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The Impacts of Gifted and Talented Education

Rachana Bhatt
Georgia State University

Georgia State University
Andrew Young School of Policy Studies

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Rachana Bhatt*

Department of Economics
Georgia State University

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Abstract

This paper estimates the impact of gifted and talented program participation on academic achievement and peer composition for a sample of 8^{th} grade students. Gifted education provides children that have been identified as having high ability in some intellectual respect with a supplemental curriculum to their traditional school course work. Participation in gifted programs is not random, so OLS estimates are biased by the presence of unobserved heterogeneity which is correlated with participation status as well as outcomes. To obtain causal estimates, I use an instrumental variables approach where the instrument is a self-constructed measure of how well each child fulfills the criteria his/her school uses to admit students into the gifted program, relative to the child's peers. The IV estimates indicate that, in the short run, participation is associated with a significant increase in math standardized test score performance. In the long run, participation is found to increase the probability a child takes Advanced Placement classes. There is no evidence that participation influences the composition of a child's peer group.

JEL Classification: *I21*

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1 Introduction

Gifted and talented education is a form of ability grouping that is commonly practiced in elementary and middle schools around the U.S.; as of 2000 there were over 3 million gifted students in public schools (Snyder, 2001). Like other forms of ability grouping, gifted programs are designed to improve the outcomes of participants by giving educators the opportunity to tailor the standard curriculum to better fit the needs of students of different ability levels. What distinguishes gifted programs from other types of ability grouping however, is that these programs serve only the highest ability students.[1] To date, much of the education and economic research has focused on the impact of ability grouping when all students are grouped (typically, high, middle and low ability groups), with particular emphasis placed on the outcomes of low ability students. The findings of these studies have been mixed: Betts and Shkolnik (2000) find little impact of tracking on math test score growth, while Figlio and Page (2002) find some positive improvement in test performance for low ability students. Argys et al. (1996) conclude that de-tracking schools would have a positive effect on low achieving students, whereas Figlio and Page (2002) and Epple (2002) find schools which track actually draw resources (high income students) to the school, and that this can positively impact low achieving students.[2] This paper is a departure from previous research because it analyzes the impact that a particular form of grouping-gifted and talented programs-can have on the academic and peer group outcomes of the high ability students they serve. In particular, I look at 8^{th} grade participation using data on gifted programs from the National Educational Longitudinal Survey (NELS).

Participation in a gifted program is not random, so standard OLS estimates will likely be biased by unobserved characteristics of students which are correlated with participation status as well as outcomes. Presumably, higher ability students will be selected for partic-

[1]The presence of a gifted and talented program in a school does not necessarily imply anything about whether or how other students in the school are grouped or tracked.

[2]Figlio and Page (2002) also examine the impact that gifted and talented programs (and remedial programs) have on school choice, and find that the presence of these programs also draws high income students to the school.

ipation, and this will lead to OLS estimates which are upward biased. Alternatively, the OLS estimates can be downward biased if lower ability students are chosen for participation. This is consistent with Walsh's (2008) finding that the highest achieving non-gifted students significantly outperform the lowest achieving gifted students. To obtain unbiased estimates, I use an IV approach. The instrument is a set of three-way interactions which reflect each child's performance, relative to his/her peers, along the criteria his school uses for gifted program admission. For instance, some schools in the NELS use race or ethnicity to admit high achieving children from under-represented groups. The instrument is the interaction of (i) an indicator for whether the child's school uses race for gifted admission (=0 no, =1 yes), (ii) an indicator for the child's minority status (=0 not a minority, =1 minority), and (iii) the percentage of minority students in the child's class. In this way, the instrument conveys whether a child fulfills the criteria he is evaluated on, and this is relative to how well his competitors (classmates) fulfill the criteria. Intuitively, this interaction predicts participation since a minority child at a school that uses race for gifted admission is more likely to get into the program when he has fewer other minority classmates to compete with.

I use this triple interaction of variables instead of the levels or double interactions of (i), (ii), and (iii) because a reasonable case can be made that the triple interaction is independent of outcomes, while the level or double interactions are not. For instance, it is possible that a school which uses race for gifted admission also treats children differentially by race in other regards, and this directly impacts outcomes. Even using the interaction of say,(i) and (ii) is questionable, since a high ability minority child (or parent of) may systematically select a school where race is used in order to improve the chances of admission. To ensure that identification only stems from the triple interaction, I include the level and double interactions of (i-iii) as controls in all regressions. Furthermore, I provide a number of pieces of evidence that suggest students do not choose a school on the basis of the triple interaction, and that the instrument only impacts student outcomes through gifted participation.

The NELS data collects information on children in their 8^{th}, 10^{th}, and 12^{th} grade years, and this enables me to estimate the impact of participation on a number of outcomes including test score achievement, future course decisions, and peer group composition. For almost all academic and peer outcomes the OLS estimates suggest a positive impact of participation. When participation is instrumented, a significant and large effect is found on 8^{th} grade math test scores, but this subsides in subsequent years. Moreover, participation is found to increase the probability of enrollment in an Advanced Placement class by 12^{th} grade. For other measures of academic achievement, the estimates are insignificant, but the point estimates are non-zero.

The remainder of the paper is organized as follows: Section 2 provides an overview of gifted and talented education and research. In Section 3 I describe the data, and in Section 4 I outline the estimation strategy, and discuss the validity of the instrument. In Section 5 I display and discuss the results, and Section 6 concludes.

2 Gifted & Talented Education: History & Research

Gifted and talented programs in the U.S. date back to the mid 1800's when the first classes for high ability children were integrated into Missouri public schools. By the first half of the twentieth century gifted programs had spread into schools throughout the U.S. In 1958, the National Defense Education Act (NDEA) was established to improve math, science, and foreign language competency among elementary and secondary students, and this is viewed as the first formal federal support of gifted education (Gallagher and Weiss, 1979). In 1988, the Jacob Javits Gifted and Talented Students Education Act was established, which provides schools with strategies to educate gifted children and conducts research under the National Research Center on the Gifted and Talented. In 2002, the Javits Act was re-sanctioned under the No Child Left Behind Act, and expanded to offer statewide grants for gifted education (ESEA, 1965; NCLB, 2001).[3] Furthermore, in 2001 the federal definition of a gifted child

[3]This funding is provided to gifted programs that serve students who are traditionally under-represented in gifted and talented programs, and supports state and local efforts to improve services for all gifted students.

was modified to its current definition:[4]

"Students, children, or youth who give evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services and activities not ordinarily provided by the school in order to fully develop those capabilities."(NCLB, 2001)

There is no federal mandate requiring states to identify and/or educate gifted students. Each state individually decides whether and to what extent it will provide gifted services, or delegates this responsibility to local school districts and schools. This freedom has resulted in a large variation in the admittance to gifted programs. Identification can vary by state, school district, or even school, and can often involve multiple levels of assessment. For instance, in California's Gifted and Talented Education (GATE) program, parents and/or teachers are asked to recommend students for gifted programs, and then the students are analyzed on the basis of performance in past classes, achievement on the California Standards Test, and one-on-one interviews.[5] In a similar fashion, the organization, structure, and curricula for programs can vary a great deal. In the NELS data, some programs emphasize math and science, while others focus on reading, music, or art. Intensity of programs can range from grouping all gifted children for all subjects all day long, grouping them for only some subjects, or simply removing students from their normal class for a set period of time and frequency.[6]

The majority of direct research on gifted programs comes from the education literature, but no study (to my knowledge) has examined the impact that participation in a gifted program has on students. Instead, research has focused on the training of gifted educators,

In 2002 $11 million in grants were awarded, 2003: $11 million (17 new awards granted), 2005: $11 million (13 new awards), 2006: $9.6 million (25 continuation awards from previous years).

[4]The first federal definition of a gifted and talented child was published in the Marland Report to Congress in 1971:"Gifted and talented children are those identified by professionally qualified persons...[and] require differentiated educational programs and/or services beyond those normally provided..." (Marland, 1971)

[5]For more information, see the California Department of Education, GATE.

[6]Funding is similarly diversified. Aside from some funding from the Javits Act, programs are primarily funded from state and/or local appropriations from educational funds, and can be supplemented by private donations or fund raising efforts (Davidson, 2004).

and on defining the characteristics of gifted students (Lytle, 1979). Konstantopoulos et al. (2001) find gifted students are more likely to have parents with a college education or higher, come from high SES families, spend more time on homework and leisure reading, and have high self-perception.[7] Elhoweris et al. (2005) examine the implications of race when teacher recommendations are used for admission. In a controlled setting, the authors find that white students received higher referral rates than minority students despite similarities in school performance.

3 Data Description: NELS

The data for this analysis are drawn from the National Educational Longitudinal Survey of 1988. The survey follows a cohort of students who were in 8^{th} grade in 1988 for 12 years at two year intervals until 1994, and then again in 2000. In the first three survey waves, students, the corresponding administrator of the child's school, parent(s), and two of the child's teachers were asked questions relating to the child's educational and home experience.[8] The NELS data are constructed specifically to address questions relevant to a student's life in a particular survey year (i.e. children are asked about taking college entrance exams in their sophomore and senior years), and in the first three survey waves students were administered standardized tests in math, science, history and reading.

The NELS provides a good framework for studying gifted and talented programs in the U.S. because it asks a series of questions regarding gifted education to principals, teachers, parents, and children in the first survey year. There are approximately 950 schools and 10,000 student responses from 8^{th} graders in 1988. For the analysis, I drop all information from schools that did not have a gifted program on campus, as well as student observations with missing 8^{th} grade test score information and missing information on gifted status (main

[7] The authors define a highly talented student as a student that performs in the top 3 % on a test of academic achievement.

[8] Teacher surveys were only administered in the child's 8^{th} and 12^{th} grade. In 8^{th} grade, an english/social studies teacher and a math/science teacher were asked to participate in the survey, but in 12^{th} grade, only a math/science teacher was surveyed. In the fourth survey year (2000) only the child was surveyed.

variables of interest). This leads to a final sample of 5,265 students from 530 schools.[9] I consider only students at schools with gifted programs since it is non-random which schools adopt gifted programs and which students select to go to schools with programs. Moreover, the identification strategy requires information that is only reported by schools with gifted programs.

In the survey, children were asked whether they participated in a gifted program during their 8^{th} grade year. Principals at schools with gifted programs were asked what criteria were used to evaluate admission into the program, and how the program was structured (organization and curriculum). Table 1 describes the responses to the these questions.[10] Schools choose any number of criteria to base admission on, and the average in the data is 4.7 criteria. The majority of schools use standardized and additional tests, teacher referrals and school grades to determine admission. Presumably, the choice of criteria is related to characteristics of the school, as well as the population of students who attend that school. The most popular curricula are math and english/literature, but some schools also teach art and music.

Finally, in terms of the structure, administrators reported that children are either taken from their regular class for supplemental instruction, are grouped together for all subjects and have their own curriculum, are grouped together only in the particular subjects in which they excel, or are given supplemental instruction in their standard classroom/other.[11] There is no more detailed information about program organization, so it is unclear how formal the in-class/other gifted programs are. Presumably, in these programs teachers split their time between gifted and non-gifted students. As a result, teachers could mix gifted teaching

[9] The majority of the decline in sample size is due to excluding schools without gifted programs- approximately 4,000 of the initial sample attend schools without gifted education.

[10] In addition, both of the surveyed teachers were asked whether they taught a gifted class at the school. If so, they were asked to report their training (formal, certificate, etc...), and their satisfaction with the resources available for gifted education (money, time). 965 math/science and 878 english/social studies teachers were also gifted instructors. Parents were asked what expectations they had for their child's gifted enrollment, and responses included: Complete school faster, deeper understanding of the subject and intellectual stimulation, association with high ability peers, and develop musical/artistic abilities.

[11] Neither the criteria for admission nor curricula are mutually exclusive. The organization of gifted programs is mutually exclusive.

practices with non-gifted instruction, and moreover they can include (exclude) non-gifted (gifted) students into (from) gifted instruction. Using responses from gifted instructors in the NELS data, I find roughly equal amounts of time are spent on gifted instruction in the in-class gifted programs as in the grouped for all or some subjects programs. Conditional on teaching a gifted class, instructors reported spending 19%, 31%, 25%, and 28% of their total instructional time on gifted instruction for the "taken from class", "grouped for all", "grouped for some", and "in-class/other" categories, respectively. In principle then, with the exception of the first category, students are exposed to similar amounts of gifted instruction. In practice, these differing organizational structures and curricula can have differential effects on student outcomes, and I examine this in more detail in Section 5.

It is important to note that the data does not include information about whether a student participated in a gifted program prior to 8^{th} grade. Moreover, no information is given about whether these program characteristics were determined at the state, school district, or school level. One final point is that all questions were asked at the end of the academic year. This means there's only a limited set of information that is known about the child prior to potential participation in 8^{th} grade. For instance, there is information about parents education level, family income, average school grades from $6^{th} - 7^{th}$ grade, and race, but no information about standardized test score performance prior to 8^{th} grade. I discuss how this limitation impacts the construction of the instrument in the next section.

4 Empirical Specification

4.1 Estimation

I first estimate the impact of gifted participation on student outcomes using an OLS specification: OUTCOMES $= \alpha_0 + \alpha_1$X$+ \alpha_2$g $+ \varepsilon$. Here, OUTCOMES include math and reading test score performance (in 8^{th}, 10^{th} and 12^{th} grade; standardized to have mean 0 and standard deviation 1), binary indicators (=0 no, =1 yes) for whether the child reported enjoying or being challenged in school, whether the child took college entrance exams (pre-SAT, SAT), whether the child took an Advanced Placement class, whether the child graduated early or is on grade (in 1992, child should have been in 12^{th} grade) and whether the child has friends who have dropped out, think it's important to get good grades, and plan on attending college after graduation. X is a vector of child, parent, and school characteristics and are listed in Appendix Table 1. g indicates a child's self-reported participation status (=0 no, =1 yes). The OLS estimate of α_2 will be biased in the presence of individual heterogeneity, so to obtain causal estimates I instrument gifted participation using the following first stage regression: $g = \beta_0 + \beta_1 X + \beta_2 Z + \mu$, where Z is the instrument. In all the OLS and IV regressions I cluster standard errors at the school level.

4.2 Instrument

I construct the instrument using the criteria for gifted admission that schools report in the NELS data. For every child, I create an indicator for whether or not their school uses a given criteria (=0 no, =1 yes), and interact it with a measure of how the child "satisfies" that criteria, and then interact that with a measure of how the child's classmates "satisfy" that criteria. For instance, with respect to using past grades for admission the instrument set is: *Binary indicator for whether or not grades are used at the child's school * Composite measure of child's average grades in* 6^{th} *and* 7^{th} *grade * Percentage of remedial students in the child's school.* The composite grade is a continuous variable measuring grades over 6^{th} and 7^{th} grade in 4 subjects (math, science, english, social studies) that was created by the NELS administrators. Values range from 0.5 (mostly grades below D) to 4 (mostly A's). I use the percentage of remedial students to reflect the grade achievement of a child's classmates because there is no other aggregate measure of grades in the data. In addition, the percentage of remedial students is measured at the school level, and not just for 8^{th} grade, but again this is the only information available.[12] For race, the interaction is: *Binary indicator*

[12] I attempted to construct an 8^{th} grade classmate measure by using the individual average grades reported for each student in a school, and calculating the average among those who attend the same school. There

*for whether or not race is used*Binary indicator for child's minority status*Percentage of minority students in a child's* 8^{th} *grade class.* The first and third terms of each interaction take the same value for all children that attend the same school, while the second term is individual specific.

Ideally, a triple interaction could be created for each of the 9 criteria that schools in the NELS data potentially use for admission. However, the structure of the data only allows me to construct two sets of interactions-one for race and one for grades. The data contains very little information about the child before 8^{th} grade that could be used to construct the other interactions. For instance, there are no measures of standardized test performance or teacher evaluations prior to 8^{th} grade. This data restriction limits the predictive power of the first stage IV estimates, presented below.

4.3 First Stage Estimates

Table 2 displays the results from the first stage IV estimation. I estimate the equation using a linear probability model where gifted participation is a binary variable (a probit model yields similar results). The regression includes all the controls listed in Appendix Table 1, including the level and all double interactions of the variables used to construct the triple interactions. The coefficient estimates on these levels, double interactions, and triple interactions are displayed in the table. The left hand side displays the coefficients for race, and the right hand side for grades. The first third of the table displays the estimates for the level terms, the second third shows the double interactions, and the final third reports the estimates for the instruments. The classmate characteristics (percentage minority, and percentage remedial) are formatted as dummy variables, and are relative to schools with 0 to 5% minorities, and schools with 0% remedial students, respectively. The NELS data reports % minority as a categorical variable (0%, 1-5% etc...) to protect the identity of schools, whereas % remedial is given as a continuous variable. I place % remedial in categories to

are only a handful of surveyed students per school (average of 10), and so this constructed measure failed to be informative.

mimic the structure of the % minority variable. Finally, bin sizes are chosen to equalize the number of student observations in each bin. For example, the 15-100% remedial category has a similar amount of observations as the other categories, and the wide bin width is just necessary because there are few schools with very high amounts of remedial students.[13]

Many of the signs on the levels and double interactions are consistent with intuition: For instance, an increase in the composite grade by one unit increases the probability of admittance by 5.1%, and there is a positive (although insignificant) effect of being a minority at a school that uses race as a criteria for gifted admission. A unit increase in average grades at a school that uses grades increases the probability of being admitted by 14.7% relative to attending a school that doesn't use grades. Moreover, a student's chances of admission are higher if his school uses grades and he has a lot of remedial classmates, or if he good grades has a lot of remedial classmates.

The relevant coefficients for identification are displayed in the lower third of the table. Looking first at the coefficients on the race interaction, we observe the following: A child who is a minority and attends a school that uses race as an admission criteria is less likely to be admitted into the program if he attends a school with a lot of other minority classmates compared to if he attended a school with few minority classmates. The estimates are almost monotonically decreasing in the probability of admission as the percentage of minority classmates increases, and this has an intuitive interpretation: An individual minority student is more likely to be chosen (at a school that uses race as a criteria) if he is one of a few minorities, relative to if he is one of many.

The right hand side displays the estimates for the grades interaction. Again, the coefficient estimates are almost monotonically decreasing as the percentage of remedial students increases. This implies that a student who has high average past grades at a school that uses grades is less likely to be admitted into the program when there are more remedial

[13]Moreover, grouping 0% minority with 1-5% minority was necessary for identifying all the coefficients on the race triple interactions, as there are no minority students at schools which use race as a criteria and have 0% minority classmates. Results in the first and second stage do not qualitatively change if the bin widths for % minority and % remedial are alternatively defined.

students. This finding is puzzling, as we'd expect that more remedial students implies fewer competitors. However, the direction of the estimates can be rationalized by the following observation: When a school has a lot of remedial students, it's likely that the "cutoff" grade used by the school is lower than the "cutoff" grade at a school with fewer remedial students. For instance, at a school with 0% remedial students, a student must have at least an A be seriously considered for admission, whereas at a school with 40% remedial students, a student only needs to have a B to be considered. If the bar is lower at higher percentage remedial schools, a student can face greater competition for a position in the program simply because more of his/her classmates meet or exceed the cutoff. To gauge whether higher percentage remedial schools have lower standards, I examine the average grades across 6^{th} and 7^{th} grade for gifted and non gifted students at schools that use grades as a criteria, separated by the percentage of remedial students. The difference between the grades of participants and non-participants is high at schools with few remedial students, but progressively gets smaller (with one exception): The difference is 0.61, 0.61, 0.62, 0.56, and 0.46 at 0%, 1-4%, 4-9%, 9-15%, 15-100% remedial student schools. This decline suggests that gifted students at high percentage remedial schools look more similar to their non-gifted classmates, and this could result from schools setting lower standards for admission. As a consequence, students can face more, not less competition at higher percentage remedial schools.

The F-statistics testing the joint significance of the instruments are described at the end of the table. For the race and grade interactions combined, the F-statistic is small in magnitude- *for all 9 interactions, 3.21*, but this is large enough to reject the null hypothesis of joint insignificance. Presumably, the instrument set could be improved if triple interactions could be created for all the criteria, but this is not possible due to the lack of pre-treatment data. The weak instrument can be problematic for the estimation. First, the lack of predictive power of the instruments for gifted status suggest the IV second stage estimates will be measured imprecisely. Second, and most importantly, the IV estimates can potentially be biased. Bound et al. (1995) show a weak instrument will lead to IV estimates which are biased in the same direction as the OLS estimates, if there is even a small correlation between the outcome regression error and the instrument. Since the instrument is limited by data constraints, I focus attention in the next section on providing evidence that the race and grades triple interactions are not correlated with unobserved heterogeneity.

4.4 Validity of Instrument

There are two prominent concerns about the triple interactions. The first is that the triple interaction for grades directly affects outcomes because it measures ability. Grades presumably reflect ability, and one may be concerned that using grades in the triple interaction will mechanically correlate the instrument with ability. It is important to bear in mind that grades are controlled for in level and double interaction form, so the triple interaction itself does not measure ability. To further verify this, I use additional information about a child's course work in the NELS data. Information is collected about a child's enrollment in advanced or accelerated classes during 8^{th} grade, and I predict this using the triple interactions.[14] Table 3 displays the coefficient estimates on the triple interactions in the first column. The estimates are small and insignificant and follow no clear pattern. If the instrument reflected ability, then a priori, it should be correlated with what is arguably an ability based outcome-advanced class participation.

A second concern with the instrument is that individuals may systematically select a school to attend based on the triple interaction. It could be that a child with high unobserved ability will choose to attend a particular school because his chances of being admitted-based on the triple interaction-are high. For instance, a high ability minority child may choose to attend a school that uses race for gifted admission, and among those schools will choose the one with the fewest minority students, so that the chances of admission are high. Selection

[14]The regression also controls for the variables in Appendix Table 1 and the level and double interactions of the variables that make up the triple interaction. In the NELS data separate questions are asked about participation in advanced classes, accelerated class and gifted and talented programs. I combine the responses from advanced and accelerated course participation to construct the variable of interest. It is possible that some gifted participants categorize their classes as advanced/accelerated, however it is not possible to determine the extent to which this occurs.

on the triple interaction requires that a child/parent observe all the components of the interaction at multiple schools, and to have the foresight to select the school at which the child is most likely to be admitted. Although this is unlikely to occur, it is still important to consider this possibility. One way to gauge this is to see whether the triple interactions predict a child's movement to a new school in the year prior to participation-the assumption being that a child will change schools if his chances are better elsewhere. The coefficient estimates on the triple interaction when the dependent variable is moved in the past year are given the second column of Table 3, and indicates that the triple interaction has no predictive power for changing schools.

An additional piece of evidence supporting random selection of schools with respect to the instrument is displayed in Table 4 and Figure 1. Table 4 displays the first stage IV estimates for grades (left hand side) and race (right hand side) when the sample is split into groups on the basis of the number of criteria used to evaluate gifted admission. Considering grades first, the first column illustrates the estimates for students whose schools may or may not use grades as a criteria, but use 3 or fewer other criteria for admission. The second group is the counterpart-those schools which may or may not use grades, but use more than 3 other criteria. The groupings for the right hand side are similar: Students whose schools may or may not use race as a criteria, but use 4 or fewer (left column), or 4 or more criteria (right column). The intuition for these groupings is that the grade/race instruments will be stronger determinants of participation at schools that use fewer criteria compared to those that use more. That is simply because at the latter, many other aspects of a child are taken into account, so it is not essential for them to satisfy the grade/race criteria in order to gain admission. The estimates in the table support this idea: Comparing students who are evaluated on few other criteria relative to those who are evaluated on more, the former have a much lower probability of admission compared to the latter at each percentage remedial/minority category.[15] I.e. The point estimates suggest that relative to

[15]The table suppresses the coefficient estimates for the other triple interaction: I.e. In the regressions for the left hand side, I include the variables in Appendix Table 1, the race and grades triple interactions,

a 0% remedial school, a child with given grades at a school that uses grades, has 15-100% remedial students, and uses 3 or fewer other criteria has a 18% lower chance of admission. In comparison, the same child, at a school with the same characteristics but the school uses more than 3 other criteria is only 12% less likely to be admitted.

If there is selection into schools based on the triple interactions, the results of Table 4 suggest that this should be most evident at schools where students are judged on few other criteria, since it is there that a child's past grades or race relative to their classmates will have the biggest impact on admission. For race, this implies a minority child will choose a school that uses race, and among those, will choose one with few other minority students. For grades, a high achieving child will choose a school that uses grades, and among those schools, choose the one with fewest remedial students. To gauge if this occurs, I isolate two samples of students and illustrate their school choices in Figure 1. In the upper diagram, the sample is constructed to include only students who attend schools that use grades for gifted admission, and these students all have past average grades higher than 3.5 (arbitrarily determined cutoff; suggests mostly getting grades between B and A). I split these students further into two groups-those who are evaluated on 3 or fewer criteria and those evaluated on more than 3. The height of each bar illustrates the fraction of students in each sample that choose to attend a school with a given percentage of remedial students. A priori, if selection on the grades triple interaction occurs, we expect to observe a mass of students in 0% remedial schools in the 3 or fewer criteria sample relative to the more than 3 criteria sample. As can be seen, only 10% of high achieving students choose this bin in the 3 or fewer criteria sample relative to 16% in the more than 3 criteria sample. The lower figure illustrates the same concept, this time with the sample restricted to minority children at schools that use race for admission, and further split into students whose school uses 4 or fewer criteria,

their levels and double interactions. However, I omit the race triple interaction coefficients from the table for brevity, since the criteria of interest is grades. Similarly for the right hand side of the table. Different cutoff criteria numbers were used to make the groupings (3 for grades, 4 for race) in order to equate sample sizes between the groups. In addition, because of the smaller sample sizes, there is one category (race: >4 criteria, 6-20% minority) where there are very few minority students whose schools use race as a criteria, consequently this coefficient can not be estimated.

or 4 or more. Selection suggests that minority students at schools using few other criteria will locate themselves in the small percentage minority schools, yet the figure indicates this group is no more likely to choose this type of school than those students who are evaluated on more criteria. These figures provide suggestive evidence that school selection on the basis of the triple interaction does not seem to occur.[16]

5 Results

The OLS and IV results estimating the impact of gifted participation are given in Tables 5 and 6. Table 5 shows the results for math and reading test score performance in 8^{th}, 10^{th}, and 12^{th} grade. The OLS estimates from each year for each subject are large and positively correlated with gifted participation. Over time though they decrease in magnitude. The IV estimate for 8^{th} grade math test performance is the only estimate that remains significant once participation is instrumented. The coefficient is large in magnitude: Participation is associated with a 0.86 standard deviation gain in test scores. For the remainder of the math test scores, there is a non-zero effect, but the estimates are too imprecise to retain significance. In contrast, the IV point estimates for reading are closer to zero for all years, and are insignificant. This suggests that participation has minimal affect on reading in all years, but a strong effect on math performance in the year of participation.

Table 6 shows the results for all other academic and peer group outcomes. As mentioned, all outcomes are formatted as binary variables, and the specifications were estimated as linear probability models; probit estimation provides similar results. The OLS estimates for academic outcomes like interest in school, taking college entrance exams, and positive peer group attributes (having friends that think it's important to get good grades, plan on attending college, etc...) show a positive correlation with participation. The only negatively correlated outcome is being challenged in school, which is consistent with the notion that

[16]The lower histogram is skewed to the right because there are more minorities at higher percentage minority schools.

gifted students, if not given the opportunity to take non-traditional classes, can often feel bored in school. When participation is instrumented, the only significant effect remains for taking an Advanced Placement class by the student's 12^{th} grade year. Participation is associated with a 34% increase in the probability of taking an AP class. There is no indication that participation significantly influences a child's peer group: A participant is no more likely than a non-participant to have friends who will attend college, think it's important to get good grades or have dropped out.[17]

Table 7 shows the estimates for participation in programs with different organizational structures and curricula. Intuition suggests that programs that teach math will improve math performance more than those that don't. Moreover, it's likely that performance is higher in programs where children are grouped for all or many subjects versus situations where children are only taken from their traditional class for a specified time. This intuition is supported in Table 7, where the left hand side shows the estimates of participation on math test for each of the program structures, and the right hand side shows the estimates for programs that specifically teach math or reading versus those that don't. The effects of participation are highest among children who are grouped for some or all subjects, and there's a negatively signed but insignificant estimate for in-class/other programs. This suggests that although exposure to the program may be similar across organizational structures (noted in Section 2), perhaps some methods of instruction are less effective than others. The impact of gifted programs on math test scores is highest among students in programs where math is taught, but the large estimate for non-math gifted programs suggests there may also be some spill-over effects. Finally, no significant estimates are found for reading test scores for those students who have a reading component of their gifted program. It is important to note that although there are only a few IV estimates in Tables 5-7 that are statistically significant-8^{th} grade test scores, AP course uptake-many of the other point estimates are non-zero and

[17]The smaller sample size for reading is due to a few students who did not take the reading exam. The smaller sample for outcomes in 10^{th} and 12^{th} grade are due to students leaving the survey sample (transfering schools, dropping out). There is no indication that this attrition is systematically correlated with the instrument set.

often large. This suggests that gifted education might actually have large impacts on these outcomes, but due to the weak first stage estimates, the second stage estimates are noisy.

One characteristic of the above results is that the IV estimates are larger than the OLS estimates. Although this is a common feature in the IV literature, this finding is puzzling. Intuition suggests the OLS estimates are upward biased, yet the IV estimates suggests they are downward biased. One explanation for this is that gifted participation in 8^{th} grade is correlated with with program participation in prior years. As long as prior participation is uncorrelated with the instrument, the IV estimates should be unbiased. However, given the instrument, it's likely than any prior participation would affect grades in 6^{th}-7^{th} grade, and using this measure to construct the grade triple interaction will lead to biased IV estimates. I re-estimate the first stage and second stage IV results using only the triple interaction of race, and find similar estimates as when both race and grade triple interactions are used. For instance, participation is associated with a 1.1807 [s.e.=0.5554]** increase in 8^{th} grade math test scores when only the race triple interaction is used. The similarity in the estimates suggest that this concern does not substantially impact the results.

A second explanation is that there is negative selection into gifted programs, such that lower ability students are actually chosen for participation. Walsh (2008) provides evidence using the NELS data which suggests the test scores of the highest achieving non-gifted students are higher than the achievement of the lowest performing gifted students. He attributes this to parental lobbying, whereby lower ability students with involved parents crowd out higher ability students with un-involved parents from gifted participation. Since the test scores are post-treatment measures of ability, I replicate Walsh's analysis using average grades from 6^{th}-7^{th} grade and find that indeed, the highest achieving non-gifted students have higher average grades than the lowest achieving gifted students. For instance,the average difference in past grades within a school between gifted and non-gifted students is 0.56, indicating gifted students have a half letter grade higher achievement than non-gifted students. When this same average difference is calculated between the gifted and non-gifted students who have grades below and above the average for all their gifted and non-gifted classmates, respectively, the sign reverses and the magnitude is -.46. This suggests that the OLS estimates could be biased by the inclusion of lower-achieving students into gifted and talented program.

A second characteristic of the IV results is their large magnitude. The impact of 8^{th} grade participation was measured as a 0.86 standard deviation gain in the test score distribution. While this is large, the OLS estimate suggests even the mean difference between gifted and non-gifted students, controlling for observables is only slightly smaller: 0.51 standard deviations. In order to place the IV estimates in context, I re-estimate the IV regression using each student's item response theory (IRT) score instead of their standardized score for the 8^{th} grade math test.[18] When this replacement is made, the estimated effect is an 8.803 [s.e.= 4.192]** point gain in test scores for gifted participants. This estimate is only 25% larger than Figlio and Page's (2002) estimate on the returns to ability tracking. The authors examine the impact of ability tracking on IRT test score growth from 8^{th} to 10^{th} grade for students in the bottom of the 8^{th} grade test score distribution and find an estimated impact for these students of 6.88 [s.e.=2.710]**. The proximity of the two estimates suggest the impact of gifted and talented education estimated in this study, although large, is not unreasonable, particularly if the children selected for gifted programs are not necessarily the ones with the highest prior achievement.

6 Conclusion

This paper examines the impact of participation in gifted and talented programs for the 1988 8^{th} grade class. The existence of these programs provides a unique opportunity to consider how ability grouping impacts students at the upper end of the ability spectrum: I.e. Do gifted programs make the brightest students brighter? From a policy perspective, it is of in-

[18]IRT score is a metric for measuring test achievement. The NELS data includes the IRT score, as well as the standardized score used in the main analysis.

terest to quantify how these programs impact students, so that decisions about organization, curriculum, and funding can be better made. In order to obtain causal estimates of the effect of participation, I use variation in how schools admit students into their gifted programs to create a measure of each child's probability of admission relative to his/her classmates. I show the instrument predicts participation, and provide suggestive evidence that it is a valid instrument. The IV estimates suggest that gifted participation increases math test scores immediately after participation, but has a dwindling effect over time. Moreover, it positively impacts class choice in the future, but doesn't have a statistically significant affect on peer group outcomes or other academic outcomes.

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Table 1: NELS Gifted and Talented Education Survey Questions

Administrator: *Is there a gifted program for 8th graders in the school?*

	# Schools	# Students
Yes	530	5,265

Gifted program teaches:

	# Schools	# Students
Math	387	3,881
Science	314	3,036
English/Literature	433	4,284
Social Studies	303	3,050
Foreign Languages	135	1,255
Computer Science	168	1,700
Music	130	1,316
Art	140	1,369
Other	112	1,150

In which way is gifted instruction organized in the school?

	# Schools	# Students
Students taken from regular class	164	1,504
Grouped for all subjects	116	1,191
Grouped for some subjects	137	1,424
In class/other	113	1,146

Following factors used in the selection of students for the gifted program:

	# Schools	# Students
Scores on standardized exams	501	4,929
Additional test results	404	3,996
Teacher or counselor referal	475	4,699
Parental requests	300	3,005
School grades	403	3,996
Opportunity for racial/ethnic group	92	844
Personal interview	141	1,428
Student requests	152	1,535
Other	35	309

Student: *Are you in a gifted program?*

	Yes	No
	1,176	4,089

Table 2: First Stage IV Estimates

Dependent Variable: Participation in gifted program (=0 no, =1 yes)

Race		Grades	
Levels			
Minority (=1 yes)	-0.0058	Grades (=4 A's..1 D's)	0.0515
(s.e.)	[0.0380]		[0.0365]*
Race is criteria (=1 yes)	-0.0009	Grade is criteria (=1 yes)	-0.3532
	[0.0351]		[0.1343]***
% Minority (omit 0-5%)		% Remedial (omit 0%)	
6-20%	0.0048	1-4%	-0.187
	[0.0171]		[0.1469]
21-40%	0.0595	4-9%	-0.221
	[0.0242]***		[0.1497]*
41-60%	0.067	9-15 %	-0.2205
	[0.0337]**		[0.1484]
61 plus %	0.1497	15-100%	-0.2815
	[0.0506]***		[0.1700]*
Double Interactions			
Criteria * Minority	0.1744	Criteria *Grades	0.1476
	[0.1216]		[0.0427]***
Criteria * % Minority		Criteria * % Remedial	
6-20%	0.0453	1-4%	0.2713
	[0.0503]		[0.1746]
21-40%	0.0428	4-9%	0.2558
	[0.0511]		[0.1724]*
41-60%	0.1161	9-15 %	0.2864
	[0.0710]*		[0.1733]*
61 plus %	0.0639	15-100%	0.446
	[0.0919]		[0.1925]**

Table 2: First Stage IV Estimates (continued)

Double Interactions (continued)			
Minority * % Minority		Grades * % Remedial	
6-20%	0.0629	1-4%	0.0948
	[0.0464]		[0.0468]**
21-40%	0.0616	4-9%	0.0877
	[0.0496]		[0.0477]*
41-60%	0.0539	9-15 %	0.1102
	[0.0555]		[0.0476]**
61 plus %	-0.0194	15-100%	0.1079
	[0.0638]		[0.0554]**
Instruments: Triple Interactions			
Minority*Criteria*%Minority		Grades*Criteria*%Remedial	
6-20%	-0.0499	1-4%	-0.1221
	[0.1440]		[0.0559]**
21-40%	-0.2861	4-9%	-0.104
	[0.1395]***		[0.0550]**
41-60%	-0.4212	9-15 %	-0.1361
	[0.1488]***		[0.0556]***
61 plus %	-0.1229	15-100%	-0.1732
	[0.1526]		[0.0627]***
F-stat (on race instruments)		F(4, 529) = 4.24	[p-value: 0.0022]
F-stat (on grade instruments)		F(4, 529) = 2.39	[0.0496]
F-stat (on all instruments)		F(8, 529) = 3.21	[0.0014]
N		5265	
R^2		0.1735	

Standard errors are given in brackets. They are adjusted for clustering by 8th grade school. All regressions include the controls listed in Appendix Table 1. The instruments are the triple interactions, however the coefficient estimates on the levels and double interactions are displayed for illustration as well. * Denotes significantly different from zero at the 0.10 level, ** at the 0.05, *** at the 0.01.

Table 3: Impact of Instrument on Advanced Classes, Mobility

Dependent Variable: In advanced/accelerated class, moved to school in past year (=0 no, =1 yes)
Independent Variables: Controls (including level and double interactions), triple interactions

	In advanced/accelerated classes	Moved to school in past year
Triple Interactions : Criteria*Minority*%Minority		
% Minority		
6-20%	-0.0039	0.0002
(s.e.)	[0.151]	[0.132]
21-40%	0.1763	-0.0164
	[0.1444]	[0.1295]
41-60%	0.0411	-0.0817
	[0.1475]	[0.1271]
61 plus %	0.0637	-0.0885
	[0.1541]	[0.1345]
Triple Interactions : Criteria*Grades*%Remedial		
% Remedial		
1-4%	0.0994	-0.0527
	[0.0695]	[0.0498]
4-9%	0.0085	0.033
	[0.0706]	[0.0518]
9-15 %	0.0048	-0.0071
	[0.0645]	[0.0516]
15-100%	-0.0202	-0.0127
	[0.0804]	[0.0549]
N	4,400	5,198
F-stat on instruments	F(8, 530) = 1.24	F(8, 529) = 0.59
F-stat on race instr	F(4, 530) = 1.36	F(4, 529) = 0.90
F-stat on grade intr	F(4, 530) = 1.11	F(4, 529) = 0.30
R^2	0.1588	0.0739

Standard errors are given in brackets. They are adjusted for clustering by 8th grade school. All regressions include the controls listed in Appendix Table 1. The samples are restricted to include only students that attend schools with advanced or accelerated classes, and students with information on school tenure. *Denotes significantly different from zero at the 0.10 level, ** at the 0.05, *** at the 0.01.

Table 4: First Stage IV Estimates by Number of Evaluation Criteria

Dependent Variable: Participation in gifted program (=0 no, =1 yes)
Independent Variables: Instruments, controls

	Number of *other* criteria used for gifted admission				
	<= 3	> 3		<= 4	> 4
Triple Interaction: Criteria * Grades * % Remedial			Triple Interaction: Criterai* Minority * % Minority		
% Remedial			% Minority		
1-4%	-0.144	-0.1001	6-20%	N/A	-0.0356
	[0.0840]*	[0.0839]			[0.1441]
4-9%	-0.1339	-0.0562	21-40%	-0.3884	-0.1822
	[0.0809]*	[0.0838]		[0.1129]***	[0.1456]
9-15%	-0.1788	-0.0097	41-60%	-0.5052	-0.3718
	[0.0894]**	[0.1026]		[0.1588]***	[0.1669]**
15-100%	-0.1871	-0.1167	61 plus %	-0.4115	-0.0103
	[0.0904]**	[0.1318]		[0.1607]***	[0.192]
N	2,244	3,021	N	2628	2637
F-stat (on grade instr)	F(4, 227) = 1.40	F(4, 301) = 0.50	F-stat (on race instr)	F(3, 266) = 6.03	F(4, 262) = 2.09
[p-value]	0.2351	0.7325	[p-value]	0.0005	0.0821
R^2	0.1864	0.1933	R^2	0.1976	0.1852

Standard errors are given in brackets. They are adjusted for clustering by 8th grade school. All regressions include the controls listed in Appendix Table 1, including levels, double interactions, and the other critera's triple interactions (omitted here for brevity). Some coefficients could not be estimated (denoted N/A) because there are few observations in that cell: * Denotes significantly different from zero at the 0.10 level, ** at the 0.05, *** at the 0.01.

Table 5: Impact of Gifted Education on Test Scores

Independent Variable: Gifted & Talented Participant (=0 no, =1 yes)
Dependent Variable: Standardized Test Score (mean 0, s.d. 1)

	Math Scores		Reading Scores	
	OLS	IV	OLS	IV
	8th Grade			
Gifted	0.5084	0.8634	0.3884	-0.0528
[s.e.]	[0.0323]***	[0.4111]**	[0.0332]***	[0.4103]
N	5265		5261	
R^2	0.4627		0.3599	
	10th Grade			
Gifted	0.4305	0.4504	0.3536	-0.0435
[s.e.]	[0.0300]***	[0.4006]	[0.0338]***	[0.4201]
N	4836		4842	
R^2	0.4749		0.3483	
	12th Grade			
Gifted	0.3805	0.4964	0.2919	-0.1237
[s.e.]	[0.0325]***	[0.4753]	[0.0368]***	[0.4687]
N	4054		4052	
R^2	0.4736		0.3347	

Standard errors are given in brackets. They are adjusted for clustering by 8th grade school. Test scores are normalized to be mean zero, standard deviation 1. All regressions include the controls listed in Appendix Table 1. Sample sizes differ because not all students participated in follow-up tests. * Denotes statistically significant from zero at the 0.10 level, ** at the 0.05 level, *** at the 0.01 level.

Table 6: Impact of Gifted Education on Academic and Peer Outcomes

Independent Variable: Gifted & Talented Participant (=0 no, =1 yes)
Dependent Variable: Academic and Peer Group Outcomes (=0 no, =1 yes)

	OLS	IV	Mean	N
8th Grade				
Enjoy class	0.0848	0.0013	0.4073	5175
[s.e.]	[0.0171]***	[0.26]	[s.d.=0.4913]	
10th Grade				
Challenged in class	-0.0261	0.1192	0.8482	4752
	[0.0128]**	[0.1717]	[0.3587]	
Took Pre SAT	0.095	0.2958	0.2172	4699
	[0.0165]***	[0.1967]	[0.4124]	
Took AP class	0.2707	0.1861	0.2986	4829
	[0.0181]***	[0.2191]	[0.4576]	
Most of friends dropped out	0.0105	0.0613	0.0186	4773
	[0.0052]**	[0.0649]	[0.1352]	
Important to my friends to get good grades	-0.0034	0.1102	0.5009	4727
	[0.0181]	[0.2272]	[0.5]	
12th Grade				
Graduated early	0.0004	-0.0844	0.023	4739
	[0.0055]	[0.0859]	[0.1499]	
On grade	-0.0038	0.0816	0.9569	4739
	[0.0069]	[0.135]	[0.2029]	
Took SAT	0.0941	0.1044	0.4886	4658
	[0.0166]***	[0.2218]	[0.4999]	
Took AP class	0.2707	0.3426	0.2986	4829
	[0.0181]***	[0.1721]**	[0.4576]	
Most of friends dropped out	0.0105	0.0627	0.0186	4773
	[0.0052]**	[0.0694]	[0.1352]	
Important to my friends to get good grades	-0.0034	0.0263	0.5009	4727
	[0.0181]	[0.274]	[0.5]	
Most of my friends going to 4-year college	0.0708	-0.0743	0.5657	4368
	[0.0169]***	[0.2905]	[0.4957]	

Standard errors are given in brackets. They are adjusted for clustering by 8th grade school. All regressions include the controls listed in Appendix Table 1. Sample size varies due to missing information on the dependent variable.
* Denotes statistically significantly different from zero at the 0.10 level, ** at the 0.05, *** at the 0.01.

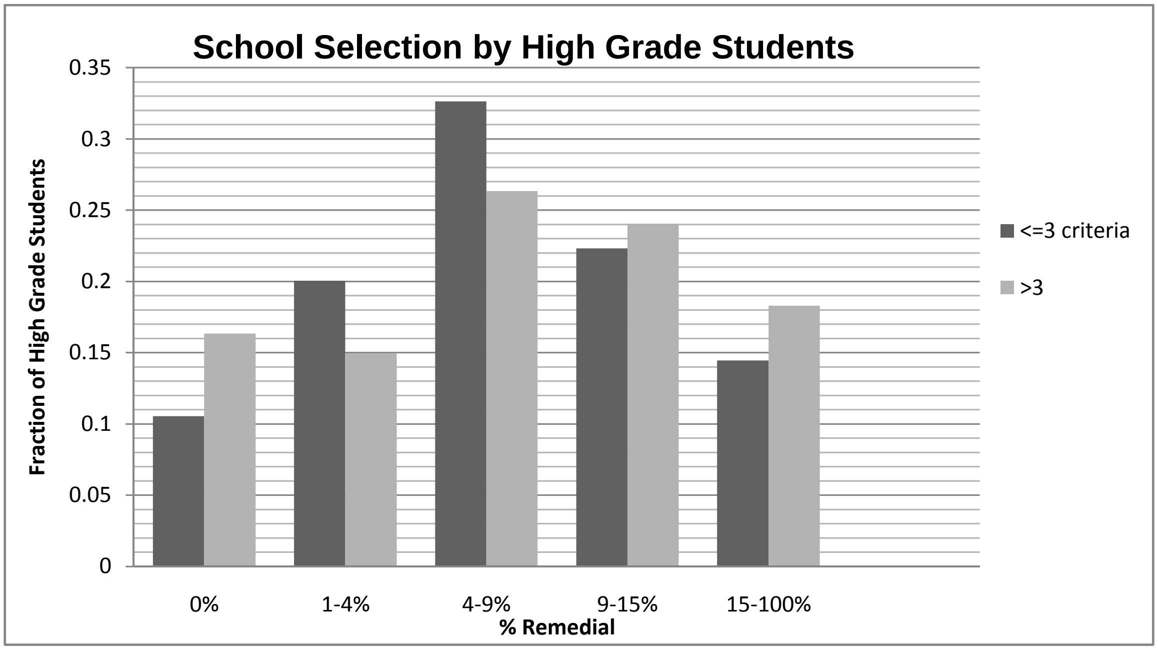
Table 7: Impact of Gifted Education on Test Scores, by Intensity

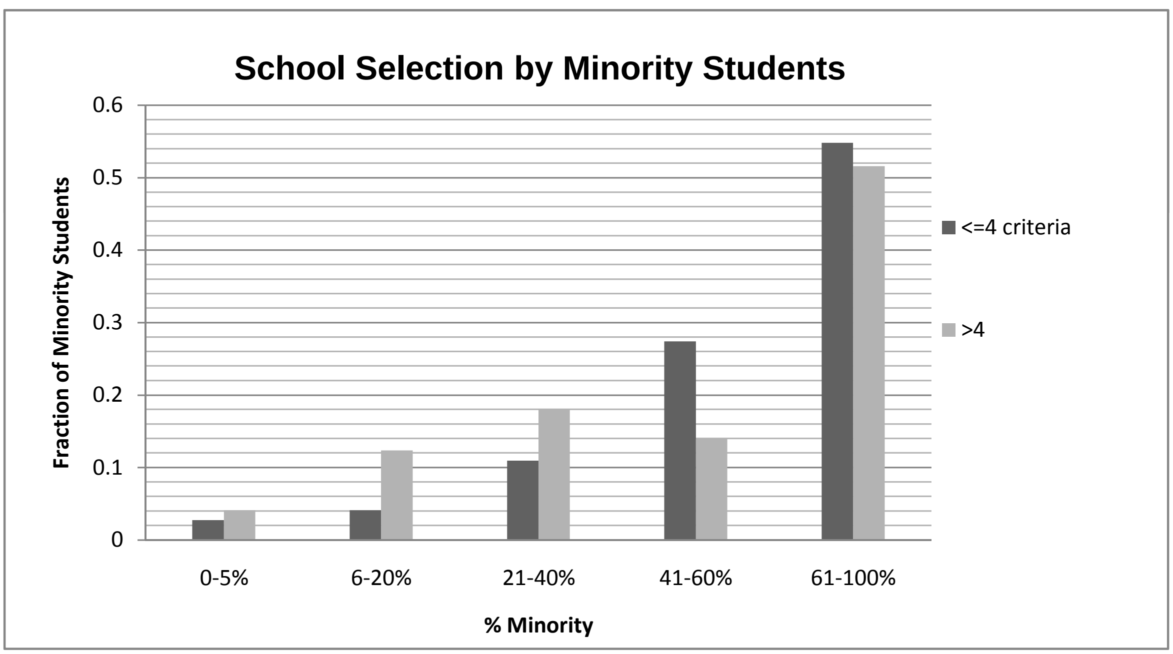
Dependent Variable: For organization: Standardized Math Test Score in 8th Grade
Dependent Variable: For curriculum: Standardized Math or Reading Test Score in 8th Grade
Independent Variable: Gifted Participation (=0 no, =1 yes)

	OLS	IV	OLS	IV
	Organization		Curriculum	
	Taken from class		Teach math	
Gifted	0.4254	0.8812	0.5192	1.1637
[s.e.]	[0.0659]***	[0.7802]	[0.0358]***	[0.4936]***
N	1424		3881	
R^2	0.4969			
	Grouped for all subjects		Doesn't teach math	
Gifted	0.5646	1.1195	0.4748	0.8489
[s.e.]	[0.0597]***	[0.5141]**	[0.0734]***	[0.4625]*
N	1504		1369	
R^2	0.5296		0.4686	
	Grouped for some subjects		Teach reading	
Gifted	0.5894	0.6972	0.4163	-0.1453
[s.e.]	[0.0663]***	[0.3638]**	[0.0367]***	[0.5513]
N	1191		4280	
R^2	0.5272		0.3692	
	In class/other		Doesn't teach reading	
Gifted	0.4422	-0.117	0.2905	0.0887
[s.e.]	[0.0702]***	[0.61]	[0.0829]**	[0.5572]
N	1146		975	
R^2	0.5132		0.4081	

Standard errors are given in brackets. They are adjusted for clustering by 8th grade school. All regressions include the controls listed in Appendix Table 1. * Denotes statistically significant at the 0.10 level, ** at the 0.05 level, and *** at the 0.01 level.

Figure 1: School Selection





Appendix Table 1: Control Variables (Means)

	Participants	Non-Participants		Participants	Non-Participants
Student & Geographic Characteristics					
Minority	0.3560	0.2698	Urban (omit rural)		
	[0.4790]	[0.4438]	Urban	0.2411	0.1842
				[0.4279]	[0.3876]
Female	0.5129	0.5456			
	[0.5000]	[0.4979]	Suburban	0.4798	0.4528
				[0.4997]	[0.4978]
Average grades	3.4236	2.8739			
(=1 F, =5 A)	[0.6398]	[0.7124]	Region (omit west)		
			Northeast	0.1578	0.1784
Family gets daily	0.9296	0.8878		[0.3646]	[0.3828]
newspaper	[0.2559]	[0.3156]			
			North Centra	0.2298	0.2466
Family has	0.9919	0.9870		[0.4208]	[0.4311]
encyclopedia	[0.0896]	[0.1131]			
			South	0.3697	0.3716
				[0.4829]	[0.4832]
Parent Characteristics					
At least one	0.9838	0.9743	Income (in thousands, omit < $10,000)		
parent works	[0.1262]	[0.1582]	$10-15	0.0583	0.0849
				[0.2343]	[0.2787]
Highest Education (omit < hs)					
High School	0.1367	0.2175	$15-20	0.0720	0.0814
	[0.3437]	[0.4125]		[0.2586]	[0.2735]
Some College	0.3673	0.4489	$20-25	0.0841	0.1222
	[0.4822]	[0.4974]		[0.2777]	[0.3275]
College	0.1837	0.1307	$25-35	0.1748	0.2031
	[0.3873]	[0.3371]		[0.3799]	[0.4023]
Masters	0.1578	0.0618	$35-50	0.2395	0.2112
	[0.3646]	[0.2407]		[0.4269]	[0.4082]
Professional	0.0793	0.0292	$50-75	0.1909	0.1317
	[0.2702]	[0.1682]		[0.3931]	[0.3381]
SES (omit 1st Quartile)			$75-100	0.0607	0.0278
SES 2	0.1861	0.2612		[0.2388]	[0.1643]
	[0.3893]	[0.4393]			
			$100 plus	0.0534	0.0271
SES 3	0.2646	0.2645		[0.2249]	[0.1623]
	[0.4412]	[0.4410]			
SES 4	0.3924	0.2078			
	[0.4884]	[0.4057]			

Standard deviations given in parentheses. SES was constructed as a continous variable-and then defined into quartiles- by NELS survey administrators using information on parent's education, occupation, and family income.

Appendix Table 1: Control Variables (Means) (continued)

	Participants	Non-Participants		Participants	Non-Participants
School Characteristics: 8th Grade School					
8th gr attendance	93.9976	93.9398	# Teachers (omit < 10)		
	[2.8234]	[2.8076]	10-20	0.2136	0.2106
				[0.6179]	[0.6138]
8th gr retention	91.9450	92.6398			
	[8.6557]	[7.7856]	20-30	0.5291	0.5581
				[1.1438]	[1.1675]
St-Teach Ratio	17.9078	17.4491			
	[4.5677]	[4.1411]	30-40	0.8608	0.8959
				[1.6445]	[1.6678]
Private School					
	0.0396	0.0368	40-50	0.7403	0.8017
	[0.1952]	[0.1882]		[1.7765]	[1.8348]
School Enrollment (omit < 200)			50-60	0.9029	0.8093
200-400 students	0.1286	0.1441		[2.1461]	[2.0498]
	[0.3349]	[0.3512]			
			60-75	0.7419	0.8276
400-600	0.2379	0.2642		[2.1556]	[2.2604]
	[0.4259]	[0.4409]			
			75 plus	0.5825	0.3776
600-800	0.2387	0.2277		[2.0795]	[1.6967]
	[0.4264]	[0.4193]			
			Base Salary (omit < $14,000)		
800-1,000	0.1594	0.1566			
	[0.3661]	[0.3635]	$14-16,000	0.1319	0.1816
				[0.3384]	[0.3855]
1,000 plus	0.1052	0.0919			
	[0.3068]	[0.0906]	$16-18,000	0.3115	0.3133
				[0.4632]	[0.4638]
8th gr enrollment (omit < 50))					
50-100	0.1044	0.1270	$18-20,000	0.3034	0.2969
	[0.3058]	[0.3330]		[0.4599]	[0.4569]
100-200	0.2168	0.2395	$20-22,000	0.1319	0.1159
	[0.4122]	[0.4268]		[0.3384]	[0.3201]
200-300	0.2354	0.2540	$22,000 plus	0.0906	0.0497
	[0.4244]	[0.4353]		[0.2871]	[0.2174]
300-400	0.1926	0.1728	% Free Lunch (omit 0%)		
	[0.3944]	[0.3781]	1-5	0.1521	0.1314
				[0.3592]	[0.3378]
400 plus	0.1796	0.1307			
	[0.3840]	[0.3371]	6-10	0.1044	0.1233
				[0.3058]	[0.3288]

Appendix Table 1: Control Variables (Means) (continued)

	Participants	Non-Participants		Participants	Non-Participants
School Characteristics: 8th Grade School					
% Free Lunch (continued)			Gifted & Talented Program		
11-20	0.2233	0.2082	% Students	10.8568	8.0051
	[0.4166]	[0.4060]		[11.5425]	[7.3487]
21-30	0.1383	0.1421	Standardized Tests	0.9474	0.9317
	[0.3454]	[0.3491]	(=0 not used,=1 use	[0.2233]	[0.2522]
31-50	0.1764	0.1911	Additional Tests	0.7540	0.7624
	[0.3812]	[0.3932]		[0.4308]	[0.4256]
50-75	0.0979	0.1004	Teacher Referral	0.8997	0.8896
	[0.2972]	[0.3005]		[0.3005]	[0.3133]
75-100	0.0218	0.0278	Parent Request	0.5583	0.5662
	[0.1462]	[0.1643]		[0.4967]	[0.4956]
% Minority (omit < 1-5%)			Grades	0.7791	0.7441
6 to 20	0.2694	0.2707		[0.4150]	[0.4364]
	[0.4438]	[0.4443]			
			Racial Opportunity	0.1934	0.1499
21 to 40	0.1966	0.1506		[0.3950]	[0.3570]
	[0.3975]	[0.3577]			
			Student Interview	0.2314	0.2763
41 to 60	0.0995	0.0921		[0.4218]	[0.4471]
	[0.2994]	[0.2891]			
			Student Request	0.2735	0.2899
61 to 100	0.1650	0.1155		[0.4459]	[0.4537]
	[0.3713]	[0.3196]			
			Other	0.0631	0.0565
% Remedial (omit 0%)				[0.2432]	[0.2308]
1-5	0.2888	0.2969			
	[0.4534]	[0.4569]			
			Interactions		
6-10	0.3244	0.3302			
	[0.4683]	[0.4703]	Grades Criteria * Average Grade 6th-7th grade		
11-20	0.1731	0.1513	Grades Criteria * % Remedial Students in School		
	[0.3785]	[0.3584]			
			Average Grade 6th-7th grade*% Remedial		
21-40	0.0477	0.0609			
	[0.2132]	[0.2390]	Race Criteria * Minority Status		
41-100	0.0243	0.0211	Race Criteria * % Minority Students in School		
	[0.1539]	[0.1435]			
			Minority Status * % Minority		