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Race and Teacher Evaluations as Predictors of Algebra Placement

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This study is a longitudinal look at the different mathematics placement profiles of Black students and White students from late elementary school through 8th grade. In particular, this study utilizes the Early Childhood Longitudinal Study—Kindergarten Class of 1998–1999 (ECLS-K) data set to analyze the impact of teacher evaluation of student performance versus student demonstrated performance on the odds of being placed into algebra in the 8th grade. Results revealed that Black students had reduced odds of being placed in algebra by the time they entered 8th grade even after controlling for performance in mathematics. In addition, teacher evaluations of student performance were shown to play a greater role, albeit adversely, for Black students than for their peers. These results are discussed in terms of both implicit theory research and critical race theory. An important implication of this study is that placement recommendations must be monitored to ensure high-achieving students are placed appropriately, regardless of racial background.

Key words: Achievement gap; Algebra; Race; Teacher evaluation

In this study we looked at why tracking students in mathematics classes "disproportionately affects minority . . . students irrespective of prior achievements" (Stiff, Johnson, & Akos, 2011, p. 65) and considered whether issues of racial inequity in the United States may be countered, in part, by simply making student placements in middle grades according to their elementary school performance data. We were interested in expanding on research that investigated whether differences in placement profiles were evident for Black students (Battey, 2013; Moses & Cobb, 2001; Oakes, 1990), especially if Black students were high achieving (Berry, 2008; Stiff & Harvey, 1988; Stiff & Johnson, 2011). Specifically, we investigated how elementary teacher evaluations of student performance in mathematics and demonstrated student performance in mathematics predict eighth-grade placement in algebra per students' racial background.

We do not argue that mathematics placements based on performance tests are superior to teacher evaluations of student performance. In fact, there is evidence that both methods of placement are vulnerable to misinterpretation and can be unreliable in evaluating student performance (Morgan & Watson, 2002). Instead, in this study we investigated how student performance data and teacher evaluations influence mathematics placement outcomes for different groups of students and assumed that race should not play a role in such placement decisions. Similarly, the study did not address the merits or faults of tracking itself; instead, we investigated patterns of course placement within the current system of tracking that may contribute to differential student outcomes.

Tracking and the United States

Tracking (or leveling) students according to perceived needs and abilities is a common practice in U.S. mathematics classrooms. It begins in elementary school through within-class grouping and the identification of students for participation in gifted programs. It continues into middle and high schools via student placements into differentiated courses having different content objectives that follow different mathematical course-taking trajectories (Boaler, 2008; Schmidt & McKnight, 2012). Schmidt and McKnight (2012) described this phenomenon in the following way:

> A unique characteristic of U.S. middle school mathematics is the large number of different courses that are available. . . . The practice in the United States contrasts sharply with the international norm. . . . The point is . . . not all U.S. children have the same mathematics learning opportunities at 8th grade, unlike children in many other countries. (pp. 100–101)

Research on tracking is long-standing and was initially focused on analyses of the demographic trends and academic effects of tracking students (Bowles & Gintis, 2002; Cahan & Linchevski, 1996; Gamoran & Mare, 1989; Garet & Delaney, 1988; Hallinan, 1994, 2003; Oakes, 1990). These studies generally found, and more recent analyses continue to affirm, that tracking has distinct demographic trends and leads to differential outcomes for different groups of students (Archbald & Farley-Ripple, 2012; Battey, 2013; Darling-Hammond, 2010; Flores, 2007; Schmidt & McKnight, 2012).

Given the current practice of placing students in different course trajectories from middle school on, it is widely understood in the United States that the mathematics classes students take, and when they take them, matter. Taking algebra by eighth grade has an impact on students' academic achievement in high school as well as student success in college (Adelman, 1999; Horn & Nuñez, 2000; Trusty, 2004). At the same time, students who do not take algebra by eighth grade are not likely to take high-level mathematics courses during their postsecondary education (Stiff et al., 2011). Currently, students who are afforded the greatest opportunity to study high-quality mathematics in high school tend to have similar demographic characteristics: White or Asian American and of middle to high socioeconomic status (Cahan & Linchevski, 1996; Flores, 2007; Hallinan, 2003). Because of the effect of class placement on student achievement, placement decisions, if differentially applied to students of different racial or ethnic backgrounds, may serve to exacerbate the effect of the achievement gap in mathematics between Black students and others (Battey, 2013; Berry, 2008; Stiff & Johnson, 2011; Stiff et al., 2011).

Studying Influences of Tracking: Fifth Grade Through Eighth Grade

This study was designed to update and extend our understanding of race and student placements in eighth-grade mathematics by focusing on the longitudinal effects of teacher evaluations and students' mathematics performance on placement outcomes. We intentionally examined these issues during the critical years from upper elementary school through middle school.

Addressing course-taking patterns in high school is difficult to achieve once a student is actually in high school (Burris, Heubert, & Levin, 2004). Indeed, high school course trajectories are greatly influenced by course-taking patterns in middle school, which are, in turn, influenced specifically by sixth-grade mathematics placements (Akos, Lambie, Milsom, & Gilbert, 2007; Akos, Shoffner, & Ellis, 2007; Dauber, Alexander, & Entwistle, 1996; Stiff & Johnson, 2011; Stiff et al., 2011). It has been long established that the level of placement in middle school mathematics classes is a very strong determinate for how a student will be placed in high school mathematics courses (Burris et al., 2004; Burris, Heubert, & Levin, 2006; Catsambis, 1994; Dauber et al., 1996; Gamoran & Mare, 1989; Geiser & Santelices, 2006; Hallinan, 2003; Oakes, 1990). Moreover, it has been suggested that elementary school teachers may play a critical, albeit hidden, role in middle school placement decisions (Dauber et al., 1996). This study addressed teacher evaluations at the elementary level because the juncture between elementary school and middle school has been identified as a critical time for making course placement decisions (Akos, Shoffner, et al., 2007; Dauber et al., 1996; Stiff & Johnson, 2011; Stiff et al., 2011). It is not an exaggeration to say that high school success in mathematics, college success, and consequent career paths (Battey, 2013; Trusty, 2004) are, in part, by-products of mathematics placement decisions made for 11-year-olds as they enter sixth grade. It is important to tease out factors that affect whether students are equitably placed into the most appropriate middle school mathematics courses, as determined by the complex interplay between students' performance and their teachers' evaluations of that performance. Many factors are involved in students' mathematics placements from fifth to sixth grade (Dauber et al., 1996; Useem, 1992). Fifth-grade teacher recommendations appear to play a significant role in the placement process. Akos, Shoffner, and Ellis (2007) documented that in a large southeastern school district, teacher recommendations were a key component of placement decisions. Parents surveyed in that study identified teacher recommendations as the most important determinant of course placement for their children. Specifically, 89% of parents named teacher recommendations as the key placement factor, 64% named test scores, 26% named administrative decision, 21% named parent preference, and fewer than 5% named other factors such as grades.

Teacher Evaluations, Mathematics, and Race

The idea that teachers, by virtue of their judgments and expectations about students, may have an impact on student performance is not a new issue. In the 1960s, research about teacher expectations and self-fulfilling prophecies, such as the work of Rosenthal and Jacobson (1968) on the Pygmalion effect, generated interest in how teacher expectations about their students might affect student performance. In a review of the subsequent two decades of research on teacher expectation effects, Good (1987) defined teacher expectations as "inferences that teachers make about the future behavior or academic achievement of their students, based on what they know about these students now" (p. 32). Good characterized the body of research on teachers' expectation effects as leading to a consensus that they "can and sometimes do affect teacher-student interaction and student outcomes" (p. 33). A later meta-analysis of teacher expectation and self-fulfilling prophecies concluded that teacher expectation effects do occur but that the effects are consistently reported to be small (Jussim & Harber, 2005).

Although the overall effects of teacher judgments about students appear to be small, there is evidence that they do seem to have a racial bias that likely affects Black students differently than it does other students. In fact, Jussim, Eccles, and Madon (1996) found that teacher expectations had a larger impact on Black students than on their White peers, even when controlling for socioeconomic status. More recent examples of this line of research include a study that found that White teachers had lowered expectations for their Black students' performance on standardized tests (Oates, 2003) and that informal teacher talk about students of color was dominated by deficit-based themes (Pollack, 2013).

It has become clear over the years that teacher expectations and impressions about students, although not fully understood, are a part of students' experiences and contexts for learning. The need to understand the context of students' learning of mathematics was clearly stated by Schoenfeld (1992):

> My own bias is that the key to this problem lies in the study of enculturation (and socialization). . . . And if we are to understand how people develop in their mathematical perspective, we must look at the issue in terms of the mathematical communities in which students live *and the practices that underlie those communities* [emphasis added]. (p. 364)

In our research, we expand the definition of *practices* to include teacher evaluation of student performance that may affect teacher expectations and recommendations regarding a student's place in the greater mathematical communities found within the school. This expanded definition is in keeping with the knowledge that in the United States, teachers determine classroom cultures and "learning opportunities are ultimately shaped into real opportunities by what goes on in the classroom" (Schmidt & McKnight, 2012, pp. 68–69). That is to say, it is in the hands of teachers that "issues of equity in content coverage finally play out" (p. 69).

Although it has been noted that there is not a large body of work addressing the questions concerning the relationships among Black students, mathematics, and teacher impressions (Martin, 2012; Oates, 2003), recent efforts to understand the effect of teacher evaluations on Black student performance are emerging. A qualitative case study of eight high-achieving Black male elementary students found that more than half of these students were disadvantaged by lower mathematics placements than their performance would have predicted (Berry, 2008). A large quantitative study put teacher perception at the center of analysis and then compared students in racially congruent (same race student and teacher) and incongruent classroom conditions. The researcher concluded that Black students are vulnerable to lowered test scores when placed in the classrooms of White teachers and that this may be attributable to White teachers' lowered perceptions of their Black students' academic ability (Oates, 2003).

In a call to increase research regarding Black students and their experience in mathematics, Martin (2012) argued specifically for papers that look at the complex relationships that influence Black students' learning in mathematics. This call included exploring school-based issues, such as course placements, discipline referrals, and academic support referrals, that may become intertwined with definitions of Blackness and may affect teachers' evaluation of student competencies and consequent access to rich learning opportunities (Martin, 2012). Stinson (2007) argued for an emphasis on the achievement of Black students over a deficit model as the issues of student performance in mathematics are studied. Along these lines, we aim to add to work that explores these issues by investigating the relative role of teacher evaluations of student performance and students' demonstrated performance for Black versus White students as well as for Black students who have demonstrated a high level of achievement.

Current Study

Our investigation was a secondary analysis of the Early Childhood Longitudinal Study—Kindergarten Class of 1998–1999 (ECLS-K) national database. The ECLS-K followed students from kindergarten through the eighth grade. The initial kindergarten sample was nationally representative and included 21,260 children throughout the country. The ECLS-K database includes extensive student, family, teacher, and school level data such as student background characteristics in the home, teacher credentials and evaluations of students, and school demographic data. Data for this study were drawn from the third grade (student mathematics performance scores), fifth grade (student mathematics performance scores and teacher evaluation of student performance), and eighth grade (student mathematics course placement). These rounds of data were collected in 2002, 2004, and 2007, respectively. The key research questions of this study were:

1. How does fifth-grade teacher evaluation of student ability predict placement in algebra for White students versus Black students?
2. How does fifth-grade teacher evaluation of student ability predict placement in algebra for high-performing students?

Conceptual Framework

Perceptual bias and implicit beliefs. A distinction has been made in the psychological literature between teacher expectations that lead to a self-fulfilling prophecy and those that have an impact on teachers' perceptual bias (Jussim, Madon, & Chatman, 1994). A *self-fulfilling prophecy* occurs when a teacher's beliefs have a direct impact on students' performance, whereas a *perceptual bias* is found when a teacher's beliefs have an impact on the teacher's own evaluation of a student. This perceptual bias may or may not have an impact on student performance.

Implicit Theory Research holds that contemporary issues surrounding decision making in general (Kahneman, 2011) and race in particular (Banaji & Greenwald, 2013) are less likely to be conscious decisions and are more likely subconscious decisions, of which the decision maker is unaware. Consistent with Implicit Theory Research, we do not argue that any findings regarding teachers' evaluations of students are a conscious decision to subordinate student abilities in accordance with racial prejudice but instead are likely driven by implicit beliefs about students.

The current study utilizes the perceptual bias framework (Figure 1) to understand possible indirect and longitudinal effects upon students. This basic construct is

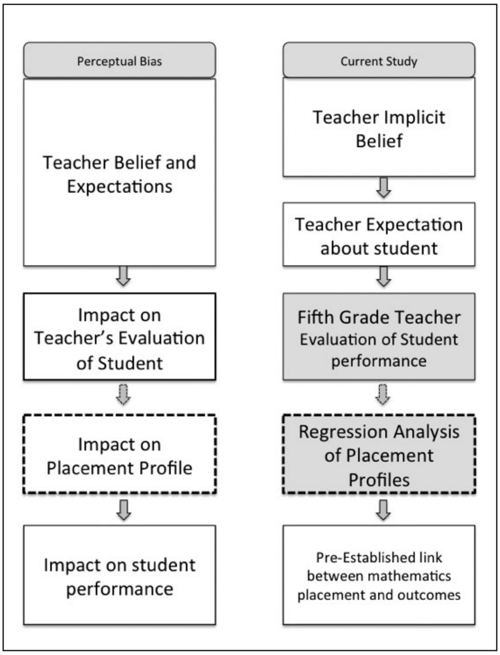

Figure 1. Conceptual framework: implicit belief, perceptual bias, and teacher evaluation of student mathematical abilities. To the left is a basic rendering of the perceptual bias construct outlined in Jussim, Madon, and Chatman (1994). The boxes with dotted lines represent the theoretical idea presented here that beliefs and expectations of teachers may affect teacher recommendations that then have an impact on actual student placements in courses. It has been established that placement does affect outcomes. To the right is our adaptation of that basic construct for this study that includes the idea that teacher beliefs are not necessarily conscious but are instead implicit. The grey boxes represent our specific areas of analysis.

rendered on the left of Figure 1; the dashed box indicates a theoretical link between the established impact of perceptual bias on the evaluation of the student and the teacher's recommendations regarding student placement. In this study we included the idea that teacher beliefs and expectations are implicit, as described above (Figure 1, right-hand side). We specifically investigated whether teacher evaluations of students, as measured by their evaluation of the students' mathematical performance, might demonstrate a different relationship to Black students versus White students (see grey boxes, Figure 1). Because it has been determined that the mathematics courses students complete in middle school influence high school and postsecondary outcomes, our conceptual framework is designed to investigate the possible link between elementary school teacher evaluation of student performance and eventual outcomes in mathematics as set in motion by middle school mathematics placements.

Why high-performing Black students? As part of the study, data collected on high-performing students were examined to determine whether these students were placed into courses in a manner consistent with teacher evaluation of student performance or consistent with students' demonstrated mathematics performance. Our rationale for isolating high-performing students is multifaceted. Initially, it rests on explicating the nature of the complex realities surrounding the extent to which U.S. students from different ethno-racial backgrounds are afforded the opportunity to study higher mathematics. As a collective subpopulation, Black students in the United States are commonly characterized and perceived as low performing in mathematics (Pollack, 2013; Stinson, 2007). Indeed, a plethora of scholarly and popular literature delineates challenges of enhancing the mathematics proficiency of Black students (see Chubb & Loveless, 2002; Paige & Witty, 2010; Thernstrom & Thernstrom, 2003). Our goal was to avoid the problematic framework that implies that White student performance is inherently superior and thereby normative (Martin, 2012; Singham, 2005) and that the primary issue in closing the achievement gap is to raise the achievement of Black students to the level of their White peers (Berry, 2008; Stinson, 2007). Thus, our focus on high-performing Black students allows us to offer a fuller image of these students' experiences in the context of mathematics study.

Second, we seek to illuminate the situation facing Black youngsters who, through performance-based indications of their abilities in third and fifth grade, would appear to be qualified candidates to receive teacher recommendations for placement on a course trajectory that would afford them the opportunity to study higher level mathematics (in this case, algebra) in middle school. By focusing on high-performing students, we were also permitted to control for particular key elements (e.g., low student efficacy as suggested by low achievement scores) that undoubtedly affect teacher evaluations of student ability as well as teachers' subsequent recommendations for student placements in mathematics courses beyond the fifth grade. This focus is in keeping with Martin's (2012) call for studies that help us better understand the experiences of Black students at the midlevel of the classroom, as opposed to the macrolevel of state and national trends or the microlevel of individual experiences and results (Martin, 2012). Finally, it occurred to us that by focusing on teacher evaluation and eventual placement of high-performing students, the potential for an actionable way to, at least partially, address inequity within a school setting may present itself. The overall performance of Black students may be enhanced simply by placing students, as they exit elementary school, in middle grades classes according to demonstrated performance. Because of the persistent racialized descriptions of the achievement gap (wherein Black students are characterized as a monolithic low-performing collective), this solution—placing students according to their performance—may seem immediately counterintuitive. To the contrary, extant research has demonstrated that high-performing Black students are frequently overlooked and tracked into low-level mathematics courses based on these students' demographic characteristics (Stiff & Johnson, 2011); in this case, the characteristic is race.

Method

Sample

The initial sample size of the ECLS-K study was over 20,000 students. Through attrition, the sample size was reduced to 11,260 students by fifth grade. The ECLS-K data collection protocol mandated that mathematics performance data be collected for approximately half of these students ($N = 5{,}339$). For the current analysis, data indicating the eighth-grade placement of the students were also needed, and this information was gathered from the teacher questionnaires at the eighth-grade level ($N = 4{,}449$). The current study also eliminated students from schools that either required algebra or did not offer algebra, because we assumed that schoolwide policy, rather than teacher evaluation or student performance, would be the mechanism in place for deciding student course placement. Therefore, students were included only from schools where some eighth-grade students did take algebra while others did not. After these adjustments, the sample size at the eighth grade became 3,055.

Instruments

The relationships among teacher evaluation, student mathematics performance, demographic data, and eighth-grade mathematics placement were investigated. Independent variables used in the ECLS-K study included the average performance across assessments of student mathematical performance at the third and fifth grades (Math Performance) and fifth-grade teacher ratings of the mathematical performance of these same students (Teacher Evaluation). Evaluations by fifth-grade teachers were used because, as discussed above, these teachers play a significant role in making recommendations for the placement into the critical first year of middle school (Grade 6). The mathematics performance scores in both third and fifth grade were utilized in order to capture the students' performance over the course of their late elementary years and to create a more stable performance indicator (two data points averaged rather than one data point alone).

Teacher evaluation. The Teacher Academic Rating Scales (TARS) in mathematics are a variable housed within the ECLS-K data set. These scales were completed by teachers for individual students and represent a detailed measure of the teachers' understanding of each student's mathematical ability level at a given grade level (see sample questions used in the TARS, Figure 2). The TARS was constructed for the ECLS-K by the National Center for Education Statistics (NCES) to align with prior research about skills that predict later achievement and also to clearly link with current curricular standards (Pollack, Atkins-Burnett, Najarian, & Rock, 2005). Throughout this study, we use the fifth-grade TARS directly as a proxy for the teacher's evaluation of a student and simply rename the variable "Teacher Evaluation" for the purpose of making the function of the TARS clear within this analysis.

Mathematics performance. Student mathematics performance was assessed using achievement tests designed by the NCES for the ECLS-K data set to measure student performance level and growth in mathematics and to assess skills that are typically taught and considered developmentally important at a given grade level. Because no assessments were available at the time that met the specific needs of a longitudinal study of its nature, assessments were constructed specifically for the ECLS-K and included items from commercial measures of mathematics as well as items that had been released from NCES studies (Pollack et al., 2005). Standards from the National Assessment of Educational Progress (NAEP), the National Council of Teachers of Mathematics, the American Association for the Advancement of Science, and the National Academy of Science (Pollack et al., 2005) as well as the scope and sequence of documents from state assessments were taken into consideration in constructing the assessments.

Given the emphasis on longitudinal trends, the ECLS-K mathematics assessment was built around an Item Response Theory (IRT) model. All raw scores were converted to IRT scale scores, which are given in standard deviation units (Pollack et al., 2005). By using IRT in testing, scores from different batteries of tests can be compared. In equating test scores, evaluators can examine growth (i.e., changes in ability) due to interventions (Hill & Lubienski, 2007). Items with r-biserials of .40 or higher were the standard for the assessment (Pollack et al., 2005). Consistent with research practices, a small number of items were also included that fell below this standard if they were useful in capturing other important information and creating an acceptable number of administered items (Pollack et al., 2005). The exact items used for the cognitive assessment have not been released to the public.

Preparation of Data

The Math Performance variable and Teacher Evaluation (TARS) variable initially had different quantitative scales in the ECLS-K data set. For this study these variables were standardized to allow for direct comparison of effects (King, 2008). Specifically, we transformed both the Math Performance and the Teacher Evaluation variables into z-scores. Both variables were normally distributed, so no transformations were needed to further prepare the data for analysis.

Circle one for each titem.						
	Not yet	Beginning	In progress	Intermediate	Proficient	Not applicable
Shows understanding of place value, for example, compares decimals to the thousandths place (1.04 > 1.009)	1	2	3	4	5	N/A
Makes reasonable estimates of quantities and checks answers, for example, estimates the product in a problem such as \$19.95 × .75 by mentally multiplying 20 × .8 = 16	1	2	3	4	5	N/A
Uses strategies to multiply and divide, for example, estimates a product or quotient and then uses the calculator to check the estimate, or divides by 4 to determine 25% of 32	1	2	3	4	5	N/A
Divides multidigit problems with remainders in the quotient, for example, computes 536 ÷ 30, or 6,135 ÷ 7	1	2	3	4	5	N/A
Demonstrates algebraic thinking, for example, solves for an unknown in an equation such as 16 × *A* = 48; or expresses a function as a general rule that enables them to determine any term in the sequence.	1	2	3	4	5	N/A

Figure 2. Fifth grade sample questions: teacher academic rating scale—mathematics. From *Spring 2004 Fifth Grade Child-Level Questionnaire: Mathematics Teacher* (p. 1), by the National Center for Education Statistics, 2004, Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Adapted with permission.

Because the goal of this study was to understand how students are placed in mathematics classes in relation to teacher evaluation and their mathematical performance, all students were analyzed to determine general placement profiles. As discussed earlier, high performers were also analyzed. A high-performing group serves to create a contrast between potentially low expectations (Teacher Evaluation) and demonstrated student ability (Math Performance). Therefore, a group of High Performing Students was created. These students scored between the 70th and 99th percentile in third grade, in fifth grade, or in both third and fifth grade. This group was created to capture the placement patterns for students whose demonstrated performance was consistent with potential placement in algebra by eighth grade.

The category cutoff for High Performing is based on documentation indicating that approximately 35% of students in the United States take algebra or above at the eighth-grade level (Loveless, 2008). This implies that those performing at approximately the 70th percentile or above at some point in late elementary school are potential candidates for advanced placement mathematics in middle school, and algebra by eighth grade, if placement is made according to demonstrated performance.

Analysis and Controls

The independent variables in this study are Math Performance and Teacher Evaluation; the dependent variable of interest was student placement in algebra or above by eighth grade. Placement decisions were recorded as *placed in algebra* (yes) or *not placed in algebra* (no). Logistic regression is appropriate for use in studies where the dependent variable is an either-or situation such as in the current study.

In logistic regression, controls are put in place to ensure comparisons of students with comparable background characteristics. When analyzing odds of placement for Black and White students, we controlled for socioeconomic status (SES), receipt of special education services, gender, Math Performance, and Teacher Evaluation. Regarding SES, a composite scale score was provided within the ECLS-K for each student based on socioeconomic indicators of both prestige and wealth. These indicators are: father/male guardian's education, mother/female guardian's education, father/male guardian's occupation, mother/female guardian's occupation, and household income. This composite socioeconomic variable was utilized as the SES covariate. Receipt of special education services was determined through variables within the ECLS-K (F5SPECS and F6SPECS) that indicated whether or not a student had an Individualized Education Plan (IEP) in place during the third- and fifth-grade rounds of data collection.

Logistic regression utilizes the logarithm of odds to produce the regression coefficient variable (B), also called the logit. Just as with linear regression, a coefficient variable B with a value near 0 indicates that the variable is not significant. The variable B (the slope) indicates how much the dependent variable changes in relation to a given independent variable. In this study, for instance, when looking at placement odds for a student who is Black, variable B is interpreted as follows: If a student is Black, his or her log odds of placement is affected by a factor of B (while holding other variables constant). This statistic, then, provides an indicator of the odds one has of being placed in algebra per a given background characteristic. Because it is the logarithm of the odds, however, it can be difficult to interpret; therefore, the odds ratio is generally preferred for interpretation (King, 2008).

Logistic regression also yields a comparative statistic: the Exponentiation of *B*, also known as the odds ratio (*OR*). This provides an effect size. Effect sizes are, in general, reported to relay the substantive significance of a result as opposed to the purely statistical significance of a result. In this analysis, the effect size conveys how much a one-unit change[1] in an independent variable affects the odds of placement in algebra by eighth grade. So if we are looking at the Math Performance variable we read the *OR* as follows: A one-unit change in Math Performance predicts the odds of placement for this group of students by a factor of the *OR* value compared to the comparative group. An *OR* of 2 for Math Performance, for instance, would mean that a standard deviation change of 1 in a student's Math Performance doubles the predicted odds of placement for a student of that group compared to the comparative group.

For the purpose of generating the *OR* statistic, when using race as a predictor, dummy variables were created using the group of White students as the comparative group. An $OR < 1$ would indicate that Black students have smaller odds than their typical White peers of being placed in algebra, as determined by the controls outlined above.

In order to maximize the ability to make inferences about the eighth-grade sample, weights were applied for this analysis to account for both the attrition of students by the eighth grade round of data and to account for the specific selection of students determined by the conditions of this study (National Center for Education Statistics, 2009).

Results

Descriptive Statistics

Overall, in this study, 43% of the sample students were placed in algebra, and 68% of High Performing students were placed in algebra (Table 1).

Correlational Analyses

Correlational analyses of the data set revealed moderately strong correlations between teacher evaluation of student performance in mathematics and students' demonstrated mathematics performance scores in the fifth grade ($r = .64$, $p < .001$). In addition, both teacher evaluation of student performance and students' mathematics performance showed a moderate relationship to student placement in eighth-grade mathematics (Teacher Evaluation, $r = .44$, $p < .001$; Math Performance, $r = .49$, $p < .001$).

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[1] A one-unit change in this analysis is a standard deviation change of 1 because our variables have been transformed into *z*-scores.

Table 1
Frequency and Percentages of Students Placed in Algebra by Performance Categories and Race

Performance category	N[a]	White N (%)	Black N (%)	Hispanic N (%)	Asian N (%)	Other N (%)
All Students	3,055	2,009(66)	198(6)	432(14)	134(4)	143(5)
High Performing	1,278	970(76)	38(3)	122(10)	68(5)	47(4)

[a]N = 3,055 with 139 students missing race data. This yields an N of 2,916 for analysis including race.

Correlations between fifth-grade teacher evaluation and mathematics performance for students in different racial categories and students with an IEP were also analyzed to determine if teacher evaluations were accurate for certain subsets of students (Table 2). Correlations between fifth-grade teacher evaluation and fifth-grade student mathematics performance were consistently found to be moderately strong across racial subsets and for students with IEPs and in line with the correlation found for all students.

Table 2
Correlations: Fifth-Grade Teacher Evaluation versus Math Performance by Race, IEP Status, and Inconsistently High Performance

Students	r
All	.64***
White	.63***
Black	.62***
Hispanic	.69***
w/IEP	.61***

****$p < .001$*

Logistic Regression Analyses

White students. For White students, the odds of being placed in algebra are favorable when compared to their comparatively typical Black peers (OR = 1.48, p = .007). For White students, Math Performance is a stronger predictor of placement than is Teacher Evaluation. In terms of the odds ratios, a 1.0 SD increase in Math Performance increases the odds of placement by a factor of 3.05 (B = 1.11; OR = 3.05, p < .001). A 1.0 SD increase in Teacher Evaluation increases the odds of placement by a factor of 1.51 (B = .41; OR = 1.51, p < .001).

An interaction was found between Math Performance and Teacher Evaluation that indicated the statistics reported above are mitigated by an internal difference within the data. The interaction indicates that Teacher Evaluation was a more powerful predictor of placement for higher performing White students than for lower performing White students. For low-performing White students, placement outcomes were virtually the same, regardless of Teacher Evaluation. As mathematics performance increased, the impact of Teacher Evaluation on student placement increased. For students who were rated low by the fifth-grade teacher, the interaction trend line indicates that student placement in eighth-grade algebra was suppressed, even in the presence of high Math Performance. These trends can be visualized with an interaction chart that helps us interpret the flow of the data by charting what would happen when a student has extremely high or extremely low Math Performance or Teacher Evaluation scores (Figure 3).

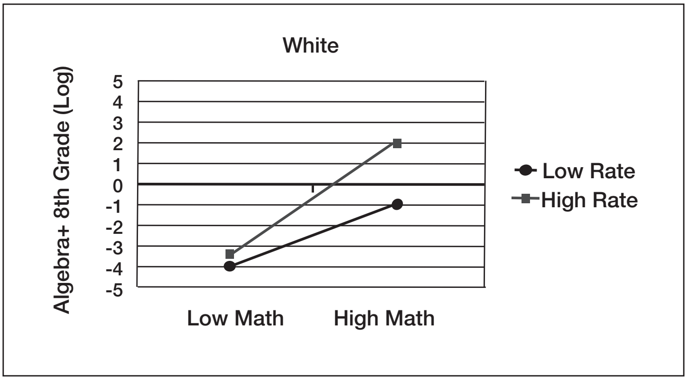

Figure 3. Graphic representation of trends within the data for White students. The interaction in the data between Teacher Evaluation (rate) and Math Performance (math) indicates that for White students, a low teacher evaluation reduces odds of placement disproportionately for high-performing students compared to low-performing students. Reference points for Log-Odds: –2 or lower ≈ 1% chance of placement; –1 ≈ 10% chance; 0 ≈ 50% chance; +1 ≈ 90% chance; +2 or higher ≈ 99% chance.

Here we use the coefficients and the constant term, as we would in multiple linear regression, to create an equation that accounts for the unique effect of each variable. This allows us to analyze what happens when a student receives extremely high or low Math Performance scores or Teacher Evaluation ratings as compared to his or her average performing same-group peer. To capture the extreme range of our data, we look at theoretical scores that are 2 standard deviations above and 2 standard deviations below the norm. Although the extreme data points used for analysis may not represent actual student data points, the slopes of the line were determined by the actual data and therefore help us to understand trends. We calculated a logit score for each condition (2 *SD* above the mean for Teacher Evaluation—High Rate; 2 *SD* below the mean for Teacher Evaluation—Low Rate; 2 *SD* above the mean for Math Performance—High Math; 2 *SD* below the mean for Math Performance—Low Math). The y-axis component of each point is the overall impact of the variables on placement outcomes and is reported in logits. Therefore a 0 indicates a 50% chance of Placement in Algebra by eighth grade compared to the average-rated and average-performing peer. Values below 0 indicate a less than 50% chance and values above 0 a greater than 50% chance of placement compared to the average peer.

Consistent with the fact that we have a significant interaction term, we see that the impact of Teacher Evaluation is different across the spectrum of different possible Math Performance scores for White students. Teacher Evaluation as a predictor affects the odds of placement less for low-scoring students than for higher performing students. For high-performing students, a low rating affects prediction odds from a logit of positive 2 (approximately 99% chance of placement) to a logit of –1 (approximately 10% chance of placement) with the low rating.

Black students. Black students have reduced odds of placement in algebra by the eighth grade compared to their peers. Using Black as a predictor, a student who is Black has an *OR* of .68, meaning an odds of placement that is approximately two-thirds that of his or her White peers when controlling for other factors ($B = -.39$; $OR = .68$, $p = .007$).

Both Teacher Evaluation ($B = .40$, $p = .036$) and Math Performance ($B = .66$, $p = .001$) were significant predictors of mathematics placement for Black students, and there was no interaction between Teacher Evaluation and Math Performance for these students (Table 3).

Table 3
Black Students: Teacher Evaluation and Math Performance as Predictor of Eighth-Grade Math Placement

Variable	*B*	Odds ratios	Confidence interval
Teacher Evaluation	0.40*	1.49*	1.03–2.15
Math Performance	0.66**	1.93**	1.30–2.87
Interaction	0.24	1.27	.87–1.85

*$p < .05$. **$p < .01$.

Again using a chart to plot extreme conditions to understand the trends in the data, we see that unlike White students, Black students who have a theoretically high mathematics performance score and a high teacher rating do not have excellent prediction odds of being placed in algebra (Figure 4). If a Black student has both high Teacher Evaluation and a high Math Performance, the trends in the data indicate that the student has essentially the same odds of algebra placement as Black students who have average mathematics scores and average teacher ratings. We infer this from the fact that the regression formula yields a logit of 0, which is interpreted as a 50% chance of being placed compared to average performing Black students (Figure 4). Conversely, White students with high Teacher Evaluation and high Math Performance have dramatically increased prediction odds (Figure 3) of placement in algebra by eighth grade compared to their average-performing White peers. Furthermore, Black students who are high performing but have a low Teacher Evaluation rating (Figure 4) have prediction odds of one-tenth the rate of placement for their average-performing and average-rated Black peers.

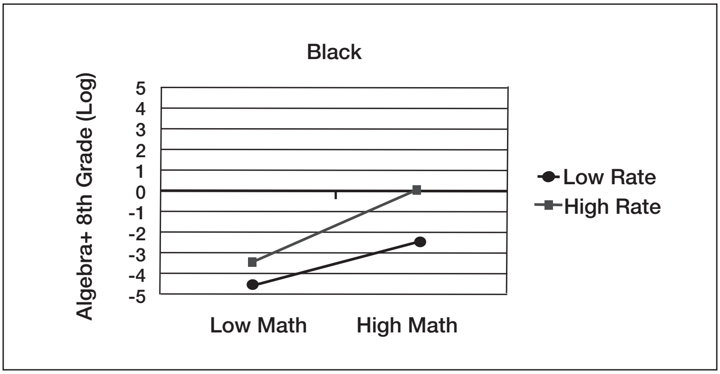

Figure 4. Graphic representation of trends within the data for Black students. There is no interaction in the data between Teacher Evaluation (Rate) and Math Performance (Math) for Black students. For students with both a high or low math performance score, a low teacher evaluation suppresses placement odds.

High-performing Black students. Results from the group of High-Performing Black students support the odds predictions made in the regression chart discussed above. For Black students who did demonstrate high performance (High Performers), the odds of placement in algebra were reduced by a factor of two-fifths compared to their White peers ($B = -.93$; $OR = .39$, $p \leq .0001$). This is a highly significant result and a more severe reduction in odds than for the group of all Black students as reported above.

Finally, comparisons of both the regression coefficients (B) and the ORs indicate that Math Performance was consistently a more powerful positive predictor for White students' placement than it was for Black students (Table 4).

Discussion

It has been previously established that the mathematics classes students take matter. In general, students gain in overall academic achievement by virtue of a higher mathematics class placement in high school (Cahan & Linchevski, 1996; Hallinan, 2003). Indeed, as a direct result of their study of advanced mathematics courses in high school, such students enter college with critical prerequisite knowledge and skills necessary to study disciplines and professional fields (e.g., physics, engineering, computer science) that decidedly are closed to students who were not afforded opportunities to study advanced mathematics in high school.

Table 4
White Students Versus Black Students: Comparison of the B Statistic and Odds Ratios [*Exp*(*B*)] *for Math Performance* (*Math*) *and Teacher Evaluation* (*Teacher*)

	B		Odds ratio	
Students	Math	Teacher	Math	Teacher
White Students	1.11	.41	3.05	1.51
Black Students	.66	.40	1.93	1.49

Among other factors, the tiered structure of courses, the myriad opportunities for extracurricular activity involvement, and the heterogeneous character of secondary student populations make it exceedingly difficult to isolate which factors have the greatest impact on course-taking patterns in high school. This is especially the case once a student is actually in high school (Burris et al., 2004, 2006). Nevertheless, course-taking trajectories in mathematics are predictable because the courses students are likely to take in high school are greatly influenced by their course-taking patterns in middle school. Correspondingly, middle school patterns are influenced by the overall quality and opportunity to learn mathematics in elementary classrooms. Specifically, sixth-grade mathematics class placements can foretell later mathematics study for most students (Akos, Shoffner, et al., 2007; Dauber et al., 1996; Stiff & Johnson, 2011; Stiff et al., 2011).

Thus, to a large degree, high school and college outcomes are predictable by-products of academic decisions made for students when they are 11 years old and in the fifth or sixth grade. What has not been established is how the factors that determine this transition from elementary to middle school may affect this trajectory. The essential question raised herein is whether specific indicators, such as the fifth-grade teacher's evaluation of student mathematical ability and the demonstrated mathematical performance of that student, affect these subsequent placement outcomes differently for different groups of students. Our findings suggest that they do.

Moreover our findings reveal that this differential impact is largely attributed to the race of the student. In this regard, Black students had lower odds of placement in algebra by the eighth grade than their White peers. Specifically, when controlling for Math Performance, Teacher Evaluation, socioeconomic status, gender, and IEP status, the odds of placement in algebra by the eighth grade for Black students were reduced by two-thirds to two-fifths compared to their White peers. For Black students, Teacher Evaluation was nearly as powerful a predictor as Math Performance. This is in sharp contrast to the general finding that Math Performance was a decidedly more accurate predictor of algebra placement than Teacher Evaluation for White students (see Table 4).

Our data indicate that Teacher Evaluation was, comparatively, a more powerful predictor for mathematics placement for Black students than it was for their White peers. This supports the claim that demonstrated academic performance does not have the same impact on placement outcomes for Black students as for White students. High-performing Black students are particularly affected by this trend. Indeed, it appears that high performance among Black students may not be attributed to the students' own mathematics abilities in the same way it is to their White peers and does not provide the access to higher mathematics placements. Stated differently, for Black students, high performance does not overcome the impact of a low Teacher Evaluation rating vis-à-vis eighth-grade mathematics placement.

Note that our data do not support the hypothesis that Teacher Evaluation would be a stronger outright predictor for Black students than for White students. In fact, the predictive power of Teacher Evaluation was the same for both groups. A summary of the patterns of placement data (Figure 5), specifically considering the different impact of performance, begs the question: What mitigates the impact of performance for Black students compared to their White peers?

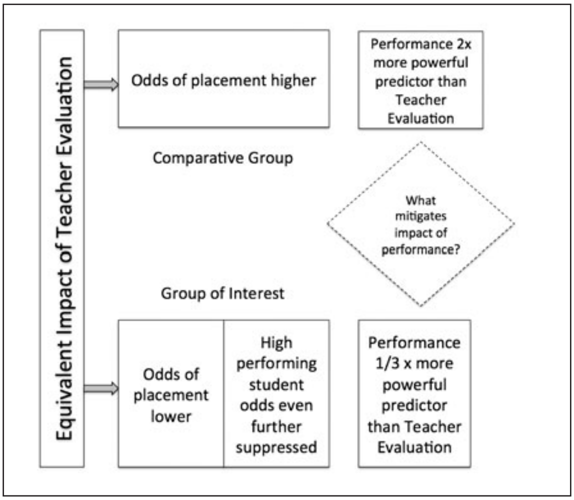

Figure 5. The equivalent impact of teacher evaluation shown pictorially. Teacher valuation has the same predictive power for Black and White students, but what mitigates the impact of student performance on placement odds for Black students?

We suggest here that the pattern in which Teacher Evaluation is suppressed compared to Black student performance serves as a viable and plausible explanation. Lower teacher ratings for high-performing Black students are consistent with (a) lowered rate of placement, (b) lowered impact of performance, and (c) equal impact of Teacher Evaluation. Although the data correlating Teacher Evaluation and Math Performance were consistent for White and Black students, we hold that this is consistent with suppressed evaluations for Black students, so long as the evaluations for White students are likewise favorable compared to performance. Again, this is consistent with the need to explain why Teacher Evaluation scores are stable across races but high performance is not "recognized" in the placement profile of Black students.

Considering Alternative Explanations

Here we draw a conclusion that high-performing Black students are not gaining equitable access to algebra class by the eighth grade based on analysis of a national data set. We further conclude that race is a factor in this trend and suggest that teacher evaluation of Black students may play a role in the racialized nature of these patterns. It is critical to note that there are other possible explanations, and we hope that this paper will open up conversations about these possibilities as well as the ones suggested here. For instance, our study does not rule out the possibility that high-performing Black students are not gaining access because of institutionalized issues within the school. Although our study ensured that algebra was available by the eighth grade at the schools for all students that were analyzed, it could be that limited resources kept the number of these classes to a minimum in these schools. At the same time, we believe that this explanation is inconsistent with the fact that Teacher Evaluation for Black students maintained an equal impact to Teacher Evaluation for White students. If institutional barriers affected Black students by reducing access and teachers evaluated students in line with student high performance, then the impact of Teacher Evaluation would "take a hit" and should go down in predictive value. These institutional barriers for high-performing Black students are consistent with lowered rate of placement and lowered impact of performance. However, they are inconsistent with equal impact of Teacher Evaluation.

It is also possible that Black students themselves have opted out of algebra classes in spite of being recommended for them. Similarly, given our data, this explanation is inconsistent with the Teacher Evaluation variable maintaining predictive value, because students going against a high evaluation of them would, again, reduce the impact of Teacher Evaluation consistent with their high performance. High-performing Black students "opting out" is consistent with lowered rate of placement and lowered impact of performance. Yet, as above, it is inconsistent with equal impact of Teacher Evaluation.

Implications and Next Steps

When it comes to Black students, performance data appear to have a reduced influence on placement and teacher evaluation an enhanced influence. That is to say, even in the light of objective measures of achievement and potential, the demonstrated mathematics acumen of high-performing Black students cannot be counted on (as it does for their White peers) to differentiate them academically from lower performing same-race peers. In short, Black students confront an untenable impediment in that their Blackness (or, as we suggest here, the teachers' implicit responses to these students' Blackness) serves as an invisible, albeit formidable, obstacle to gaining access to higher level mathematics courses, irrespective of their demonstrated performance. This observation stands in contrast to the idea that lower performance drives the achievement gap in isolation. Instead, it supports the conjecture that teacher placement recommendations, based disproportionately on teacher evaluation, may also contribute to a gap in achievement for Black students.

The differences in placement patterns identified in this study translate into fewer opportunities for Black students to access the courses that are demonstrated to increase future academic success. And because the odds of Black students encountering this negative outcome are greater than the odds faced by their White peers, it seems evident that, to some degree, this difference is the result of teacher evaluations reflecting negative perceptions of Black students as being nonacademic in general (Oates, 2003; Pollack, 2013) and nonacademic in the study of mathematics in particular. Conversely, the more favorable odds of gaining access to advanced mathematics courses for White students can be viewed as a direct manifestation of longstanding positive perspectives surrounding Whiteness and the related privileges it affords those so classified (McIntosh, 1988). Indeed, examined through the lens of critical race theory, findings from our study provide an especially troubling example of racialized privilege, as embodied in the notion of Whiteness as property (Harris, 1993). The example of our findings strikes us as especially egregious because it occurs in the context of course-taking trajectories based on children's demonstrated academic performance and teacher evaluations of these students' capabilities at the fifth-grade level—a time when many of those involved (parents, students, and the teachers themselves) likely do not foresee the powerful, long-term implications of placement recommendations. The unspoken privilege of Whiteness as property manifests itself in that White children can count on their race to enhance their odds of being perceived by their teachers as capable of learning mathematics at higher levels. Ladson-Billings (2004) has described the operations of Whiteness as property vis-à-vis school curriculum and opportunity to learn. These findings support this view and the idea that the enhanced property value of Whiteness (and conversely the devaluation of Blackness) is in operation as early as elementary school.

Schools are, almost by definition, purveyors of culture. And as purveyors of culture, they are not passive recipients of cultural norms; rather, they actively engage in and promote them. A disturbing sidebar to this reality is that without thoughtful intervention, the culture transmitted and reinforced in schools will perpetuate extant patterns similar if not identical to those found in the larger society. Findings from our study suggest some students became victims to a type of negative academic racial profiling—learning mathematics while Black, as it were. Like its counterpart in the larger society, the negative academic profiling identified in this study represents a blatant violation of a fundamental right. In this case, it is the right of all students to be assured that their demonstrated performance will serve as equal leverage toward opportunities to learn.

We hasten to note that although this study was not initially theoretically grounded in Critical Race Theory (CRT), the nature of our findings challenged us to examine more closely the implications in light of the racialized nature of the academic achievement gap itself. An important element of CRT is to address issues of racism, not from a position of "color blindness," but through deliberate consideration of the experiences of Black and other minoritized populations. The explicit purpose is to make connections between those experiences and the color we do see. Similarly, CRT holds that Whiteness, and the privileges it affords, have become so ingrained in the fabric of U.S. institutions (including schools) that it is often invisible, unnamed, overlooked, and thereby not analyzed.

The obvious question at this point, the *what now*, needs to be addressed by the education establishment and society at large. We have identified differences in the eventual placement rates for Black and White students into algebra by eighth grade and have spotlighted how the success of Black students is being limited by undervaluing their academic performance.

In this case, the *what now* is greatly affected by the *why*. In the book *Blindspot: Hidden Biases of Good People*, Banaji and Greenwald (2013) draw the conclusion, based on evidence that is "far too substantial to ignore" (p. 209), that "*Implicit race attitudes* (*automatic race preferences*) *contribute to discrimination against Black Americans*" (p. 208). As an example of how to outsmart unconscious implicit assumptions, they cite the use of blind auditions for professional musicians (Banaji & Greenwald, 2013). Although using blinded academic performance testing, without regard for the students' race or teacher evaluation of student performance, may not be as clear an answer for schools as a blind audition is for musicians, we believe there is merit to this analogy. Because of our deeply ingrained ideas about Black and White students' expected performance levels, many people may implicitly expect that a blinded practice would reduce Black student placement in higher math classes. To reiterate, although our call for teachers to assign Black students to mathematics courses based on the individual student's actual demonstrated performance strikes us as a painfully obvious solution, we acknowledge that for various reasons (not the least of which are longstanding beliefs about and acceptance of notions of Black inferiority) this solution might appear counterintuitive to many. But the findings of this study and others that have taken into consideration the experience of Black students or high-performing Black students (Berry, 2008; Stiff et al., 2011) suggest otherwise. We believe, and our data suggest, that the achievement gap may be partially explained by this differential opportunity to learn and that there are academically high-performing black students being overlooked because of implicit assumptions made about them. In this vein, a first step for administrators and teachers who want to avoid the impact of implicit bias is to simply create a blinded spreadsheet of scores and placement recommendations. It may be that these blinded data spreadsheets line up with what teachers would have recommended for student placement. And it may be that they do not. Either way, the *what now* is to let the students' performance drive placement until there is clear evidence that teacher evaluations of student performance are not hindering the placement outcomes of Black students.

References

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns and Bachelor's degree attainment* (Research Report No. 431363). Washington, DC: U.S. Department of Education. Retrieved from: http://www2.ed.gov/pubs/Toolbox/index.html

Akos, P., Lambie, G. W., Milsom, A., & Gilbert, K. (2007). Early adolescents' aspirations and academic tracking: An exploratory investigation. *Professional School Counseling, 11*(1), 57–64. doi:10.5330/PSC.n.2010-11.57

Akos, P., Shoffner, M., & Ellis, M. (2007). Mathematics placement and the transition to middle school. *Professional School Counseling, 10*(3), 238–244.

Archbald, D., & Farley-Ripple, E. N. (2012). Predictors of placement in lower level versus higher level high school mathematics. *High School Journal, 96*(1), 33–51. doi:10.1353/hsj.2012.0014

Banaji, M. R., & Greenwald, A. G. (2013). *Blindspot: Hidden biases of good people*. New York, NY: Delacorte Press.

Battey, D. (2013). Access to mathematics: "A possessive investment in whiteness." *Curriculum Inquiry, 43*(3), 332–359. doi:10.1111/curi.12015

Berry, R. Q., III. (2008). Access to upper-level mathematics: The stories of successful African American middle school boys. *Journal for Research in Mathematics Education, 39*(5), 464−488.

Boaler, J. (2008). *What's math got to do with it?* New York, NY: Penguin Books.

Bowles, S., & Gintis, H. (2002). Schooling in capitalist America revisited. *Sociology of Education, 75*(1), 1–18.

Burris, C. C., Heubert, J. P., & Levin, H. M. (2004). Math acceleration for all. *Educational Leadership, 61*(5), 68–71.

Burris, C. C., Heubert, J. P. & Levin, H. M. (2006). Accelerating mathematics achievement using heterogeneous grouping. *American Educational Research Journal, 43*(1), 105–136. doi:10.3102/00028312043001105

Cahan, S., & Linchevski, L. (with Ygra, N., & Danziger, I.). (1996). The cumulative effect of ability grouping on mathematical achievement: A longitudinal perspective. *Studies in Educational Evaluation, 22*(1), 29–40. doi:10.1016/0191-491X(96)00002-8

Catsambis, S. (1994). The path to math: Gender and racial-ethnic differences in mathematics participation from middle school to high school. *Sociology of Education, 67*(3), 199–215. doi:10.2307/2112791

Chubb, J. E., & Loveless, T. (Eds.) (2002). *Bridging the achievement gap*. Washington, DC: Brookings Institution Press.

Darling-Hammond, L. (2010). *The flat world and education: How America's commitment to equity will determine our future.* New York, NY: Teachers College Press.

Dauber, S. L., Alexander, K. L., & Entwistle, D. R. (1996). Tracking and transitions through middle grades: Channeling educational trajectories. *Sociology of Education, 69*(4), 290–307. doi:10.2307/2112716

Flores, A. (2007). Examining disparities in mathematics education: Achievement gap or opportunity gap? *High School Journal, 91*(1), 29–42. doi:10.1353/hsj.2007.0022

Gamoran, A., & Mare, R. D. (1989). Secondary school tracking and educational inequality: Compensation, reinforcement, or neutrality. *American Journal of Sociology, 94*(5), 1146–1183. doi:10.1086/229114

Garet, M. S., & Delany, B. (1988). Students, courses, and stratification. *Sociology of Education, 61*(2), 61–77. doi:10.2307/2112265

Geiser, S., & Santelices, V. (2006). The role of advanced placement and honors courses in college admissions. In P. C. Gándara, G. Orfield, & C. L. Horn (Eds.), *Expanding opportunity in higher education: Leveraging promise* (pp. 75–114). Albany, NY: State University of New York Press.

Good, T. L. (1987). Two decades of research on teacher expectations: Findings and future directions. *Journal of Teacher Education, 38*(4), 32–47. doi:10.1177/002248718703800406

Hallinan, M. T. (1994). Tracking: From theory to practice. *Sociology of Education, 67*(2), 79–84.

Hallinan, M. T. (2003). Ability grouping and student learning. *Brookings Papers on Education Policy, 6*, 95–124. doi:10.1353/pep.2003.0005

Harris, C. (1993). Whiteness as property. *Harvard Law Review, 106*(8), 1709–1791.

Hill, H. C., & Lubienski, S. T. (2007). Teachers' mathematical knowledge for teaching and school context: A study of California teachers. *Educational Policy, 21*(5), 747–768. doi:10.1177/0895904807307061

Horn, L., & Nuñez, A.-M. (2000). *Mapping the road to college: First-generation students' math track, planning strategies, and context of support* (NCES 2000-153). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2000/2000153.pdf

Jussim, L., Eccles, J., & Madon, S. (1996). Social perception, social stereotypes, and teacher expectations: Accuracy and the quest for the powerful self-fulfilling prophecy. *Advances in Experimental Social Psychology, 28*, 281–387. doi:10.1016/S0065-2601(08)60240-3

Jussim, L., & Harber, K. (2005). Teacher expectations and self-fulfilling prophecies: Knowns and unknowns, resolved and unresolved controversies. *Personality and Social Psychology Review, 9*(2), 131–155. doi:10.1207/s15327957pspr0902_3

Jussim, L., Madon, S., & Chatman, C. (1994). Teacher expectations and student achievement: Self-fulfilling prophecies, biases, and accuracy. In L. Heath, R. S. Tindale, J. Edwards, E. J. Posavac, F. B. Bryant, E. Henderson-King, … J. Myers (Eds.), *Applications of heuristics and biases to social issues* (pp. 303–334). New York, NY: Plenum Press.

Kahneman, D. (2011). *Thinking, fast and slow*. New York, NY: Farrar, Straus, and Giroux.

King, J. E. (2008). Binary logistic regression. In J. W. Osborne (Ed.), *Best practices in quantitative methods* (pp. 358–384). Thousand Oaks, CA: Sage Publications.

Ladson-Billings, G. (2004). New directions in multicultural education: Complexities, boundaries, and critical race theory. In J. A. Banks & C. A. McGee Banks (Eds.), *Handbook of research on multicultural education* (2nd ed., pp. 50–65). San Francisco, CA: Jossey-Bass.

Loveless, T. (2008). *The misplaced math student: Lost in eighth grade algebra*. Providence, RI: Brown Center on Education Policy. Retrieved from http://www.brookings.edu/~/media/Research/Files/Reports/2008/9/22%20education%20loveless/0922_education_loveless.PDF

Martin, D. B. (2012). Learning mathematics while black. *Educational Foundations, 26*(1–2), 47–66.

McIntosh, P. (1988). *White privilege and male privilege: A personal account of coming to see correspondences through work in women's studies*. Unpublished manuscript, Center for Research on Women, Wellesley College, Wellesley, MA.

Morgan, C., & Watson, A. (2002). The interpretative nature of teachers' assessment of students' mathematics: Issues of equity. *Journal for Research in Mathematics Education, 33*(2), 78–110. Retrieved from http://www.jstor.org/stable/749645

Moses, R. P., & Cobb, C. E., Jr. (2001). *Radical equations: Math literacy and civil rights*. Boston, MA: Beacon Press.

National Center for Education Statistics. (2004). *Spring 2004 fifth grade child-level questionnaire: Mathematics Teacher*. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Retrieved from http://nces.ed.gov/ecls/pdf/fifthgrade/teacherMath.pdf

National Center for Education Statistics. (2009). Early Childhood Longitudinal Study—Kindergarten Class of 1998–1999 Database Training Seminar, May, 2009. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics.

Oakes, J. (with Ormseth, T., Bell, R. M., & Camp, P.). (1990, July). *Multiplying inequalities: The effects of race, social class, and tracking on the opportunities to mathematics and science*. (Document No. NSF-R-3928). Santa Monica, CA: RAND corporation. Retrieved from http://www.rand.org/content/dam/rand/pubs/reports/2006/R3928.pdf

Oates, G. L. S. C. (2003). Teacher-student racial congruence, teacher perceptions, and test performance. *Social Science Quarterly, 84*(3), 508–525. doi:10.1111/1540-6237.8403002

Paige, R., & Witty, E. (2010). *The Black-White achievement gap: Why closing it is the greatest civil rights issue of our time*. New York, NY: AMACOM.

Pollack, T. M. (2013). Unpacking everyday "teacher talk" about students and families of color: Implications for teacher and school leader development. *Urban Education, 48*(6), 863–894. doi:10.1177/0042085912457789

Pollack, J. M., Atkins-Burnett, S., Najarian, M., & Rock, D. A. (2005). *Early childhood longitudinal study, kindergarten class of 1998–99 (ECLS-K), psychometric report for the fifth grade* (NCES 2006–036). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Retrieved from http://files.eric.ed.gov/fulltext/ED489079.pdf

Rosenthal, R., & Jacobson, L. (1968) *Pygmalion in the classroom: Teacher expectation and pupils' intellectual development*. New York, NY: Holt, Rinehart & Winston.

Schmidt, W. H., & McKnight, C. C. (2012). *Inequality for all: The challenge of unequal opportunity in American schools*. New York, NY: Teachers College Press.

Schoenfeld, A. H. (1992). Learning to think mathematically: Problem solving, metacognition, and sense making in mathematics. In D. A. Grouws (Ed.), *Handbook for research on mathematics teaching and learning* (pp. 334–370). New York, NY: MacMillan.

Singham, M. (2005). *The achievement gap in U.S. education: Canaries in the mine*. Lanham, MD: Rowman & Littlefield Education.

Stiff, L. V., & Harvey, W. B. (1988). On the education of black children in mathematics. *Journal of Black Studies, 19*(2), 190–203. doi:10.1177/002193478801900206

Stiff, L. V., & Johnson, J. L. (2011). Mathematical reasoning and sense making begins with the opportunity to learn. In M. E. Strutchens & J. R. Quander (Eds.), *Focus in high school mathematics: Fostering reasoning and sense making for all students* (pp. 85–100). Reston, VA: National Council of Teachers of Mathematics.

Stiff, L. V., Johnson, J. L., & Akos, P. (2011). Examining what we know for sure: Tracking in middle grades mathematics. In W. F. Tate, K. D. King, & C. R. Anderson (Eds.), *Disrupting tradition: Research and practice pathways in mathematics education* (pp. 63–77). Reston, VA: National Council of Teachers of Mathematics.

Stinson, D. W. (2007). African American male adolescents, schooling (and mathematics): Deficiency, rejection, and achievement. *Review of Educational Research, 76*(4), 477–506. doi:10.3102/00346543076004477

Trusty, J. (2004). *Effects of students' middle-school and high-school experiences on completion of the bachelor's degree* [Research Monograph No. 1]. Amherst, MA: University of Massachusetts, School of Education, Center for School Counseling Outcome Research. Retrieved from http://www.umass.edu/schoolcounseling/uploads/ResearchMonograph1.pdf

Thernstrom, A., & Thernstrom, S. (2003). *No excuses: Closing the racial gap in learning*. New York, NY: Simon & Schuster.

Useem, E. L. (1992). Middle schools and math groups: Parents' involvement in children's placement. *Sociology of Education, 65*(4), 263–279. doi:10.2307/2112770

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