)***
High academic track			4.726 (.177)***
Student/teacher ratio			-.059 (.031)*
Per-pupil expenditure (in 1,000s)			.042 (.091)
Percentage of students on free/reduced lunch			-.058 (.007)***
Black segregated school (>75%)			-3.877 (.654)***
White segregated school (>95%)			1.328 (.263)***
Probability of attending public school		-.210 (.017)***	-.104 (.015)***
Intercept	50.283	50.482	50.278
Baseline Variation			
Variance component	73.914	67.646	52.281
Percentage of baseline individual variation explained		8.480	23.498
Variation between Schools			
Variance component	23.419	12.489	8.717
Percentage of school variation explained		46.672	62.778

Note. Metric coefficients (standard errors)

* $p < .05$ ** $p < .01$ *** $p < .001$ (one-tailed tests)

Among influential educational factors are teacher expectations, track placement, student/teacher ratio, and the race/class composition of schools. Students whom the teacher believes will eventually attend college are shown to score, on average, 6.8 points higher than their peers whom teachers believe will not attend college. Students on a high academic track score 4.7 test score points higher, on average, than other students, all else constant. These relations are strong and significant at the .001 probability level.

The effects of teacher expectations and high academic track placement are consistent with past research, especially that suggesting interconnections between expectations, track placement, and student performance (e.g., Alexander, Entwisle & Thompson 1987; Rist 1970; Rosenthal & Jacobsen 1968) as well as general resource and climate differences associated with high teacher expectations and high track placement (e.g., Gamoran & Berends 1987; Oakes 1985; Vanfossen, Jones & Spade 1987). Yet there may very well be a reciprocal relation (self-fulfilling prophecy) between these relations. Students who do well are likely to end up on the highest academic tracks and to garner the highest of teacher expectations and, in turn, respond accordingly. With regard to academic track placement in particular, some testing process has likely occurred at an earlier time period, partially influencing the placement of a given student at the outset. Thus, one might argue that what is modeled here can be supplemented with an alternative modeling strategy in which student performance precedes track placement and teacher expectations causally. Although beyond the scope of this particular article, the use of longitudinal models that control for student achievement at an earlier point is warranted. Such modeling will help to flesh out causal and potentially reciprocal relations, as well as allowing for an assessment of the reproduction of educational disparities during later and earlier grades.

Student/teacher ratio and the race and class character of the school are important for mathematics achievement. For a 1% increase in the percentage of students receiving free or reduced school lunch, average mathematics achievement decreases correspondingly by .06 points. More interesting is the effect of racial segregation, even with other school considerations controlled for. On average, there is a 3.9 point penalty associated with attending a black segregated school. The reader should note that rather than simply a disadvantage associated with attending a nonwhite school, which would have been the interpretation had a continuous measure of racial composition been used, attending a white segregated school is actually advantageous. Scores in mathematics are 1.3 points higher, on average, in white segregated schools compared to more integrated schools, all else constant.[13]

In a preliminary model, the two racial segregation measures and their reference category were accounted for simply with the inclusion of a general continuous measure of the proportion of the student body that is nonwhite. This was shown to have a weak and negative influence on student performance. Some literature on racial composition and potential threat effects suggests the possibility of curvilinear

relations (Blalock 1967). I took this into account by examining whether a nonlinear or even curvilinear relation better captured what is occurring. There was a slightly better nonlinear (natural log) fit. Most of the variation and negative influence of racial composition occurred between 0 and 10% nonwhite. Thus, the use of the natural log rather than the dummy breakdowns utilized here may have resulted in a misleading interpretation, drawing attention to the disadvantages of attending a nonwhite school while disguising the advantages of attending a white segregated school.

The possibility of an interaction between a student's race and the racial composition of the school the student attends was explored, but no statistically significant interactions were found. This suggests that the positive influence of attending a white segregated school is more likely reflective of a school resource advantage not captured with the per-pupil expenditure measure. Possible resources that remain untapped include teacher quality, parental volunteer participation, and local PTA time and monetary contributions, each of which reflect educational resources that may provide advantages to a student body in general rather than just particular racial group members within that student body (see also Bankston & Caldas 1996).

Findings presented clearly show the contemporary significance of school class and racial segregation for achievement. Poorer, segregated schools likely offer less to students in the way of resources, equipment, classes, general physical surroundings, and perhaps even teacher quality. Going to a poor school also means going to school with those disadvantaged in a variety of ways, some of which were specified in equation 2.

Note the reduction in family and peer group coefficients once classroom and school attributes are added to the modeling of mathematics achievement. The declines in coefficient magnitude, especially for single-parent household and family socioeconomic status indicators, suggest that some of the influence of family background is indirect. It is quite likely that family income, parental structure, and parental education each affect where a child attends school and, consequently, what the class and racial character of that school is. Similarly, family background affects achievement indirectly through its impact on teacher expectations and academic track placement — linkages better established in the literature (e.g., Alexander, Entwisle & Thompson 1987; Dauber, Alexander & Entwisle 1996).[14]

The large decline in coefficient size and statistical significance for peer aversion suggests that the formation of peer group influence that is less than conducive to educational achievement is not created in a social or, perhaps more accurately, an institutional vacuum. Rather, its diminishing significance with the introduction of educational processes suggests that it is through schools in particular, and perhaps through the grouping of children of low socioeconomic status, that peer aversion is manifested.[15]

With regard to mathematics scores in general, we see a substantial portion of the racial gap, nearly 44%, explained by family and peer group differences in combination with structures and processes occurring at the classroom and school levels. As we have also seen, the influence of families and peer groups on achievement need not be exclusively direct. Rather, it is also indirect — influencing where a student attends school, with whom the student attends school, through teacher expectations, and through track placement.

ACHIEVEMENT PROCESSES AND READING OUTCOMES

Table 3 presents similar modeling of reading achievement. As was the case with mathematics achievement, I first introduce race to the model and then follow it with the addition of student background characteristics and educational attributes, respectively. The average black-white gap in reading achievement is 6.3 standardized test score points; a gap .4 points smaller than that observed on the mathematics test (see equation 1). The introduction of family and peer group attributes, offered in equation 2, adds to the predictive power of this model. The decline in the race coefficient between equations 1 and 2 is 31.5%. Of general baseline variation in reading achievement controlling for race, 8.1% is explained by family background and peer group factors. These same attributes explain 37.2% of the average school variation in reading achievement, again highlighting the nonrandom distribution of students across schools.

The effects of family socioeconomic status, family structure, and peer aversion on reading are largely consistent with those reported for mathematics. Family income and having 50 or more books in the household each have a strong and positive influence on reading achievement. Living in a single-parent household depresses reading test scores by .6 points, on average, relative to those students who live with both natural parents. Once again, this influence is likely due to resource differences not captured here as well as psychological distress and tensions associated with socialization that may accompany family dissolution. As in mathematics findings, coming from a parent/stepparent household shows no discernible effect on reading when other indicators of family socioeconomic status are taken into account.[16] The influence of siblings on achievement is shown here to be negative and statistically significant. For every additional sibling, reading test scores are shown to decrease correspondingly by .5 points. This negative influence of siblings on reading achievement is much stronger than that for mathematics (see also Steelman 1985).

Equation 3 of Table 3 adds the educational considerations to the model. The race coefficient declines to 3.5, suggesting that about 13.2% of the average racial gap is accounted for by educational institutional processes. The proportion of the racial gap explained differs only slightly between the two tests. For mathematics achievement, approximately 30% of the racial gap is accounted for by family and

TABLE 3: Hierarchical Linear Modeling Estimates of Reading Achievement on Race, Family/Peer Group Attributes, and Classroom/School Characteristics for Black and White Tenth Graders, 1990

	Reading Achievement Test Score		
	Equation 1	Equation 2	Equation 3
Student race (1 = black)	-6.322 (.358)***	-4.329 (.354)***	-3.496 (.325)***
(Ln) Family Income		.294 (.070)***	.131 (.064)*
50+ books in Household		3.163 (.313)***	2.601 (.287)***
Parental Education			
High school degree or equivalent		2.076 (.343)***	1.228 (.315)***
College degree		5.002 (.391)***	3.037 (.361)***
Family Structure:			
Single-parent household		-.631 (.252)**	-.129 (.232)
Parent/stepparent household		.292 (.268)	.358 (.230)
Number of siblings		-.458 (.075)***	-.400 (.069)***
Peer aversion to Education		-.324 (.063)***	.018 (.058)
High Teacher Expectations			5.979 (.186)***
High Academic Track			4.046 (.189)***
Student/Teacher Ratio			-.007 (.034)
Per-pupil Expenditure (in 1,000s)			.056 (.096)
Percentage of Students on Free/Reduced Lunch			-.041 (.007)***
Black Segregated School (>75%)			-2.401 (.685)***
White Segregated School (>95%)			.853 (.275)***
Probability of Attending Public School		-.179 (.017)***	-.091 (.016)***
Intercept	50.418	50.562	50.418
Baseline Variation			
Variance component	77.472	71.229	59.798
Percentage of baseline individual variation explained		8.058	22.813
Variation between Schools			
Variance component	18.613	11.689	9.287
Percentage of school variation explained		37.200	50.105

Note. Metric coefficients (standard errors)

* $p < .05$ ** $p < .01$ *** $p < .001$ (one-tailed tests)

peer group considerations and about 14% is explained by educational processes. For reading test outcomes, these percentages are 32 and 13%, respectively.

The effects of teacher expectations and track placement are statistically significant and quite strong. Students for whom teachers have college attendance expectations score 6 points higher, on average, than other students, all else constant. Those on a high academic track score 4.1 points higher, on average, relative to those on middle and low academic tracks. These findings are slightly weaker than those observed for mathematics. As was noted in Table 1, African Americans are less likely than are European Americans to be on a high academic track and are less likely than their European American counterparts to be accorded high teacher expectations. It is also the case that disproportionately lower family socioeconomic status may disadvantage African American students through the formation of teacher expectations and the placement of students on particular ability tracks.[17]

Unlike findings for mathematics, student/teacher ratio does not exhibit a significant influence on reading achievement. However, the important findings on the class and racial composition of the school one attends do hold up. For each percentage point of the student body in a given school who receive free lunches, average test scores in that school decrease by .04 points. The penalty associated with attending a black segregated school is, on average, 2.4 points and the advantage of attending a white segregated school is .9 points.

Coefficient magnitudes for family and peer background indicators decline significantly, in some cases by more than half, with the introduction of educational attributes. This again suggests linkages across these institutional levels and the likely playing out of family background differences within and across schools and classrooms. Approximately 45% of the observed racial gap in reading achievement is accounted for with the inclusion of family background, peer group, and educational characteristics. Nearly 23% of the general variation across the sample is accounted for, while more that 50% of the between-school variation in achievement is explained.

Summary and Discussion

Patterns of influence across mathematics and reading models are similar with a few exceptions. Families' socioeconomic status appears to be slightly more influential for mathematics, while parental structure and number of siblings are only slightly more influential for reading. Among educational attributes, student/teacher ratio was shown to be influential for mathematics but not reading. The influence of track placement and teacher expectations, partially a function of family background, are strong in the case of both, as are the effects of class and racial segregation.

The strong influence of racial segregation, controlling for class composition and some of the most fundamental educational resources, seems to fly in the face of research suggesting either that racial composition does not matter (e.g., Cook 1979) or that it is accounted for by class disparities within a given school (Coleman et al. 1966). As it turns out, school racial composition matters for both reading and mathematics achievement in the direction one would expect, even with class composition and other familial and educational attributes accounted for. Attending a black segregated school continues to have a negative influence on achievement. Attending a white segregated school, in contrast, positively shapes average test performance. Although some of these effects may be due to variations in culture, or in the cultural capital students bring into schools, I suspect that other educational resources such as teacher quality may account for these effects.

Quite interesting as well is the persistent and negative influence of the sample bias control. While simply serving as a statistical control, its inclusion has uncovered substantively meaningful patterns. A greater probability of public school attendance, certainly shaped by lower family socioeconomic status, negatively affects achievement. Perhaps it is from this bias control that one of the clearest linkages between families and schools has been uncovered. Socioeconomic differences result in student quality and allocation differences between public and private schools. The dispersion of students in this manner, in turn, likely further reinforces race and class disparities in both educational opportunity and achievement.

The influence of families and peer groups is partially mediated by educational processes. What this suggests is that the institution of education, as it currently stands, at least partially reproduces the inequalities with which children walk into school. Coefficients for family socioeconomic status and structure decline substantially in magnitude, suggesting that their influence in general, and differences in these background attributes across racial groups, are partially played out at classroom, school, and district levels. Peer aversion, to the extent it exists, appears to be created at the school level, probably through track placement and race/class segregation.

Family and peer attributes are crucial to the patterning of educational achievement. The institution of education shapes achievement through the stratifying and segregating of students, through the placement of expectations, and through the allocation of resources. Crucial to our understanding of these processes are linkages between family and educational institutional levels — linkages that tend to reproduce broad patterns of societal inequality.

Limitations and Theoretical Extension

Although the findings presented are strong and interesting in and of themselves, there remain some operational issues and theoretical limitations worth mentioning.

It is certainly the case, for instance, that the models presented could be specified even further. Social-psychological, perceptual, and aspirational processes likely mediate some of the family influences uncovered here. School and classroom effects may indeed be direct, but they too may pattern student aspirations, motivation, and consequently achievement.

Along with specifying the many mediating pathways between families, schools, and educational outcomes, future endeavors in this research area should explore more explicitly and systematically interactions across levels. We know for instance, and some of the evidence presented here suggests, that there is a connection between family background and processes such as ability grouping and the formation of teacher expectations. The relation between family background and the allocation of students to schools segregated by race and class, schools that vary predictably in resources, is a strong one as well. A more elaborate modeling strategy will take these into account with the inclusion of multiple interaction terms across levels of influence. Such interactions could also be used to explore whether the nature of effects themselves vary by racial group. Rather than simply treating such an exercise as a fishing expedition, however, researchers undertaking this effort should specify beforehand what conditional relations they expect and why.

More crucial than issues of statistical specification is the fact that more general spatial variation in stratification patterns and processes is not modeled here and is rarely dealt with in educational research, including that pertaining to race. As some have noted, structures and processes of opportunity vary between and even within regions of the U.S. (e.g., Hodson 1978; Kalleberg, Wallace & Althauser 1981; Tolbert, Horan & Beck 1980; Tomaskovic-Devey 1987). Thus, families and peer groups are embedded in localities that shape the likelihood of being poor, uneducated, or averse toward education in the first place.

Research and theorizing focusing specifically on patterns of racial opportunity indeed highlight that it varies by place and is patterned by a number of processes, not the least of which are local racial competition (Blalock 1967; Lieberson 1980; Olzak 1992), the concentration of African Americans in poorer, split-labor market areas (Bonacich 1972; Lichter 1989; Wacquant & Wilson 1989; Wilson 1987), and discrimination in hiring and pay (Kirshenman & Neckerman 1990; Thomas, Herring & Horton 1994; Tomaskovic-Devey 1993). Racial opportunity also varies as a function of local political-economic processes, including elite and corporate investment decisions, class-based politics and insurgency, and the interaction of race and class politics (Beck & Colclough 1988; James 1988; Tomaskovic-Devey & Roscigno 1996). With few exceptions, these insights have yet to be adequately incorporated into research and theory on educational opportunity and class and racial achievement patterns (but see Entwisle & Alexander 1994; Garner & Raudenbush 1991; Roscigno 1995, 1996; Villemez & Beggs 1994; Walters & James 1992). Straightforwardly, general and race-specific educational processes and

outcomes should be linked to and should vary spatially as a function of broader stratification processes played out at the local societal level.

Future theorizing and research on educational processes, achievement, and the black-white gap in particular would be served well in acknowledging that important influences, be they at the family or educational institutional level, are fluid and vulnerable to local conditions. Combined with the ideas and modeling already presented here, such an undertaking will offer a quite comprehensive understanding of educational inequality and the organizational reproduction of stratification arrangements. It will also help advance a powerful set of conceptual tools and empirical findings for those attempting to address these disadvantages on the policy front.

Notes

1. Unlike the base year (1988) survey undertaken when the students were eighth graders, the first follow-up survey (1990) provided a variety of peer influence and teacher expectation measures.

2. Coleman and Hoffer's (1987) analysis of differences between U.S. public and U.S. private high schools is noteworthy and provides a useful elaboration of the advantages that private schools afford to students.

3. The regression coefficients by student attributes and region used in the computation of the sample bias control are reported in the Appendix.

4. For more detail on how this weight was computed, the reader should see the NCES's First Follow-Up: Student Component Data File User's Manual (1992).

5. Analyses of Latino students, for instance, clearly demarcate the influence of linguistic difference on educational outcomes (e.g., Fernandez & Nielsen 1986; Trueba 1986), while comparative analyses suggest that familial processes, as they relate to educational outcomes, may be quite distinct for Asian American students (e.g., Kao 1995; Sue & Okazaki 1990).

6. For further empirical specification of family structural differences, such as single mother, single father, mother/stepfather, father/stepmother, see especially Downey (1995b).

7. I expect that this measure is actually hiding a resource allocation difference for black and white students. Preliminary analyses, in fact, suggest that although there seems to be a slight black advantage in spending, a higher proportion of expenditure goes to instruction for white students. For black students, building maintenance and construction seem to take up a larger share of overall resources. More analyses on where the spending actually occurs is warranted.

8. It is difficult to make sense of a racial composition influence without putting it into the context of integration. For instance, one might expect a positive effect of nonwhite racial composition (i.e., integration), but then a decline in scores as schools and classrooms become increasingly nonwhite (due to resource differences). Alternatively,

one might expect a strong positive influence of nonintegration in predominantly white schools, due to resource and class composition differences. Utilizing dummy variable breakdowns of white segregation and nonwhite segregation, with integration as the reference category, helps to clarify the potential varying effects of racial composition on educational outcomes (see Entwisle & Alexander 1994).

9. Unlike other educational measures (e.g., spending, race/class composition), teacher expectations and academic track are measured at the individual student level. Given that they represent educational processes as opposed to family/peer background attributes, however, they are introduced into models of achievement at the same time as other, more structural, educational attributes.

10. Since the primary interest here is in potentially mediating relations across levels of influence, rather than conditional or interactive effects, all regression coefficients with the exception of the intercept have been "fixed," or constrained to be constant within schools. To aid in the interpretation of family/peer and school-level effects, all explanatory variables have been centered on their means. The one exception is student race, the central focus, which has been centered on the group-specific mean. Thus, the intercept represents the white student value when all else is zero, while the race coefficient represents the average disadvantage in achievement for black students, relative to the white intercept. For further discussion of mean centering and constraining effects within schools or neighborhoods, see especially Bryk and Raudenbush (1992), Garner and Raudenbush (1991), and Entwisle, Alexander and Olsen (1994).

11. Assuming that public versus private school attendance is in large part a function of family background and socioeconomic status, it has been added in equation 2 with other family measures rather than in equation 1, where the assumption would be that it is somehow exogenous to the processes discussed.

12. This is a lin-log model ($y = b_0 + b_1 \, ln \, [x_1] + e$). As a lin-log model, the slope coefficient b_1 relates the absolute change in y for a given relative or proportional change in x.

13. Models I have undertaken that examine classroom/school/district influences independently suggest stronger total effects of school racial composition on test performance. This influence is lessened, as one might expect, when family considerations are controlled for as they are in the models presented here. This suggests that at least a portion of the racial composition influence is the result of differences in family socioeconomic status across schools that are primarily white and those that are disproportionately nonwhite.

APPENDIX A: Achievement Test Score Means, Standard Deviations, and Logistic Regressions of Public Versus Private School Attendance

	Math Standardized Test Score	Reading Standardized Test Score
Public School Students		
Mean	50.586	50.451
Standard Deviation	9.908	9.895
Private School Students		
Mean	57.776	57.082
Standard Deviation	8.783	8.548
Difference in group means (t-test) significant at the $p < .001$ level	Yes	Yes

Logistic Regression Coefficients of Public (versus Private) School Attendance by Race, Income, and Region[a]

	(1)	(2)[b]
Student Race (1= black)	.643 (.101)***	-.144 (.111)
(Ln) Family Income		-1.380 (.042)***
Region:[c] South		-.710 (.102)***
Northeast		-.752 (.108)***
North Central		-.483 (.106)***
Intercept	1.783	17.192

Mean black student predicted probability = 91.872%
Mean white student predicted probability = 85.603%

[a] Metric coefficients (standard errors).
[b] The logistic regression of public school attendance on race, shown in the first equation, was run for comparative purposes. Equation 2 was used in the actual computation of predicted probabilities.
[c] Region reference = West

*** $p < .001$

14. Equation 3 was also run without teacher expectations and academic track in the model. Coefficients for family income and parental educational level were much stronger, indeed suggesting that a portion of the family background influence is through the formation and reinforcement of teacher expectations and track placement.

15. This interpretation is supported by preliminary modeling of variation in peer aversion by school context and educational processes. School class composition has a weak but significant influence on peer aversion. Much stronger effects are found for classroom processes, especially high academic track placement and high teacher expectations, each of which substantially reduce peer aversion.

16. As in the mathematics outcomes, the influences of family income and parental education are stronger without the sample bias correction in the model. Again, this suggests that a portion of the family socioeconomic status effect is through the allocation of children to public and private schools.

17. This interpretation is supported by the stronger influence of family income and parental educational level when teacher expectations and high academic track are taken out of the model presented in equation 3.

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