Tracking Decisions in North Carolina's Public High Schools

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Abstract

This paper analyzes the criteria employed to assign students into tracked English and Mathematics classes across public high schools in North Carolina. Specifically, I examine the probability of high track placement moving from eighth grade to ninth grade classrooms based upon both achievement and demographic factors. Analysis is performed at both the school and district level. Although student performance does affect placement at both levels, there are other personal characteristics that are significant factors in determining track assignment. The main finding is that being black has a positive effect on high track placement at the district level, but a negative effect at the school level. The former appears to be linked to residential segregation, while the latter suggests a within-school bias that has important policy implications.

I. Introduction

Tracking, an educational stratification technique incorporated in many public high schools in the United States, separates students by different ability levels, with the aim of maximizing student achievement at each level (Hallinan, 1996). While tracking can begin as early as the late elementary or middle school grades, it is most common in high school and generally occurs in English and Mathematics classes. Track levels vary by school; while some schools can have more than four or five levels (and may even allow students to attend technical or vocational schools), others will simply have a general and advanced level.

Although tracking is extremely common across the country—and even more common in other countries—the practice is highly controversial, and subject to much criticism in the education literature (Hanushek & Wobmann, 2006; Hallinan, 2001). Various papers and articles cite limited access to higher tracks, and assert that criteria for placement into tracks, particularly the highest, differ greatly across schools and can be somewhat arbitrary (Kilgore, 1991). While in most cases teacher recommendations, past achievement, and student motivation are key factors in track placement, their relative contribution in decision making varies across schools and districts. Thus, decisions waft between arbitrary, exclusive, inclusive, and meritocratic (Kilgore, 1991). The goal of most schools is to be meritocratic in tracking decisions, which should result in student distributions matching national patterns and students' expectations. However, deviations from this desired pattern are quite common and can result in over or under populated high and low tracks as compared to averages (Kilgore, 1991). An additional criticism is that schools either are unable to or do not choose to alter their initial track placements, restricting the ability of students to move between tracks (Hallinan, 1991).

While scholars have identified numerous problems with tracking systems, perhaps the most salient relates to biases in placement, distancing schools from the meritocratic tracking systems described by Kilgore (1991). Many schools have been found to use policies that result in classroom-level segregation by gender, income, race, or ethnicity as a result of tracking decisions. Though the exact causes of the segregation can only be hypothesized, it is problematic for several reasons. The interaction between students of several backgrounds leads to enhanced cultural knowledge and awareness, as well as increased development of leadership skills (Antonio, 2001). Furthermore, certain classrooms might be restricted in their resources or instructional tools, leading to inequality (Oakes & Guiton, 1995; Mickelson, 2001). Nonetheless, more meritocratic tracking decisions could help to eliminate some of the classroom-level segregation and potentially ameliorate the increasing achievement gaps between students of different backgrounds.

While much prior research has therefore focused on how tracking decisions are made, who is placed in what track, and whether there is mobility between tracks, few have analyzed an area as large as a state, and what factors influence assignments at both the district and school levels. Furthermore, most studies do not decompose and compare the trends in placement between various academic subjects. Finally, while many papers have acknowledged biases toward (or against) groups of certain backgrounds, they sometimes do not investigate the correlates or causes of such biases in track placement.

This paper analyzes tracking decisions in the public schools of the state of North Carolina. Using data from the North Carolina Education Research Data Center, I aim to determine what eighth grade characteristics influence tracking decisions at the ninth grade level across the state at both the district and school levels. Particular attention is paid to race and ethnicity as a factor, as North Carolina has a substantial minority population, with a strong representation of black and Hispanic students in its public schools. Empirical analysis is conducted to examine track placement trends among racial and ethnic groups, as well as those of different socioeconomic backgrounds, to determine whether there are significant biases in tracking assignments toward certain groups. It is suspected that, because in the past they have been found to have higher achievement, there is favoritism toward placing white and Asian students into the highest track. Additionally, it is assumed that there are arbitrary (but perhaps biased) decisions regarding students with similar achievement, on the margin between high and low track placement, and inherent biases in those placements result in black and Hispanic students generally being placed in the lower tracks. I have found, however, that there is a great discrepancy in black students' placement in the higher track depending on whether I control for district or school effects. Additionally, some of the variables differ in their significance between English and Mathematics classrooms, with placement in English classes typically more influenced by non-meritocratic factors.

This paper will proceed as follows. First, in Section II, I will present some background information on tracking assignments and decisions in public high schools in the form of a literature review, highlighting how and where this paper will contribute to the prior research. Section III will then discuss the theoretical framework behind tracking incorporated in many of the models described in the education literature, and my particular empirical specification. In Section IV, I will explain the type of data I have obtained and the attributes of the dataset used in the analysis section. Section V will describe my analysis and articulate explanations for the results I have compiled and found. Finally, Section VI concludes the paper, summarizing my findings and articulating some policy implications stemming from the results.

II. Literature Review and Paper Contributions

The previous research on tracking is quite extensive, and although there are some articles that analyze significant factors in track placement, they typically incorporate only a few schools and thus a smaller number of observations, making the results somewhat inconclusive. Nonetheless, the literature frequently does conclude that there is some sort of bias or favoritism present in tracking decisions, although the grounds of the bias vary with the focus of each paper. The research on tracking and tracking decisions in high schools can be split into three major categories: analysis of actual decision-making, mobility between tracks, and achievement effects caused by tracking decisions. While this paper deals mainly with the first of these three areas, it does touch on the other two, making them relevant points to address. Therefore, this literature review will focus mainly on what has been written about tracking decisions, but also will briefly survey the literature tracking mobility and achievement effects.

In terms of school policies and approaches toward tracking, James D. Jones, Beth E. Vanfossen, and Margaret E. Ensminger (1995) find that track placements vary greatly by school and they indicate that two students with the same achievement could be placed in different track levels depending on the school which they attend. Such a phenomenon can occur due to one school's higher average achievement than another or the emphasis on different criteria for tracking decisions between the schools (Jones, Vanfossen, & Ensminger, 1995). Using the High School and Beyond survey, they also find that when schools offer students the choice of their track placement, more students end up in higher track classrooms than when school administrators and teachers are the sole determiners of track placement, indicating that students do desire high track placement. Maureen T. Hallinan (1991) reaches similar conclusions, and further finds that while schools try to adopt tracking policies that are appropriate for their student populations, once the initial policy is developed, it is rarely altered. Such stagnant policies typically result in restricted access to higher track classes and similar student distributions in classes from year to year (Hallinan, 1991).

Looking at the results of track placements from a student standpoint, Adam Gamoran (1992) studies direct assignment to tracked classrooms from the middle school level to high school, a type of analysis quite similar to the methods used in this paper. In particular, he studies five demographically distinct public high schools to see what types of factors influence initial assignment in tracked classrooms at the high school level. Using test scores and past grades as his determinants of past achievement, he finds that high-achievers are unequivocally correctly placed in the highest level classrooms, whether through test scores, teacher recommendations, or self-placement. He also concludes that of the middle-achieving students, those of higher socioeconomic backgrounds are more likely to be placed into the most rigorous tracks (Gamoran, 1992).

Daniel G. Solorzano and Armida Ornelas (2002) discuss Hispanic and Latino enrollment in Advanced Placement (AP) classes, one type of an advanced track that occurs generally a few years after beginning high school. They explain how school structures implicitly favor white students toward placement in AP classes and that Chicano and Latino students inherently do not have equal access to AP and Honors classes. Such discrepancies result from their isolation as an ethnic group in schools or residential segregation placing them in poorer schools that do not offer these classes (Solorzano & Ornelas, 2002). Kristin

Klopfenstein (2001) develops empirical models and finds that income, rather than race or ethnicity, is the single most important factor influencing why black and Hispanic students enroll in AP classes at a much lower level than white students. She finds that track placement is somewhat of a self-fulfilling prophecy. Given their history of high achievement and dominating enrollment in AP classes, white students are more likely to be encouraged to take an AP class. The finding that track placement reinforces and dictates student achievement is confirmed in many other articles similar to Klopfenstein's (Rosenbaum, 1978; Gamoran & Mare, 1989).

Jeannie Oakes' research overlaps with some of Klopfenstein's findings, and she applies them more generally to tracking decisions, not just the AP framework. She also concludes that lower tracks are generally composed of students from lower socioeconomic backgrounds, and that, accordingly, high track classes are often homogenous (Oakes, 1987). She further indicates that minority students are likely to be in low track classes, while white and Asian students are most often enrolled in higher tracks that generally have better teaching and learning resources (Oakes & Guiton, 1995). Roslyn Arlin Mickelson (2001) focuses more on trends in racial groups for track placement in the urban Charlotte-Mecklenburg, North Carolina school district and she similarly concludes that black students are more likely to be placed in lower tracks, where there are fewer educational resources available for instruction than in higher track classrooms. Thus, she finds that the separate tracks in Charlotte are not equal, and create inferior opportunities for students in the lower track to learn.

Hallinan has also written several articles on track mobility in secondary school, focusing on general trends and race effects. Track mobility, at its core, is the ability to move between tracks after the initial placement is made (i.e. moving to a higher track from an initial low track placement) (Hallinan, 1996). In one article, she finds that while mobility is limited overall, there is much more of it than assumed in the educational research community (Hallinan, 1996). Using a longitudinal sample of 2,000 students, she finds that students actually move from low to high tracks more frequently than high to low tracks. Additionally, Hallinan finds that changes occurred in English classes more frequently than Mathematics, but that female, low income, and black students are more likely to drop into the lower track than those of other, more privileged backgrounds. In a separate article focusing more on race effects in track mobility, Hallinan (1995) again finds that black students are more likely to move to lower tracks in both English and Mathematics, unless they are initially enrolled in high track classes in both subjects. There have been a substantial number of articles indicating that stereotype threat and peer effects lead to some of this downward mobility of minority students, especially black and female students (Steele, 1997; Tyson, Darity, & Castellino, 2001). Regardless of reason, such movement from a high to low track for black students could negatively affect their self-esteem, motivation, and attitudes toward learning (Hallinan, 1995).

The literature on achievement effects as a result of tracking is most varied in its content and results, focusing sometimes on overall academic gains of students, and on other occasions its effects on achievement gaps, or long-term educational goals and outcomes. In particular, Robert E. Slavin (1990) finds that ability grouping results in very little measurable increased achievement in the high track levels. He performed a study analyzing both classrooms where tracking was used and classrooms where students were of heterogeneous ability levels. Ultimately, by using standardized tests to measure overall learning and attainment, Slavin concludes that results were similar for high-achieving students in both classroom types, but that low-achieving students performed slightly better in heterogeneous ability classrooms.

Gamoran (1986) studies ability grouping in elementary levels, and attempts to apply his framework to the high school and collegiate level. He concludes that in the same way reading groups are determinants of reading ability in first grade, ability grouping at the high school level could be influential in determining collegiate ability and vocational placement. Hanushek and Wobmann (2006) further Gamoran's findings and support the idea that tracking at an early age is meaningful in determining later achievement. In examining several different countries' approaches to tracking, they find that early tracking can reduce average achievement for those in the lower tracks and exacerbate achievement gaps at higher levels of education (high school, for example).

Perhaps a more common segment of the literature examines the effects of tracking on inequality between certain ethnic, racial, or socioeconomic groups. In a study examining the differences in achievement as a result of tracking in Rockford, Illinois and San Jose, California, Oakes (1995) determines that grouping practices limit opportunities and lead to lower outcomes for the students in remedial or lower tracks. She also finds that black and Hispanic students are strongly overrepresented in the lower tracks, and therefore concludes that these students on average do not reach their full potential as a result of tracking. Alternatively, David N. Figlio and Marianne E. Page (2002) find that schools that have instituted a "detracking" framework, or have changed from tracked to untracked systems in their classrooms, do not improve outcomes, and in fact, increase the discrepancy between low and high achieving students. Using the National Education Longitudinal Study, they conclude that the differences may be in place prior to track stratification, and the more specified educational structure of track systems aid in student achievement. Overall, the literature on effects of tracking on achievement gaps and inequality is rather inconclusive, much like some of the other literature described in this section.

In this particular paper, I expand on this prior research in analyzing tracked public high school classrooms, looking closely at the types of variables that lead to high track placement in high schools across the state of North Carolina. Using eighth grade student characteristics, I examine what factors—both meritocratic and biographical—significantly enter into the decisions of the schools in their tracking decisions. Compared to Gamoran's (1992) model, this paper analyzes a much more well-defined geographic area, using substantially more data to focus mainly on racial and ethnic differences in high track placement. While Gamoran only examines five high schools in five districts and compares results between them, I used data on 98 districts and 307 schools across North Carolina, and accounted for both district and school differences in placements. This type of analysis is typically not performed in articles on tracking and tracking decisions in high schools. When synthesized with the previous literature on tracking, this paper provides important conclusions and implications about tracking decisions in North Carolina and their effect on the achievement of groups of various backgrounds.

III. Theoretical Framework and Empirical Specification

A. General Framework for Tracking Decisions

The research I have prepared focuses on the degree to which tracking decisions are meritocratic, and whether there is discrimination in assigning students of different racial or ethnic groups to the highest track. Although it is desirable to assume that tracking decisions are meritocratic, and incorporate only achievement-based criteria, my analysis will test this very assumption. By studying many high schools from across North Carolina, I created a very powerful analysis that reveals trends throughout the state.

As previously noted, I assumed that all public high schools with tracking systems aim for meritocratic decisions, consistent with previous research (Kilgore, 1991). Generally, meritocratic decisions involve the combination of various criteria, but frequently incorporate some combination of students' past grades, perceived ability and motivation, test scores, and counselor recommendations (Kilgore, 1991; Gamoran, 1992). While most students accept high track placement when it is assigned to them, students often have a choice if they want to be in the higher track classrooms (Jones, Vanfossen, & Ensminger, 1995). Because most students accept the high track assignment, especially initially, I have not included this decision as a variable in my framework. Therefore, assuming track assignments are based exclusively on achievement, I begin with the following model:

Track Placement = f (grades, ability, motivation, test scores, recommendations) **(1)**

While this formula is the desired one for most public high schools, there are inevitably other factors that could influence or bias a students' track placement. Accordingly, the model listed above might appropriately include more factors besides the "achievement criteria" outlined in Equation (1), and I have estimated it as follows:

Track Placement = f ("achievement criteria", gender, race/ethnicity, parental request, family income, peer effects, etc.) **(2)**

There are various reasons that the additional factors in Equation (2) might also help to explain student track placement. For example, it is possible that those families with greater income have parents who place a higher value on education, and who thus encourage their children to take school more seriously or insist that their child be placed in a higher track, regardless of actual achievement (Useem, 1991). Also, a student with many friends who are lower-achievers might be more inclined to downplay his or her intellectual talents in favor of fitting in with his or her friends (Osborne, 2001). Such behavior might hinder that student's achievement and thus his or her likelihood of being placed in the highest track—regardless of actual ability—indicating that peer effects could significantly alter track placement (Osborne, 2001). Additionally, there may be some bias from teachers or counselors toward placing higher income, male, or white and Asian students into the advanced tracks, making income, gender, and race and ethnicity significant factors in track placement.

The main goal of this paper is to analyze these variables in great detail to answer various questions. In particular, are tracking policies in North Carolina's public high schools biased? Are there non-meritocratic measures that act as significant factors in tracking decisions? Specifically, are the actual criteria used to make tracking decisions employed in such a way that students are more or less likely to be placed in the highest track based upon racial or ethnic background alone? If the answers to any of these questions are yes, then it becomes plausible to argue that tracking policies are not only biased, but also may inhibit students' ability to learn at the level and pace they may want or deserve.

B. Model Approach and Specification

To answer the aforementioned questions, I studied the classrooms in which ninth grade students in North Carolina are enrolled. I chose ninth grade as opposed to other grades as it is often the first year of high school, and the first time in many school districts that students are placed into different tracks (Gamoran, 1992). Ninth grade track placement is also a particularly interesting grade level to study as most students generally do not move between tracks after their initial high school track placement (Hallinan, 1995). Since students' eighth grade characteristics are the criteria used to determine track placement in ninth grade, I studied data indicating students' backgrounds from eighth grade to see how these characteristics affect the students' ninth grade placement into English and Mathematics classes. Beyond just examining race and ethnicity, I also analyzed which other non-meritocratic variables are significant, which might help to explain potential racial or ethnic biases in track placement.

The best way to empirically answer the questions outlined above is to use probit regression models. This framework will predict the probability of student assignment to the highest track on a scale from zero to one based upon some or all of the variables. Each of the regressions that I ran stem mainly from the two frameworks depicted in Equation (3) and Equation (4) as follows:

P (Highest Track Placement) = f (test scores, anticipated Reading grade, race/ethnicity) **(3)**

P (Highest Track Placement) = f (test scores, anticipated Reading grade, race/ethnicity, gender, days absent, free/reduced price lunch eligibility, parent educational attainment, limited English proficiency) **(4)**

The reason I base my regressions on both of these frameworks is because, as previously noted, the variables of interest are student race and ethnicity binary variables. In each of these equations, test scores and the anticipated grade in Reading (English) class should be the only significant predictors of highest track placement (as they are the only truly meritocratic criteria in the above equations), meaning that none of the other explanatory variables in Equation (3) or (4) should be significant in these regressions (assuming there is no measurement error). Equation (3) thus reflects whether being of a specific racial or ethnic background is significantly correlated with track placement, while Equation (4) breaks down which theoretically extraneous factors in meritocratic tracking decisions have the largest impact in actual placement; specifically, whether it is race or ethnicity, or a possible correlate of race or ethnicity [one of the additional variables included in Equation (4)]. Thus, I account for the omitted variable bias present in Equation (3) and can observe which omitted variables most strongly affect the coefficient values and significance by examining results from Equation (4).

To further add to the power of this analysis, I use a cross-sectional fixed effects regression framework for each of the probit models. Specifically, I created binary variables at both the district and school level so that I control for differences in tracking policies and student characteristics between districts and between schools. Consequently, each of the main regressions actually has one of the following baseline frameworks, outlined in Equation (5) and Equation (6) [with controls meaning the additional variables added from Equation (3) to Equation (4)]:

P (Highest Track Placement) = f (test scores, anticipated Reading grade, race/ethnicity, "controls", district binary variables) **(5)**

P (Highest Track Placement) = f (test scores, anticipated Reading grade, race/ethnicity, "controls", school binary variables) **(6)**

The district binary variables in Equation (5) and the school binary variables in Equation (6) help account for the differences in track assignments between districts and schools and create the fixed effects regressions.

I separated the data related to English classes and Mathematics classes, and ran regressions for the specific subjects. These are the two subjects in which tracking is most common across high schools and districts throughout the nation (Hallinan, 1991). Only schools and districts which utilize tracking policies in both subjects are included in this analysis. The dataset is also restricted to public schools, so all magnet, charter, and vocational schools are excluded from the analysis.

C. Variables in the Analysis

In terms of the measurements of specific variables, the dependent variable for this analysis, fittingly, is "track level". For simplicity, I made this variable binary, with "0" signifying lower track classes and a "1" indicating that the class is the highest track at that particular school. By using a binary, rather than multi-level, dependent variable, it is easier to institute the probit model I outlined above.

I utilized End-of-Grade test scores to proxy for achievement. The End-of-Grade tests are given to all students in North Carolina in grades three through eight to measure student achievement, to provide accountability for schools and teachers, and to satisfy the national requirements of No Child Left Behind (North Carolina Department of Public Instruction). Tests are given in both Reading and Mathematics. In eighth grade, the scale for the Reading test ranges from 231 to 290 while the scale for the Mathematics test ranges from 235 to 310, according to the North Carolina Education Research Data Center. I used raw scores for both the Reading and Mathematics End-of-Grade Test Score variables in the regressions.

I also incorporated the student's anticipated grade in their Reading (English) course in eighth grade to proxy for achievement. When the data was collected at the time of the eighth grade End-of-Grade tests, the teachers identified the students' anticipated grade in their

Reading class for the academic year. A projection of the anticipated grade is particularly useful, as this prediction is generally the class grade that helps to determine student track assignment for the next year (many assignments are made prior to the end of the current school year). I coded this variable from “0” to “4”, with “0” representing an anticipated grade of “F”, “1” representing a “D”, “2” a “C”, “3” a “B”, and “4” an “A”. Such information on grades was only available for the Reading/English class, but not the Mathematics class.

The days absent variable is a whole number indicating the number of days which the student did not attend school during their eighth grade year. This variable not only includes days which students did not attend school by their own choice (for illness, family trips, emergencies, etc.), but also days which students were not present due to some type of suspension or expulsion. A breakdown of the reasons for each of the student absences was not available.

The free and reduced price lunch eligibility variable is a proxy for family income, widely used in many other education articles for the same purpose. In North Carolina, family application forms for obtaining free or reduced lunch eligibility for students are sent to homes and must be returned to the schools in order to determine eligibility, along with any food stamps or Work First Family Assistance (WFFA) forms (North Carolina Department of Public Instruction). Based upon this information, school officials decide whether the student will be eligible, although parents can appeal an initial decision. Table 1 below, taken from the North Carolina Department of Public Instruction website, summarizes eligibility requirements for free or reduced lunch in North Carolina’s public schools (note that “family size” does not include the student).

Table 1: Free/Reduced Lunch Eligibility in North Carolina						
	FREE			REDUCED		
Family Size	Yearly Income	Monthly Income	Weekly Income	Yearly Income	Monthly Income	Weekly Income
1	$11,674	$973	$225	$16,613	$1,385	$320
2	$15,756	$1,313	$303	$22,422	$1,869	$432
3	$19,838	$1,654	$382	$28,231	$2,353	$543
4	$23,920	$1,994	$460	$34,040	$2,837	$655
5	$28,002	$2,334	$539	$39,849	$3,321	$767
6	$32,084	$2,674	$617	$45,658	$3,805	$879
7	$36,166	$3,014	$696	$51,467	$4,289	$990
8	$40,248	$3,354	$774	$57,276	$4,773	$1,102
Each Additional Family Member:	+$4,082	+$341	+$79	+$5,809	+$485	+$112

As noted in Table 1, free and reduced price lunch eligibility is a function of the number of additional family members besides the student, and the family's income. In the dataset, free and reduced price lunch eligibility is coded as a binary variable equal to "1" if the student is eligible for free or reduced price lunch and "0" if the student is not eligible.

I chose to measure parent educational attainment using three binary variables: one indicating that neither parent is a high school graduate, one indicating at least one parent has a high school diploma but less than a four year college degree (Bachelor's degree), and one indicating that at least one parent has a Bachelor's degree or greater. I classified parent educational attainment by using the highest parent's attainment. For students in a single-parent household, the parent with whom the student primarily lives is used to measure parent educational attainment. To avoid multicollinearity in the regressions, I only incorporated the variable indicating at least one parent has obtained a high school diploma but less than a Bachelor's degree, and the variable indicating at least one parent has obtained a Bachelor's degree or greater.

In terms of limited English proficiency, students are "flagged" by the school upon entry if their first language is not English, if English is not the primary language used in the home, or if students are unable to speak English fluently. This variable is coded on a binary basis, with a “1” signifying that the student has been flagged for limited English proficiency and a “0” for all other students.

For the racial and ethnic group variables, students are coded with a “1” if they are a member of that group; they are coded with a “0” otherwise. For purposes of the regressions, I use the white/Caucasian identification as the comparison group. To avoid multicollinearity, I do not include the variable for white students in the regression, which enables me to observe the likelihood of members of other racial or ethnic groups to be placed in the high track as compared to white students. Student gender is also a binary variable and is coded similarly. Students are assigned a “1” if they are female, while male students are assigned a “0”.

Using these variables, I developed the regression models to measure “the probability that a student is enrolled in at least one highest track class in either English or Mathematics.” I described the model in this way because I used only one observation in each subject per student so that certain students or schools were not given extra weight in the regression analysis. Therefore, even though there were many students in the state of North Carolina who were enrolled in multiple English or Mathematics classes during the 2006-2007 academic year, I only included one classroom observation for those students in English and Mathematics classes. For the instances in which students were enrolled in both high and low track classes within the same subject, I used the observation in which the student was enrolled in the highest track.

D. Limitations

There are some noteworthy caveats to this analysis. One is related to the outcome measure described in the previous section. By creating a binary dependent variable, the model is certainly simplified. In many schools, there are more than two track levels, often four or five. Additionally, by limiting the observations to one per subject per student, I simplified the model, as there are some students who would otherwise have observations in both high and low track classes within the same subject (although there were very few such students).

Additionally, while I incorporated the anticipated eighth grade Reading class grade into this model, I was unable to account for the anticipated grade in any other subject, most notably Mathematics. Classroom grades have been found to be one of the best indicators of track placement, and the fact that they are missing for most of the classes certainly weakens the model a bit. Omitting grades for Mathematics classes specifically might inflate the coefficients on a few variables, including the variable for female, since female students generally outperform male students in the classroom (Downey & Vogt Yuan, 2005). It could also influence the parent educational attainment variable, since children's classroom performance closely correlates with their parents' educational achievement. Furthermore, projections of anticipated grades are also potentially subject to teacher bias toward or against groups of certain backgrounds.

Another potential, but less significant, shortcoming to this model is the fact that in some schools, tracking actually begins in middle school, especially in Mathematics classrooms (Gamoran, 1992). Students could be separated into general Mathematics and Pre-Algebra, or Algebra 1 classrooms, as early as sixth or seventh grade (and ability grouping sometimes even begins in elementary school) (Gamoran, 1986). Consequently, tracking might have already been in existence for some of these students before their ninth grade year, and thus I would not be identifying their initial placement. Consistent with the information previously mentioned, if tracking does occur in middle school, it may be difficult for students to move between track levels in their ninth grade assignment (Hallinan, 1991).

It is also nearly impossible to quantify some other factors that may enter into the social aspects of tracking decisions. In particular, peer effects generally have an influence on student motivation, and thus achievement, although the degree to which this phenomenon affects achievement is inconclusive (Tyson, Darity, & Castellino, 2001; Osborne 2001). Peer effects basically imply that students tend to achieve and be enrolled in similar classes to their friends, and may purposefully limit their achievement to be more like them, which has been well-documented for black students (Tyson, Darity, & Castellino, 2001). Similarly, stereotype threat, or the idea that students of certain backgrounds achieve only at the level expected of them, can significantly alter student achievement (Steele, 1997). A particularly common example of stereotype threat is the expectation of female students to perform weaker in Mathematics and Science classes (Steele, 1997; Osborne, 2001). While it is generally established that peer effects and stereotype threat do have some impact on student achievement, it has not been measured and the degree of their effects are inconclusive.

IV. Data Sources and Dataset Attributes

To perform this analysis and incorporate the variables outlined in the previous section, I acquired data from the North Carolina Education Research Data Center (NCERDC), which has offices on the campus of Duke University. The NCERDC obtains data from schools across the state, including public, private, magnet, charter, and vocational schools, and the datasets range from student level statistics to school level and district level data. I worked closely with the NCERDC's members to obtain student-level datasets that could be utilized for the previously outlined analysis plan. With the datasets released by the

NCERDC, I manipulated and combined them to create one large dataset that I used for my analysis. Though some of the information has been rescaled and reworked for the purposes of my analysis, all of the data and statistics included in this project originally come from the NCERDC.

At the core of this analysis is the NCERDC's "Course Membership" dataset for the 2006-2007 school year. This dataset indicates the courses in which many of the students in North Carolina are enrolled at all grade levels, with over 2.2 million observations in total. As stated previously, I included only ninth grade students in schools that track in both English and Mathematics classes. Each student in the Course Membership dataset is coded by a numeric Master ID instead of student name or identity, so I have no way of knowing who the students actually are, just their background characteristics and the classes in which they were enrolled.

I also acquired other datasets from the previous school year (2005-2006) indicating these same students' eighth grade characteristics, from which their ninth grade class and track placements stem. Using the Master ID, I matched students between the datasets and combined the datasets so that the courses which the students took in ninth grade (the 2006-2007 academic year) were paired with the same students' background characteristics from their eighth grade year (the 2005-2006 academic year). In total, I merged approximately four datasets to create the ultimate dataset that I used for this analysis, with approximately 175,000 observations in total, virtually evenly split between English and Mathematics classrooms. The summary statistics for these variables and a brief description of the way in which they were measured (more extensively described in the previous section) are outlined in Table 2.

Table 2: Summary Statistics for Major Variables			
Variable	**Mean**	**SD**	**Description**
Reading Scaled Score	264.88	8.25	State End-of-Grade Test Scores, scaled 231-290
Math Scaled Score	273.00	10.54	State End-of-Grade Test Score; scaled 235-310
Anticipated Reading Grade	2.64	1.11	Student's Anticipated Grade in Reading/English Class Scaled; 0=F, 1=D, 2=C, 3=B, 4=A
Gender	0.4972	0.50	Binary; female=1, male=0
Days Absent	8.00	8.09	Number of days missed in 8th grade, including disciplinary
Free/Reduced Lunch Eligible	0.3633	0.48	Proxy for Income; Binary; eligible=1, not=0
Less than HS Diploma	0.0705	0.26	Parent Educational Attainment; Binary; yes=1, no=0
HS Diploma but no Bachelor's	0.6053	0.49	Parent Educational Attainment; Binary; yes=1, no=0
Bachelor's Degree or Greater	0.3242	0.47	Parent Educational Attainment; Binary; yes=1, no=0
Limited English Proficiency	0.0465	0.21	Flagged by school Binary; yes=1, no=0
Track	0.2970	0.46	Dependent Variable Binary; 1=highest, 0=other

The NCERDC codes students into six different racial or ethnic groups: white, black, Asian, Hispanic, American Indian, or multiracial. Students can only be coded in one of the six groups; if a student belongs to two or more of the groups, he or she is identified as "multiracial". The distribution of observations between racial and ethnic groups is outlined in Table 3.

As can be seen from Table 3, the dataset is dominated mainly by white and black observations, but is fairly representative of the population of North Carolina as a whole

(2006 American Community Survey). The relatively strong presence of Hispanic students in this study is particularly noteworthy and important, as the population of this group in North Carolina is growing quickly.

Table 3: Distribution of Racial/Ethnic Groups

Racial/Ethnic Group	Number of Observations	Proportion
White	105,921	60.31%
Black	50,445	28.72%
Asian	3,431	1.95%
Hispanic	9,674	5.51%
American Indian	2,508	1.43%
Multiracial	3,639	2.07%
Total	175,618	100.00%

Given this distribution of racial groups and the previous literature indicating achievement gaps between racial and ethnic groups, it is important to note those initial differences in this dataset. Figures 1 and 2 depict the average test score on the Reading and Mathematics End-of-Grade tests and the anticipated reading grades, respectively, for each racial and ethnic group.

There are some interesting differences to note between the test score and anticipated grade data. Though white students on average have the highest scores on the End-of-Grade Reading tests, Asian students have the highest anticipated grades in Reading class on average. Also, while multiracial students have relatively high End-of-Grade test scores in Reading on average, their actual grades in Reading classes are quite comparable to those students from racial and ethnic groups with lower average achievement on the exams. Given these results in terms of average test scores and Reading grades between the racial and ethnic groups, it is also quite interesting and revealing to examine the differences in parent educational attainment between the racial and ethnic groups. Figure 3 analyzes such differences.

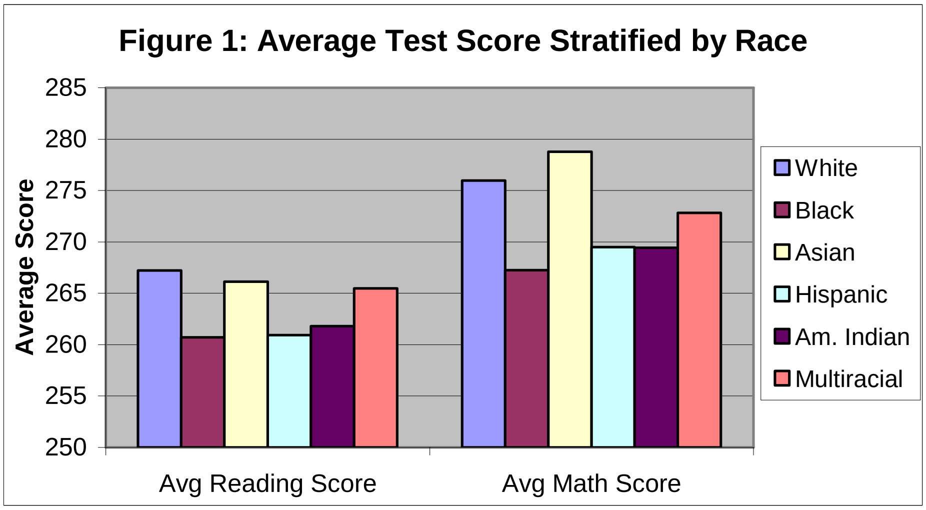


Figure 1: Average Test Score Stratified by Race
Average Score
285
280
275
270
265
260
255
250
Avg Reading Score
Avg Math Score
White
Black
Asian
Hispanic
Am. Indian
Multiracial

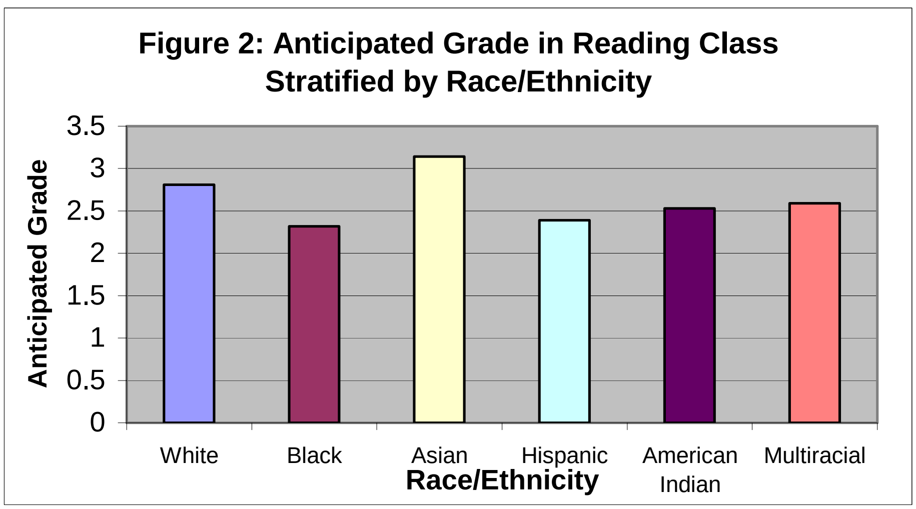


Figure 2: Anticipated Grade in Reading Class Stratified by Race/Ethnicity
Anticipated Grade
3.5
3
2.5
2
1.5
1
0.5
0
White
Black
Asian
Hispanic
American Indian
Multiracial
Race/Ethnicity

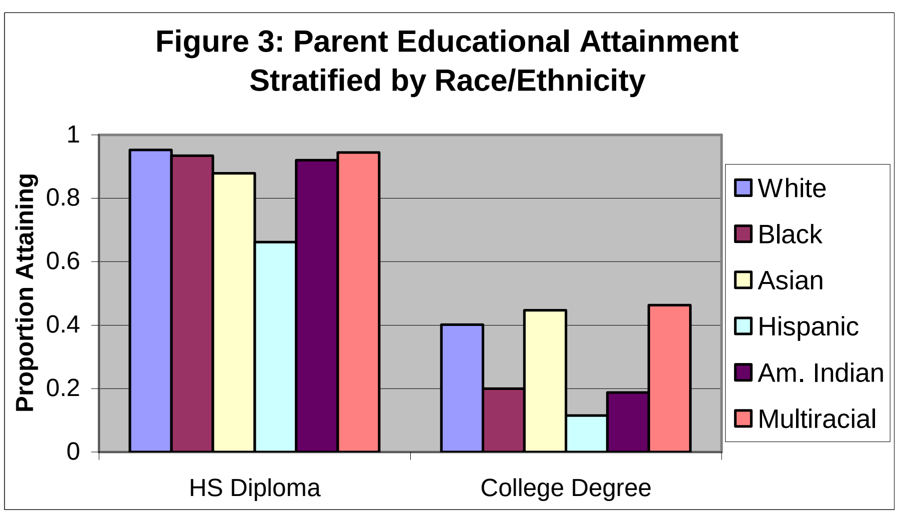
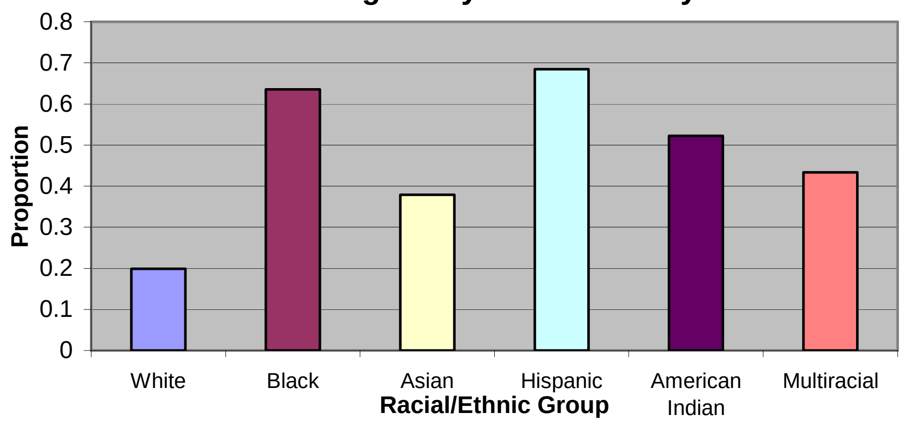


Figure 3: Parent Educational Attainment Stratified by Race/Ethnicity
Proportion Attaining
1
0.8
0.6
0.4
0.2
0
HS Diploma
College Degree
White
Black
Asian
Hispanic
Am. Indian
Multiracial

Parent educational attainment in Figure 3 is the proportion of students who have one parent (or both) with that level of educational attainment. The high school diploma portion of the chart is fairly similar across racial and ethnic groups, with the exception of Hispanics; over 80% of students in each of the racial or ethnic groups have at least one parent who has graduated from high school (other than Hispanics). The college degree (Bachelor's degree) category, however, has much more variation. Multiracial students actually have at least one parent who obtained a Bachelor's degree or greater most frequently, followed closely by Asian and white students. Black, American Indian, and Hispanic students, respectively, have the smallest proportion of parents who earn a Bachelor's degree, or higher. However, Hispanic students, overall, have substantially lower parent educational achievement than all other racial or ethnic groups in each category.

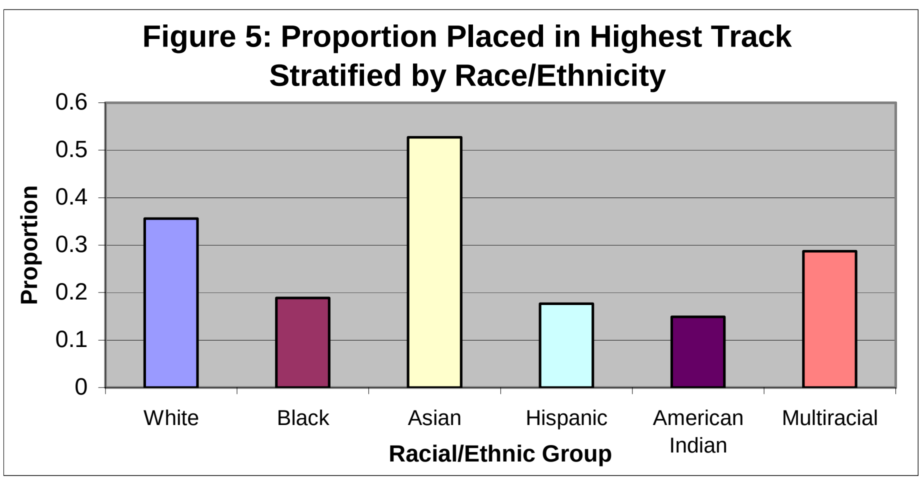
As outlined in Figures 1 through 3, there are substantial differences in terms of test scores, grades, and parent educational attainment between the racial and ethnic groups in this dataset. Figure 4 shows that there are also great differences between racial and ethnic groups in terms of income, using free and reduced price lunch eligibility as a proxy.

Figure 4: Proportion Free and Reduced Price Lunch Eligible by Race/Ethnicity

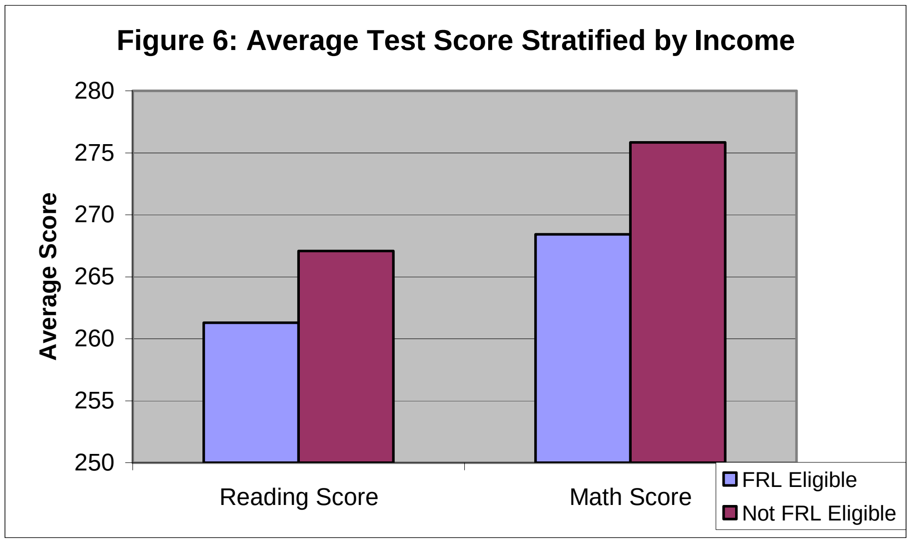


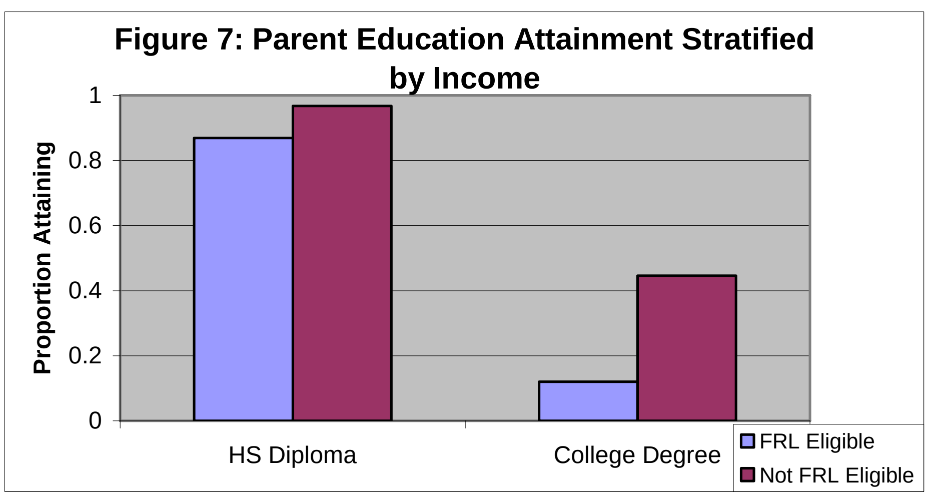
A substantially larger proportion of students eligible for free and reduced price lunch are also of the racial or ethnic groups that on average score lower on the End-of-Grade tests, have lower anticipated reading grades, and have parents of lower educational achievement. Specifically, while only 20% of the white students in the sample are eligible for free or reduced price lunch, over 60% of black and Hispanic students are eligible, and over 50% of American Indian students. In keeping with the results from Figures 1 through 3, there is also great stratification between racial and ethnic groups in terms of income, shown in Figure 4.

Given these differences, it is interesting to look at Figure 5, which reports the stratification of racial groups in terms of high track placement, the dependent variable in the regressions. The differences in proportion of the members of each racial or ethnic group enrolled in a highest track are staggering. While Asian students are placed in high track classrooms over half of the time, black, Hispanic, and American Indian students are all enrolled in the highest track under 20% of the time. This value is substantially lower than the overall average of approximately 30% of students enrolled in the highest track classes.



In addition to differences in achievement, parent educational attainment, and track placement between racial and ethnic groups, there is also a strong difference between income brackets in the same categories. I show such differences using charts similar to those in Figures 1 and 3, but I stratify by income instead of race and ethnicity. To proxy for income, I used free and reduced price lunch eligibility, with two groups: one that is not eligible and one that is, similar to the variable incorporated in my regression analysis. The characteristics of the dataset when stratified by income are depicted in Figure 6 and Figure 7.





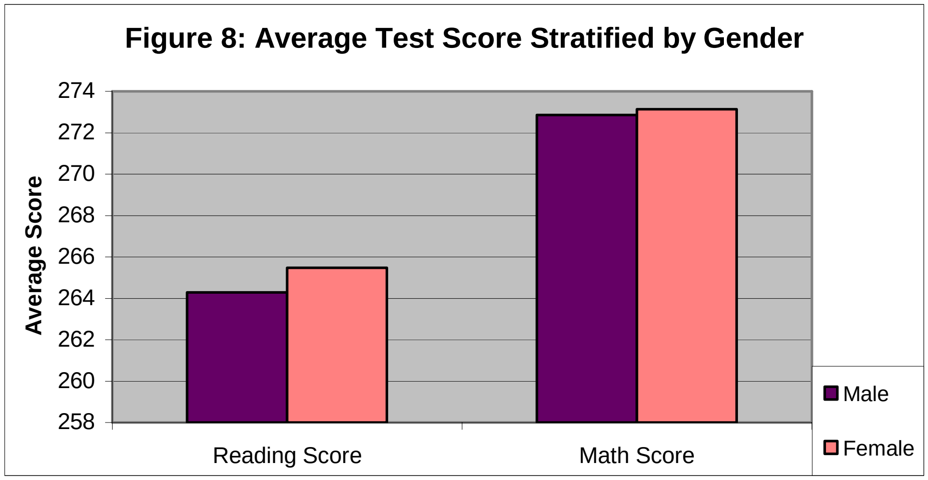
Just as there is great stratification between racial and ethnic groups, there is also great stratification in achievement between income brackets. In terms of test scores, those of higher income brackets score between six and seven points higher on both the Reading and

Mathematics End-of-Grade tests. While both those students who are and are not free or reduced price lunch eligible have a high rate of at least one parent who has graduated high school, there is a much greater discrepancy between those who have parents with a Bachelor's degree or greater. The students of higher income brackets have at least one parent who has a Bachelor's degree or greater over 40% of the cases in the dataset, while only 10% of those who are of the lower bracket (free or reduced price lunch eligible) have at least one parent with a Bachelor's degree. Such a discrepancy is expected, given the wage premiums for college graduates (Murphy & Welch, 1989).

There are further differences in terms of anticipated Reading grades and actual track placement between the income groups. Students who are not eligible for free or reduced price lunch have an average anticipated Reading grade of 2.85, nearly a "B", whereas those who are eligible have an average anticipated Reading grade of 2.31, over half of a grade level lower. Additionally, while about 38% of higher income students are placed in the highest track in this sample, only about 16% of lower income students are in highest track classrooms.

Because there has been substantial literature written on female-male student achievement gaps, I also outlined the difference between male and female student performance on the End-of-Grade tests in Figure 8. As can be seen in Figure 8, male and female students have a virtually equal average performance on the exam, with female students scoring slightly (but insubstantially) higher in both Reading and Mathematics.

Because parental educational attainment is similar between male and female students, those results are not depicted in any charts or figures. However, it is interesting to note the differences between female and male students in terms of anticipated Reading class grade



and track placement. Female students have an expected Reading grade of nearly half of a grade higher than their male counterparts, 2.87 to 2.41. Additionally, female students are more likely to be placed in the highest track classrooms; specifically, about 34% of female students in the sample were placed in the highest track, with only about 26% of male students attaining such placement.

In terms of other trends in this dataset, as shown in Table 2, only approximately five percent of the student observations have been flagged for limited English proficiency. The majority of the students that are classified as being limited English proficient are Hispanic or Asian; in fact, about 68% of Hispanic students and 42% of Asian students in the dataset have been identified as having limited English proficiency. There is a very small difference between the average number of days absent between the racial and ethnic groups, as well as between income groups and genders. In fact, the only noteworthy deviation of the rather similar distribution is that Asian students are absent much less on average (about four days) as compared to other groups (which average around eight days absent).

V. Data Analysis and Findings

I used probit regression models to determine the probability of highest track placement given various combinations of the control variables. The sections that follow outline my major results and findings.

A. District Fixed Effects Regressions

Depicted in Tables 4 and 5 are regression results using district fixed effects in English and Mathematics classes, respectively. In North Carolina, school districts can contain anywhere between one high school in less populated regions to well over 10 high schools in densely populated areas like Charlotte-Mecklenburg. I had data on 98 school districts across the state of North Carolina, all of which were included in the district fixed effects regressions. The columns of the regressions are numbered (1) through (8) in each table. Column (1) includes only the racial and ethnic binary variables as a baseline of the distributions of track placements between racial and ethnic groups. I note that this is a biased and poor regression, and does not show what is truly occurring in North Carolina's high schools, even though some observers might look at these results and wrongfully assume and conclude otherwise. Because these results are biased, they are not really discussed in this section.

The more meaningful results and the focus of this analysis, however, are in Columns (2) through (8), which show substantial differences from the results in Column (1). These more valuable results include the achievement variables and combinations of other controls, with all of the variables included in Column (8).

In Columns (2) through (8), the major general trend to notice is that there is actually favoritism toward black students for placement into the highest track. Specifically, for both

Table 4: District Fixed Effects Regressions: English Classes

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reading Scaled Score	--	0.0745***	0.0738***	0.0729***	0.0708***	0.0722***	0.0713***	0.0711***
		(63.22)	(62.30)	(60.81)	(58.50)	(59.76)	(58.71)	(58.42)
Math Scaled Score	--	0.0482***	0.0512***	0.0503***	0.0479***	0.0440***	0.0471***	0.0471***
		(55.17)	(57.55)	(55.84)	(52.56)	(48.89)	(51.40)	(51.43)
Anticipated Reading Grade	--	0.4713***	0.4390***	0.4338***	0.4148***	0.4443***	0.4056***	0.4059***
		(72.90)	(66.38)	(64.64)	(61.14)	(66.32)	(58.96)	(58.99)
Female	--	--	0.2695***	0.2763***	0.2949***	--	0.3055***	0.3005***
			(23.05)	(23.37)	(24.69)		(25.09)	(25.09)
Days Absent	--	--	--	--	--	-0.0066***	-0.0077***	-0.0078***
						(-7.44)	(-8.66)	(-8.74)
Free/Reduced Lunch Eligible	--	--	--	-0.2163***	-0.1362***	-0.1179***	-0.1239***	-0.1215***
				(-15.63)	(-9.58)	(-8.28)	(-8.66)	(-8.48)
High School Diploma	--	--	--	--	0.2079***	0.1830***	0.1990***	0.1918***
					(6.97)	(6.14)	(6.65)	(6.39)
Bachelor's Degree	--	--	--	--	0.5659***	0.5171***	0.5484***	0.5409***
					(17.91)	(16.38)	(17.30)	(17.01)
Limited English Proficiency	--	--	--	--	--	--	--	-0.1216***
								(-2.96)
Black	-0.7606***	0.0395***	0.0278*	0.1076***	0.1181***	0.1084***	0.0970***	0.0946***
	(-66.05)	(2.63)	(1.84)	(6.66)	(7.25)	(6.62)	(5.89)	(5.74)
Asian	0.0852***	0.0882**	0.0904**	0.1531***	0.1735***	0.1444***	0.1491***	0.1948***
	(2.60)	(2.06)	(2.11)	(3.51)	(3.91)	(3.27)	(3.36)	(4.13)
Hispanic	-0.7800***	-0.2029***	-0.2099***	-0.1152***	-0.0236	-0.0404	-0.0386	0.0200
	(-35.96)	(-7.41)	(-7.64)	(-4.04)	(-0.81)	(-1.38)	(-1.31)	(0.56)
American Indian	-0.6594***	-0.2858***	-0.2923***	-0.2472***	-0.2238***	-0.2166***	-0.2199***	-0.2198***
	(-14.07)	(-4.93)	(-5.03)	(-4.21)	(-3.80)	(-3.68)	(-3.73)	(-3.73)
Multiracial	-0.2893***	-0.0224	-0.0375	0.0061	0.0223	0.0278	0.0142	0.0151
	(-9.22)	(-0.58)	(-0.97)	(0.16)	(0.56)	(0.71)	(0.36)	(0.38)
Pseudo R-squared	0.1201	0.4546	0.4591	0.4594	0.4663	0.4612	0.4667	0.4668
Number of Observations	88,281	88,020	88,020	86,185	85,817	85,569	85,569	85,569

Note: * denotes significance at 10% level, ** denotes significance at 5% level, and *** denotes significance at 1% level
Numbers in parentheses denote z-statistics; a value with "--" indicate that the variable was not included in regression

Table 5: District Fixed Effects Regressions: Math Classes

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reading Scaled Score	--	0.0265***	0.0257***	0.0248***	0.0222***	0.0244***	0.0234***	0.0235***
		(18.77)	(18.14)	(17.38)	(15.38)	(16.88)	(16.10)	(16.12)
Math Scaled Score	--	0.1158***	0.1173***	0.1168***	0.1151***	0.1122***	0.1140***	0.1140***
		(93.37)	(93.18)	(92.15)	(89.99)	(88.59)	(88.70)	(86.68)
Anticipated Reading Grade	--	0.3573***	0.3412***	0.3346***	0.3152***	0.3162***	0.2949***	0.2948***
		(42.12)	(39.16)	(38.00)	(35.35)	(35.96)	(32.55)	(32.53)
Female	--	--	0.1123***	0.1162***	0.1295***	--	0.1399***	0.1400***
			(7.86)	(8.08)	(8.93)		(9.60)	(9.60)
Days Absent	--	--	--	--	--	-0.0173***	-0.0179***	-0.0179***
						(-13.33)	(-13.76)	(-13.74)
Free/Reduced Lunch Eligible	--	--	--	-0.1967***	-0.1054***	-0.0803***	-0.0816***	-0.0828***
				(-10.57)	(-5.48)	(-4.15)	(-4.22)	(-4.26)
High School Diploma	--	--	--	--	0.2796***	0.2622***	0.2687***	0.2721***
					(5.74)	(5.36)	(5.49)	(5.53)
Bachelor's Degree	--	--	--	--	0.5958***	0.5593***	0.5715***	0.5750***
					(11.95)	(11.17)	(11.40)	(11.43)
Limited English Proficiency	--	--	--	--	--	--	--	0.0408
								(0.82)
Black	-0.8696***	0.0464***	0.0396**	0.1100***	0.1224***	0.0879***	0.0797***	0.0806***
	(-61.48)	(2.66)	(2.01)	(5.25)	(5.79)	(4.12)	(3.72)	(3.76)
Asian	0.3062***	0.3559***	0.3550***	0.3975***	0.4295***	0.3855***	0.3846***	0.3705***
	(9.47)	(8.14)	(8.11)	(8.95)	(9.51)	(8.53)	(8.50)	(7.66)
Hispanic	-0.7731***	-0.1824***	-0.1847***	-0.0955**	0.0028	-0.0226	-0.0226	-0.0403
	(-28.87)	(-4.98)	(-5.04)	(-2.52)	(0.07)	(-0.58)	(-0.58)	(-0.90)
American Indian	-0.5830***	-0.0387	-0.0423	-0.0060	0.0182	0.0241	0.0205	0.0206
	(-9.65)	(-0.47)	(-0.52)	(-0.07)	(0.22)	(0.29)	(0.25)	(0.25)
Multiracial	-0.3459***	-0.0107	-0.0168	0.0187	0.0383	0.0305	0.0238	0.0235
	(-9.58)	(-0.22)	(-0.35)	(0.39)	(0.79)	(0.62)	(0.49)	(0.48)
Pseudo R-squared	0.1134	0.5058	0.5065	0.5063	0.5116	0.5128	0.5139	0.5139
Number of Observations	87,337	87,093	87,093	85,298	84,959	84,726	84,726	84,726

Note: * denotes significance at 10% level, ** denotes significance at 5% level, and *** denotes significance at 1% level
Numbers in parentheses denote z-statistics; a value with "--" indicates that the variable was not included in regression

English and Mathematics classes, the coefficient on black is positive and significant at the 5% level or the 1% level in nearly all of the regressions. Such results counter much of the previous literature which indicates that minority racial and ethnic groups are less likely to obtain high track placement (Oakes, 1995).

As depicted in Tables 4 and 5, for the other racial or ethnic groups, all of the regressions indicate that Asian students are overwhelmingly more likely to be placed in the highest track in both English and Mathematics classes. In general, Hispanic students are significantly less likely to be placed in the highest track; only when certain combinations of controls are included does the coefficient become insignificant. There are far fewer observations for American Indian and multiracial students (combined they represent approximately 3.5% of the observations); however, the results are still worth noting. For English classes, American Indian students are less likely to be placed in the highest track at a significant level in all of the regressions, but for Mathematics classes, there are no significant results in Columns (2) through (8). The multiracial variable also has insignificant coefficients in Columns (2) through (8), regardless of whether the class is English or Mathematics.

In terms of the test score variables [Columns (2) through (8)], it is interesting to note that a one point increase in the Mathematics test score has a close to equal impact on high track placement in English classes as a one point increase in the Reading test score (as measured by the coefficients). Alternatively, for Mathematics classes, a one point increase in the Mathematics test score results in an impact nearly five times as large as a one point increase in the Reading test score. Nonetheless, the test score variables do have the largest z-scores, indicating that tracking decisions do strongly rely on achievement-based criteria.

Although the coefficient on anticipated Reading grade is positive and significant in both English and Mathematics regressions, it is appropriately much stronger in the regressions for the English classes.

The majority of the control variables are more significant and larger in magnitude for English classes. Perhaps these results, along with the test score dynamic mentioned above, are due to the fact that tracking decisions for English classes include criteria that might overlap in Mathematics studies, or may not incorporate well-defined criteria. Meanwhile, Mathematics tracking decisions might involve more concrete measures and include criteria more exclusively related to Mathematics.

The results of the control variables are, in general, consistent with previous literature and the fact that they typically decrease the magnitude of the negative relationship between some of the racial and ethnic binary variables upon their inclusion is not surprising, as they account for some omitted variable bias present in the regressions in Column (2). For example, as indicated earlier, black and Hispanic students in this sample were much more likely to be eligible for free and reduced price lunch, and have parents who have lower educational attainment on average. Therefore, it is not unexpected that upon their inclusion, the omitted variable bias decreases, making the significant and positive effect of being black increase and the significant negative coefficient on the Hispanic variable become statistically insignificant (Columns (5) through (8) in the tables).

It is also important to note that students whose families have higher incomes or whose parents have a higher educational attainment are more likely to be in the high track and have parents who take an active approach to their education (Useem, 1991). Specifically, those families in higher income brackets are more likely to be the ones whose parents call school principals or guidance counselors and request that their children be placed in a higher track classroom, even if the initial placement is otherwise (Useem, 1991). Consequently, this phenomenon is another reason why high income or high parent educational attainment yields a greater likelihood of being placed in the highest track (Useem, 1991). As mentioned earlier, the parent educational attainment variables could also be capturing some omitted achievement factors such as additional classroom grades, or innate ability and motivation.

Another noteworthy result from the district fixed effects regression is the role of the limited English proficiency variable, which has a strong and significantly negative coefficient in the English regressions, but has a statistically insignificant coefficient for Mathematics classes (exhibited in Column (8) of each Table). It is relatively intuitive to think that someone who has limited proficiency in English would be less likely to be in the high track in English classes, where language and expression skills in English are integral, than in Mathematics classes where language skills are not as essential in learning the material.

The days absent variable, expectedly, has a negative relationship with highest track placement; this effect is outlined by Columns (6), (7), and (8) in Tables 4 and 5. This variable serves as a proxy in several ways, including motivation and also student health; the number of days absent will likely increase if a student receives poor medical care, or is prone to getting sick with greater frequency. The days absent variable might also capture behavioral issues; in particular, students disciplined with greater frequency are also more likely to miss more school, via a suspension or an expulsion. If students are not allowed to attend school as a form of discipline, the days missed from this punishment will count for the number of days absent that school year.

Potentially further harming the achievement of those who are absent more frequently is the fact that teachers might have a difficult time helping them understand the material upon their return, particularly if they are absent for an extended period of time. These students could consequently have issues comprehending the material. The inclusion of the days absent variable slightly decreases the positive significance of the black coefficient, which may mean that black students in particular are more affected by missing a day of school.

The days absent variable is the only control variable to have a larger coefficient (in magnitude) in Mathematics classes rather than English classes, meaning that perhaps the number of days absent has a greater effect on track placement in Mathematics classes. This result is potentially explained by the fact that being absent from a Mathematics class requires much more material to be made up and learned on one's own than an English class. Mathematics material builds on previous days' classes much more than English; it is essential to understand one day's lesson to progress to the next one in Mathematics, and if the student cannot understand the material on his or her own, it might prove to be quite detrimental in the long run (Lee & Bryk, 1988). Alternatively, missing one (or several) days of English might be easier to make up and complete on one's own, and thus the absences might be less influential on achievement and consequent track assignment in the following school year.

Perhaps the most interesting result upon inclusion of the control variables is the strongly positive and significant relationship of being female on the probability of highest track placement [Columns (3) through (5) and also Columns (7) and (8)]. This result is particularly relevant given the growing literature on female students outperforming male students in academics and as potential applicants to college. Perhaps this trend starts in middle school, which explains the strong relationship with being female and placement into the highest track in English or Mathematics classrooms in ninth grade. It could also indicate that female students are more mature, and thus perceived by teachers and counselors to be more prepared to handle the work of a higher track class, making them unequivocally favored to be placed in the highest track in English or Mathematics in ninth grade (Downey & Vogt Yuan, 2005). Another possibility is that there is a discrepancy in the distribution of class grades in academic subjects between male and female students. Specifically, perhaps female students earn higher marks more frequently than their male counterparts, and although their scores on the End-of-Grade tests are similar to male students (as shown in Figure 8), female students are outperforming them in classrooms (Downey & Vogt Yuan, 2005). As outlined earlier, this phenomenon is certainly true in eighth grade Reading classes (females on average earn nearly a half-grade higher). Since classroom grades are also high indicators of track placement but are not wholly included in this analysis (Mathematics class grades, specifically, are missing), the latter explanation seems particularly apt.

Given this strongly significant coefficient on the female variable, it is interesting to see the regression results when just the test scores, race/ethnicity binary variables, and gender variable are included in one regression. Such regressions show the effect of the female variable on the race and ethnicity binary variables, and the isolated effect of gender in the likelihood of being placed in the highest track. The results for this type of regression are outlined in Column (3) in Table 4 and Table 5.

An intriguing finding stemming from those regressions is that the coefficient on black is more strongly positive without the gender coefficient (in Column (2) of Tables 4 and 5) than when it is included (Column (3) of Tables 4 and 5). Specifically, while the black coefficient is positive and significant at the 1% level without the variable for female, it is positive and significant at the 5% level with the gender coefficient for Mathematics classes, and at the 10% level in English classes. Given the results of these regressions, it seems that black female students are more likely to be placed in the highest track than black male students. This fact is confirmed by the data: approximately 22% of black female students are placed in the highest track, while only 14% of black male students earn similar placements. Like in the aggregate data, black female students score only slightly higher than black male students on the End-of-Grade tests; on both exams, the averages are between two points of one another. Consequently, it seems like the explanation put forth above for the discrepancy between male and female students in terms of classroom grades on the whole also applies to just black students, as well, which has been noted in the literature (Saunders, Davis, Williams, & Williams, 2004). This hypothesis is confirmed by the anticipated Reading grade data; black female students have about a half-grade higher anticipated Reading grade than their black male counterparts (2.56 to 2.08).

B. School Fixed Effects Regressions

In addition to running regressions using district fixed effects, I also used just school fixed effects regressions so that I could focus on tracking trends within North Carolina's individual schools. The results of the regressions including none of the controls and all of the controls for the 307 schools in the school fixed effects regressions are shown in Tables 6 and 7, with Table 6 outlining results for English classes, and Table 7 for Mathematics classes. The same column ordering is employed in Tables 6 and 7, again with the results in Column (1) being biased and less meaningful and the focus thus remains on the output in Column (2) through (8).

Table 6: School Fixed Effects Regressions: English Classes								
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Reading Scaled Score	--	0.0789***	0.0782***	0.0773***	0.0755***	0.0769***	0.0762***	0.0759***
		(63.87)	(62.98)	(61.46)	(59.40)	(60.69)	(59.69)	(59.34)
Math Scaled Score	--	0.0538***	0.0572	0.0563***	0.0541***	0.0496***	0.0532***	0.0532***
		(58.20)	(60.67)	(58.99)	(55.96)	(52.09)	(54.77)	(54.81)
Anticipated Reading Grade	--	0.4999***	0.4643***	0.4571***	0.4357***	0.4680***	0.4243***	0.4249***
		(73.17)	(66.41)	(64.36)	(60.62)	(65.94)	(58.18)	(58.23)
Female	--	--	0.2919***	0.3014***	0.3233***	--	0.3307***	0.3306***
			(24.00)	(24.49)	(25.96)		(26.45)	(26.44)
Days Absent	--	--	--	--	--	-0.0079***	-0.0092***	-0.0093
						(-8.52)	(-9.89)	(-10.00)
Free/Reduced Lunch Eligible	--	--	--	-0.2743***	-0.1924***	-0.1705***	-0.1781***	-0.1747***
				(-18.83)	(-12.88)	(-11.41)	(-11.86)	(-11.61)
High School Diploma	--	--	--	--	0.2211***	0.1915***	0.2106***	0.1995
					(7.07)	(6.14)	(6.72)	(6.34)
Bachelor's Degree	--	--	--	--	0.6171***	0.5594***	0.5971***	0.5859***
					(18.59)	(16.88)	(17.91)	(17.53)
Limited English Proficiency	--	--	--	--	--	--	--	-0.1876***
								(-4.34)
Black	-0.8216***	-0.0787***	-0.0942***	0.0014	0.0155	-0.0103*	-0.0143**	-0.0178**
	(-65.60)	(-4.78)	(-5.69)	(0.08)	(0.88)	(-1.66)	(-1.98)	(-2.01)
Asian	0.0247	0.0343	0.0356	0.1106**	0.1414***	0.1085**	0.1124**	0.1839***
	(0.73)	(0.76)	(0.79)	(2.40)	(3.02)	(2.33)	(2.39)	(3.68)
Hispanic	-0.8151***	-0.3062***	-0.3156***	-0.1976***	-0.0981***	-0.1170***	-0.1157***	-0.0267
	(-36.42)	(-10.61)	(-10.89)	(-6.58)	(-3.18)	(-3.80)	(-3.74)	(-0.72)
American Indian	-0.6328***	-0.2316***	-0.2387**	-0.1675***	-0.1402**	-0.1352**	-0.1366**	-0.1369**
	(-12.58)	(-3.65)	(-3.75)	(-2.60)	(-2.17)	(-2.09)	(-2.11)	(-2.12)
Multiracial	-0.3206***	-0.0687*	-0.0868**	-0.0341	-0.0108	-0.0052	-0.0219	-0.0208
	(-10.02)	(-1.70)	(-2.14)	(-0.83)	(-0.26)	(-0.13)	(-0.53)	(-0.50)
Pseudo R-squared	0.1472	0.4917	0.4966	0.4980	0.5054	0.5001	0.5062	0.5064
Number of Observations	88,281	88,020	88,020	86,185	85,817	85,569	85,569	85,569

Note: * denotes significance at 10% level, ** denotes significance at 5% level, and *** denotes significance at 1% level
Numbers in parentheses denote z-statistics; a value with "--" indicates that the variable was not included in regression

Table 7: School Fixed Effects Regressions: Math Classes

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reading Scaled Score	--	0.0273***	0.0265***	0.0256***	0.0234***	0.0258***	0.0247***	0.0247***
		(18.51)	(17.88)	(17.16)	(15.49)	(17.02)	(16.25)	(16.22)
Math Scaled Score	--	0.1254***	0.1271***	0.1266***	0.1252***	0.1221***	0.1242***	0.1242***
		(94.04)	(93.82)	(92.86)	(90.98)	(89.72)	(89.79)	(89.78)
Anticipated Reading Grade	--	0.3860***	0.3686***	0.3593***	0.3385***	0.3398***	0.3166***	0.3166***
		(42.99)	(39.94)	(38.52)	(35.81)	(36.44)	(32.93)	(32.93)
Female	--	--	0.1187***	0.1231***	0.1377***	--	0.1487***	0.1487***
			(7.98)	(8.22)	(9.11)		(9.79)	(9.79)
Days Absent	--	--	--	--	--	-0.0180***	-0.0187***	-0.0187***
						(-13.33)	(-13.78)	(-13.77)
Free/Reduced Lunch Eligible	--	--	--	-0.2566***	-0.1697***	-0.1441***	-0.1458***	-0.1459***
				(-13.04)	(-8.37)	(-7.07)	(-7.14)	(-7.13)
High School Diploma	--	--	--	--	0.2701***	0.2523***	0.2588***	0.2593***
					(5.32)	(4.95)	(5.07)	(5.06)
Bachelor's Degree	--	--	--	--	0.6055***	0.5675***	0.5802***	0.5806***
					(11.64)	(10.84)	(11.08)	(11.05)
Limited English Proficiency	--	--	--	--	--	--	--	0.0060
								(0.12)
Black	-0.9064***	-0.0825***	-0.0901***	-0.0060	0.0044	-0.0339**	-0.0434**	-0.0432**
	(-58.63)	(-3.76)	(-4.10)	(-0.26)	(0.19)	(-1.96)	(-2.27)	(-2.22)
Asian	0.2686***	0.3165***	0.3156***	0.3707***	0.4062***	0.3599***	0.3589***	0.3569***
	(8.08)	(6.90)	(6.87)	(7.94)	(8.55)	(7.57)	(7.54)	(7.02)
Hispanic	-0.7765***	-0.2770***	-0.2796***	-0.1671***	-0.0667	-0.0945**	-0.0945**	-0.0972**
	(-28.15)	(-7.20)	(-7.26)	(-4.21)	(-1.64)	(-2.31)	(-2.31)	(-2.08)
American Indian	-0.6008***	-0.0612	-0.0660	-0.0102	0.0173	0.0226	0.0179	0.0179
	(-9.09)	(-0.68)	(-0.73)	(-0.11)	(0.19)	(0.25)	(0.19)	(0.19)
Multiracial	-0.3614***	-0.0478	-0.0545	-0.0082	0.0124	0.0006	-0.0069	-0.0070
	(-9.82)	(-0.95)	(-1.09)	(-0.16)	(0.24)	(0.01)	(-0.14)	(-0.14)
Pseudo R-squared	0.1424	0.5396	0.5403	0.5409	0.5462	0.5475	0.5486	0.5486
Number of Observations	87,337	87,093	87,093	85,298	84,959	84,726	84,726	84,726

Note: * denotes significance at 10% level, ** denotes significance at 5% level, and *** denotes significance at 1% level
Number in parentheses denote z-statistics; a value with "--" indicates that the variable was not included in regression

These regressions yield results that are mostly quite similar to the district fixed effects regressions. In particular, in Columns (2) through (8), the coefficient for the anticipated Reading grade and the strong relationship with being female to high track placement both remain quite obvious and distinct. The Pseudo R-squared values are similar for all of the regressions (still higher in Mathematics and lower in English classes). The End-of-Grade test score variables also remain strongly significant and show the same pattern for English and Mathematics classes as in the district fixed effects. The Hispanic coefficients are still significantly negative in most of the regressions (although they are insignificant when certain variables are included), while the American Indian and multiracial coefficients show the same pattern as under the district fixed effects regressions. It is interesting to note a different pattern in the Asian variable under school fixed effects from district fixed effects. While the Asian coefficient is still significantly positive under Mathematics classes, it is insignificant for English classes when most of the control variables are not included [Columns (2) and (3)]. This phenomenon might be caused by the anticipated Reading grade variable; Asian students have much higher anticipated Reading grades, which could deflate some of the seemingly strong Asian favoritism in English track placements.

As for the control variables, their coefficients are in the expected direction and the same directions as those in the district fixed effects regressions. Like the district fixed effects regressions, the control variables are in general even more significant for English classes than they are for Mathematics classes, which could relate to the more objective criteria being taught and used in making English tracking decisions than in Mathematics tracking decisions.

Despite the various similarities, there are some highly striking and important differences in the coefficient for the black variable. In particular, the coefficient is still significant at the 1% or 5% level in Columns (2) and (3) and Columns (6) through (8), but actually in the negative direction, opposite the direction of all the coefficients in the district fixed effects regressions. Why is it that the black variable is significantly positive under the district fixed effects, but significantly negative under the school fixed effects? What policies are in place that are allowing for what appears to be a paradox, at least for black students, between the district level and school level results?

The story here can be explained mainly by the extensive racial segregation within school districts that allow for black students to have an overall positive probability of being placed in the higher track at the district level but not at the school level. Within school districts, there are schools that are predominately black, thus resulting in many black students being placed in the higher track within that school. The result of more black students in high tracks in schools with more black students is thus intuitive: if a school tracks, and the majority of its students are black, then being black must be positively correlated with being placed in the high track. Residential segregation is the main cause since placement into schools is generally determined by the location in which students are living. Previous literature supports the notion of extensive residential segregation leading to within-district segregation in the schools, helping to further the validity of this explanation (Clotfelter, Ladd, & Vigdor, 2003).

Consequently, when controlling for achievement at the district level (as Columns (2) through (8) do with the End-of-Grade test scores and anticipated Reading grade), black students are more likely to be placed in the higher tracks. Residential segregation explains this phenomenon. Although blacks have lower average achievement in terms of End-of-Grade test scores and anticipated Reading grades, there are more black students than white students in certain districts. This difference is large enough that there are also more black students than whites in the higher track classrooms at the district level because of the schools that have many more black students. At the school level, however, blacks are in general less likely to be placed in the higher tracks. Since each of the regressions has controlled for achievement, however, this result could be a consequence of biases in track placements. The positive correlation between being black and being placed in the highest track classrooms at the district level is consequently artificial. One thus should not be fooled into thinking that blacks are favored or being treated equally with whites when it comes to being placed into tracked classrooms. As the negative coefficient at the school level shows, blacks are less likely to be in high track classrooms when it comes to placement at the individual schools, even when controlling for differences in achievement.

The phenomenon described above is especially true of larger school districts, from which a substantial amount of data stems for this analysis. In this dataset, urban districts like Charlotte-Mecklenburg and Wake County (Raleigh) have many black students (even more than white), thus helping to create an artificially positive effect for being black at the district level. Because of these segregated schools and within-district segregation in urban counties like Charlotte-Mecklenburg and Wake, at the district level, it will appear that blacks are being favored for highest track placement.

Tables 8 and 9 below present an oversimplified version of the paradox exhibited by the data and explained above. Table 8 outlines a true sampling of white and black students in some of the high schools in one of the districts in this dataset. The total number of white and black student observations is indicated, with the ratio of white to black students also depicted (other racial and ethnic groups are not included). In Table 9, I utilized the distributions of the schools from Table 8 to construct an example in which blacks will be overall negatively represented in high track classrooms at the school level, but positively overall at the district level.

Table 8: Sampling of Schools Within a School District Exhibiting Residential Segregation

School #	Number of White Students	Percentage White	Number of Black Students	Percentage Black
1	865	77.09%	257	22.91%
2	92	24.27%	287	75.73%
3	68	14.38%	405	85.62%
4	42	6.85%	571	93.15%
5	1,013	94.67%	57	5.33%
6	725	78.04%	204	21.96%
7	16	2.30%	680	97.70%
8	123	14.01%	755	85.99%
9	799	73.84%	283	26.16%
10	178	23.58%	577	76.42%

Table 9: Residential Segregation Accounting for Discrepancy between District and School Fixed Effects Regressions

School #	Proportional Whites in High Track		Proportional Blacks in High Track		Hypothetical Whites in High Track		Hypothetical Blacks in High Track	
1	216.25	77%	64.25	23%	230	82%	50	18%
2	23	24%	71.75	76%	3	3%	93	97%
3	17	14%	101.25	86%	25	21%	94	79%
4	10.5	7%	142.75	93%	18	12%	135	88%
5	253.25	95%	14.25	5%	260	97%	7	3%
6	181.25	78%	51	22%	192	83%	40	17%
7	4	2%	170	98%	12	7%	162	93%
8	30.75	14%	188.75	86%	5	2%	214	98%
9	199.75	74%	70.75	26%	218	81%	51	19%
10	44.5	24%	144.25	76%	15	8%	175	92%
TOTALS:	**980.25**	**41%**	**1019**	**59%**	**978**	**40%**	**1021**	**60%**

Assuming that, in each school in the district, approximately 25% of students are placed in the highest track classes, the first few columns of Table 9 outline what the proportion of white and black students in the highest track should be (if they follow the distribution of the racial groups within the school). Note that the percentages match those indicated in Table 8, as this would be an equitable and proportional distribution. The far right columns of the table show a hypothetical number and percentage of whites and blacks in the high track in each school that could create the phenomenon captured in these regressions.

As can be seen in Table 9, there are more black students in the highest track than are actually proportional at the district level, creating an artificially positive relationship between being black and high track placement at the district level. If one examines the data closely, a bias appears at the school level toward placing the white students into the highest track classes. Specifically, in seven of the ten schools in the district, there are more whites than one would proportionally expect in the highest track classrooms; it is the case for only three of these schools for black students. The schools where black students are favored, however, are primarily black schools (Schools 2, 8, and 10). This phenomenon, true in this example and generally in the actual raw data used for this analysis, is caused by residential segregation, since districts generally assign their students to schools by the location in which they live. Based upon this hypothetical table, in a district fixed effects regression, there will be a positive coefficient on a black variable, but there will be a negative coefficient on the black variable at the school level, as more schools are favoring white students in their track placements.

Again, I note that this is not exactly what is going on in the actual data, as I have not controlled for differences in achievement in this table; the table was constructed to show how the phenomenon present in this analysis can occur. Additionally, districts do not have a set percentage of students to be placed in the highest track at their schools; the percentage of students in the highest track varies from school to school, even within a district. However, the school districts in which this phenomenon is occurring have similar student distributions (not necessarily tracking distributions) as those outlined in Tables 8 and 9; these are generally larger, more urban districts. Since those districts do have the most observations in the dataset, the overall coefficient on black using district fixed effects is positive.

While the overall effect of being black in the school fixed effects regression is negative, it is worth noting that the effect of being black becomes insignificant in Columns (4) and (5) in the regressions in Table 6 and Table 7. By controlling for just income and parent educational attainment, the coefficient on black moves from significantly negative to insignificant. Columns (6) and (7) show the effect of the days absent variable, which, when included and coupled with the gender variable, make the coefficient on black significantly negative. Therefore, the number of days absent variable decreasing the probability of high track placement for black students still holds, and further shows that the days absent variable is more significant in Mathematics classes than English classes. These results, like many others with the control variables, have a similar influence in the school fixed effects to the district fixed effects.

C. Marginal Probabilities

In addition to the regression results outlined above, I also compiled results regarding the marginal effects of each of the variables in the regressions. The marginal effects measure the increased or decreased probability of being placed in the higher track, given one extra unit of the variable (or, in the case of binary variables, being a member of the measured group). The results of the marginal probabilities under district fixed effects are depicted in the top half of Table 10, with the first column for English classes, and the second column for Mathematics classes. The bottom half of Table 10 shows marginal probabilities under school fixed effects, again with the first column for English classes and the second for Mathematics classes. Only variables with marginal effects that are significant at least at the 5% level are included in the table below.

Table 10: Marginal Probabilities

District Fixed Effects		
Variable	**English**	**Math**
Reading Scaled Score	0.0254	0.0022
Math Scaled Score	0.0168	0.0106
Anticipated Reading Grade	0.1451	0.0273
Female	0.1071	0.0130
Days Absent	-0.0028	-0.0017
Free/Reduced Lunch Eligible	-0.0431	-0.0075
High School Diploma	0.0678	0.0241
Bachelor's Degree	0.1991	0.0640
Limited English Proficiency	-0.0423	--
Black	0.0341	0.0077
Asian	0.0724	0.0461
Hispanic	--	--
American Indian	-0.0742	--
Multiracial	--	--
School Fixed Effects		
Variable	**English**	**Math**
Reading Scaled Score	0.0267	0.0018
Math Scaled Score	0.0188	0.0091
Anticipated Reading Grade	0.1497	0.0231
Female	0.1161	0.0109
Days Absent	-0.0033	-0.0014
Free/Reduced Lunch Eligible	-0.0608	-0.0103
High School Diploma	0.0695	0.0182
Bachelor's Degree	0.2135	0.0521
Limited English Proficiency	-0.0631	--
Black	-0.0104	-0.0062
Asian	0.0674	0.0356
Hispanic	--	-0.0066
American Indian	-0.0466	--
Multiracial	--	--

Note: "--" means insignificant marginal probability.

In the results for English classes, one of the most significant marginal probabilities is for the female variable; a student is 10.71% more likely to be placed in the highest track in English if she is female under district fixed effects, and is nearly 12% more likely under school fixed effects. Another striking result is the large values for the parent educational attainment variables. Students are about 7% more likely to be in the highest track in English if one of their parents obtained a high school diploma (as compared to students whose parents did not complete high school), and between 19% and 22% more likely to be assigned to high track classes in English if they have at least one parent who earned a Bachelor's degree or greater. In terms of racial groups, being Asian has the highest marginal probability, as Asian students are about 7% more likely to be placed in the highest track in English classes under district or school effects.

Although the same variables have the larger marginal probabilities in Mathematics classes and English classes, the raw values of the marginal probabilities are much smaller for Mathematics classes under both district and school fixed effects, as outlined in Table 10. This result further proves the explanations articulated earlier in this paper. The criteria for Mathematics track placements are more concrete, and are less swayed by the factors outlined in the regressions above, which explains the higher Pseudo R-squared values but lower marginal probabilities (Lee and Bryk, 1988).

Table 11 better outlines this phenomenon by indicating the number of standard deviations students would need to increase (or decrease) their Reading or Mathematics End of Grade test score to match the increased (or decreased) likelihood of higher track placement with having a certain background characteristic. For example, in English classes, male students would need to increase their Reading End-of-Grade test score by

0.68 standard deviations and Mathematics End-of-Grade test score by 0.76 standard deviations in order to match the marginal effect of being female on high track placement, which equates to over a 5 point increase. The most interesting result, however, is parent educational attainment; specifically, students would need to increase their Reading End-of-Grade test score by 3.51 standard deviations (nearly 30 points) in order to match the effect of having a parent with a Bachelor's degree (over just a high school diploma) to be placed in the highest track in Mathematics classes. These results are more extensively outlined in Table 11. I note that since the results are very similar between district and school effects, I have used the school fixed effects marginal probabilities to construct Table 11.

Table 11: Number of Standard Deviations Increase/Decrease on Standardized Tests Needed to Match Marginal Increase/Decrease of Other Variables

	English Classes		Math Classes	
Variable	**Reading Increase**	**Math Increase**	**Reading Increase**	**Math Increase**
Female	0.68	0.76	1.56	0.24
Anticipated Reading Grade	0.53	0.59	0.73	0.11
Days Absent	-0.01	-0.02	-0.09	-0.01
Free/Reduced Lunch Eligible	-0.28	-0.31	-0.69	-0.11
High School Diploma	0.32	0.35	1.23	0.19
Bachelor's Degree	0.97	1.08	3.51	0.54
Limited English Proficiency	-0.29	-0.32	--	--
Black	-0.05	-0.05	-0.42	-0.06
Asian	0.31	0.34	2.40	0.37
Hispanic	--	--	-0.44	-0.07
American Indian	-0.21	-0.24	--	--
Multiracial	--	--	--	--

Note: Above calculations made using school fixed effects data.
"--" represents insignificant marginal probability, so no extrapolation made

While most of the race and ethnicity variables require moderate increases or decreases in Reading and Mathematics scaled scores to match their effects, it is interesting to note that Asian students are the one caveat to this trend. Specifically, the values range from a 0.31 standard deviation increase on the Reading End-of-Grade test for English classes to a 2.40 standard deviation increase on the same test for Mathematics classes. While the anticipated Reading grade and days absent variables show only moderate increases or decreases on the standardized tests to match their marginal probabilities, it is important to note that these are discrete, rather than binary, variables. As mentioned, the variable requiring the largest increase in test scores to match its effect is, overwhelmingly, the variable representing a parent with a Bachelor's degree.

VI. Conclusions and Implications

I used probit fixed-effects regressions to determine the likelihood of highest track placement in ninth grade English and Mathematics classrooms in North Carolina's public high schools based upon eighth grade characteristics and student demographic information. The major and most unique finding of this analysis is the strong discrepancy between the district fixed effects and school fixed effects results for black students. The black variable is significantly positively correlated with high track placement using district fixed effects, but is significantly negatively correlated using school fixed effects. These results are summarized in Table 12 (since the results in terms of correlation and significance are the same under either English or Mathematics classes, they are depicted in one chart).

Table 12: Summary of Results for Black Coefficient (for both English and Mathematics Classes)

Regression Type	Correlation with High Track Placement	Significance
District Fixed Effects, with just Achievement	Positive	Significant, 5% level
District Fixed Effects, with all Controls	Positive	Significant, 1% level
School Fixed Effects, with just Achievement	Negative	Significant, 1% level
School Fixed Effects, with all Controls	Negative	Significant, 5% level

I hypothesized that such differences between the school and district fixed effects regressions are due to residential segregation, and discrepancies in the racial and ethnic make-ups of schools within a district. Regardless of the actual black student percentage in a school, black students are less likely to be placed in the highest track at the school level. Also, more schools have a majority of white students in the highest track, which further helps to explain the negative relationship in the school fixed effects regressions. When districts are composed of residentially segregated (and thus racially imbalanced) schools, and have more black students than white students at the district level, there will be an artificially positive relationship between being black and placement into a high track, even though these same students are less likely to be placed in the highest track in each individual school.

Michelle Connolly (2004) finds similar results in her work on racial discrimination and human capital in the American South after the Civil War. She found that within districts in the South, schools were allocating their funds unequally; specifically, the schools with more white students were receiving a greater majority of the funding as compared to schools with primarily black students (Connolly, 2004). Such a discrepancy was only possible due to residential segregation, as schools within a district were racially and ethnically imbalanced as a result of this phenomenon. The present paper shows that residential segregation is still a prominent aspect of public schools in North Carolina, especially in urban districts, since it helps to account for the inconsistent results between district and school fixed effects.

While Connolly shows just how strong discrimination was in the period following the Civil War in the South, this paper shows that the discrimination is not nearly as egregious as it once was in this region, particularly in North Carolina. The highest marginal probabilities for highest track placement were not for black or any other racial or ethnic group; in fact, it was for having at least one parent with a Bachelor's degree or greater. This attribute increased the likelihood of high track placement by about 20% in English classes, and about 6% in Mathematics classes. Being a female student also greatly increased the likelihood of highest track placement more than any of the race or ethnicity variables; its marginal probability was between about 2% for Mathematics classes and over 10% for English classes. Similarly, family income has a strong effect on high track placement, much stronger than being black, as evidenced by the marginal probabilities outlined in Table 10.

It appears, then, that overt racial and ethnic discrimination in track placements in North Carolina is declining, but has yet to be eliminated. The black variable is significantly negative at the school level, and we should not be fooled by the positive relationship present at the district level. Additionally, while variables such as parent educational attainment, gender, and income do a better job of explaining high track placements, there are still racial and ethnic biases hidden in these variables. I outlined that black students are much more likely to have parents with lower educational attainment and to be eligible for free or reduced price lunch. Consequently, the inclusion of these variables artificially masks the strong negative correlation between being black and highest track placement; the magnitude just seems smaller as these other variables are explaining some of the factors also included in the determination of track placement. Nonetheless, black students are overwhelmingly less likely to be placed in high track classrooms compared to their white counterparts.

Accordingly, school districts should try to be more cognizant of correcting their tracking policies at the school level if they want to ensure that black students are provided with equal opportunities, and attempt to have their tracked classrooms more closely match their school racial and ethnic distributions. Such actions can help to ensure that valuable interracial contact and equal educational opportunities are prevalent at the classroom level for students of all backgrounds. Furthermore, it can help to ameliorate the achievement gaps that result from tracking, well-documented in previous literature. Given the results in this paper and in that of Connolly's, it is also important to ensure that each school in a district—regardless of racial or ethnic makeup—is being treated equally, both in terms of resources and financing, as residential segregation can create imbalanced school racial and ethnic distributions and the potential for substantial inequality in these two areas. While it does seem that there have been dramatic improvements from the times of more explicit racial discrimination and biases in the past, there is still much work to be done if we want to ensure that all groups are treated equally in North Carolina's public high schools. With fairer tracking policies in schools and districts alike, we can move toward a system that better equalizes opportunities for all groups and backgrounds and allows students to achieve at their highest level.

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