Racial Disparities in Minnesota Basic Standards Test Scores, *1996-2000*

TECHNICAL REPORT

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Executive Summary

The Minnesota Basic Skills Test (MBST), first implemented in 1996, is now in its fifth year of use. The test measures basic skills in reading and math. It was first administered to students in the eighth grade, and all students must pass the test to graduate from high school. The Roy Wilkins Center analyzed the data of the first year's test – 1996. The results of that analysis, published in 1997, showed a large gap between the white students' test scores and those of students of color. This racial disparity could not be explained by school poverty or segregation, as many assumed. Two factors that did affect test scores were rates of attendance and mobility (the number of schools a student attended in a year). Lower attendance rates and higher mobility rates contributed to lower test scores. Yet even after identifying the impact of these two factors on the overall racial gap in test scores, the disparity between whites' and students' of color test scores remained largely unexplained.

Now, five years later, we have performed another analysis, looking at changes in average scores by school and by race, from 1996 to 2000. Has Minnesota addressed these problems adequately? How have we done?

The results of our analysis are very positive. First, reading scores for all students have increased dramatically from 1996-1999. Students of color, specifically, have seen vastly improved scores, ranging from a 9-percent increase for Asian Americans to a 16-percent increase among African Americans. This success is even more noteworthy because at the same time, other factors that mitigate against improved reading scores have increased. The number of students who do not speak English at home has doubled since 1996, and enrollment in special programs for Limited English Proficiency has tripled. In addition, school mobility and attendance rates, identified in the 1997 report as two factors that affect test scores, both changed for the worse. Given these increased negative trends, the sharp rise in reading test scores is impressive. Clearly, a huge effort has been made to implement policies or develop programs that foster achievement in reading. This effort has borne fruit, despite continued or increased problems in other areas.

Second, the size of the racial gap in test scores has diminished noticeably from 1996 to 1999. Of particular significance is the fact that these decreases occur in the unexplained portion of the racial gap, which is the part that remains after testing for specific factors, such as poverty, race, segregation and language proficiency, thought to cause poor test scores. The largest and most distinct decline is observed for Asian Americans, whose test score gap plunged from 43 percent to 16 percent for reading and from 64.4 percent to 15.5 percent for mathematics. There is also a sizable decline in the unexplained gap in test scores between blacks and whites. In 1996, 73 percent of the racial gaps in mathematics and 75 percent of the gap in reading test scores were unexplained by our models' independent variables. In 1999, 62 percent of the gap in math and 59 percent of the gap in reading were unexplained. If the unexplained portion of this gap can be seen as a measure of discrimination, these decreases suggest that Minnesota has made concerted efforts since 1996, with successful results, not to disadvantage students of color.

While these gains in students' performances are tremendous, attention still needs to be paid to improving math scores. Unfortunately, the math scores for students of color have decreased since 1996. Our results concerning the math test show that even a small change in the attendance rate strongly impacts test scores and it impacts minorities' scores more than whites' scores. The attendance rate decreased for all groups except African Americans. Their increased rate, however, was small. Poor attendance continues to be a factor in low test scores. Our analysis thus calls for a continued or renewed focus on improving attendance rates of students of color in order both to improve math test scores and to reduce the racial gap in these scores.

Interestingly, in 1996 math scores for all students were higher than reading scores. In the later years this is reversed, with reading scores outpacing math scores. It may be tempting to speculate that school resources were shifted from math to reading during these years. This conclusion, however, cannot be reached from our data. Our findings show that in fact, schools with improved readings scores had higher adds of improved math scores.

Acknowledgments

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Our initial study of the 1996 Minnesota Basic Standards Test grew out of a conversation with Carol Johnson, then Superintendent of the St. Louis Park Public Schools. Funded by the Minnesota Department of Children, Families & Learning, the 1997 report brought communities of color together to discuss and develop new programs for helping their children achieve. Dr. Sharon Tolbert Glover, President, Communities of Color Institute, organized a series of meetings with the four communities of color in the Twin Cities, funded by Medtronic, Inc. Our interaction with participants at those meetings encouraged continued research and investigation of the key factors that influence student development at the elementary level. The reports from The Minneapolis Foundation on the Minneapolis Public Schools and The Urban Coalition on St. Paul and Minneapolis schools published in spring 2000 informed our research. The Round Table on Academic Achievement of Children of Color at the University of Minnesota with Gary Cunningham, Mark Davison, Ernest Davenport, Jan Hively, and Barbara Warren provided insights and new questions for our research. I am grateful to Robert Bruininks, University of Minnesota Vice President and Provost, for a lively conversation about our studies of test scores and the community of color. Katie Sample, Executive Director of the African-American Academy for Accelerated Learning, brought me into contact with parents, teachers, and students eager to find positive outcomes in our education system. My work with Assistant Professor Susan McElroy and her Research Assistant, Ronald Fernandes, Heinz School of Public Affairs, Carnegie Mellon University, drew on national data sets to look deeper into why children of color are failing in our schools. Assistant Professor Nicola Alexander, Educational Policy and Administration at the University of Minnesota brought insight and a new perspective to this study. Community activist, Dr. Gary Kwong, alerted us to entrance requirements at magnet schools. Reginald Birts, Stephanie Haddad, Gillian Johnson, Pakou Ly, Vidhya Shanker, Justin Testerman, and Daniel Williams, students in my Spring 2000 Capstone Course, Deconstructing Race in the Twin Cities, provided fresh approaches in their May 2000 report: "Values and Student Achievement." Principals Donna Grant, Windom Open School, Shannon Griffin, Olson Middle School, and Meredith Davis, Sanford Middle School, La Rue Fields, Minneapolis Urban League, Lunn Daniels, Minneapolis Public Schools Family Involvement Office, Kay Bonzek, Franklin Middle School, Lynnea Atlas, Minnesota Minority Education Partnership, Nicola Alexander, Assistant Professor, Educational Policy and Administration, David Heistad and Rick Spicuzza, Minneapolis School District, Nancy Eustis, Humphrey Institute Associate Dean, Pam Schomaker, Minnesota Center for Survey Research, all contributed to the success of this capstone seminar and to our thinking on student achievement. McNair students, Jennifer Redlin and Jennifer Walker, raised new questions as they studied the 1998 Minnesota Basic Standards Test and analyzed the scores of urban students of color. I am grateful to David Heistad, Director of Minneapolis Public Schools Research, Evaluation and Assessment, and Associate Professor Ernest Davenport, Educational Policy and Administration, for reading a first draft of this report and their substantive comments.

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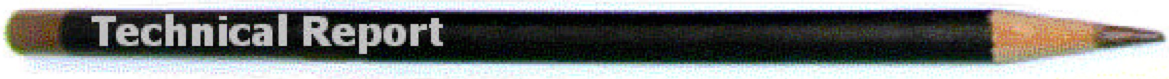

Racial Disparities
in
Minnesota Basic Standards Test Scores
1996-2000

I Overview

In March of 1997, the Roy Wilkins Center released a report examining racial disparities in Minnesota Basic Standards Test scores for 1996. That report compared the reading and mathematics scores of African Americans, American Indians, Asian Americans and Latinos with those of whites. The central conclusions of the report were:

- There are wide racial disparities in the mean test scores, in the percentage of high achievers, in the percentage of low achievers and in pass rates;
- Conventional explanations for these racial disparities, such as ***school poverty or segregation***, measuring student, school and program effects, do not uniformly explain these racial gaps;
- Highly significant and non-trivial impacts on test scores were found for increases in ***attendance*** and reductions in ***mobility***;
- But, the attendance and mobility impacts were not large enough to explain much of the racial gap in test scores
- As a result, we found large "unexplained" or residual gaps in test scores.

Using data from 1997-2000, The Roy Wilkins Center replicated the 1996 analysis in order to answer the following questions:

- What are the test scores and racial gaps in test scores for more recent years? Have the gaps narrowed or widened?
- Have there been changes in the demographic composition of the test-taking population that could possibly explain any cohort changes in test scores?
- Have there been changes in the effects of the determinants (or the significance of those effects) of test scores?
- What are the effects of such highly debated factors as poverty on test scores? Have these effects changed in more recent data?
- Has the unexplained gap in test scores widened or narrowed? In other words, do student, school or program effects have more or less explanatory power in more recent years in understanding racial gaps in test scores?

- Had more recent cohorts of test-takers taken the examination in 1996, what would their scores have been? Had earlier cohorts of students taken the examination in 1999, what would their scores have been? In other words, how much of the change in the test scores can be explained by differences in cohorts of test-takers and how much is due to other factors?

Because mobility measures used in 1996 are not calculable using 1997 or 1998 data, we have redone all of the analysis from 1996 using the measures available in subsequent years and show that the results from 1996 remain essentially the same under both measures of mobility. Then, we replicate the new 1996 analysis for 1997, 1998 and 1999. We are unable to perform a full replication of the 2000 data because of data limitations at the time of the report.

Nevertheless, we are able look at which schools did well and which ones did not do well from 1996-2000. In addition, for the period 1996 through 1999 we are able to measure the impacts of schools that do extremely well on student achievement. Thus, we are able to ask:

- How important is it for students of color to attend high achieving schools? What is the impact on students of color of attending low achieving schools?
- How does attending schools that improved their test scores between 1996 and 1999 impact individual test scores?
- What are the determinants of school improvements? Do these differ by the racial composition of the schools? Is there a trade-off between improvements in mathematics test scores and reading test scores?

First we provide details on the method of replicating the results and the analysis. We define the variables used and the models estimated. There are significant differences between the data used in 1996 and the data available in recent years. Accordingly, we redo the 1996 analysis using data comparable to what is available in more recent years.

Next, we discuss the nature of changes in the test scores and the demographics of the different cohorts of students taking the tests. We provide detailed linear and logistic regression results for the analysis of individual test scores measured in four different ways: mean test scores, probability of pass, probability of high achievement (test scores in top 20 percent) and probability of low achievement (test scores in bottom 20 percent). We compute the portion of the racial gaps in test scores that can be explained and the portion that cannot be explained by student, school or program characteristics. We examine whether observed changes in racial gaps in test scores can be attributed to cohort changes or other factors.

Finally, we explore the determinants of school improvements. We examine whether school improvements have an impact on individual test scores and whether such improvements translate into reductions in the unexplained portions of racial gaps in test scores.

II Data and Methodology for Replicating 1996 Results

A. The Data

This report, like our earlier report, uses a merged data set combining information on individual students who took the Minnesota Basic Standards examination in the years 1996 to 2000. The first data set contains information on the test scores themselves: the number and the percent of questions answered correctly for each module of the examination and for the entire examination. The data for 2000 include corrected information for mathematics test items. The second data set, available only for 1996 to1999, includes background information on each test-taker obtained from the MARRS data set, which includes information on characteristics of the student as well as basic information on the school. Thus, the detailed examination of the components of individual test scores necessarily focuses on the merger of the two data sets for the years 1996 through 1999, although we can provide insights about broad trends in test scores for the entire period between 1996 and 2000.

Dependent Variables

Mean Test Score (%)

This variable is the percent correct on the examination, calculated by dividing number of items correct by total number of items tested.

High Achiever Rate (0, 1)

This variable is the probability that the test score was in the top quintile of students. To create this variable, test scores were sorted by ascending order and divided into 5 groups. If a student's test score was in the fifth group, the student's top math variable should be 1, otherwise 0.

Low Achiever Rate (0, 1)

This variable is the probability that the test score was in the bottom quintile of students. To create this variable, all the test scores were sorted by ascending order and divided into 5 groups. If a student's test score was in the first group, the student's bottom math variable should be 1, otherwise 0.

Pass Rate (0, 1)

This variable is the probability of passing the test. Different cut lines were applied in 1996 and the other years. In 1996, if the percent correct was greater than or equal to 70, the student passed the exam and the student's pass-math or pass-reading variable was 1, otherwise 0. In 1997, 1998 and 1999, the student passed if the percent correct was greater than or equal to 75, and the student's pass-math or pass-reading variable was 1, otherwise 0.

2-year Improvement (0, 1)

This is a school-level variable. If a school's average test score in any of the categories was greater than in 1996, the school's 2-year improvement variable was assigned 1, otherwise, 0. Also computed for 1998 to 2000.

4-year Improvement (0, 1)

This is also a school-level variable. If an average test score of a school continuously improved over 4 years, 1996-2000, the school's 4-year improvement variable was assigned 1, otherwise, 0.

Independent Variables

Age

Reflects age of student for the month and year test was taken using birth date variable from the MARSS data set.

Female

This variable was created using the gender variable from the MARSS data set. If gender is female, female variable has a value of 1, otherwise, 0.

American Indian

This variable was created using the Race/Ethnicity variable from the MARSS data set. If race is American Indian, this variable has value of 1, otherwise, 0.

Asian

This variable was created using the Race/Ethnicity variable from the MARSS data set. If race is Asian, this variable has value of 1, otherwise, 0.

Hispanic

This variable was created using the Race/Ethnicity variable from the MARSS data set. If race is Hispanic, this variable has value of 1, otherwise, 0.

African American

This variable was created using the Race/Ethnicity variable from the MARSS data set. If race is African American, this variable has value of 1, otherwise, 0.

Attendance Rate

This variable was created by calculating percentage of attendance days within entire membership days. Attendance days and membership days were obtained from the MARSS data set.

English Not Spoken at Home

This variable was created using the Home Primary Language variable of the MARSS data set. The Home Primary Language is the language students learned when they began speaking, the language the student speaks most of the time, or the language usually spoken in the home. If the Home Primary Language was English, this variable had a value of 0, otherwise, 1.

Special Education / Disability

This variable was created using the Primary Disability Instructional Setting variable of the MARSS data set. If the Primary Disability Instructional Setting variable was '00', the Special Education / Disability variable had a value of 0, otherwise, 1.

Limited English Proficiency

This variable is based on Limited English Proficient (LEP) variable of the MARSS data set. Value 1 means ‘Y’[Yes], value 0 means ‘N’ [No]. This reflects any assessment during the current school year and is a cumulative count. If during the year students no longer require LEP or bilingual services, they should still be reported using code ‘Y’. If students required LEP services during the previous school year, but not in the current year, report ‘N’.

Gifted / Talented

This variable was created using the Gifted / Talented Participation variable of the MARSS data set. Value 1 means ‘Yes’, value 0 means ‘No’. Participation is defined as attending a minimum of one hour per week during any semester, trimester or quarter, or who have a cumulative total of nine hours of service during the school year.

Percent American Indian in School

This school-level variable represents the percentage of all test-takers at a school who are American Indian. It was created using the Race / Ethnicity variable of the MARSS data set.

Percent Asian in School

This school-level variable represents the percentage of all test-takers at a school who are Asian. It was created using the Race / Ethnicity variable of the MARSS data set.

Percent Hispanic in School

This school-level variable represents the percentage of all test-takers at a school who are Hispanic. It was created using the Race / Ethnicity variable of the MARSS data set.

Percent Black in School

This school-level variable represents the percentage of all test-takers at a school who are African American. It was created using the Race / Ethnicity variable of the MARSS data set.

Number of Schools Attended

This variable is the number of schools attended during the past year. This variable was created by counting unique school numbers per student in the MARSS data set.

Free / Reduced Price Lunch

This is a percentage of students who are eligible to receive free or reduced price lunch, in a school. This is the poverty variable used in the analysis. For 1998 and 1999 this variable is also available for individuals.

School Math Top Quintile

This variable is the probability that the average math test score of a school was in the top quintile of school test score rankings. To create this variable, all the average math test scores of the schools were sorted in ascending order and divided into 5 groups. If a school's math average score was in the 5th group, the School Math Top variable had a value of 1, otherwise, 0.

School Reading Top Quintile

This variable is the probability that the average reading test score of a school is in the top quintile of school test score ranking. To create this variable, the average reading test scores of all the schools were sorted in ascending order and divided into 5 groups. If a school's reading average score was in the fifth group, School Reading Top variable had a value of 1, otherwise, 0.

School Math Bottom Quintile

This variable is the probability that the average math test score of a school was in the bottom quintile of school test scores ranking. To create this variable, the average math test scores of all the schools were sorted in ascending order and divided into 5 groups. If a school's math average score was in the first group, the School Math Bottom variable had a value of 1, otherwise, 0.

School Reading Bottom Quintile

This variable is the probability a school's average reading test score was in the bottom quintile of school test score rankings. To create this variable, the average reading test scores of all the schools were sorted in ascending order and divided into 5 groups. If a school's average reading score was in the first group, the School Reading Bottom variable had a value of 1, otherwise, 0.

Middle / Jr. High School

This variable is based on the MARSS School Classification. If a School Classification is 20 (public middle school with grades 5 to 8 or a combination of these grades) or 31 (public junior high school with grades 7 to 8 or 7 to 9), the Middle / Jr. High School variable has a value of 1, otherwise, 0.

Charter School

This variable is based on the MARSS School District Type variable. If a District Type is '07' (charter school), the charter school variable has a value of 1, otherwise, 0.

B. The Problem of Mobility

In the earlier report, we used a measure of mobility that captured the number of school changes in the past five years. Because of changeovers in the student identification codes after 1996, it is not possible to derive such a measure for data after 1996. We are, however, able to compute the number of school changes in a one-year period. Figure 1, Number of Schools Attended During Year, displays the values of the mobility variable computed for each year. Overall, the number of schools attended in 1996 was 1.068. This number rose to 1.133 in 1999, representing a 6 percent increase. The highest value in 1996 was observed for African Americans (1.2254), followed by American Indians (1.1778), a ranking that is identical to that found in the earlier report using five-year school changes. The largest percentage change between 1996 and 1999 was also registered by African Americans (21.76 percent), followed by that seen by American Indians (14.24 percent).[1]

As a gauge of whether the change in the measurement of mobility affects the replication of the analysis and results, we have computed the key measure of the percent of the racial gap in test scores that is unexplained by the model variables using both the original 1996 mobility variable and the revised mobility variable. In other words, we attempt to

[1]These results are displayed in Table B-1a and Table F-4 in the appendix.

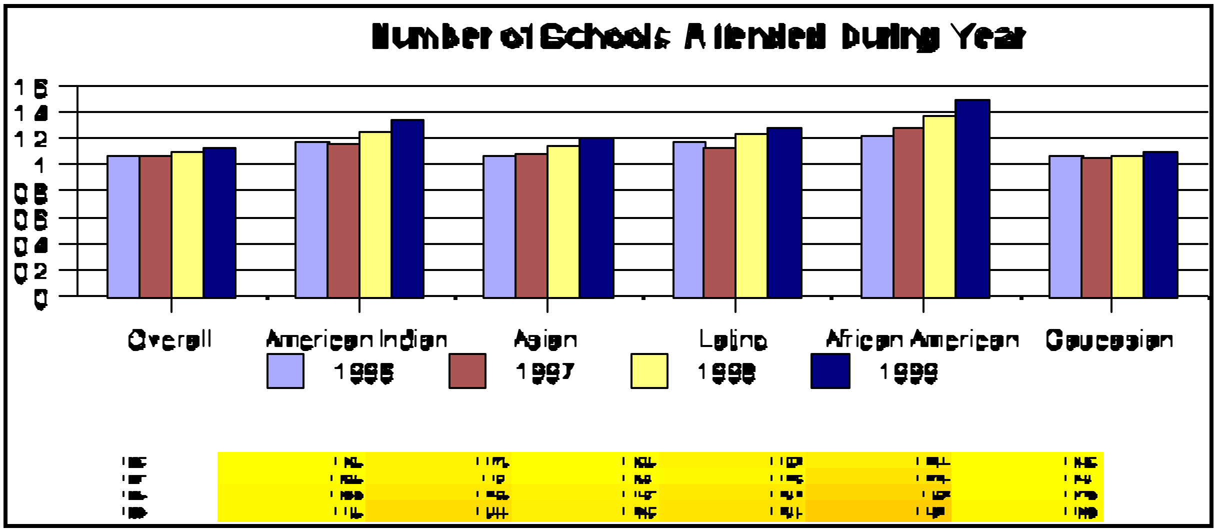

Figure 1

replicate the model and to determine whether using the 1-year mobility variable yields the same substantive conclusions as using the 5-year mobility variable.[2]

The results of replicating and revising the model reveal few substantive changes in the empirical findings from the earlier report. Figure 2, Unexplained Racial Gaps in Mean Test Scores, shows the percentages of the racial gaps in tests scores that remain unexplained after controlling for age, gender, attendance, language, disability, program participation, school rank, racial composition and poverty. These computations are performed using the 5-year mobility variable and the 1-year mobility variable. The revised results, however, show a slightly larger unexplained gap between Asian-white and black-white math and reading scores and a smaller unexplained gap between Latino and white math and reading scores. The Indian-white gaps are virtually identical between the replicated and the revised measures. Accordingly, one can conclude that using the 1-year mobility measure as opposed to the 5-year mobility measure slightly biases upward the measure of Asian-white and black-white unexplained racial gaps in test scores and biases downward the Latino-white gaps. We can accept with substantial confidence the measures produced for the Indian-white gaps.

C. The Problem of Matching of Schools

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[2]The original test scores report issued by the Wilkins Center in 1997 used SPSS to obtain the results reported. We have replicated the results using SAS, a different statistical program, and have obtained essentially the same results. Figure 2 shows the original, replicated, and revised results.

Not all schools in the 2000 sample were in the 1996 sample. In particular, St. Paul Public Schools were not included in the 1996 sample because the student identification codes used to match test scores and student characteristics differed. Some of the analysis performed in this report uses school data and compares schools across years. In these instances, we include only those schools that were continuously in the sample during the

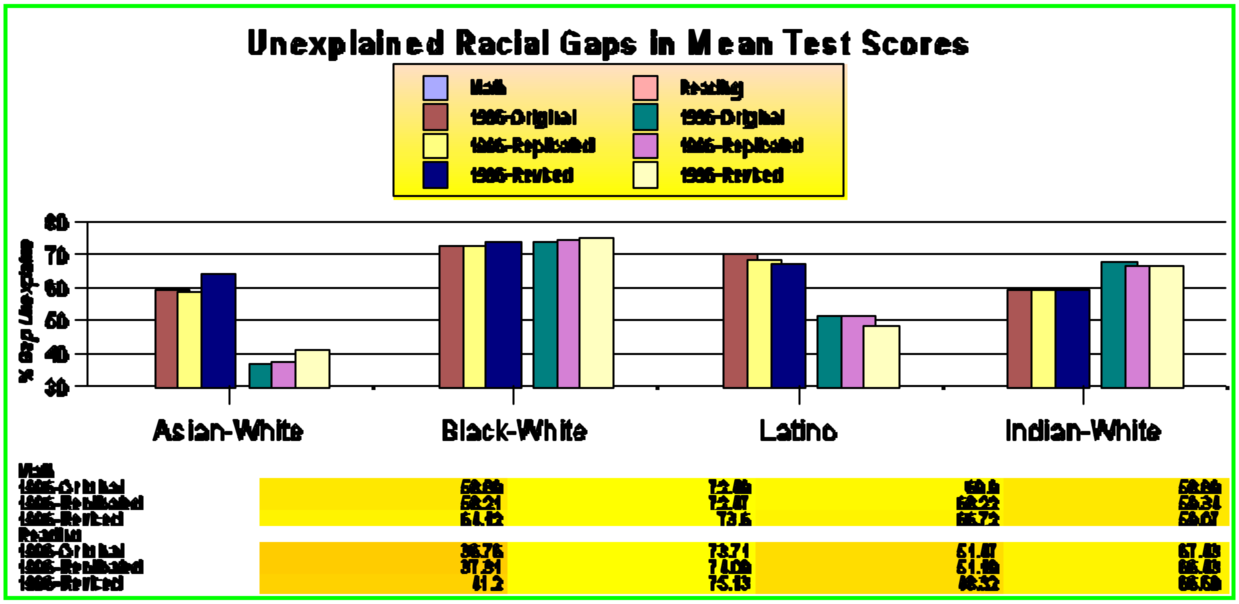

Figure 2

periods examined.

To get a sense of the difficulties of matching schools, consider the numbers of schools and students for whom mathematics scores were provided in each year. There were 52,079 students in the original sample of eighth graders in 1996. Of those, 51,180 took the mathematics portion of the examination, with 51,157 of them having valid scores. These represented 403 schools. Altogether, there were 52,054 students who took either the mathematics examination or the reading examination in 1996. This number fell to 43,118 in 1997, although there were 585 schools in the sample; 63,356 students took the tests in 1998, from 534 schools; 65,544 did so in 1999, from 534 schools; and 66,313 took the tests in 2000, from 650 schools.[3]

From 1996 to 1999, only 243 schools matched for mathematics and 230 for reading. The number of matches for schools with scores in 1996 and 1999 – meaning that there was

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[3]See Table F-1 in the appendix for details.

no assurance of matches in the intervening years – was 366 for mathematics and 360 for reading.

In other words, up to half of the sample is lost when one attempts to match schools from year to year.[4] Nearly 3,000 of the individual eighth grade test-takers included in the 1997 sample would be excluded when matching schools between 1996 and 1997, because Saint Paul schools were not included in the 1996 sample.

To assess the implications of analyzing school change data based on the exclusion of Saint Paul schools, we compared the racial distribution of the actual samples from 1996 to 2000, and samples excluding Saint Paul. We discovered that the American Indian share of the test-taker population remains unchanged; the Asian, Latino and African American shares drop; and the white share increases.[5]

Of course, there are more schools than only those in Saint Paul that are not matched across the years. There were, however, considerably more matches from 1998 to 2000. We have therefore computed two sets of school change variables. One set ranges from 1996 to 1999, with recognition of the reduction in the number of schools due to non-matches. Another set ranges from 1998 to 2000, the period in which there were more matches because most schools were required to administer the examination.

D. The Generic Method

We consider four main dependent variables in our analysis of individual test scores: mean test score (percent correct); probability of high achiever; probability of low achiever; and probability of pass. The pass rate is 70 percent correct in 1996; 75 percent correct in 1997 through 2000. High achievers are those who score among the top 20 percent of all test-takers; low achievers are those who score among the lowest 20 percent of all test-takers. These rates are computed for each year.

The model for estimating the impacts of school, program and individual characteristics on test scores is a linear model. Estimates of coefficients are obtained via ordinary least squares (OLS). Let MTS^k be the mean test score for the *kth* group. Then:

$$MTS_t^k = \sum a_{tj}^k X_{tj}^k$$

[4] In 1996, participation in the Basic Standards testing was not mandatory.

[5] Details of these results are found in Table F.3 of the appendix.

where the *X*'s denote school, program and individual student characteristics. The *á*'s denote the slopes of *MTS* with respect to the *X*'s. Note that we have estimated the model as a linear model, where alternative functional forms would also be suitable. In this instance, an alternative would be a log-linear model. For purposes of replication, however, we have chosen to adopt the functional form employed in our previous analysis.

Alternative models are used to explore the two ends of the distribution as well as the pass point. Using maximum likelihood methods, we have estimated logistic models for the probability of being a high achiever, low achiever, or of passing the examination:

The probability of high achiever for the kth group in year *t* is :

$$\Pr ob(High\ Achiever)_t^k = \frac{1}{1+\exp - \sum b_{t^i}^k X_{t^i}^k}$$

The probability of low achiever for the kth group in year *t* is:

$$\Pr ob(Low\ Achiever)_t^k = \frac{1}{1+\exp - \sum \P_{i_t}^k X_{i_t}^k}$$

And, finally the probability of passing in year *t* for the kth group is:

$$\Pr ob(Pass)_t^k = \frac{1}{1+\exp - \sum f_{i_t}^k X_{i_t}^k}$$

The body of this report focuses on the mean test scores; the detailed descriptive statistics as well as the full regression results using these alternative models are included in the appendix.

III Detailed Results – Individual Test Scores

A. Changes in Overall Scores

Table 1, Mean Test Scores by Race, 1996-2000, presents the core observations about what happened to performance on the Minnesota Basic Standards tests from 1996 to 2000. Reading scores consistently showed improvements over the past half decade. Mathematics scores for students of color showed a downward slide from 1996 to1999. Whereas in 1996 the average test scores for mathematics were 67.63, 74.85, 67.67 and 59.50 percent correct for American Indians, Asians, Latinos and African Americans respectively, these scores dropped to 64.67, 73.11, 62.88 and 56.93 percent correct in 1999. The white mathematics scores actually improved slightly, from 80.93 in 1996 to 81.47 in 1999. Thus, while white scores increased by .66 percent from 1996 to 1999, American Indian scores declined by 4.38 percent; Asian American scores slipped by 2.32 percent; Latino scores nose-dived by 7.09 percent; and black scores dropped by 4.32 percent.[6] The corrected mathematics scores for 2000 show that overall scores continued to decline, although this is the result of falling white scores. Students of color all registered improved mathematics scores from 1999 to 2000. The sobering counterpoint, however, is that the rebounding minority scores in 2000 placed African American and Asian students within a half of a percentage point of where they were in 1996; American Indian and Latino students scored 1.74 to 3 percentage points less in 2000 than they did in 1996.

Reading scores, in contrast, improved for all groups. In 1996, the average test scores for reading were 61.99, 66.84, 61.10, 54.54 and 73.75 percent correct for American Indians, Asian Americans, Latinos, African Americans, and Caucasians, respectively; in 1999, they were 68.55, 72.98, 67.15, 63.30 and 82.87 percent correct, representing improvements ranging from 9 percent for Asian Americans to 16 percent for blacks. These improvements continued in 2000.

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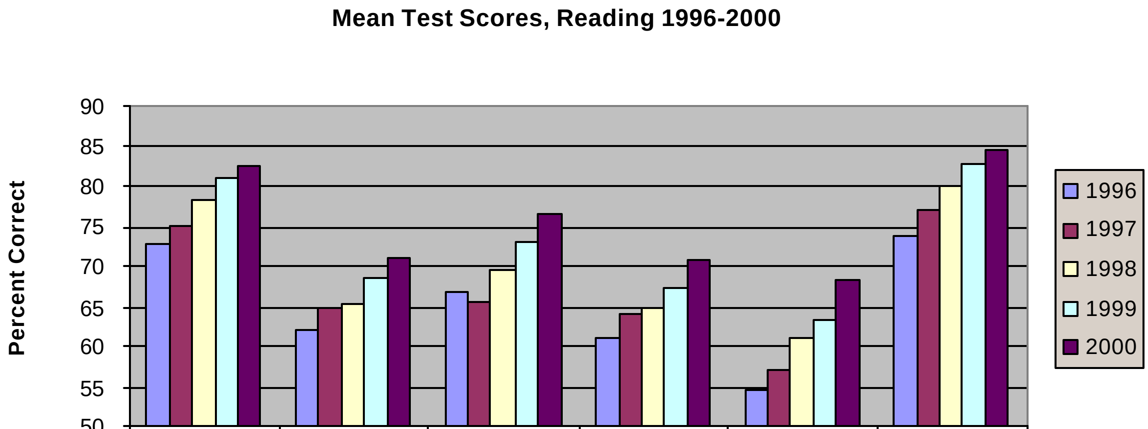
[6]See Table B-6.

Table 1: Mean Test Scores by Race 1996-2000

		1996	1997	1998	1999	2000
Math	Overall	79.78	79.97	79.40	79.23	78.72
	American Indian	67.63	69.22	65.49	64.67	65.89
	Racial Gap	-16.44%	-15.45%	-19.67%	- 20.61%	-18.49%
	Asian	74.85	73.32	71.36	73.11	74.61
	Racial Gap	-7.52%	-10.44%	-12.48%	-10.25%	-7.70%
	Latino	67.67	67.60	64.21	62.88	64.61
	Racial Gap	-16.39%	-17.43%	-21.24%	-22.82%	-20.08%
	African American	59.50	59.84	56.75	56.93	60.00
	Racial Gap	-26.48%	-26.91%	-30.40%	-30.12%	-25.78%
	Caucasian	80.93	81.87	81.53	81.47	80.83
Reading	Overall	72.70	75.11	78.28	80.90	82.57
	American Indian	61.99	64.77	65.39	68.55	71.15
	Racial Gap	-15.95%	-15.93%	-18.38%	-17.27%	-15.85%
	Asian	66.84	65.63	69.56	72.98	76.48
	Racial Gap	-9.37%	-14.82%	-13.18%	-11.93%	-9.55%
	Latino	66.10	64.10	64.89	67.15	70.81
	Racial Gap	-17.16%	-16.81%	-19.00%	-18.97%	-16.25%
	African American	54.54	57.15	61.04	63.30	68.27
	Racial Gap	-26.05%	-25.82%	-23.81%	-23.61	-19.26%
	Caucasian	73.75	77.05	80.11	82.87	84.55

The improvements in reading scores and the contrasting decline in mathematics scores can be seen graphically in Figures 3 and 4. It is tempting to blame the decline in mathematics test scores on possible shifting of resources to help improve reading test scores, but this conclusion cannot be drawn directly from the evidence provided here. To make the case that schools shifted resources from the teaching of mathematics to reading -- acknowledging that mathematics scores were initially higher than reading scores -- a comparison needs to be made between school scores. We cannot make that case using our data for two reasons. First, the evidence provided here is about individual test scores with different cohorts of students represented in each year. Second, the schools included in the various years' samples are not all matched. We discuss a more detailed examination of the effects of improved reading scores on mathematics scores later in this report.

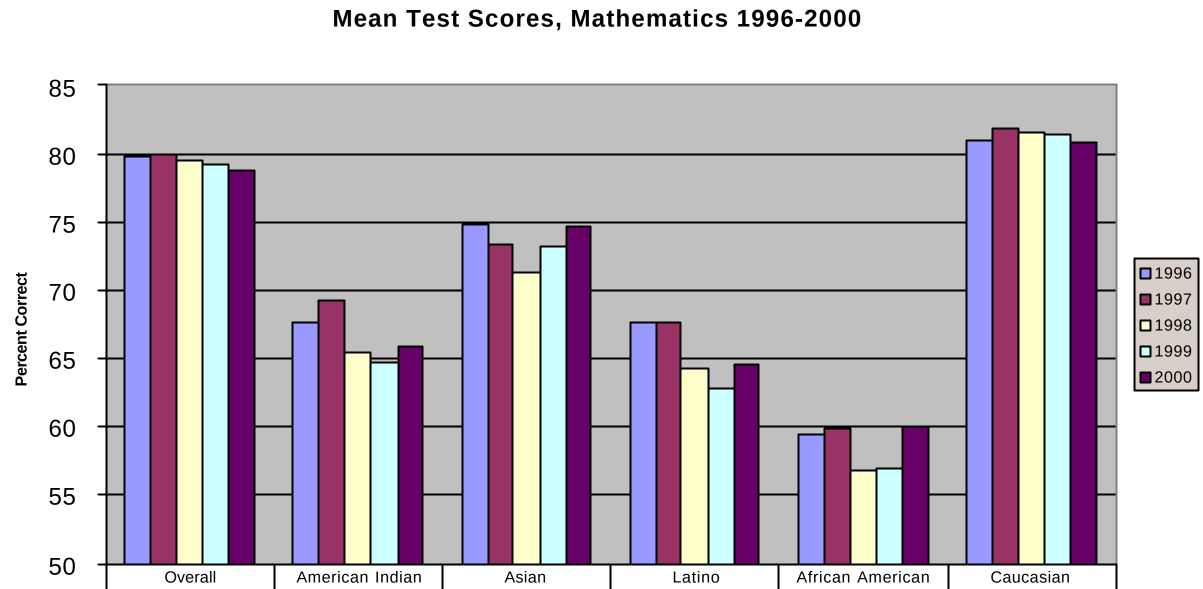


	Overall	American Indian	Asian	Latino	African American	Caucasian
1996	72.70	61.99	66.84	61.10	54.54	73.75
1997	75.11	64.77	65.63	64.10	57.15	77.05
1998	78.28	65.39	69.56	64.89	61.04	80.11
1999	80.90	68.55	72.98	67.15	63.30	82.87
2000	82.57	71.15	76.48	70.81	68.27	84.55

Figure 3

One of the dire consequences of the uniformly declining mathematics test scores between 1996 and 2000 is that racial gaps in test scores were at least as wide in 2000 as they were in 1996, for all but African Americans. In 1996 there were American Indian-white, Asian-white, Latino-white and black-white gaps in mathematics scores of -16.44%, -7.52%, -16.39% and -26.48%. In 2000, these gaps were -18.49%,-7.70%, -20.08% and -25.78%. It is no consolation to note that the slim narrowing of the black-white gap represents less than three-quarters of a percent.

By way of contrast, the black-white gap in reading scores narrowed considerably from 1996 to 2000. The gap was -26.05% in 1996 but declined to -19.26% in 2000. The other racial gaps remained about the same.



	Overall	American Indian	Asian	Latino	African American	Caucasian
1996	79.78	67.63	74.85	67.67	59.50	80.93
1997	79.97	69.22	73.32	67.60	59.84	81.87
1998	79.40	65.49	71.36	64.21	56.75	81.53
1999	79.23	64.67	73.11	62.88	56.93	81.47
2000	78.72	65.89	74.61	64.61	60.00	80.83

Figure 4

B. Changes by Components of Examination

Without explicitly arguing *why* mathematics scores declined, we can look descriptively at the components of the decline.[7] In 1996, the component of the mathematics examination dealing with shapes and spaces registered the highest scores. Overall, test-takers answered 88.5 percent of the questions correctly. This compares with 69.9 percent of percentages-and-ratios questions answered correctly; 70.4 percent of estimation questions answered correctly; and 76.3 percent of chance-and-data questions answered correctly. Test-takers also did well in 1996 on number sense (81 percent correctly answered), measurement (81.6 percent correctly answered), whole numbers (84.7 percent correctly answered) and tables and graphs (87.8 percent correctly answered).

On those sections where the 1996 cohort fared poorly, the 1999 cohort of test-takers showed mixed improvement overall. Whereas scores on the percentages-and- ratios and

[7]Table B-8b in the appendix provides these details.

estimation questions rose overall by about 3 to 3.7 percent, chance-and-data scores declined by nearly 7 percent. The declines were particularly pronounced among students of color: African American scores on chance and data dropped nearly 20 percent, from 55.8 percent correct in 1996 to 45 percent correct in 1999. American Indian scores were lower by 17 percent; Asian scores fell by nearly 10 percent; and Latino scores plunged by about 20 percent on this portion of the examination.

Even on some of those portions of the examination where students in the 1996 cohort fared well, such as shapes and spaces, there was a decline in test performance. The 1999 cohort's scores on shapes and spaces declined by nearly 12 percent from the 1996 cohort's scores, with Latinos, African Americans and American Indians showing the largest declines: 18, 17 and 16 percent, respectively. Yet on whole numbers, another area where the 1996 cohort did well, the 1999 cohort saw a slight improvement, with scores a modest 2 percent higher.

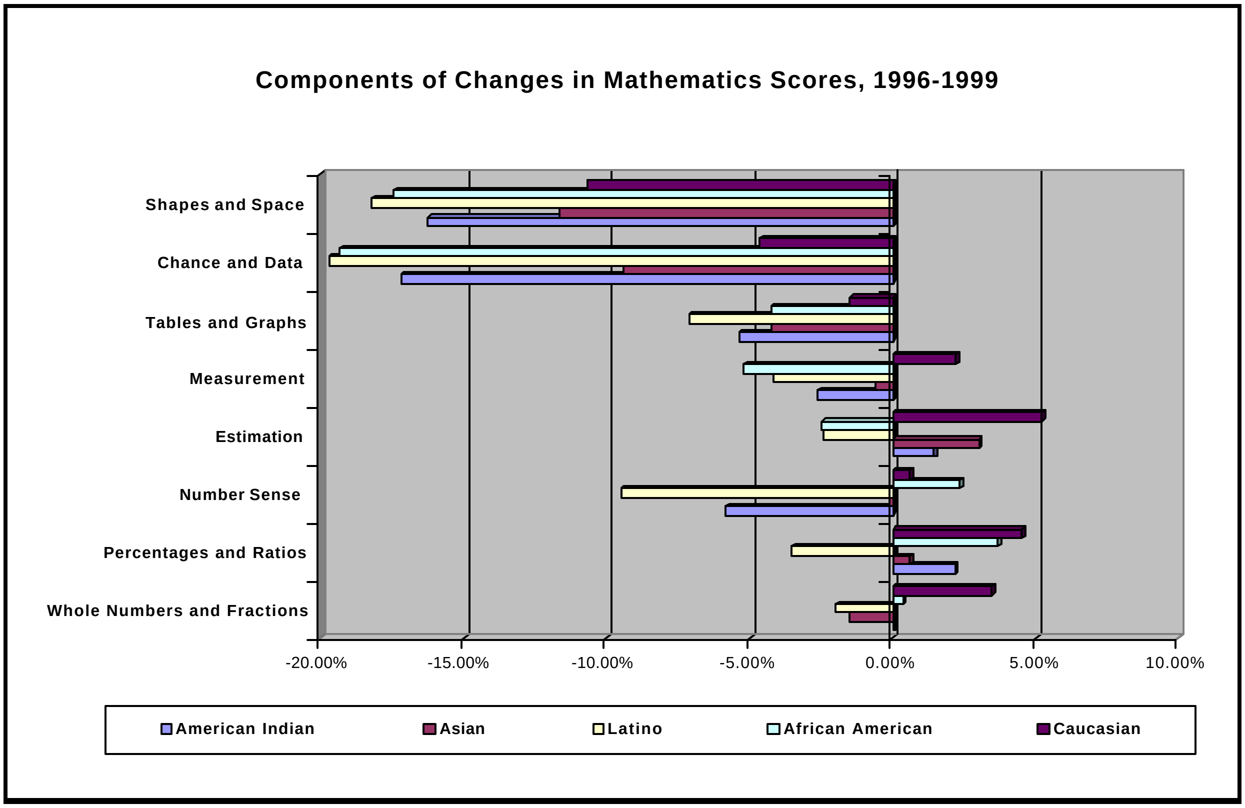


Figure 5

The improvements and declines in scores among the components of the mathematics examination were not uniform from year to year. Had we found that scores improved in those areas where scores were lowest in 1996 and declined or remained unchanged in those areas where scores were highest in 1996, we speculate that test preparation in subsequent years focused on weak areas among the 1996 cohort, at the expense of strong areas. The evidence does not provide unambiguous support for this type of trade-off. Figure 5, Components of Changes in Mathematics Scores, 1996-1999, shows that there were big declines in areas both where groups did well in 1996 (shapes and spaces, tables and graphs) and where they did poorly (chance and data). The figure shows that there were improvements in areas where they did well (whole numbers) and there were declines in areas where they did poorly (estimation). What is more telling, however, is that on several sections of the examination whites improved while many students of color did not (measurement, estimation, number sense, percentages and ratios, and whole numbers and fractions). Could the initial racial gaps in test scores among the 1996 cohort have influenced the test preparation initiatives that resulted in the differential performance on the 1999 examination? To test this hypothesis we plotted the relationship between a) the percentage gap between the scores of whites and those of each group of students of color for each component of the examination and b) the percentage change in the scores for each group of students for each component of the examination. Figure 6, No Effect of Initial Racial Gap in Math Component Scores on Change in Math Component Scores, 1996-1999, shows that there is no linear relationship between the two measures of racial disparity in test scores in 1996 and percentage change in test scores between 1996 and 1999. A linear regression model reveals that the effect of the initial racial gap in test scores in 1996 has no measurable impact on the improvement or decline in test scores from 1996 to 1999. The imperceptible negative slope is not statistically significant.

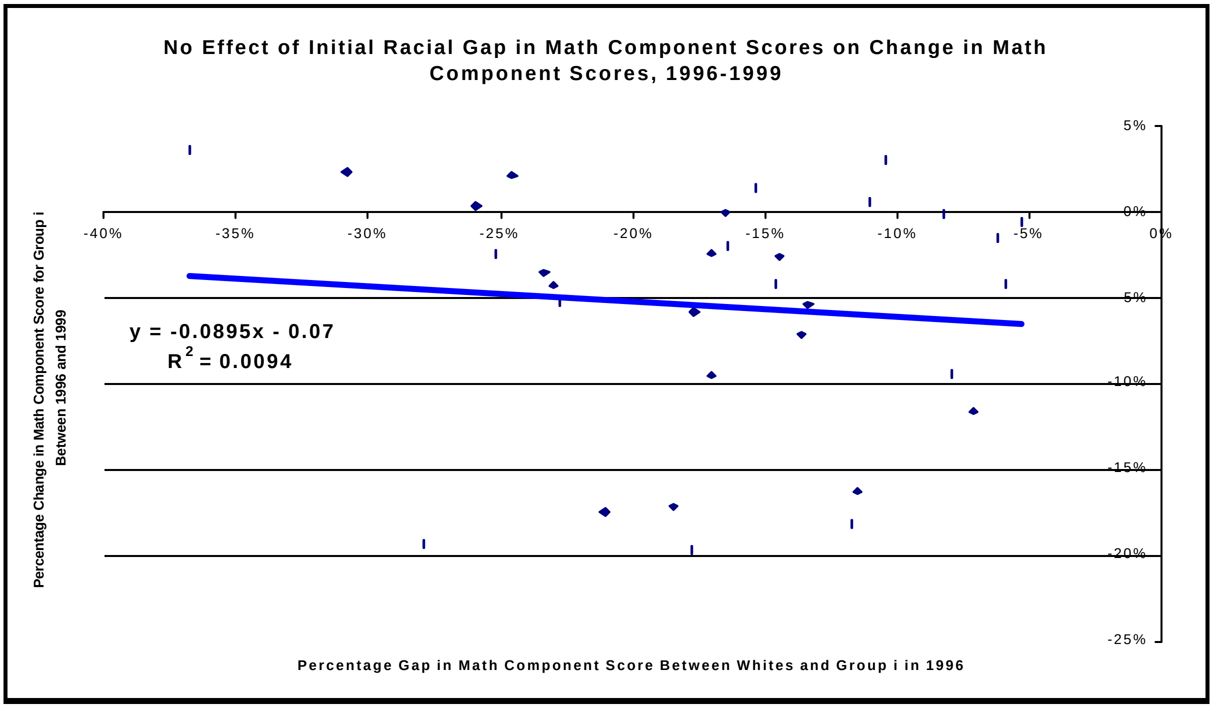


Figure 6

C. Changes in Characteristics of Students between 1996 and 1999

The nature of the test-taking population changed dramatically from 1996 to 1999. Although the age and gender distributions were similar in 1996 and 1999 (a .17% overall decline in mean age and a .94% decline in the representation of females)[8], there were sizable changes in language ability, program participation and racial composition of schools. These changes are detailed in Table B-1a in the appendix. We summarize the key findings here:

- There was an overall increase in the percent of students coming from homes where English is not spoken. In 1996, this measure was 2.27 percent. In 1999, it was 5.09 percent, representing an increase of 123.96 percent between 1996 and 1999. The largest percentage change was registered among African Americans. In 1996 this measure was 3.24 percent. By 1999, it rose to 8.69 percent, representing an increase of 168.21 percent.

- As a result of this sizable increase there was a corresponding rise in the percent of

[8]Most test-takers were 13 ½ years of age when they took the test in each of the cohorts. There were no statistically significant differences in the gender composition of the cohorts.

students enrolled in Limited English Proficiency (LEP) programs. Overall, the share of students in these programs rose 245.60 percent (from less than one percent to more than three percent). The highest concentration in LEP programs was found among Asian students, with 43.09 percent enrolled in 1999, representing an increase of 132.29 percent over the 18.55 percent enrolled in these programs in 1996. In 1999, the percentage of Asian students surpassed that of Latino students in LEP courses (31.55 percent), whereas in 1996 Latinos had the highest share of students enrolled in LEP courses (21.39 percent). But from the perspective of relative changes, the biggest increase was registered among African Americans: 2.16 percent were enrolled in LEP courses in 1996; 6.76 percent were enrolled in these courses in 1999, reflecting a tripling of the representation of blacks in these courses.

- Luckily, the representation of students in gifted and talented programs increased overall by 37.57 percent (11.66 percent in 1999, up from 8.47 percent in 1996). The largest relative increase was among African Americans, whose representation in these programs rose from 2.83 percent in 1996 to 6.42 percent in 1999.

- Unfortunately, there was also an increase in the representation of students in special education and disabled programs. The overall increase was 26.47 percent, with the largest relative increases observed among Latinos (120.90 percent), American Indians (105.81 percent) and African Americans (87.95 percent). The largest concentrations of students in these programs were observed among American Indians (22.81 percent in 1999) and African Americans (21.69 percent in 1999). That is, more than a fifth of black and Native American students were enrolled in special education and/or disabled student programs, up from merely 11 percent in 1996.

- There was also a dramatic change in the racial composition of schools in the short span of the 4 test years from 1996 to 1999. In 1996, the average American Indian eighth grade test-taker attended a school that was 21.27 percent American Indian; that figure rose to 24.28 percent by 1999. Among Asians, the average 8th grade test-taker attended a school that was 9.62 percent Asian in 1996; that figure was up to 17.16 percent in 1999. Latinos attended schools that were 4.82 percent Latino in 1996; that figure rose to 7.88 percent in 1999. African Americans attended schools that were 25.75 percent black in 1996; by 1999 the black concentration had risen to 31 percent. Of course, the majority of whites attend schools that are disproportionately white, providing a context for interpreting the degree of segregation of our schools. Nonetheless, it is instructive to look at the racial composition of the schools that the lowest performing and highest performing students attend.

  - Among high mathematics (reading) achievers, the concentration of black students rose from 1.83 percent (2.06 percent) in 1996 to 3.05 percent (3.11 percent) in 1999. That is, high achieving students increasingly attended schools with a larger representation of black students. Black high math (reading) achieving students attended schools that saw their representation of blacks rise from 9.79 percent (14 percent) to 15.35 percent (17.42 percent), reflecting relative increases of 56.81 percent (24.43 percent).

< Although black low performers are more heavily concentrated than black top performers in schools with high percentages of other black students, the changes between 1996 and 1999 are not as dramatic. Among black low mathematics (reading) performers, the percentage of black students in the school rose from 29.27 percent (31.27 percent) in 1996 to 34.57 percent (35.54 percent) in 1999, representing an increase of 18.09 percent (13.68 percent). Thus, the black concentration rose relatively more among high achieving blacks than among low achieving blacks.

< We can also look at the racial concentration in the top and low achieving mathematics and reading schools. Among American Indians there was no change in the representation in the top achieving math schools (7.16 percent in 1996 and 7.24 percent in 1999), while there was a slight drop in the representation in the top achieving reading schools (10.85 percent in 1996 and 7.58 percent in 1999). All other groups showed increases in representation at the top achieving math and reading schools, with the large relative increases obtained by blacks and Asians whose attendance at top mathematics schools rose 72.16 percent and 52.40 percent respectively. Still, whites attend top math schools at the highest rate, representing 20.13 percent in 1996, and 33.63 percent in 1999. The percentage of students attending top reading schools increased similarly.

< Interestingly, there was a drop in the overall percentage of students attending bottom reading and mathematics schools. Whereas 12.75 and 14.48 percent of students attended bottom mathematics and reading schools in 1996, 2.81 and 3.85 percent did so in 1999. The construction of the measure of top and bottom school helps to clarify how this can happen. The scores of all schools, regardless of size, were sorted. The top 20 percent of the schools were rated as top schools; the bottom 20 percent of schools were rated as bottom schools. Because schools are of different sizes, there is no reason to expect that 20 percent of students should attend the top schools and 20 percent of students should attend the bottom schools. Moreover, as the number of schools and their sizes change (there are more smaller schools in more recent years), we further obtain the logical possibility that 20 percent of the students do not attend the top 20 percent of the schools.

In short, there are some measurable changes in the population of test-takers and the schools they attend across the different years. Somewhat surprising, in light of the other changes in the population of students, is the fact that there was little change in the measures of school poverty, attendance[9] or mobility[10] across the years. In 1996, the average student attended a school in which 22.47 percent of the students received free or reduced-price lunches. That measure increased 2.76 percent, to 23.09 percent, in 1999. The average attendance rate was 94.89 percent in 1996; it was 93.92 percent in 1999. The average number of schools attended -- our measure of mobility -- was 1.068 in 1996 and 1.133 in 1999. There were, of course, differences across races and even these small changes are statistically significant.[11]

[9]Attendance rates were lower in 1999 than they were in 1996 for all but African Americans. Black 1999 attendance rates were significantly higher than the 1998 attendance rates, which were insignificantly lower than the 1997 and 1996 attendance rates. Although these attendance changes are statistically significant, the percentage changes from 1996 to 1999 are small.

[10]The percentage increases in our mobility measures from 1996 to 1999 were non-trivial, given the relatively low base from which the computation is made. African American mobility rates, already the highest of any racial group, increased by about 22 percent between 1996 and 1999, from 1.23 to 1.49 moves per school year. American Indian mobility increased from 1.18 moves in 1996 to 1.35 moves in 1999; Asian mobility increased from 1.07 to 1.21; Latino mobility rose from 1.17 to 1.28; while white mobility increased from 1.06 to 1.10. Importantly, the mobility changes are much larger than the attendance declines.

[11]These results cannot be attributed to the exclusion of St. Paul Public Schools in the 1996 analysis. The attendance and mobility measures deteriorated between 1997 and 1999 as well.

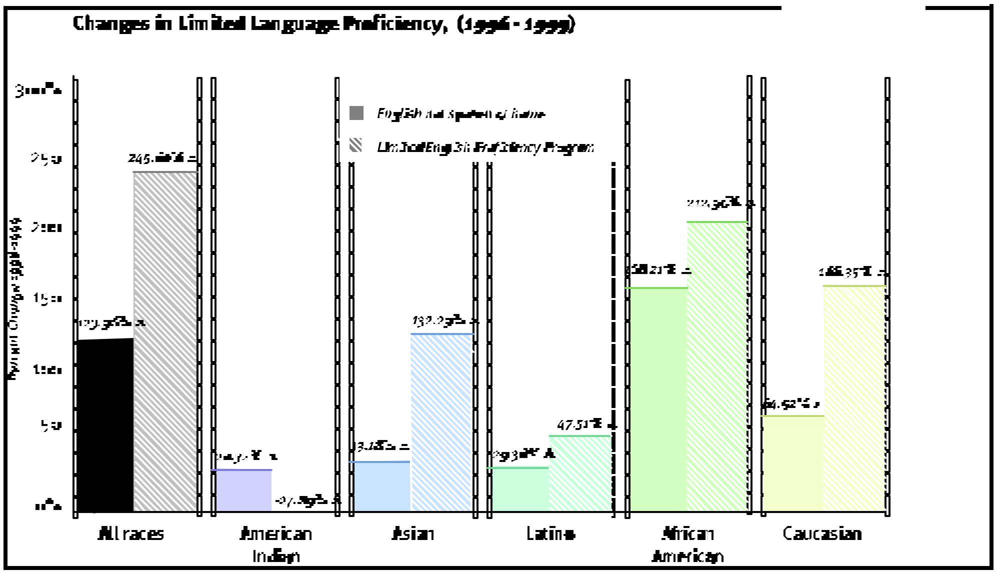


Figure 7

It is worth restating that the most conspicuous change in the student population was the change in language proficiency. The changes in the language proficiencies of Asian, Latino and African American test-takers were substantial. As manifested in the variable "English not Spoken at Home" and the variable "Participation in Limited English Proficiency Program," the measures show that overall there was a doubling of persons whose home language was not English (2.3% to 5%) and a tripling in LEP program participation (.9% to 3%). Figure 7, Changes in Limited Language Proficiency, (1996-1999), shows the percentage increase in 1999 over the 1996 cohort values of English not Spoken at Home and LEP for all statistically significant changes. Large increases can be seen for African Americans, Latinos and Asians, driving up the overall figure for the state, whose student population is becoming increasingly represented by these diverse groups.

The impacts of language proficiency on test scores are substantial as well. Figures 8 and 9 compute the percentage differences between the mathematics and reading test scores of English speakers and non-English speakers (as measured by whether English is spoken at home). The differences are insignificantly different from zero for American Indians in each year, and thus are not displayed. For whites, the mathematics differences are 4.73% in 1996 but the other differences, though smaller than those for students of color, do appear to gain magnitude from 1996 to 1999. And, importantly, there is an upward trend in the disparity in mathematics test scores, which underlines the role that language ability plays in the acquisition of math skills.

Similar comparisons can be made between poor and non-poor students. Unfortunately, measurements of individual poverty are not available to us for 1996 or 1997. Accordingly, our replications of the 1996 analysis focus on the school poverty variable. Nevertheless, it is instructive to compare descriptively the test scores of poor children and non-poor children.

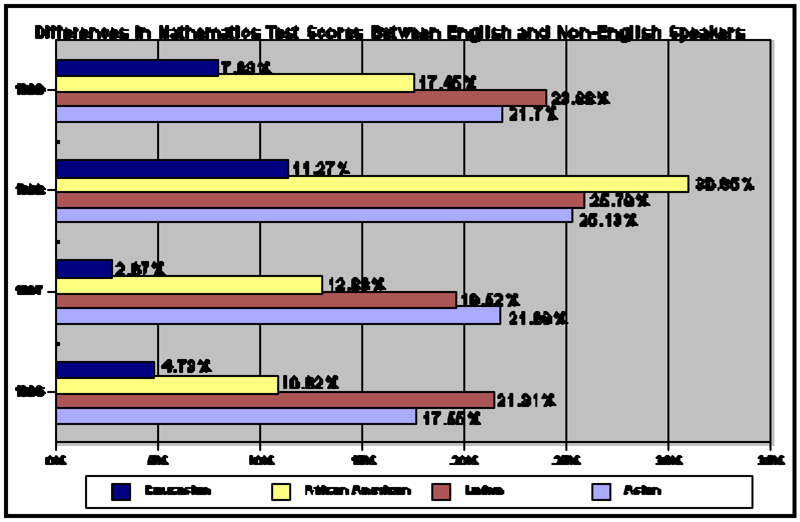


Figure 8

Not surprisingly, the average test scores of poor children are lower than they are for non-poor children. In 1998, the test score gap between poor and non-poor children was about 14 percent in both reading and math. For poor children, the math score was 70% correct, and the reading score was 69% correct. For non-poor children the average scores were 81 and 80% respectively. In 1998, the gap widened. The mathematics and reading scores were 68.5 and 71 percent for poor children and 82 and 84 percent for non-poor children, yielding gaps of 16.8 and 15 percent.[12]

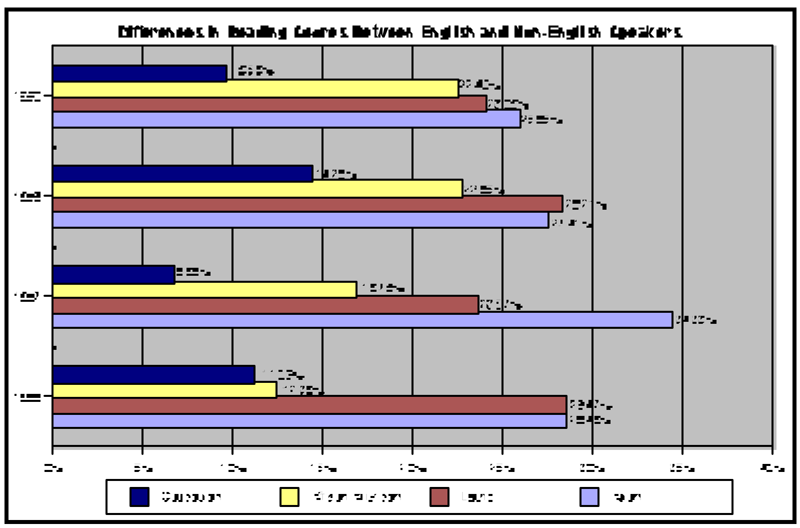


Figure 9

When one looks at the disparity in test scores among poor and non-poor whites versus nonwhites, however, the possibility that poverty may not explain the racial gap in test scores arises. Table 2, Racial Gaps in Mean Test Scores Among the Poor vs. the Non-Poor, displays the percentage difference between white and non-white test scores among poor and non-poor students. If poverty were the cause of the lower test scores of students of color, it should also be the cause of lower scores among whites. That is, there should be little

[12]Actual percentages differ due to rounding. See appendix Table B-11 for full computations.

racial gaps in test scores among the poor and the non-poor students. That is not what we find. There are as sizable, and often comparable, racial gaps in test scores among those who are poor as there are among those who are not poor. Indeed, in 1998, the white-Asian and the white-American Indian gaps are larger among the non-poor than they are among the poor. The mathematics and reading gaps for Asians, for example, were 11 and 13 percent for poor children but 13 and 14 percent for non-poor children.

To be sure, the racial gaps narrowed for non-poor between 1998 and 1999 (virtually disappearing among Asians but declining by more modest amounts for other groups) but still there exists non-trivial differences in the mathematics and reading test scores between whites and American Indians, Latinos and African Americans, whether the reference group is poor or not.

Table 2: Racial Gaps in Mean Test Scores Among the Poor vs. the Non-Poor

	1998		1999	
	Poor	**Non-Poor**	**Poor**	**Non-Poor**
Mathematics				
American Indian vs Caucasian	20%	22%	21%	18%
Asian vs Caucasian	11%	13%	11%	2%
Latino vs Caucasian	25%	23%	29%	18%
African American vs Caucasian	41%	35%	40%	26%
Reading				
American Indian vs Caucasian	16%	21%	16%	15%
Asian vs Caucasian	13%	14%	15%	3%
Latino vs Caucasian	22%	19%	23%	13%
African American vs Caucasian	28%	24%	28%	17%

The Determinants of Racial Gaps in Test Scores

We have estimated models for mean test scores, high achiever rates, low achiever rates and pass rates separately for each year for each race. Independent variables are: age, gender, attendance, English not spoken at home, program participation (LEP, Special Education/disability, gifted and talented), racial composition of the school, poverty composition of the school, mobility and school ranking. Full details of the regressions are provided in the appendix.

The purpose of the separate regression analysis is to obtain a measure of the percentage of the racial gap that can be explained by the aforementioned factors (and by extension to measure the percentage of the gap that is unexplained). The unexplained gap --

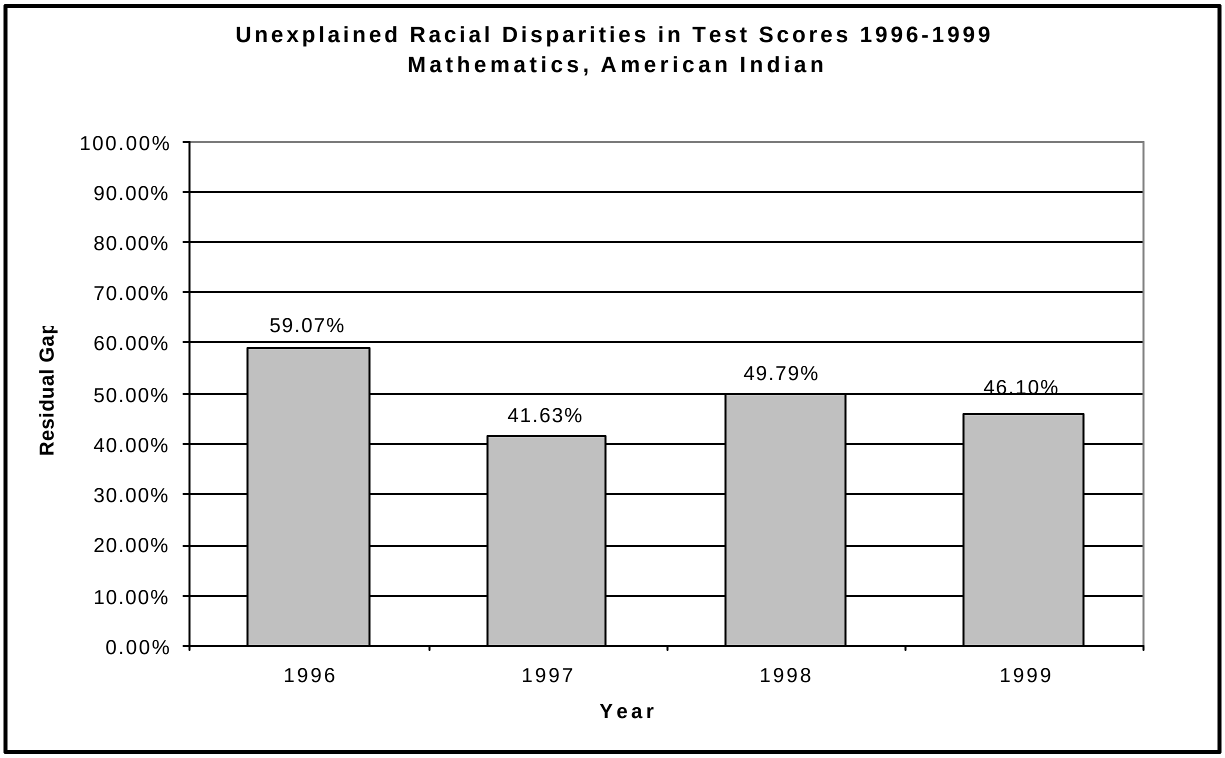


Figure 10

or the unexplained residual or the residual difference -- is often understood by social science researchers to measure *differential treatment of identically situated individuals.* Of course, such an interpretation requires that the model be properly specified and that all relevant factors have been appropriately captured in the model.

For convenience, we summarize the residual difference results first and then go into detail about some of the independent factors that influence the explained portion of the racial gaps in test scores. Figures 10 – 17 succinctly show that the unexplained portion of the racial gaps in test scores declined noticeably from 1996 to 1999. The largest and most distinct decline is observed for Asian Americans. The white-Asian unexplained test score gap plunged from 41 percent to 16 percent for reading and from 64.1 percent to 15.5 percent for mathematics. That is to say, that whereas in 1996 much of the racial gap in test scores between whites and Asians could not be explained by such differences as attendance, mobility, poverty, language or program participation, in 1999 nearly all of the difference was explained by these factors. Evidence of racially differential treatment of identically situated whites and Asians was more prominent in 1996 than in 1999.

There is also a sizable decline in the unexplained gap in test scores between blacks and whites. In 1996, 73.6 percent of the racial gaps in mathematics and 75 percent of the gap in reading test scores were unexplained by our models' independent variables. In 1999, 62 and 59 percent of the gaps for math and reading, respectively, were unexplained. While these figures show that most of the racial gap still remains unexplained, they also point to improvements in treatment of equally situated blacks and whites.

While these encouraging findings are displayed for each racial group and for both mathematics and reading, the pattern of improvement has been uneven across the years. For example, the unexplained mathematics gap was actually smaller for American Indians and African Americans in 1997 than it was in 1999 – signaling that the improvement over the 1996 measure was not continuous.

Most of the alternative specifications of test performance also show that the residual difference (or unexplained racial gap) declined between 1996 and 1999, with the exception of reading scores for high achieving Latinos, wherein the unexplained gap inched up slightly. The overall finding of reduced unexplained gaps, however, obscures the fact that, generally, high-achiever racial gaps remained nearly as unexplained in 1999 as they were in 1996. The declines ranged from 2 percent (the Asian-white reading gap) to 36 percent (the American Indian-white reading gap). In contrast, in the low-achiever model, there were larger increases in the explained gaps, particularly among Asians. For example, whereas the unexplained proportions of the racial gaps in Asian mathematics low-achiever rates was 60 percent in 1996, it was only 8 percent in 1999.

Table 3: Unexplained Residual Differences in Alternative Models of Test Scores

	High Achiever Model			**Low Achiever Model**			**Pass Rate Model**		
	1996	1999	% Change	1996	1999	% Change	1996	1999	% Change
Mathematics									
American Indian vs Caucasian	44%	41%	-6%	62%	46%	-27%	62%	45%	-29%
Asian vs Caucasian	88%	68%	-24%	60%	8%	-87%	60%	20%	-67%
Latino vs Caucasian	62%	56%	-10%	65%	49%	-25%	65%	49%	-24%
African American vs Caucasian	59%	55%	-6%	69%	60%	-13%	69%	58%	-16%
Reading									
American Indian vs Caucasian	80%	51%	-36%	68%	53%	-22%	65%	52%	-20%
Asian vs Caucasian	60%	59%	-2%	43%	15%	-66%	31%	27%	-11%

Latino vs Caucasian	49%	51%	3%	48%	35%	-27%	46%	39%	-15%
African American vs Caucasian	78%	53%	-32%	71%	57%	-19%	72%	57%	-21%

Nevertheless, the broad picture that emerges is of fewer and fewer unexplained racial gaps in test scores, meaning that there was less unequal treatment of equally situated students. Alternatively put, more and more of the racially unequal determinants of test scores explained more and more of the unequal test results. What are these factors? We have decomposed the explained portion of the test scores for each year and the full results are provided in the appendix.[13] We summarize the results here:

- In 1996, the most important factors contributing to the explained portion of racial gaps in test scores facing American Indians and blacks were individual attendance rates and attending a low-ranked school. Attendance accounted for 33.6 percent and 40.5 percent of the explained portion of the Indian-white mathematics and reading score gaps, respectively; it explained 31.9 and 33.2 percent of the explained portion of the black-white mathematics and reading score gaps. Attending a bottom-ranked school contributed 27.9 and 42.4 percent to the explained portion of the Indian-white test scores, while it made up 40.7 and 52.1 percent of the explained portion of the black-white gap in test scores. In other words, poor attendance and attending a low-ranked school made up almost all of the explained portion of the racial gap in test scores in 1996 for blacks and American Indians.
- In 1999, mobility surpassed attendance as the most important factor contributing to the black-white gap in test scores, while enrollment in special education or disabled programs took over as a leading factor in explaining both the black-white gap and the Indian-white gap. Attendance at bottom-ranked schools was not as important in 1999 as it was in 1996, and explained less of the black-white or Indian-white gaps than did special education or disability enrollment.
- Among Asians, almost all of the explained racial gap in mathematics test scores can be attributed to language proficiency. In 1996, 59 percent of the explained mathematics gap was associated with enrollment in limited English proficiency programs; in 1999, 81.6 percent was. For reading, the LEP percentages were 94.7 and 89.2 in 1996 and 1999.
- Among Latinos, much but not all of the explained racial gaps can be attributed to language proficiency. In 1996, 32.9 and 60 percent of the explained mathematics and reading gaps were associated with LEP participation. By 1999, these figures had changed to 46.3 and 57.7 percent. Whereas attendance mattered somewhat in 1996 (amounting to 28 and 15.6 percent of the mathematics and reading explained portions of the racial gap in test scores), by 1999, mobility had become a more dominant factor (accounting for 10.3 and 8.5 percent of the mathematics and reading explained gaps

[13]See Tables I-1 to I-4 in the appendix.

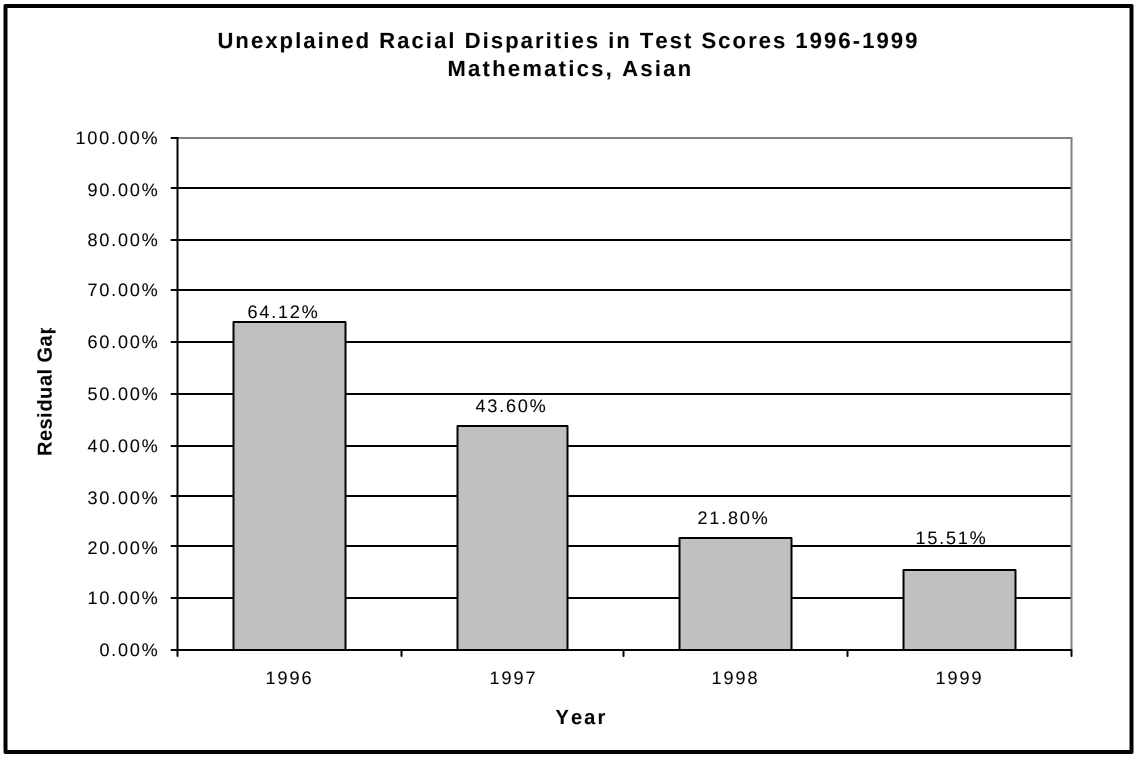


Figure 11

as opposed to 4.5 and 2.9 percent for attendance).

In summary, then, language proficiency looms as an extremely powerful contributing factor to the racial gaps in test scores, at least for Asians and Latinos, and these effects have intensified dramatically in the short span of four years. In addition, even though in 1999 attendance remains important in accounting for the explained portion of the racial gap in test scores for blacks and American Indians, it has been overtaken by the role of frequent changes in schools and concentration in special education and disabled student programs.

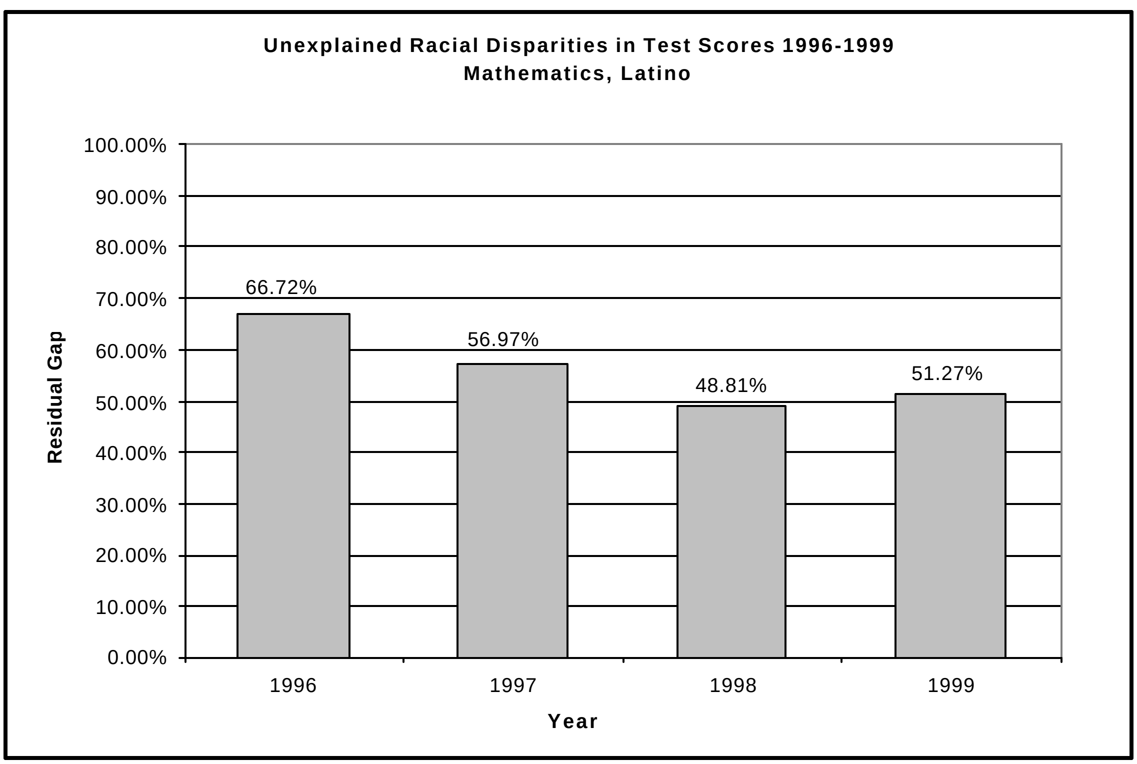

Unexplained Racial Disparities in Test Scores 1996-1999
Mathematics, Latino
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Residual Gap
66.72%
56.97%
48.81%
51.27%
1996
1997
1998
1999
Year

Figure 12

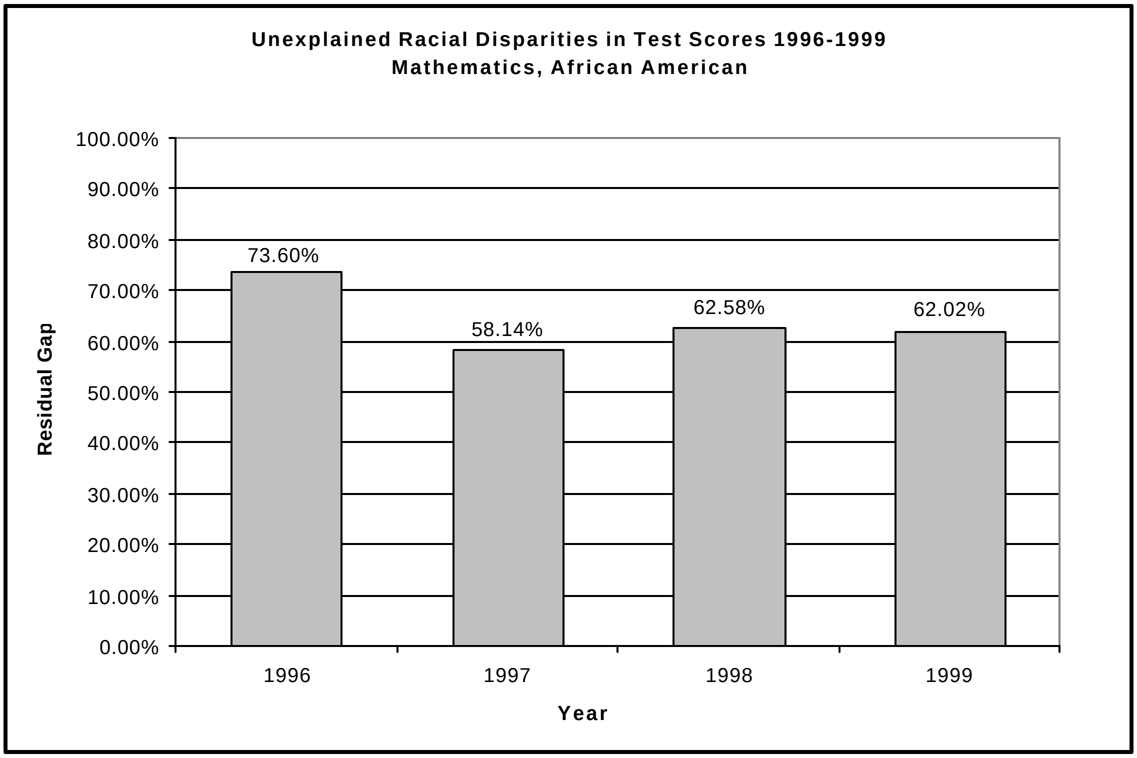


Figure 13

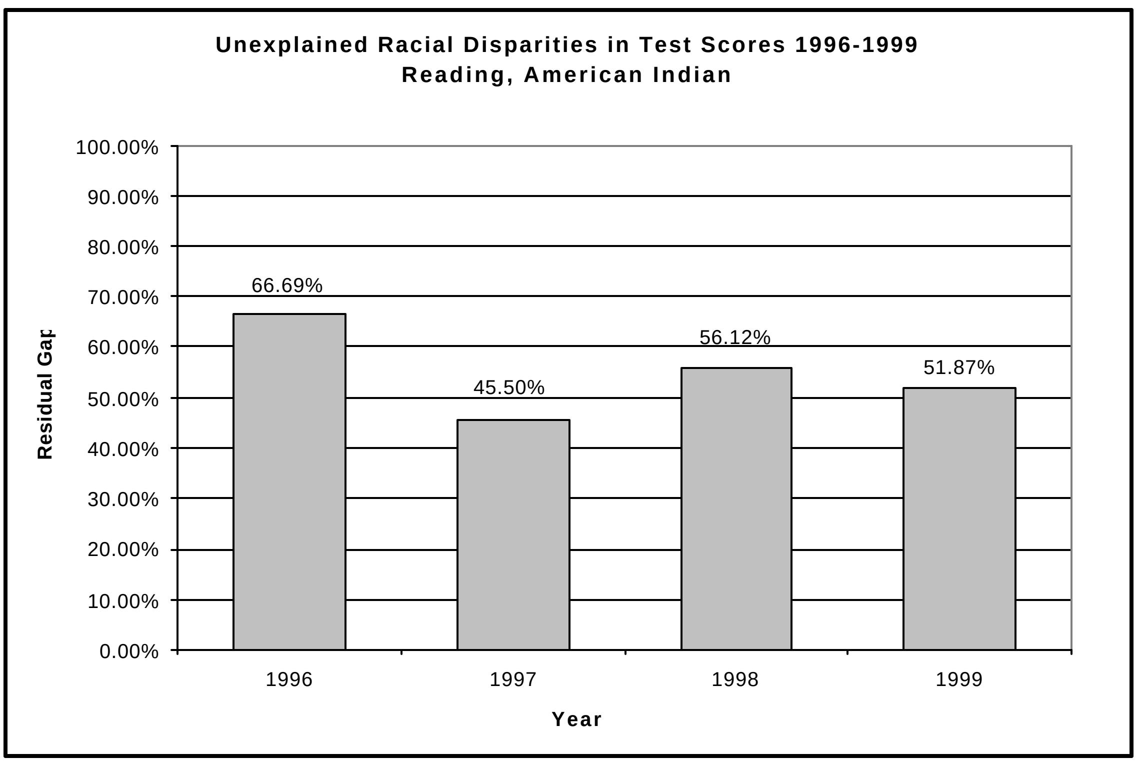


Figure 14

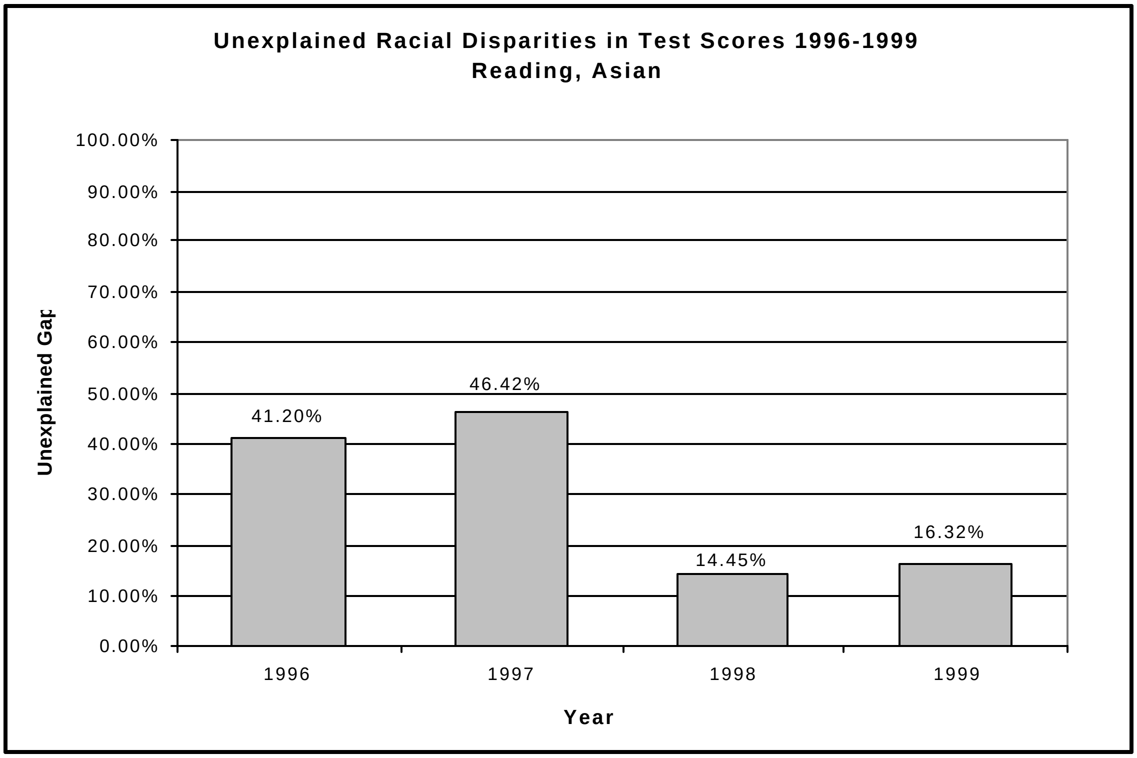


Figure 15

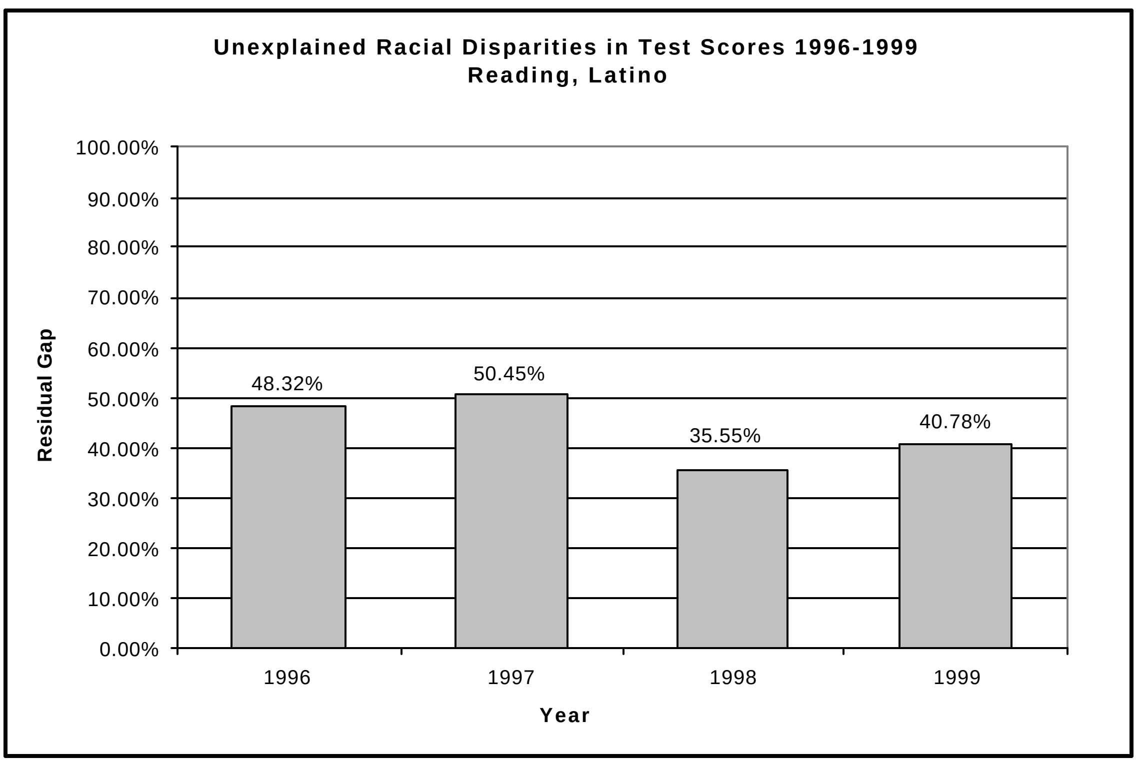


Figure 16

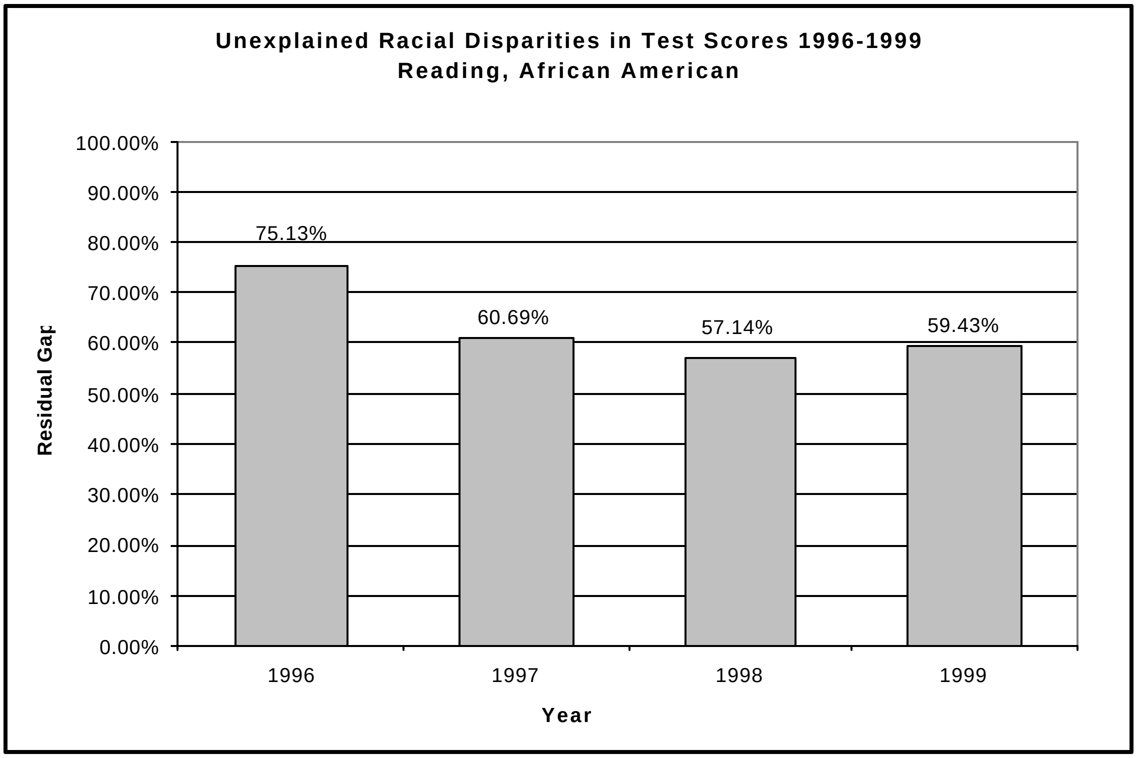


Figure 17

Effects of Poverty

Because of the widespread belief that poverty causes poor test performance and because our earlier report failed to find any measurable adverse impacts of poverty on test scores, this report examines poverty in greater detail. We estimated in the earlier report that the test scores of minority students were *inelastically* related to school poverty. By inelastic we mean that a one percent change in school poverty results in a less than one percent change in test scores. After an exhaustive replication and detailed analysis, we now conclude that there is no uniform adverse impact of school poverty on the test scores of the vast majority of students of color.

Our original assessment of the impacts of poverty on test scores relates to poverty as measured by the percent of students in a school receiving free or reduced-price lunches. This was the only measure of poverty available to us in the 1996 data. Individual poverty was not measured. In 1998, individual poverty measures became available. This poverty measure can be broken into those who receive free lunch, those who receive reduced-price lunch, or those who receive either. We have expanded the basic model of mean test scores and estimated eight different variations of the model separately for each race for 1998 and 1999 and separately for mathematics and reading tests.[14]

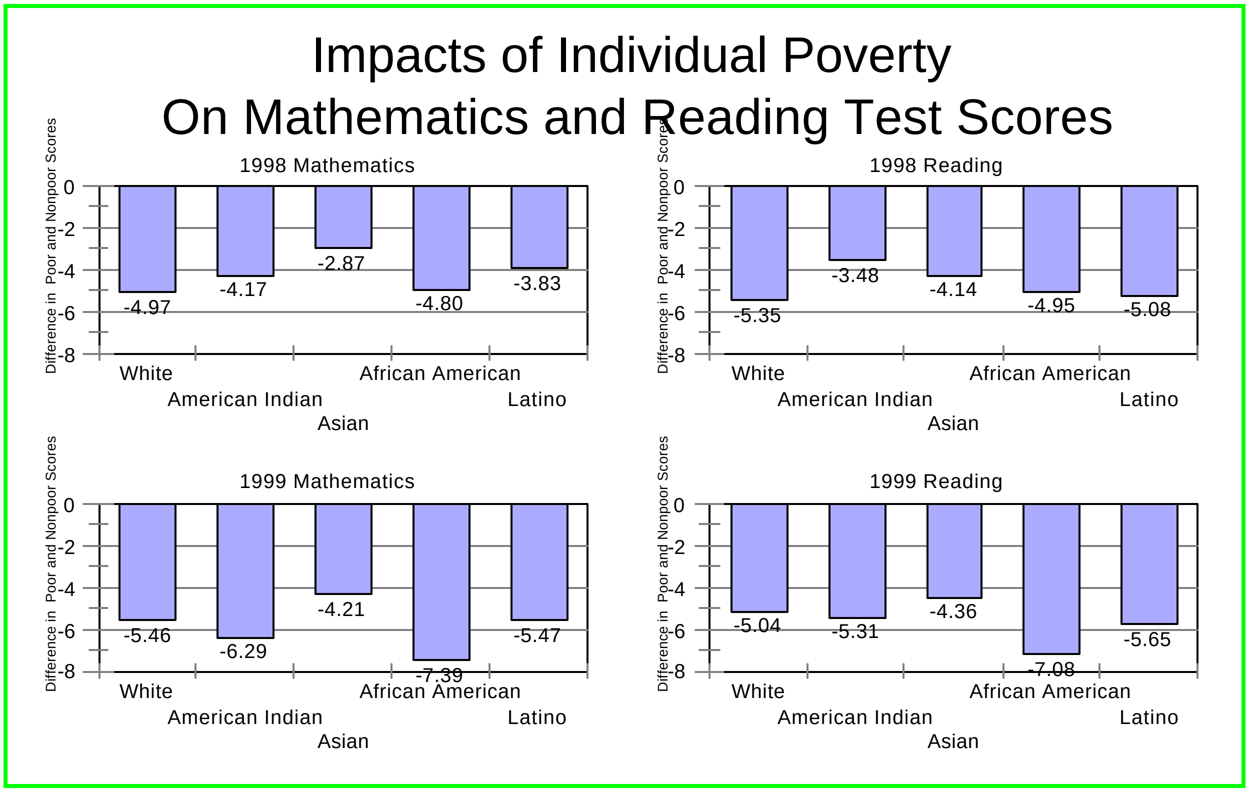


Figure 18

Our central conclusion is that school poverty still does not matter much, but individual poverty does have a statistically significant impact on test scores. The full results are reported in the appendix. These results show the estimated coefficients of school and individual poverty on test scores. The school poverty coefficients can be interpreted as the change in test scores that results from a one-percentage point increase in school poverty rates. For example, the coefficients of the school poverty rates in the 1998 white, black, American Indian, Asian and Latino mathematics mean test score equations are: -0.0210, 0.0665, 0.0149,

[14]These results are displayed in Tables D-1 to D-12.

0.0237 and -0.0326.[15] The interpretation of the white coefficient (-.0210) is that a one-percentage point increase in school poverty -- equal to 16 percent for white students -- would result in a reduction in test scores by two one-hundredths of a point. Or, a 10-percentage point increase in white school poverty -- from 16 percent to 26 percent -- would result in a reduction in test scores by two-tenths of a percentage point. Or, an 84-percentage point increase in white school poverty -- from 16 percent to 100 percent -- will result in a reduction in test scores by 1.764 percentage points. Put differently, moving from a school with no poverty to an all-poverty school (an increase in 100 percentage points in school poverty) would only reduce white test scores by about 2 percentage points.

The American Indian, Asian and Latino coefficients are not statistically significant. In other words, there is no statistically significant impact of school poverty rates on American Indian, Asian or Latino test scores. The statistically significant coefficient on school poverty in the black equation signals the fact that school poverty does affect black performance. However, the positive sign of the coefficient suggests that blacks attending schools with larger shares of poor students have higher, not lower, test scores. The negative coefficient in the white equation suggests that whites do less well when they are enrolled in schools with large shares of poor students. These conclusions are not consistent with the contention that poverty explains the racial gap in test scores -- not, at least, with the notion that *school poverty* is at the root of racial gaps in test scores. In order for this to be so, one would have to demonstrate that school poverty lowers test scores for students of color as well as for whites, and perhaps lowers it more for students of color than it does for whites. This is not what we found in our earlier work; this is not what we find now.

Armed with *individual* poverty measures for 1998 and 1999, however, we are prepared to reassess our original conclusion. The eight model specifications used are:

Model 1 : School level of free/reduced-price lunch.
Model 2 : Individual level of free / reduced-price lunch.
Model 3 : School level of free / reduced-price lunch receiver and individual level of free / reduced-price lunch.
Model 4 : Individual free lunch.
Model 5 : Individual reduced-price lunch.
Model 6 : School level of free / reduced-price lunch and individual free lunch.
Model 7 : School level of free / reduced-price lunch and individual reduced-price lunch.
Model 8 : Individual free lunch, individual reduced-price lunch and school level of free / reduced-price lunch.

Two general conclusions emerge. First, the size of the impacts of individual poverty are larger than the size of the impacts of school poverty. Second, the size of the individual

[15]See Table A-3a in the appendix for full results of these equations.

poverty variables grew between 1998 and 1999.

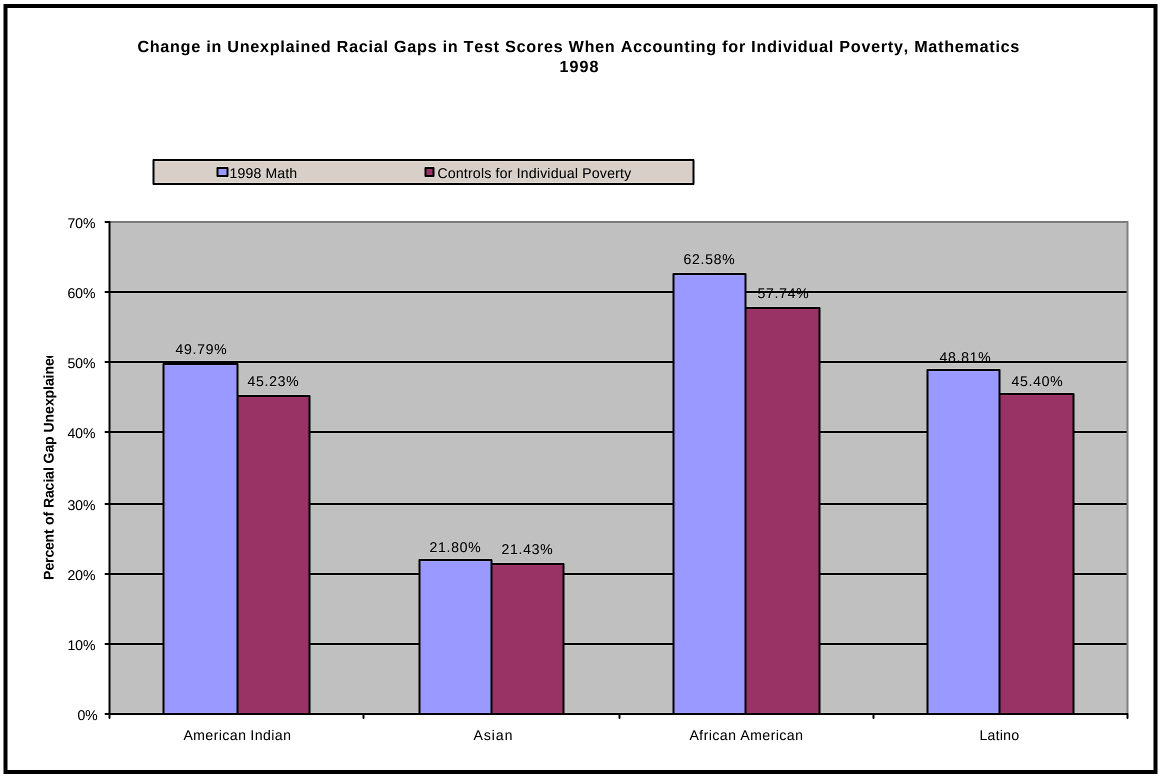


Figure 19

The coefficients on the individual poverty variable must be interpreted as the difference between the test scores of poor and non-poor students. Figure 18 shows that the difference in mathematics test scores between poor and non-poor students ranged from three to five percentage points in 1998, but from four to seven percentage points in 1999. The difference in reading test scores between poor and non-poor students ranged from about 3.5 to 5.4 percentage points in 1998 but from 4.4 to 7 percentage points in 1999. Recall that the order of magnitude of the school poverty effect was about 2 percentage points' difference between schools with no poverty and those with 100 percent poverty.

We gain two insights from these computations. First, poverty does have a statistically significant impact on test scores. This impact, however, at best accounts for only a seven-percentage point gap between the test scores of poor and non-poor students. Since there is as much as a 20-percentage point racial gap, the second insight is that not all of racial gaps in test scores can be attributed to the impacts of poverty on test scores.

To see this, we have estimated the unexplained portion of the racial gap in test scores with and without control for individual poverty. Figure 21shows that while there is a noticeable decline in the measures of the unexplained racial gap in test scores for most groups when one accounts for individual poverty versus school poverty, much of the unexplained racial gaps remain. For example, when ones accounts for individual poverty rates as opposed to school poverty rates, the unexplained gaps in mathematics scores between American Indians and whites dropped from 46 percent to 40 percent in 1999. These gaps dropped from 15.5 percent to 7 percent for Asians; they dropped from 51 percent to 47 percent for Latinos; and,

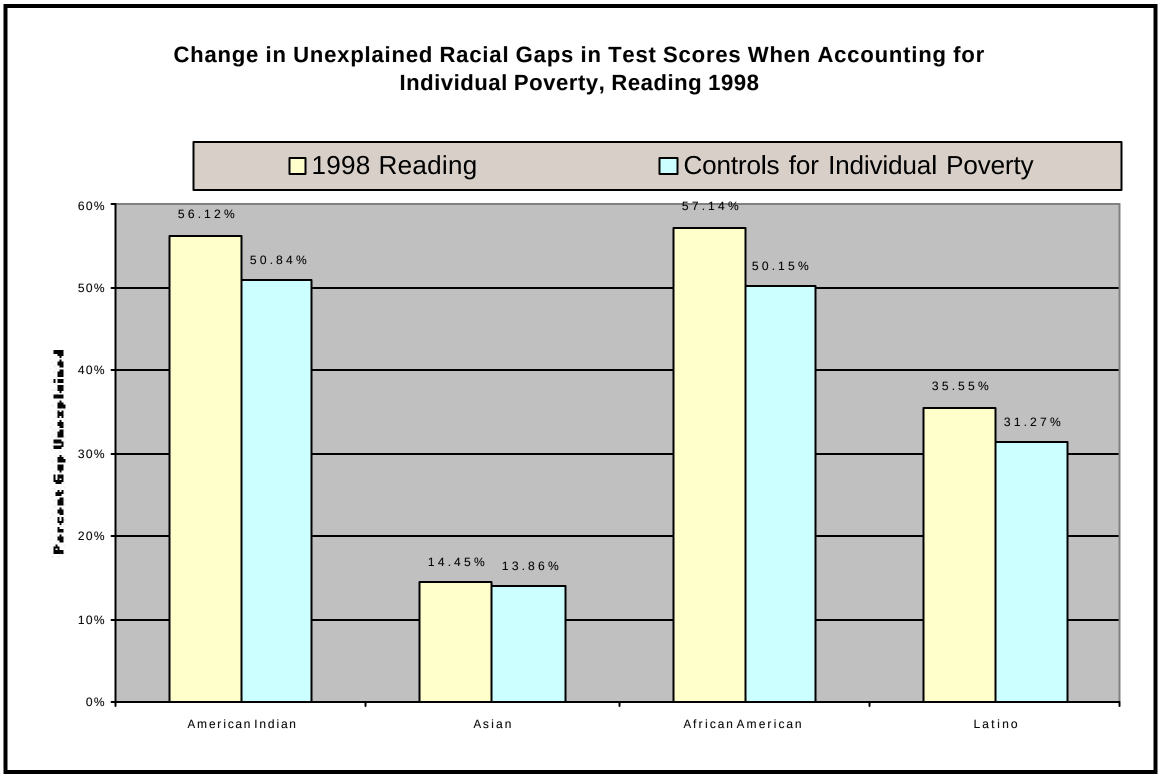


Figure 20

for blacks they dropped from 62 percent without to 55 percent with controls for individual poverty.

Thus, there is some reduction in the unexplained gap in test scores, though not much for some groups. And, the pattern differs between years: Asians – who generally faced smaller unexplained gaps in test scores – saw little difference between their measure of unexplained gaps with and without controls for individual poverty in 1998, but saw substantial differences in 1999.

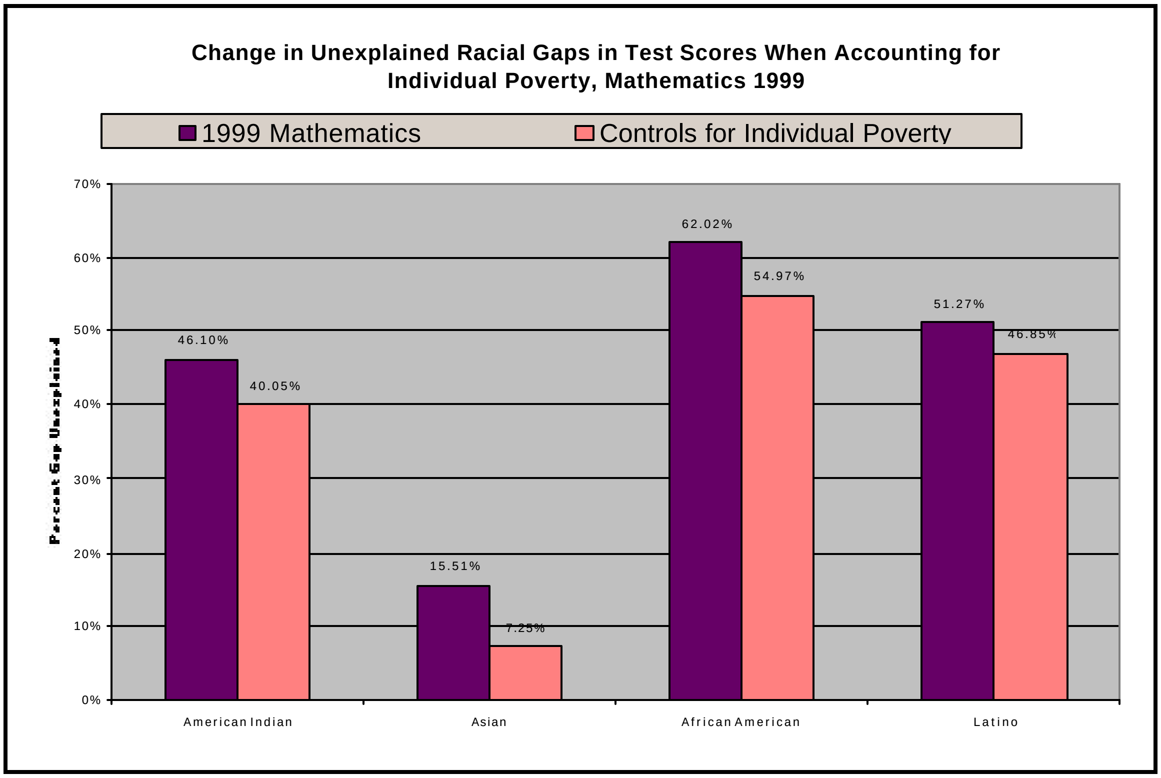


Figure 21

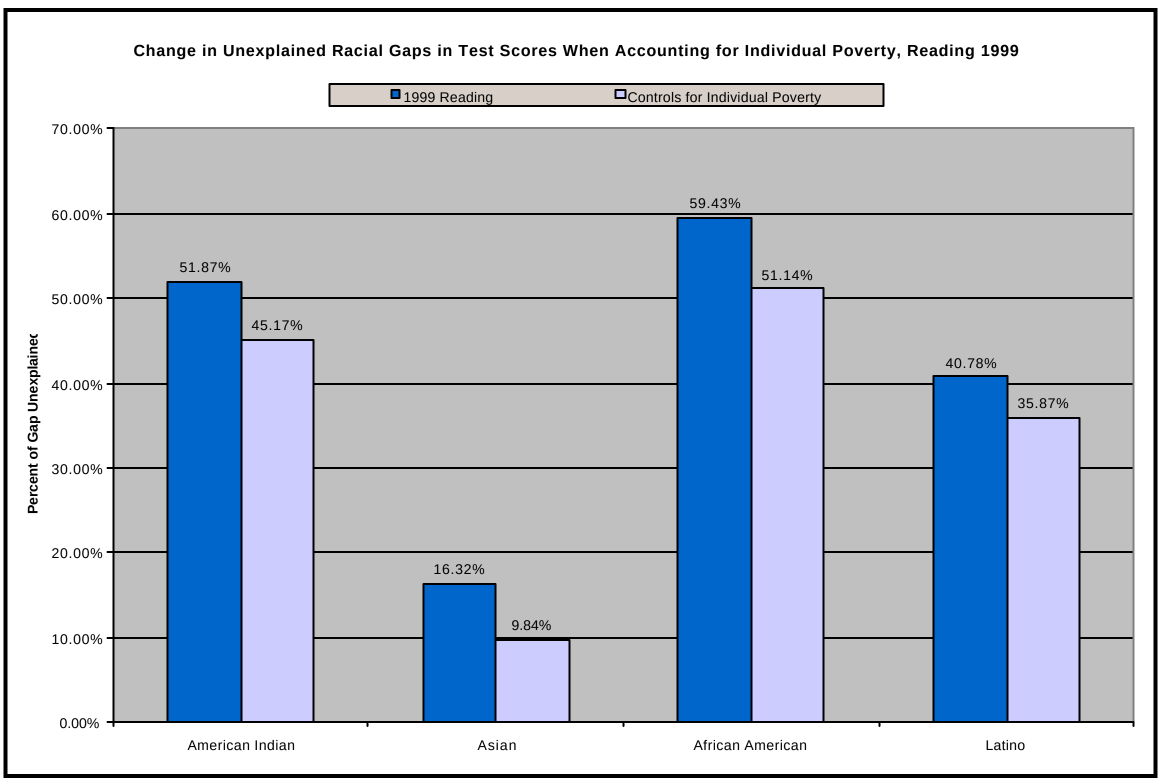


Figure 22

We therefore reach these conclusions about the impacts of poverty:

< School poverty has minuscule impacts on test scores, and racial differences in school poverty cannot explain much of the racial differences in test scores.

< Individual poverty does have a statistically significant impact on test scores for whites and students of color. These impacts are larger than the impacts of school poverty and the impacts of free lunch recipiency are larger than the impacts of reduced-price lunch recipiency.

< Ultimately, however, there is no consistent and sizable drop in the unexplained racial gap in test scores across racial groups or across years. Individual poverty does not explain much of the racial gap in test scores.

Detailed Results – School Test Scores

We have also examined the factors that contribute to improved school test scores. We ask what factors explain increases in school scores and whether improvements in one subject come at the expense of declines in another?

Figures 7-1 to 7-4 in the appendix show that about 44 percent of schools improved their mathematics scores between 1998 and 2000; but only 15.8 percent showed consistent improvements (i.e., scores in 1999 that exceeded scores in 1998 *and* scores in 2000 that exceeded scores in 1999). More than 51 percent of schools improved their mathematics scores between 1996 and 1999, but only 7 percent saw consistent improvements. The largest improvements were among Asian American students and, in the 1998-2000 period, among African American students.

Figures 8-1 to 8-4 in the appendix reveal that larger percentages of schools improved their reading scores, although again, far fewer that had consistently improved scores. Additionally, improvements in white reading school scores outdistanced those of other groups of students.[16]

What factors explain these improvements? What distinguishes schools that improve from those that do not? We examined this question by estimating logistic equations for the probability of a 2-year (or 4-year) improvement and the probability of continuous (over 2 or 4 years) improvements. We considered factors such as the racial composition of a school, the poverty status of a school, whether the school was a charter school, and whether the school was a top-ranked or bottom-ranked school. The full results of these regressions are found in the appendix in Tables E-1 to E-17, along with Tables G-1 to G-29 listing the schools that improved.

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[16]We created the average test score by race for each school. Thus, the white school reading test score is the average test score for whites at a given school.

There are many differences between the schools that improved and those that did not.[17] Schools that did not improve reading scores for three consecutive years (from 1998-2000) had higher poverty rates than those that did improve. Black poverty rates, however, were higher at schools that improved than at schools that did not. Schools that did not improve reading scores were more likely to be charter schools, although there is no difference for blacks. These simple observations, based on the descriptions of the schools that improved and those that did not, motivate the regression analysis.

Although there are observed differences on some measures between schools with and without improved scores, few of these statistically explain which schools improved and which ones did not

Effects of Attendance on Test Scores

There is a continuing debate about the relative effects of attendance on student performance. On one hand, when one controls for socio-economic background characteristics of students and school variables, empirical evidence shows that attendance has an independent influence on standardized test scores (Lamdin, 1996; 1998). Theoretical support comes from studies that examine how a school's nurturing environment enhances attendance and thereby helps to improve learning (Rosenfeld and Richman, 1999; Green, 1998). On the other hand, attendance does not show an independent influence on test scores when controlling for measures of school competition and student cognitive ability (Borland and Howsen, 1998). A closer look at this policy debate, however, suggests that what really matters is not *whether* there is an observed impact of attendance on test scores – however that impact may occur – but rather *how large* is that impact. In other words, whether the attendance effect is statistically significant at the 10-percent level using a one-tailed test or at the 5-percent level using a two-tailed test is not so important for policy purposes. The important issue is *how large* of an impact attendance has on test scores.

This question emerges partly because we did not find a huge amount of variation in attendance. In our previous report we found -- and we confirm here -- that although attendance has a statistically significant impact on test scores, equalizing racial differences in attendance will do little to eliminate racial gaps in test scores. Equalizing attendance rates that differ between races by, say, 5 percentage points may not be enough to equalize test scores that differ by, say, 20 percentage points.

Nevertheless, it may be useful to increase minority attendance even if it only slightly reduces racial gaps in test scores. Accordingly, we ask: *how large* would the impact on test scores be if we increased attendance rates by a small amount?

[17]For details, see Tables B8a and B8b in the appendix.

To accomplish this task, we compute elasticities of mean test scores, high achievement rates, low achievement rates and pass rates with respect to increases in attendance rates. The elasticity is understood to be the percentage change in the test score measure as a result of a one-percent change in the attendance rate. An elasticity greater than one implies a very responsive result: a one-percent increase in attendance yields more than a one-percent increase in test scores. An elasticity less than one implies an unresponsive result: a one-percent increase in attendance yields less than the same percentage increase in test scores.

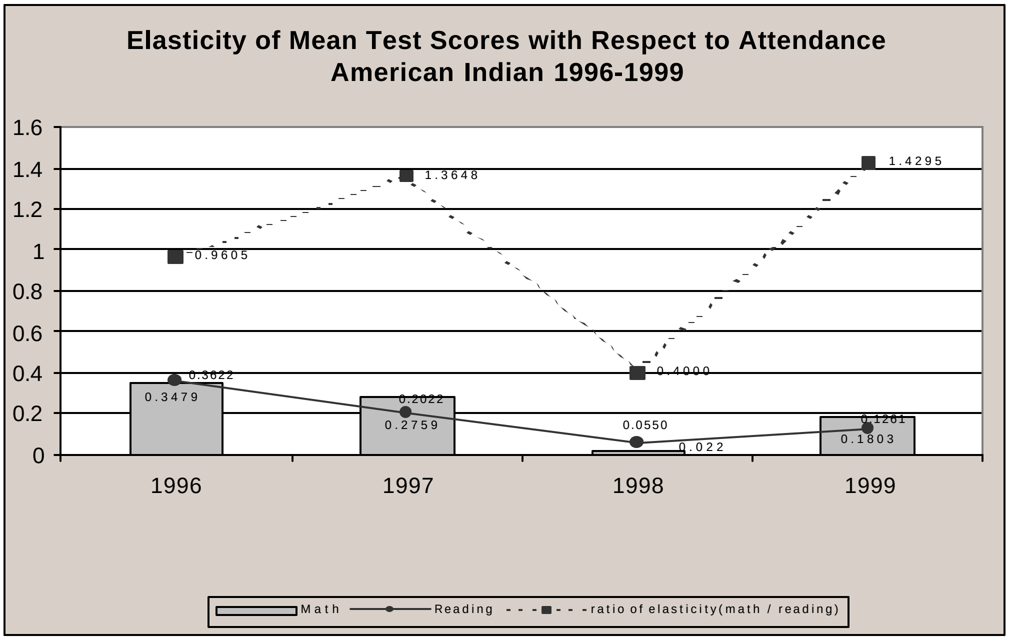


Figure 23

To compute the elasticities we take the estimated coefficients for the four models -- mean test score, high achiever, low achiever and pass rate -- and compute the slopes (derivatives) and evaluate these at the means of the attendance rates separately for mathematics and reading scores for each year and each racial group.[18]

[18]The results of these computations are provided in Tables H-1 and H-2

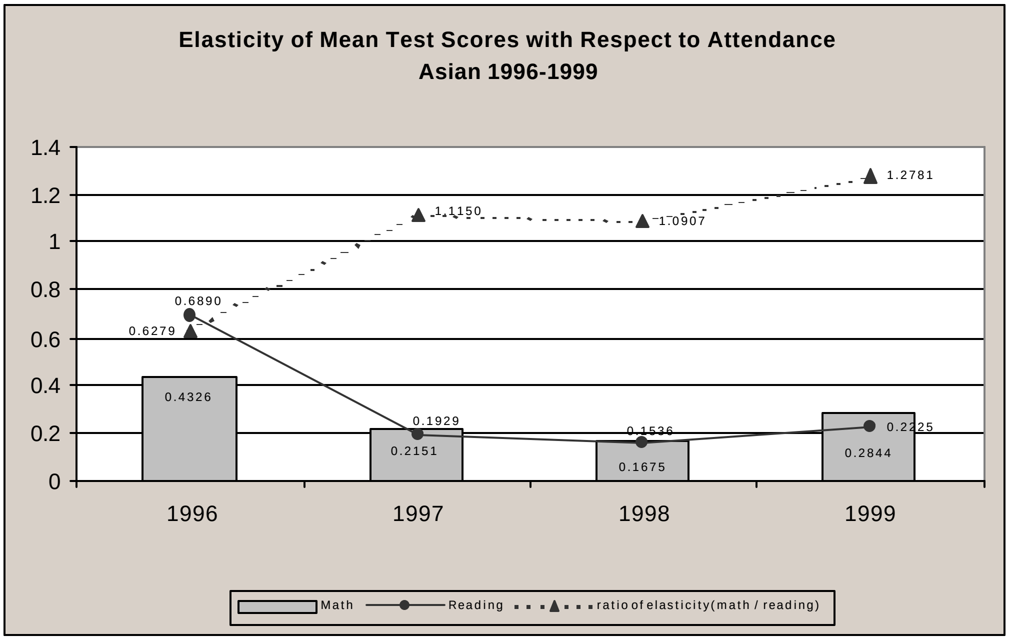


Figure 24

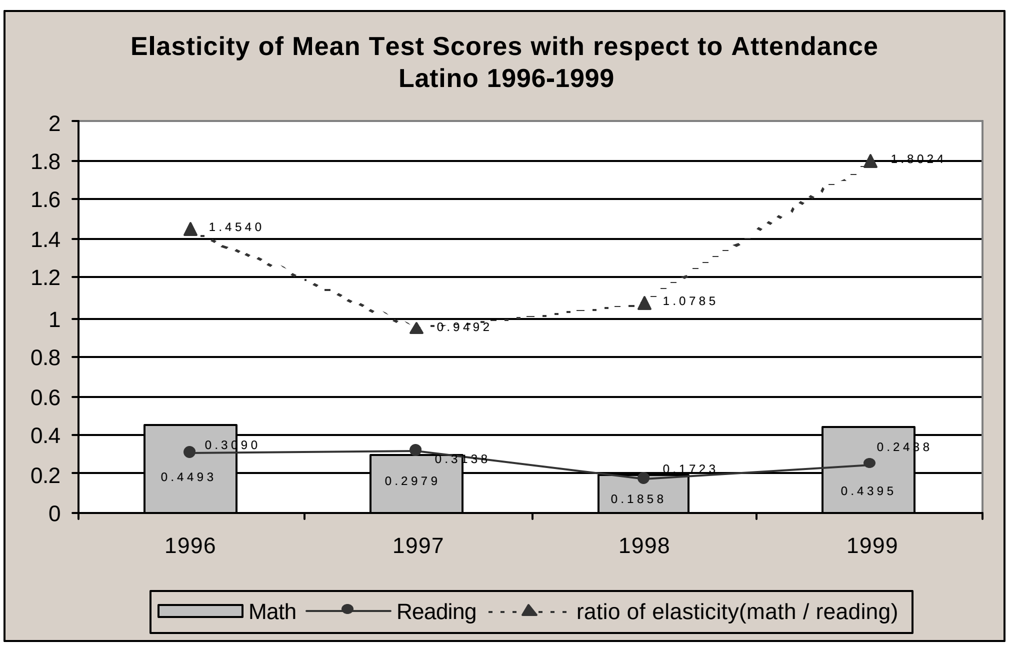


Figure 25

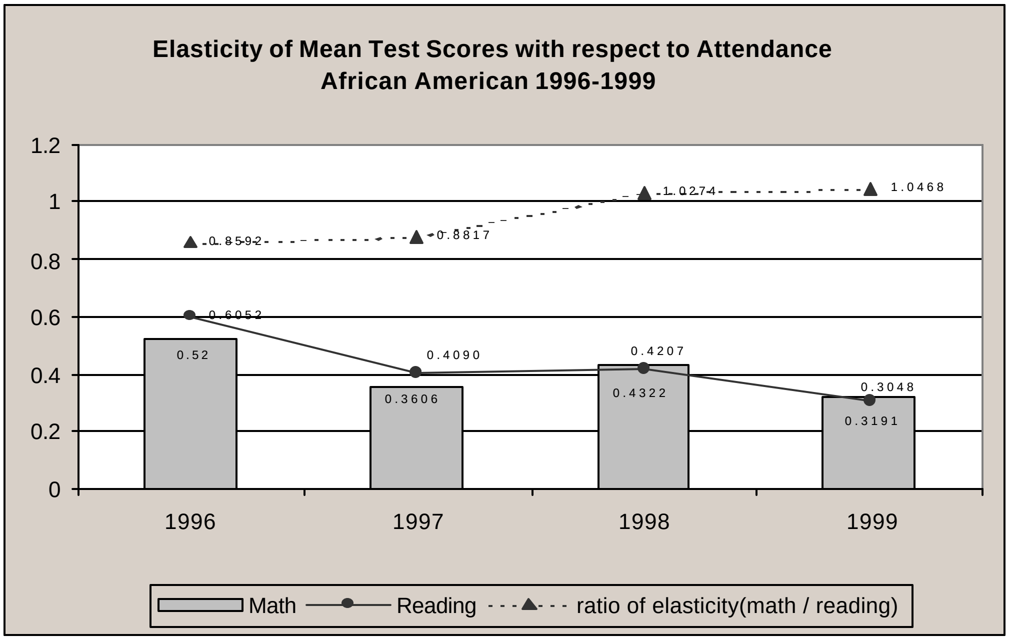


Figure 26

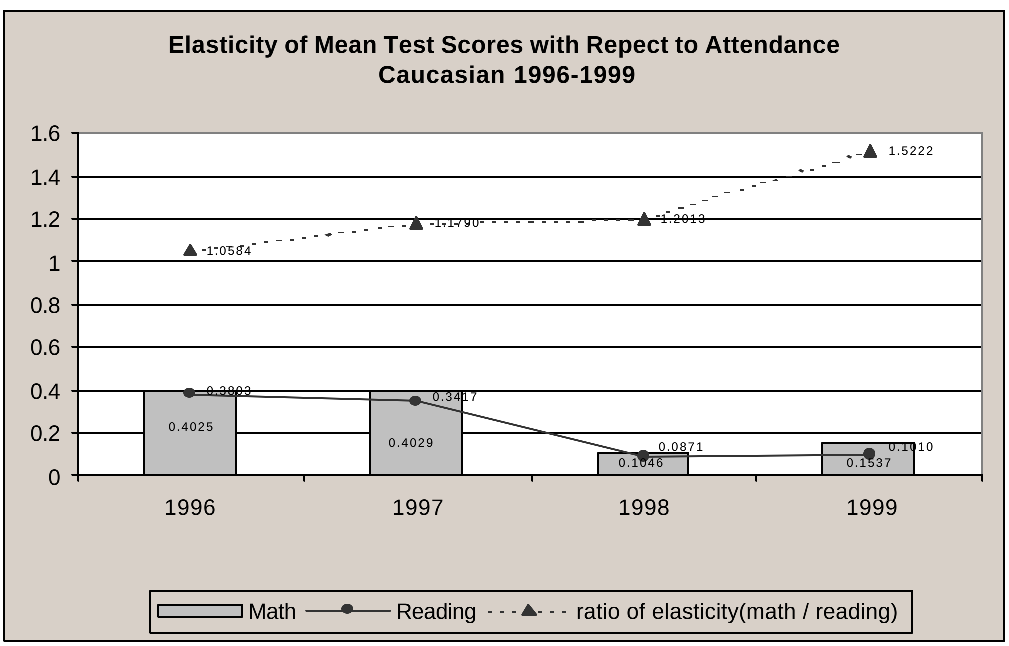
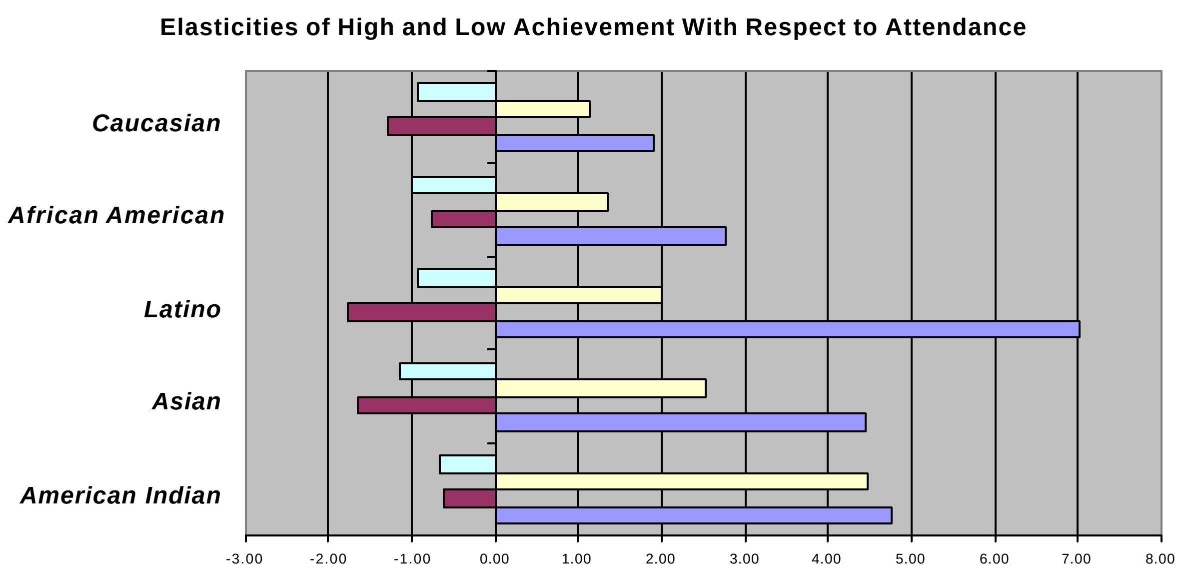


Figure 27

Figures 23 to 27 report the results of the computations. The conclusion is that attendance does not have a measurable and statistically significant effect on both mathematics and reading test scores. However, the effects of attendance are much larger on mathematics test scores than they are on reading test scores. Among American Indians, Asians, Latinos, African Americans and Caucasians, the elasticities of mean test scores in 1999 with respect to attendance rates were 0.18, 0.28, 0.44, 0.32 and 0.15, respectively – a finding that reveals the larger impact of attendance on minority test scores in 1999 than on white test scores. The corresponding elasticities for reading scores in 1999 were 0.13, 0.22, 0.24, 0.30 and 0.10.

A second important conclusion is that the attendance elasticities have declined over time. Between 1996 and 1998 for all groups except Latinos, the elasticity of mathematics scores with respect to attendance decreased. In 1999 the elasticities of the attendance rate were lower than they were in 1996. The mathematics elasticities in 1996 were 0.35, 0.43, 0.45, 0.52 and 0.40 for American Indians, Asians, Latinos, African Americans and Caucasians. Even for Latinos, though, there was a decline in the elasticities between 1996 and 1998, so the higher figures for them, like other groups in 1999, reflects a resurgence in the positive effects of attendance on test scores rather than a continued decline in the effects.



	American Indian	Asian	Latino	African American	Caucasian
Low Achiever, Reading	-0.67	-1.14	-0.92	-0.99	-0.93
High Achiever, Reading	4.47	2.54	1.99	1.36	1.14
Low Achiever, Math	-0.61	-1.64	-1.76	-0.77	-1.28
High Achiever, Math	4.76	4.46	7.01	2.78	1.91

Figure 28

The measures we have discussed refer to the impacts of attendance on the mean test scores. In Figure 28, we focus on the 1999 elasticities of mathematics and reading high and low achiever rates with respect to attendance. This figure shows that attendance effects are concentrated at the upper end of the performance distribution, not at the lower end. At higher levels of achievement, attendance produces large effects on both reading and mathematics scores. When one focuses on the lower end of the achievement distribution, attendance matters much less. Latinos registered the largest attendance effects on mathematics high achievement and American Indians revealed the largest attendance effects on reading high achievement.

Could *school* attendance explain school improvements? To answer this question we created a variable measuring the percentage change in attendance between 1996 and 1999 and included this in our model estimating the probability of test score improvements from 1996 to1999. We explored a variety of specifications of the model: where only attendance changes were included; where racial composition of the school is also included; where race and poverty concentration are included; and where mathematics and reading rankings are included along with racial concentration and poverty. We ask whether an increase in the attendance rate among a particular racial group within the school increases the likelihood that that school's test scores improve for the racial group. For example, if Latinos' attendance rates go up at a given middle school, will the school average for Latino test scores go up? The answer, detailed in the appendix Tables H-3 and H-4, is yes, but not by much. And, the answer is only yes for Latinos. For other groups, the school attendance effects are statistically insignificant, and like the Latino effect, they are minuscule. A one-percent increase in the attendance rate change produces an increase in the probability of overall school improvement of only .006 and .002 percent in Latino reading and mathematics scores. Other specifications -- using the attendance rate (rather than the rate of change in attendance), using the change in attendance and using a dummy variable measure whether attendance went up or down -- yield similar results. Thus, we find little evidence that a school as a whole improves when attendance increases. Rather, individual student performance improves when attendance increases. This suggests that there are smaller adverse impacts of being at a school with poor attendance. A student who goes to a school with overall low attendance rates still can improve her own performance by attending regularly.

In summary then, we have found:

- There are statistically significant impacts of attendance on test scores for virtually all groups.
- These effects are larger in relative magnitude when predicting improvements in mathematics scores than in predicting improvements in reading scores.
- These effects are also larger in magnitude for predicting high achievement -- in either mathematics or reading -- than for predicting low achievement. Improvements in attendance have dramatically large impacts on increasing the odds that children will score at the top 20 percent of test-takers.
- Schoolwide attendance has a statistically significant impact on the schoolwide

scores only for Latinos. That effect is extremely small.

The Effects of Changing Student Characteristics on Test Scores

There were many important changes in the composition of student test-takers between 1996 and 1999. Could these changes be at the root of the poor performance on the mathematics test scores? Would the reading test scores have been even better had there been no change in the characteristics of students? And, ultimately, would the racial gaps in test scores have been smaller in 1999 had there been no change in the characteristics of students taking the examinations? These questions approach the logical policy question of which, if any, of the demographic or school or program changes contributed to the difference in racial gaps in test scores between 1996 and 1999.

We address these questions by performing the following empirical test. We compute the actual racial gap in test scores for 1996 and 1999 for each race. We then compute what the 1999 gap in test scores would have been had any one of the determinants of the test scores remained unchanged. So, for example, we ask: what would the American Indian - white gap in test scores in 1999 have been had there been no change in the mobility of American Indians and whites between 1996 and 1999? This yields a predicted racial gap in test scores in 1999 for each determinant of test scores. From there we compute the difference between the predicted gap and the actual gap in 1999. Small percentage differences mean that a particular demographic change or school change or program change could not have contributed much to the 1999 racial gap in scores. Large percentage differences mean that the underlying factor played an important role.

Consider any difference of more than 10 percent as a meaningful change. There are not many factors that produce such a change. As Tables I-5 and I-6 in the appendix detail, most of the differences between the actual gap and the predicted gap are less than one percent. But, the changes that are larger than one percent are phenomenal. These include:

- **The effects of language proficiency on Asian American-white test score gaps**. The actual gaps in math and reading test scores in 1996 were -0.0758 and -0.0937 and in 1999 were -0.1025 and -0.0662. In other words, mathematics gaps widened and reading gaps narrowed. But, had there been no change in the percentages of students who come from homes where English is not spoken or who participated in Limited English Proficiency programs, then the reading gaps in 1999 would have been -0.0594 and -0.0176. The math gaps would have been -0.1025 and -0.0546. In other words, for reading there would have been reductions in the racial gap in test scores by 11.40% and 276.59%, had the levels of language proficiency remained unchanged since 1996. For math, the reductions would have been negligible in the case of language spoken at home, but on the order of 87.73% for LEP program participation.

- **The effects of language proficiency on other test score gaps.** Although there is only a small difference between the actual and predicted mathematics test score gap when Latino language proficiency is accounted for, the reading gaps drop by 19.59% when LEP program participation remains at its 1996 levels. The black-white gap in reading test scores would drop by 6.25% had LEP program participation remained unchanged.
- **The effects of special education and disabled student program participation.** Black, Latino and American Indian students would have faced smaller gaps in test scores had there been no change in special education or disabled student program participation. Racial gaps in reading test scores would have been 14 to 24 percent smaller had there been no increase between 1996 and 1999 in the proportions of students in these programs. Gaps in mathematics scores would have been 8 to 13 percent smaller.
- **The effects of own-race concentration.** Racial concentration has little impact on the mathematics test score gap. But, there are noticeable effects on reading gaps. Had Asian school concentration remained unchanged at 1996 levels, the reading test score gap would have dropped by 42.29%; had Latino school concentration remained unchanged at 1996 levels, the Latino-white reading test score gap would have widened by 1.49%; had American Indian school concentration remained at 1996 levels, the test score gap would have narrowed by 1.54%; had African American school concentration remained at 1996 levels, the 1999 black-white test score gap would have been larger by 17.23%. Thus, there is no consistent evidence on deleterious impacts of own-race school concentration on racial gaps in test scores that relates to all racial comparisons.
- **The effects of mobility.** Mobility rates for all groups increased between 1996 and 1999. Had the there been no change in mobility, the racial gaps in reading test scores would have been lower by 5.96%, 5.14%, 10.33%, and 4.91% for blacks, American Indians, Asians and Latinos, respectively.

In summary, most of the differences in the characteristics of students that could have changed the racial gaps in test scores over the period of 1996-1999 relate to Asian American students. The Asian-white gaps in reading scores in particular would have been smaller had there been no change in language proficiency, own-race concentration or mobility. Other groups would have benefitted from less mobility and less concentration in special education programs, although own-race concentration effects were small or beneficial. Ultimately, then, we conclude that the racial gaps we observe in 1999 are not due exclusively to changing demographics of the population.

Is there a trade-off between better mathematics scores and better reading scores?

We have estimated a wide variety of specifications of the school improvement model, reflected in the detailed tables in the appendix. We conclude that generally there were few predictors of whether a school would improve either continuously from 1996 to 1999 or whether test scores were higher in 1999 than they were in 1996. We did find, however, that one or two factors often emerged as having statistically significant impacts on within-group improvements in test scores. Variables included in the analysis of the probability of school score improvements were school poverty, racial concentration, high and low performing school, charter school, middle school or junior high school, and rural or urban school. We summarize these results first.[19]

- Schoolwide mathematics test scores for Asians were more likely to improve for schools that were top reading schools; American Indian, Latino and white schoolwide mathematics scores were more likely to improve for top performing math schools.
- Schoolwide mathematics test scores for whites were more likely to improve for schools with larger percentages of Asian students; schoolwide reading scores for African Americans were more likely to improve at schools with larger percentages of Asian students; schoolwide reading scores for Latinos were more likely to improve at schools with larger percentages of Latino students.
- But, these models generally do not explain well the differences in school performance.

Perhaps the most policy-relevant variable to examine is that of whether a school exhibited reading improvements. Could this affect mathematics test scores and/or the probability of improvements in mathematics? The question we ask is: Do school reading improvements come at the expense of better mathematics scores?

Figure 29 reports the results of estimating the probability that mathematics scores improved as a function of whether reading scores improved. This is done separately by race and for all schools as well as for two different time periods: 1996-1999 and 1998-2000. Because of the availability of information on school characteristics in the 1996-1999 data, we also report results controlling for racial characteristics and poverty concentration at the schools. The results reported in the figure are the exponential of the estimated coefficients on the reading improvement variable from logistic regressions. The measure has the interpretation of being the effect of school reading improvements on the probability that there are school mathematics improvements. The specific interpretation of the measure is that these are the odds by which mathematics scores would improve if a school had improved

[19]The detailed results of these estimations are found in Tables E-8 to E-14 in the appendix. We focus here only on improvements from 1996-1999 for which we had detailed school characteristics. Tables E-1 to E-7 relate to changes in school test scores between 1998 and 2000.

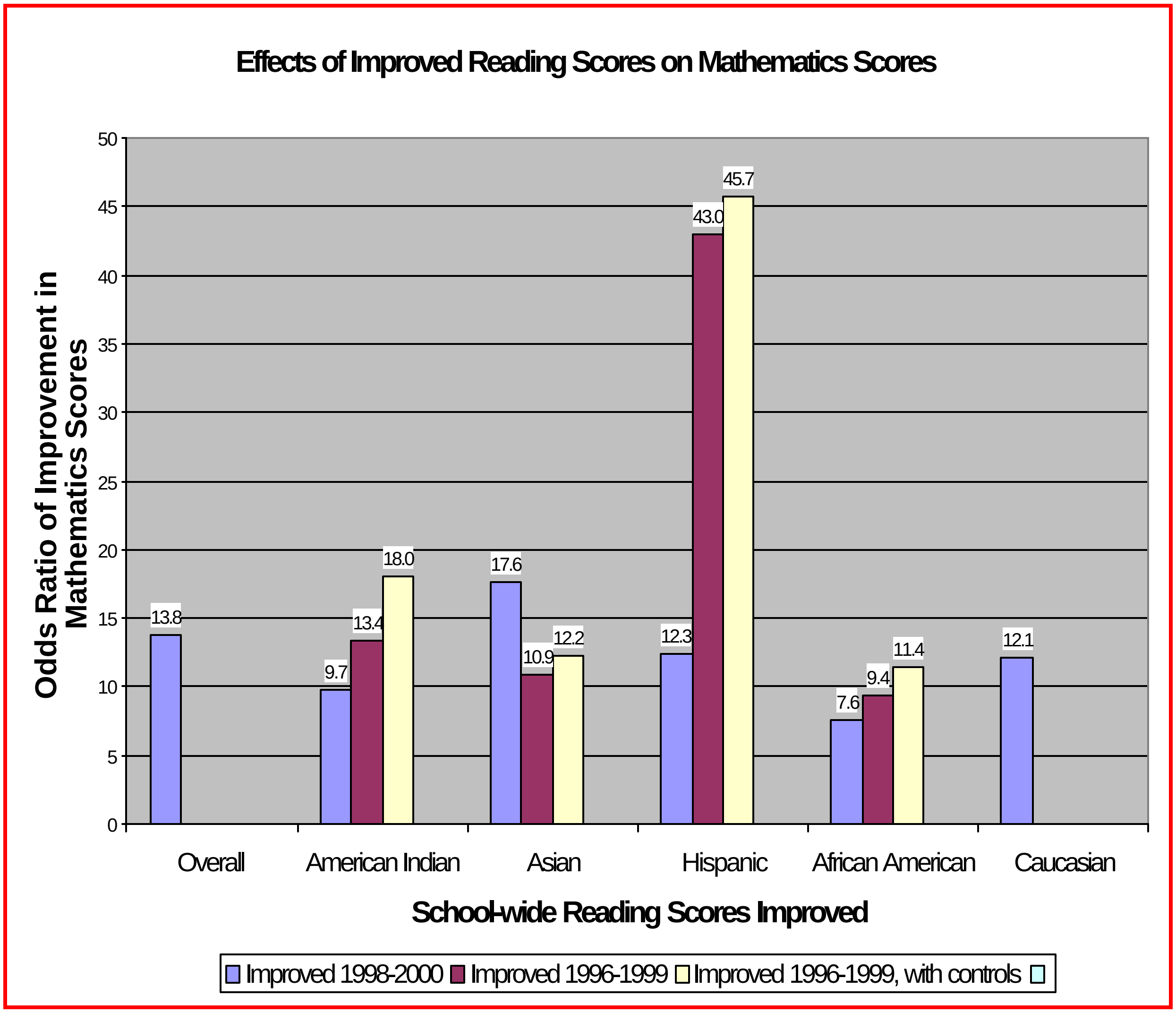


Figure 29

reading scores as opposed to no improved reading scores. Thus, a value of one means that the odds would be just the same. A value less than one would mean that the odds would be lower – that there is a trade-off between improved school reading scores and mathematics scores. A value of greater than one means that the odds of improved mathematics scores are increased if a school has improved reading scores.

There are no adverse impacts of improved reading scores on mathematics scores. Schools that succeeded in improving their reading scores did not do so at the expense of improving mathematics scores. Moreover, the odds of Latino schoolwide mathematics score improvements were 43-46 times higher for schools that improved reading scores than for schools that did not improve reading scores from 1996-1999. The odds were smaller for improvements from 1998-2000, but at a multiple of 12, the odds improvement in mathematics test scores as a result of reading improvements is still impressive. The odds ratios estimated for other groups in the 1998-2000 analysis range from 7.6 for blacks to 17.6 for Asians. Minority mathematics test score improvements, in particular, are extremely responsive to improvements in reading test scores.

Figure 29, thus, refutes the hypothesis that the significant improvements in reading test scores have come at the expense of deteriorating mathematics test scores. Did reading scores – particularly minority reading scores – improve? Yes. Did mathematics scores deteriorate? Yes, to some extent. Is there a causal relation between the two? No, there is no negative correlation between the two, at least at the school level. We find a strong and persuasive positive effect of school reading improvements on school mathematics improvements.

Is there an impact of improved schools on individual test scores?

A final question we pose that combines the lines of inquiry from the individual test score analysis and the school test score analysis is: Do students who attend schools that improved aggregate mathematics and/or reading scores have higher test scores? In other words, is there an independent impact of attending an improving school vs attending one that has not shown improvement? This, obviously, is a sensitive question, particularly in light of our inclusion in the appendix of the names and rankings of schools that improved their scores. Should parents abandon schools – even if they have high average scores – because those scores did not improve? Should parents flock to schools that showed improvements, even if those schools have low scores? We control for initial rankings of schools, school characteristics, student characteristics and program participation and then obtain a measure of the independent impact of attending a school which improved its test scores for a specified race.

Using 1999 data, we asked whether an improvement in test scores at the school between 1998 and 1999 has a statistically significant impact on individual white, black, Asian, Latino or American Indian reading or mathematics test scores. Our results are summarized below:[20]

- We find no statistically significant impact of schoolwide improvements in mathematics or reading improvements on the mean mathematics test scores of students of color. Whites who attend schools that improved their white mathematics test scores had scores that were less than a point higher than whites who attended schools that did not improve their mathematics test scores.

[20]Details are found in Tables E-17 and C-6 in the appendix.

- Latino students gained three extra points on the reading examination when they attended schools where reading scores improved.
- School improvement does not affect in any sizable way the measurement of the unexplained racial gaps in test scores.

Summary and Conclusions

In a recent and comprehensive summary of new research on black-white test score gaps, Christopher Jencks and Meredith Phillips concluded that the gaps are not deterministically immutable and that eliminating the gap is a top public policy priority. They write:

> The black-white test score gap does not appear to be an inevitable fact of nature. It is true that the gap shrinks only a little when black and white children attend the same schools. It is also true that the gap shrinks only a little when black and white families have the same amount of schooling, the same income and the same wealth. But, despite endless speculation, no one has found genetic evidence indicating that blacks have less innate intellectual ability than whites. Thus while it is clear that eliminating the test score gap would require enormous effort by both blacks and whites and would probably take more than one generation, we believe that it can be done...[I}f racial equality is America's goal, reducing the black-white test score gap would probably do more to promote this goal than any other strategy that commands broad political support. (Jencks and Phillips, 1998, p. 2; p. 4)

Unfortunately, there is no consensus over how to reduce the racial test score gap. Jencks and Phillips contend – and our findings support this contention – that reducing poverty or segregation would do little to eliminate the racial gaps in test scores. This is the case because even between white and nonwhite families with the same incomes or family structures, there remain sizable test score gaps. The range of putative explanations for the poor performance of children of color is staggering. But recent research suggests that nearly none of the explanations favored by liberals (poverty and segregation) or conservatives (family structure or heredity) have much to do with the persistent racial gaps in test scores.[21]

Our analysis, however, shows that some practical interventions hold much promise for reducing racial gaps in test scores.

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[21] Jencks and Phillips (1998) write:

> Conservatives invoke the decline of the family to explain social problems as frequently as liberals invoke poverty. But once we control for mother's family background, test scores, and years of schooling, whether she is married has even less effect on her children's test scores than whether she is poor. (p. 10)

There still remains a sizable unexplained racial gap in test scores. The largest unexplained gaps exist for African Americans and American Indians in both the reading and mathematics tests, and for Latinos in mathematics. Much of the reading gap among Latinos is explained by racial differences in characteristics, including English language mastery. While some of the unexplained gap can be attributed to the use of school poverty rather than individual poverty, we demonstrate that this represents a meager portion of the overall unexplained gap. In other words, poverty – whether measured by percent of students in a school who receive free or reduced price lunch or by the individual recipiency of free or reduced price lunch – does not explain the racial gap in test scores.

More significantly, though, the actual level of reading test scores did increase for students of color. While the racial gaps remained, the improvements are notable because they are accompanied by reductions in the unexplained portions of the racial gaps. If we think of the unexplained portion as being a measure of discrimination -- perhaps unintentional, but certainly one possible aspect of differential treatment of similarly situated white and nonwhite children -- then the implication is that test scores improved in Minnesota because of more conscious efforts not to disadvantage students of color. Examples of such efforts might include the proliferation of targeted out-of -school programs designed to improve minority student's test scores, or the intensity of school-based initiatives where there are large concentrations of students of color. It is difficult to know whether minority test score improvements are due to these programmatic efforts or simply to greater effort by students who are compelled to pass the examination in order to graduate. It is difficult to know whether the heightened teacher and administrator incentives to improve test scores are behind the spectacular rise in reading scores, or if this rise is simply the result of parents working closely with their children. Clearly, however, a momentum has been established that seems to assure that reading test scores among students of color will continue to improve.

In the case of the mathematics test scores, our results suggest that more drastic efforts may be needed to assure that these gaps diminish over time. Attendance affects minority mathematics test scores more than it does white test scores, so concentrating on improving attendance may help to further narrow the racial gap. Programs that maximize the benefits of higher attendance should also be pursued. Such efforts may include privately funded incentives to student achievement and school improvements at schools with large concentrations of students of color. By raising the math-score payoff associated with attendance for students of color, we may be able to complement other efforts to merely raise attendance.

In short, the positive progress Minnesota has made in improving reading test scores should be the impetus for further narrowing the racial gaps in both mathematics and reading test scores. There is no logical inverse relationship between reading and mathematics test score improvements. Nor are there obvious relationships between race, poverty or a host of other school-level factors and improvement over time. This is good news because it suggests that current reading improvements can be sustained while new initiatives designed to improve mathematics performance are developed and implemented.

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