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MATHEMATICAL ACHIEVEMENT IN EIGHTH GRADE: INTERSTATE AND RACIAL DIFFERENCES

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ABSTRACT

The 1992 eighth grade mathematics test of the National Assessment of Educational Progress reveals a low average level of achievement, wide variation across states, and a large difference in average scores of white and black students. Multiple regression analysis across states indicates that the characteristics of children (such as readiness to learn in kindergarten) and of the households in which they live (such as mother's education) have much larger effects on NAEP test scores than do variables (such as the student/teacher ratio) that measure school characteristics. White-black differences in the levels of child and household variables account for much of the white-black difference in NAEP test scores.

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Expressions of concern regarding the low achievement of American students have been appearing for more than a decade.[1] Some researchers contend that the bad news has been overstated,[2] but others point to a variety of evidence that provides little ground for complacency. From the early 1960s to the late 1970s, SAT scores declined substantially; this decline can only partially be explained by changes in the composition of students taking the test.[3] Since the late 1970s, there has been a slight recovery in mathematics scores, and a substantial rise in the achievement of black students overall, but verbal scores for white students remain close to their all-time low. In comparisons with students in other industrialized nations, American students often perform poorly; international differences in achievement in mathematics and sciences have received special attention.[4] U.S. employers and prospective employers frequently complain about high school graduates who lack basic skills in English and mathematics, and these complaints are echoed by university professors and administrators who find that many freshmen require extensive remedial work before they can begin higher education. Finally, it is important to note that achievement varies widely within the U.S. by geographic location, race, and socioeconomic status.

Concern regarding low achievement is not accompanied by agreement about it's causes or possible solutions. Some critics see the problem residing primarily in the schools themselves, while others believe that changes in families and communities are at the root of the problem. Even those who focus on the schools disagree as to whether the problem is primarily one of inadequate resources (e.g., high student/teacher ratios) or whether the educational process is plagued by inefficient bureaucrats and ineffective teachers. Similarly, critics who claim that the problems lie outside the schools are divided between those who see poverty as the principal cause and those who put more emphasis on changes in adult behavior that result in decreased parental involvement with their children.

In a previous study of the decline in the mental, physical, and emotional well-being of children since 1960, we found that explanations that emphasize material resources could not be valid for the first half of the period: purchases of goods and services for children by government rose rapidly, as did real household income per child, and the poverty rate of children plummeted.[5] By contrast, in the 1980s material conditions deteriorated for many children, especially those in households at the lower end of the income distribution.

This paper attempts to identify the factors associated with educational performance through an analysis of interstate differences in mathematical achievement in 1992. The determinants for all races and for white students only are identified, and the latter are used to analyze the large white-black differential in achievement.

Reliance on state data has some obvious limitations, including a relatively small number of observations and the possibility that statewide aggregates may obscure information about individual students. There are, however, at least two important advantages of state aggregate data over cross-sectional studies of individual students. First, because there is great stability in interstate differences over time, the "window of time" problem is not as severe.[6] With individual data, for example, a child may not be living in poverty at the time of a given study, but her performance in school may be significantly affected by having been in poverty for much of her life. Second, studies based on individual data usually assume that all of the effects of a variable, e.g., living in a one-adult household, are experienced by the individual child. In fact, there may be important "neighborhood" effects (i.e., externalities) which will be reflected in the aggregate data. In addition to these methodological advantages, data for certain important variables are available only by state.

Interstate and Racial Differences in Achievement

The results of the eighth grade mathematics test (MATH8) of the National Assessment of Educational Progress (NAEP) were used to measure mathematics achievement. According to some experts, the NAEP offers "the only dependable national index for monitoring the performance of our schools."[7] NAEP results were made available by state for the first time in 1990, and again in 1992. This study used the 1992 scores[8] which we found to be highly correlated with both the 1990 data (r=.97) and with the 1992 fourth grade mathematics scores (r=.95).

Three aspects of the statewide averages summarized in Table 1 deserve special attention. First, the average level of achievement--a mean of 266--is quite low.[9] For students to receive a score of 300 they only had to demonstrate an ability to solve problems involving decimals, fractions, and percentages, and to use elementary concepts in algebra, geometry, and statistics.[10] There is no state where the average eighth grader came close to meeting that standard. A score of 250 indicates only an ability to add, subtract, multiply and divide whole numbers and solve two-step problems.[11] Second, we see wide variation across states in the average level of achievement. There is almost a 40 point gap between the lowest and the highest state. Finally, achievement levels differ greatly between white and black students. The highest mean state score for blacks is below the lowest mean state score for whites. The following analyses focus on the interstate and racial differentials; the results may also throw light on the generally low level of achievement.

Determinants of Interstate Differences in Achievement

The explanatory variables used in this study are described in Table 2. They are of three types. First, there are variables such as READY and LOWBWT that pertain directly to children themselves. Second, there are variables such as MOMDRP and POVRTY that describe the households in which the children live. Finally, variables such as STU/TCH measure characteristics of the schools that the children attend. Variables were chosen on the basis of theoretical considerations, previous empirical research, and availability.

Readiness-to-learn in kindergarten (READY) is a new series developed by the Carnegie Foundation for the Advancement of Teaching. In 1990 kindergarten teachers were asked to estimate the percentage of their students who entered kindergarten ready to learn, based on "physical well-being, social confidence, emotional maturity, language richness, general knowledge, and moral awareness"; these responses were reported by state but not by race.[12] Low birthweight, a variable that has been identified as a predictor of poor performance in school,[13] was obtained from the National Center for Health Statistics.[14] The remaining child and household data were derived from the March Consumer Population Surveys (CPS) for the years 1988 through 1990.[15] The measurement of percent black (AFRAM) is straightforward, but the interpretation is complicated by correlation with many socioeconomic variables plus possible cultural biases in standardized tests.

The importance of household variables was emphasized by Coleman in 1966: "Variations in family background account for far more variation in school achievement than do variations in school characteristics."[16] The percent of children living with only one adult is of interest because of a rapid increase (5.5% in 1960, 14.8% in 1990[17]) and concerns about the effects of this increase on children. As more mothers enter the work force, it is important to examine the implications of this trend for children. To analyze this phenomenon, we focused on households where there is one adult male and one adult female, and calculated the percent of children living in these households where both adults work 20 or more hours per week. We also calculated the percent of children in households where both adults are in the labor force, but at least one works less than 20 hours per week. Most educational researchers believe that "a weak but statistically significant relationship exists between student poverty and academic achievement."[18] With one in five children currently living in poverty, it is important to consider the possible effect of this variable.

Other child and household variables that were considered but found to have no independent statistically significant relation to MATH8 included the percent of children who moved in the past year, who live in big cities, and who live in households where there are at least two adults, but no married couple. Also considered but not found to be statistically significant were the percent of mothers who received prenatal care, the number of children in Head Start as a percent of children in poverty, and median household income per person.

School variables include the student-teacher ratio in each state[19] and the portion of state and local education revenues which came from the state.[20] The portion of revenue from the state is of interest because it has increased substantially since 1968[21] and it is likely to continue to increase as taxpayers resist high property taxes and as the states seek greater equality of revenue across school districts. The increasing importance of state financing may lead to less local community involvement with the schools.

School variables which were considered but were not statistically significant included dollar revenue per student, the percent of children 9-13 in private school, and the percent of children ages 3 and 4 in preschool.

The state MATH8 averages for all races were regressed on the children, household, and school variables in a wide variety of specifications. Those regressions with the most explanatory power (highest R^2s adjusted for degrees of freedom) are shown in Table 3. Their overall explanatory power is very high; almost 90% of the variance in NAEP scores is explained by a relatively small set of variables.[22]

In all specifications the most important determinant of MATH8 is READY. It is the first variable to enter in stepwise regressions, always has a high level of statistical significance regardless of specification, and the absolute size of the effect is substantial. A change of one percentage point in READY is associated with a change of about .4 or .5 in the NAEP score. AFRAM is also always statistically significant ($p < .01$), but the size of the effect is not as large as READY. The coefficient for AFRAM varies from -.2 to -.3, depending on whether LOWBWT is included or excluded.[23]

STATSHR is the only schooling variable that is consistently significant ($p < .01$),[24] but the size of the effect is small. The coefficient of -.13 implies that an increase in STATSHR of ten percentage points would, *ceteris paribus*, result in a decrease of 1.3 points in MATH8. MOMDRP is statistically significant at $p < .05$; its effect on MATH8 is about one-half that of READY. BOTHWK, the only other variable that is statistically significant in many specifications, has a positive effect on MATH8. Although LOWBWT, POVRTY, and STU/TCH figure prominently in many discussions of student achievement, they do not play a significant role in cross-state differences in MATH8, as may be seen in regressions (2) through (5).

Determinants of Readiness to Learn in Kindergarten

Readiness to learn merits particular attention. The scatter diagram (Figure 1) and the robustness of READY in the regressions show the strong relation between this variable and achievement in mathematics in eighth grade. In order to identify the factors associated with readiness to learn, READY was regressed on several variables, and those regressions with the most explanatory power are shown in Table 4. We report the results of regressions weighted by number of children because READY was based on responses from fewer than 50 kindergarten teachers in one state. The coefficients are similar in the weighted and unweighted regressions, but the former yield higher adjusted R^2s.

Either measure of mothers' education (MOMED or MOMDRP) was the first variable brought in by stepwise regressions and was always significant at the .01 level; MOMED gave slightly better results. If MOMED increases by one year, READY increases by about five percentage points. The percent of children living in single-adult households was always significant at least at the .05 level. An increase in ADULT1 of 1 percentage point is associated with a .5 percentage point decrease in READY. This has serious implications given the 9 percentage point increase in ADULT1 since 1960.

The percent of two-adult households where both adults work $\geq$ 20 hours per week and the percent of those households where both are in the labor force but at least one works less than 20 hours were frequently significant but in opposite directions. While a one percentage point increase in BOTHWK results in a decrease of about .25 percentage points in READY, a similar increase in BOTHLFX results in an increase of the same magnitude. Low birthweight has a large but not statistically significant effect on READY. The percent of children in poverty has a very small and statistically insignificant coefficient when other variables (particularly MOMED and ADULT1) are included; AFRAM also has a small coefficient which is not statistically significant.

Racial Differences in Achievement

To test the robustness of the MATH8 regression results reported in Table 3, we estimated similar regressions for white students only (see Table 5).[25] Because READY was not reported by race, we used a predicted value for whites, estimated from the results of regression (1) in Table 4 applied to the levels of the variables for whites only.[26] Qualitatively, the results for whites-only are similar to those for all races; the principal differences are a substantial increase in the coefficients for POVRTY and MOMDRP, a large decrease for AFRAM, and a modest decrease for READY.

The regression results for MATH8 for white students and for READY for all races provide significant insights concerning the white-black differential in MATH8, as shown in Table 6. First, we we see that there is a large racial differential in READY as predicted from regression 1 in Table 4. This difference is attributable primarily to the large percentage of black children living with only one adult, and secondly to the greater education of white mothers. There are also racial differences in labor force status of two-parent families, but they have small and offsetting effects on READY.

The large racial difference in READY helps explain the large differential in MATH8. Equally important are the racial differences in MOMDRP, LOWBWT, and POVRTY. Using the coefficients from regression (5) in Table 5, the predicted white-black difference in MATH8 is 25.6. The actual difference is 37.7. Thus, the differences between whites and blacks in the children and household variables shown in Table 6 explain two-thirds of the racial difference in mathematical achievement in eighth grade. Unmeasured socioeconomic differences and segregated schools could account for some or all of the unexplained differential.

Conclusion

Multiple regression analysis of state data yields two important conclusions about mathe matical achievement in eighth grade. First, we find that the characteristics of children and the that households in which they live have much larger effects on NAEP test scores than do variables that measure school characteristics. Second, we find that white-black differences in the children and household variables account for most of the large white-black difference in NAEP test scores.

The most consistent predictors of interstate differences in mathematical achievement are the percent of children who enter kindergarten ready to learn and the percent of mothers who dropped out of high school. The percent of students who are black has a large, statistically significant negative relation with achievement in the all-races regressions; for whites-only the coefficient is much smaller, but still statistically significant. The only school-related variable that is statistically significant is a small negative effect of the share of school revenues supplied by the state. Both parents working in paid jobs has a positive effect on MATH8.

The observed difference in mathematical achievement between white and black students can be explained largely by differences in predicted readiness-to-learn in kindergarten, mother's education, low birthweight, and poverty. Readiness-to-learn in kindergarten is predicted primarily by mother's education (positive) and living in a one-adult household (negative).[27] The extent of parental labor force participation in two-parent households is also relevant: when both parents work 20 or more hours per week the effect is negative; when both parents are in the labor force but at least one works fewer than 20 hours the effect is positive.

If a public policy goal is to increase achievement in mathematics, these results suggest that more emphasis be given to the pre-school years even if this requires re-allocation of resources from formal schooling. Unless there is a dramatic improvement in the circumstances of young children, there is little chance of achieving the nationally established goals that by the year 2000 "all children will come to school ready to learn" and "American students will be first in the world in math and science achievement."[28]

References and Notes

1. See, for instance, National Commission on Excellence in Education, "A Nation at Risk," 1983 report, in *The Great School Debate* (Simon & Schuster, New York, 1985); A. D. Bloom, *The Closing of the American Mind* (Simon & Schuster, New York, 1987); D. Ravitch and C. Finn, *What Do Our 17-Yeor-Olds Know?* (Harper & Row, New York, 1987); J. I. Goodlad, P. Keating, eds., *Access to Knowledge: An Agenda for Our Nation's Schools* (College Entrance Examination Board, New York, 1990); T. Sowell, *Inside Americon Education* (Free Press, New York, 1993).

2. See D. C. Berliner, "Mythology and the American System of Education," *Phi Delto Koppon* 632-640 (April, 1993); C. C. Carson, R. M. Huelskamp, T. D. Woodall, "Perspectives on Education in America," Sandia National Laboratories, *The Journal of Educotional Reseorch*, 259-310 (May/June 1993).

3. College Entrance Examination Board, *On Further Examination*, Report of the Advisory Panel on the Scholastic Aptitude Test Score Decline (College Entrance Examination Board, New York, 1977).

4. For example, C. McKnight et al., *The Underochieving Curriculum: Assessing U.S. School Mothematics from an Internationol Perspective* (Stipes, Champaign IL, 1987); D. F. Robitaille, *The IEA Study of Mothemotics II* (Pergamon, New York, 1989).

5. V. R. Fuchs and D. M. Reklis, "America's Children: Economic Perspectives and Policy Options," *Science* 255, 41-46 (1992).

6. See M. E. Orland, "Demographics of Disadvantage: Intensity of Childhood Poverty and Its Relationship to Educational Achievement," in *Access to Knowledge: An Agenda for Our Notion's Schools*, J. I. Goodlad and P. Keating, eds. (College Entrance Examination Board, New York, 1990), pp. 43-58; K. R. White, "The Relation Between Socioeconomic Status and Academic Achievement" *Psychologicol Bulletin*, 91 #3, pp. 461-481 (1982).

7. R. D. Bock, "Designing the National Assessment of Educational Progress to Serve a Wider Community of Users: A Position Paper," ERIC ED279 664, p. 1 (1986).

8. Average scores are available for 41 states for all races and for whites and for 31 states for black students, National Center for Education Statistics, *NAEP 1992 Mothemotics Report Card for the Notion ond the Stotes* (Educational Testing Service, Washington DC, 1993), pp. 10 and 20. The average state sample was 2,531; there were 1,934 test results in the state with the smallest sample.

9. The low scores may be partly because the results are not made available to the students or their teachers; this may reduce the incentive to perform well.

10. *NAEP 1992 Mothematics Report Card for the Nation and the States*, p. 237.

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The large racial difference in READY helps explain the large differential in MATH8. Equally important are the racial differences in MOMDRP and POVRTY. Using the coefficients from regression (3) in Table 5, the predicted white-black difference in MATH8 is 20.9. The actual difference is 37.7. Thus, the differences between whites and blacks in the children and

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Conclusion

Multiple regression analysis of state data yields two important conclusions about mathematical achievement in eighth grade. First, we find that the average characteristics of children and the households in which they live have much larger effects on average NAEP test scores than do variables that measure school characteristics. Second, we find that white-black differences in the children and household variables account for much of the large white-black difference in NAEP test scores.

The most consistent predictors of interstate differences in mathematical achievement are the percent of children who enter kindergarten ready to learn and the percent of mothers who dropped out of high school. The percent of students who are black has a large, statistically significant negative relation with achievement in the all-races regressions; for whites-only the coefficient is much smaller, but still statistically significant. The only school-related variable that is statistically significant is a small negative effect of the share of school revenues supplied by the state. Both parents working in paid jobs has a positive effect on MATH8.

The observed difference in mathematical achievement between white and black students can be explained largely by differences in predicted readiness-to-learn in kindergarten, mother's education, and poverty. Readiness-to-learn in kindergarten is predicted primarily by mother's education (positive) and living in a one-adult household (negative).[27] The extent of parental labor force participation in two-parent households is also relevant: when both parents work 20 or more hours per week the effect is negative; when both parents are in the labor force but at least one works fewer than 20 hours the effect is positive.

If a public policy goal is to increase achievement in mathematics, these results suggest that more emphasis be given to the pre-school years even if this requires re-allocation of resources from formal schooling. Unless there is a dramatic improvement in the circumstances of young children, there is little chance of achieving the nationally established goals that by the year 2000 "all children will come to school ready to learn" and "American students will be first in the world in math and science achievement."[28]

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Table 6. White-Black differences in determinants of READY and MATH8, 31 states.[a]

Variable	White	Black	White minus black
Children ≤ 5			
MOMED	13.1	12.0	1.1
ADULT1	7.6	30.2	-22.6
BOTHWK	36.0	42.5	- 6.5
BTHLFX	27.4	32.3	- 4.9
Predicted READY[b]	70.4	54.7	15.7
Children 9-13			
MOMDRP	12.2	27.9	-15.7
AFRAM	14.8	22.7	- 7.9
STATSHR	52.8	55.4	- 2.6
BOTHWK	48.1	46.2	1.9
POVRTY	10.2	41.8	-31.5
Predicted MATH8[c]	274.0	253.1	20.9
Actual MATH8	274.2	236.5	37.7

[a]For this analysis, we used only the 31 states where NAEP scores were reported for both black and white students. We weighted each state average for each race by the number of 9- to 13-year-olds of that race in our CPS sample.

[b]Estimated from regression (1), Table 4.

[c]Estimated from regression (3), Table 5.

11. *Ibid.*, p. 236.

12. E. L. Boyer, *Ready to Learn: A Mandate for the Nation* (Carnegie Foundation for the Advancement of Teaching, Princeton NJ, 1991).

13. M. C. McCormick et al., "Very Low Birth Weight Children: Behavior Problems and School Difficulty in a National Sample," *The Journal of Pediatrics* 117, No. 5, pp. 687-693 (1990); H. Corman and S. Chaikind, "The Effect of Low Birthweight on the Health, Behavior, and School Performance of School-Aged Children," NBER Working Paper 4409 (1993); Department of Education, "Preparing Young Children for Success: Guideposts for Achieving Our First National Goal. An America 2000 Education Strategy" ERIC ED339 504 (1991).

14. National Center for Health Statistics, *Health, United States* (U.S. Government Printing Office, Washington DC, 1991 p. 133; 1988 p. 48).

15. Bureau of the Census, Current Population Survey, public use tapes, 1988-1990.

16. J. S. Coleman et al., *Equality of Educational Opportunity* (U.S. Government Printing Office, Washington DC, 1966), p. 218.

17. Calculated from 1960 U.S. Bureau of the Census, 1/1000 Sample, and 1990 March Current Population Survey for all children under age 18.

18. M. E. Orland, p. 45.

19. Enrollment K-12 divided by the number of teachers, National Center for Educational Statistics, *Digest of Educational Statistics*, (U.S. Government Printing Office, Washington DC, 1992).

20. Bureau of the Census, *Statistical Abstract of the United States* (U.S. Government Printing Office, Washington DC, 1992 #239, 1991 #244, 1990 #236, 1989 #229, 1988 #217).

21. K. K. Wong, "Fiscal Support for Education in American States: The 'Parity-to-Dominance' View Examined," *American Journal of Education* 97, No. 4, 329-359 (1989).

22. When the regressions were run in weighted form (the number of children in each state used as weights) the results were very similar to those shown in Table 3, and the overall explanatory power was about the same.

23. When all other variables are excluded the coefficient for AFRAM is .5.

24. STU/TCH achieves statistical significance ($p < .05$) if STATSHR and BOTHWK are both excluded. The coefficient for STU/TCH, -.5, is quite small. It implies that a reduction of two students in the student/teacher ratio would result in an increase of only one point in the NAEP mathematics score.

25. Cross-state regressions for black students are not reliable because of small sample size in several states.

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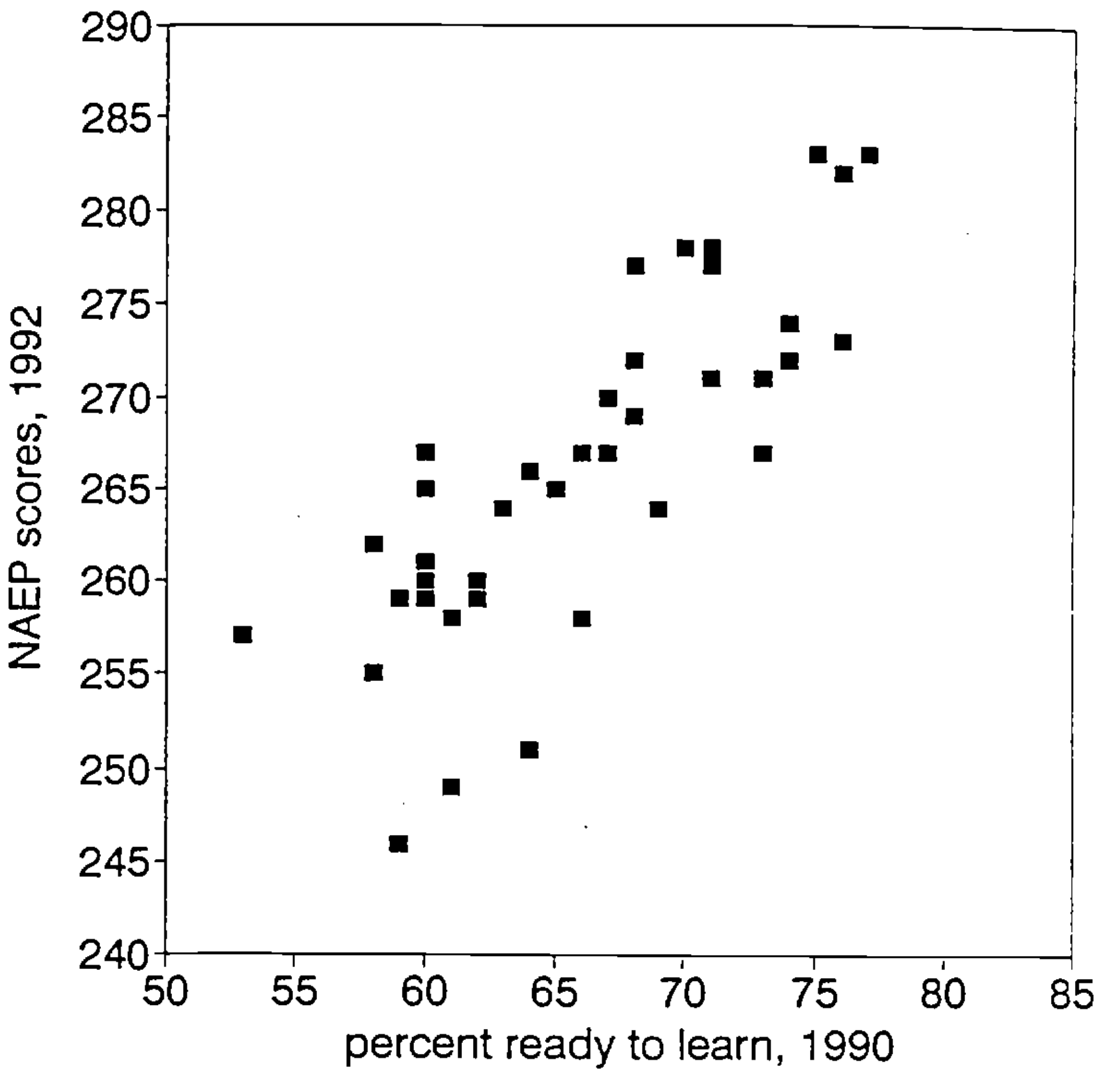

Figure 1. Scatter diagram of mathematics achievement in eighth grade and readiness to learn in kindergarten, 41 states.

26. READY was estimated for white, black, and others using the regression coefficients and the state averages for each variable and racial group. Each value was then adjusted by the factor for that state which would equate the weighted average of the three estimated values of READY to the observed value for that state.

27. Some reformers advocate delaying entry to kindergarten in order to increase the percent of children ready to learn. However, this would probably increase the disparity among children as parents with more education and more resources would be likely to substitute other learning experiences for early kindergarten, whereas parents with fewer options might settle for custodial care.

28. National Education Goals Panel, *The National Education Goals Report, Building a Nation of Learners* (Government Printing Office, Washington DC, 1992).

Table 2. Explanatory variables used in regressions.

A. Child and household variables:

READY		Percent of children ready to learn in kindergarten as assessed subjectively by kindergarten teachers, 1990.
LOWBWT		Percent of children born < 2500 grams.[a]
MOMDRP	*	Percent of children whose mothers completed less than 12 years of education.
MOMED	*	Mean number of years of education of children's mothers.
ADULT1	*	Percent of children living in households with only one adult.
BOTHWK	*	Percent of children living in households with one adult male and one adult female where both adults work at paid jobs at least 20 hours per week.
BTHLFX	*	Percent of children living in households with one adult male and one adult female where both adults are in the labor force, but at least one works less than 20 hours per week.
POVRTY	*	Percent of children living in poverty.
AFRAM	*	Percent of children classified as black, non-Hispanic.

B. School variables:

STU/TCH	Student-teacher ratio, K-12.[b]
STATSHR	Percent of state and local revenue to public elementary and secondary schools which comes from state sources.[b]

* These variables have different values for different age groups and different racial groups. MATH8 regressions use data for children ages 9 to 13; READY regressions use data for children ≤ five years of age.

[a]LOWBWT in the MATH8 regressions is based on births from 1977 to 1979; LOWBWT in the READY regressions on births from 1984 to 1986.

[b]STU/TCH and STATSHR are 5-year averages, 1986-1990.

Table 1. Percent distribution of states[a] by mathematical achievement in eighth grade, 1992.

Mean NAEP scores	Unweighted All races	Unweighted White[c]	Unweighted Black[c]	Weighted[b] All races	Weighted[b] White[c]	Weighted[b] Black[c]
281 to 284	7.3	17.1		4.9	16.1	
277 to 280	9.8	22.0		5.4	24.3	
273 to 276	9.8	26.8		6.3	37.5	
269 to 272	14.6	12.2		16.4	6.3	
265 to 268	17.1	9.8		22.0	8.0	
261 to 264	9.8	9.8		11.0	5.7	
257 to 260	22.0	2.4		27.6	2.1	
253 to 256	2.4			1.8		
249 to 252	4.9		3.2	2.8		0.2
245 to 248	2.4		3.2	1.8		0.6
241 to 244			41.9			30.7
237 to 240			16.1			15.5
233 to 236			16.1			21.8
229 to 232			19.4			31.2
Median	267	275	240	266	276	236
Mean	266	274	239	266	275	236
Standard deviation	9.1	6.6	5.2	7.8	5.9	4.7

[a]Based on 41 states for all races and whites; 31 states for blacks.

[b]By population ages 9-13, 1988 to 1990.

[c]Non-Hispanic.

Table 4. READY regression results, 50 states, all races.[a]

	(1)	(2)	(3)	(4)	(5)
MOMED	4.91 (1.08) **	4.73 (1.07) **	4.76 (1.52) **	4.80 (1.08) **	5.01 (1.52) **
ADULT1	-.57 (.15) **	-.41 (.18) *	-.56 (.19) **	-.48 (.18) *	-.44 (.21) *
BTHWK	-.27 (.08) **	-.24 (.08) **	-.27 (.08) **	-.24 (.08) **	-.25 (.09) **
BTHLFX	.26 (.10) *	.21 (.11)	.26 (.11) *	.23 (.11) *	.20 (.11)
LOWBWT		-1.08 (.65)			-1.26 (1.01)
POVRTY			-.02 (.13)		.03 (.14)
AFRAM				-.06 (.06)	.01 (.08)
Constant	14.70 (12.23)	22.38 (12.87)	16.74 (18.74)	15.24 (12.22)	19.81 (19.60)
R^2	.630	.652	.630	.639	.652
Adjusted R^2	.597	.612	.588	.598	.594

Note: * $p<.05$
** $p<.01$

[a]Weighted by number of children ≤ 5 years of age, 1988 to 1990 Current Population Surveys.

Table 3. MATH8 regression results, 41 states, all races (standard errors in parentheses).

	(1)	(2)	(3)	(4)	(5)
READY	.49 (.12) **	.41 (.13) **	.48 (.13) **	.48 (.13) **	.40 (.13) **
AFRAM	-.30 (.04) **	-.23 (.06) **	-.31 (.05) **	-.31 (.04) **	-.23 (.07) **
STATSHR	-.13 (.04) **	-.13 (.04) **	-.13 (.04) **	-.13 (.04) **	-.13 (.05) **
MOMDRP	-.24 (.09) *	-.24 (.09) *	-.25 (.10) *	-.25 (.09) *	-.25 (.10) *
BOTHWK	.24 (.09) **	.21 (.09) *	.25 (.10) *	.26 (.09) **	.21 (.10)
LOWBWT		-1.43 (.77)			-1.47 (.85)
POVRTY			.02 (.12)		.02 (.12)
STU/TCH				.12 (.26)	-.04 (.27)
constant	237.6 (11.9)	253.7 (14.4)	237.5 (12.0)	236.0 (12.5)	254.6 (16.4)
R^2	.899	.908	.899	.900	.908
Adjusted R^2	.885	.892	.881	.882	.886

<u>Note</u>: * $p<.05$

** $p<.01$

Table 5. MATH8 regression results, 41 states, whites only (standard errors in parentheses).

	(1)	(2)	(3)	(4)	(5)
READY	.32 (.10) **	.31 (.10) **	.34 (.10) **	.32 (.11) **	.34 (.10) **
AFRAM	-.09 (.04) *	-.10 (.04) *	-.11 (.04) **	-.09 (.04) *	-.11 (.04) **
STATSHR	-.12 (.03) **	-.11 (.03) **	-.08 (.04) *	-.11 (.04) **	-.07 (.04)
MOMDRP	-.49 (.11) **	-.47 (.11) **	-.42 (.11) **	-.49 (.11) **	-.41 (.11) **
BOTHWK	.20 (.07) **	.19 (.07) **	.17 (.07) *	.19 (.08) *	.16 (.07) *
LOWBWT		-.85 (.64)			-.79 (.63)
POVRTY			-.24 (.12) *		-.22 (.12)
STU/TCH				-.07 (.23)	-.12 (.22)
Constant	255.5 (9.7)	260.8 (10.4)	255.5 (9.3)	256.6 (10.4)	262.0 (10.8)
R^2	.845	.853	.862	.846	.869
Adjusted R^2	.823	.827	.838	.818	.836

<u>Note</u>: * $p<.05$
** $p<.01$