Comments Welcome

School Quality and the Longer-Term Effects of Head Start

Janet Currie
UCLA and NBER

Duncan Thomas
RAND and UCLA

November, 1997
Revised, June 1999

We thank Larry Katz, Shelley Lundberg, Steve Rivkin, Seth Sanders and participants in the NBER's Program on Children for helpful comments. Support from the Alfred P. Sloan Foundation, the National Science Foundation grant #SBR-9512670 and the National Institute of Child Health and Human Development grant R01-HD3101A2 is gratefully acknowledged. We are solely responsible for the views expressed.

Abstract

Recent research on Head Start, an enriched preschool program for poor children, has shown that effects on test scores "fade out" more quickly for black children than for white children. This paper uses data from the 1988 wave of National Educational Longitudinal Survey to show that black children who attended Head Start go on to attend schools of worse "quality" than other black children, in the sense that they attend schools in which most children have worse test scores. We do not see any similar pattern among white children, indicating that on average, white Head Start children attend schools similar to those attended by other white children. Moreover, when we stratify by school type, we find that gaps in test scores between Head Start and other children are very similar for blacks and whites. These patterns suggest that the effects of Head Start may fade out more rapidly among black students than among whites, at least in part because black Head Start children are more likely to subsequently attend bad schools.

Janet Currie
NBER and UCLA
Dept. of Economics, UCLA
405 Hilgard Ave.
Los Angeles CA 90095
currie@simba.sscnet.ucla.edu

Duncan Thomas
RAND and UCLA
Dept. of Economics, UCLA
405 Hilgard Ave.
Los Angeles, CA 90095
dt@ucla.edu

Early intervention programs for preschoolers have been suggested as a means of improving the educational attainment of disadvantaged children.[1] Children who lag behind their peers when they begin school often fall further behind -- they are more likely to repeat grades, and to eventually drop out of school. Quality preschool programs can help prepare children for school by providing cognitive stimulation, as well as health and nutritional benefits.

There are, however, large disparities in participation in these programs: in 1993, 80% of children in families earning more than $75,000 per year attended a preschool, compared to 45% of children in families with annual incomes less than $30,000. Moreover, programs attended by lower income children tend to be of lower quality. They typically have high child/staff ratios, more teacher turnover, and teachers with less training; the preschools attended by lower income children are also less likely to have formal curricula or guidelines for what students should learn, and are less likely to provide such services as health screenings (U.S. General Accounting Office, 1995).

One of the goals of the Head Start preschool program is to redress these inequities. It is a federal-local matching grant program intended to improve the skills of poor children so that they can begin schooling on an equal footing with their more advantaged peers. While program guidelines require that 90% of participants be from families below the poverty line, this constraint is seldom binding in practice. In 1992, for example, 95% of children served were poor, (U.S. Dept. of Health and Human Services, 1993).

Begun in 1964 as part of the "War on Poverty", the program now serves over 700,000 children in predominately part-day programs, at a cost of approximately $4,000 per child, per

[1] Part of the appeal of early intervention is that interventions aimed at improving the skills of teens and young adults generally have limited effects (c.f. Grossman, 1992; Lalonde, 1995; U.S. Dept. of Labor, 1995).

year (U.S. House of Representatives, 1993). This represents roughly 30% of eligible 3 to 5 year olds. By way of comparison, the average family with an employed mother spent a total of approximately $3,000 on child care in 1991, and poorer families spent even less (Casper, Hawkins and O'Connell, 1994). In order to serve greater numbers of poor children, both Democratic and Republican administrations have increased Head Start funding annually since 1989. In addition, many state governments began funding similar programs in the early 90s (Smith, Fairchild, and Groginsky, 1995).

Children who participate in a Head Start program reap many benefits during the program and immediately after completion. These benefits include improvements in future school attendance and a reduction in the probability that a child is placed in remedial education (McKey *et al.*, 1985). There is evidence suggesting that "Cadillac" interventions such as the famous Perry Preschool Program (which was funded at twice the level of regular Head Start programs) have lasting effects on a broader range of outcomes including high school completion and the avoidance of crime and teen pregnancy. When more typical Head Start programs have been evaluated, however, the evidence for long-term benefits has been less clear. For example, several studies of test scores report that benefits that emerge upon completion of the program have all but faded away three or four years later (Barnett, 1992; Berrueta-Clement *et al.*,1984). Zigler and Meunchow (1992) point out that it may be unrealistic to expect a relatively short-term intervention, like Head Start, to have long lasting effects on cognitive achievement and academic success.

Recent work, however, suggests that the rate at which Head Start benefits fade out differs among sub-populations and that there may, in fact, be long-lasting gains for some children. Using a national sample of children, Currie and Thomas (1995) show that at age 6, children who went

to Head Start score better on vocabulary and reading tests[2] than their siblings who did not attend preschool. These initial gains are essentially *identical* for black and white children. However, among blacks, the beneficial effects associated with Head Start fade out rapidly whereas among white children the benefits persist well into adolescence. Since most of the earlier evaluations of Head Start focussed on small samples of minority children, earlier work had not uncovered the longer-term benefits for white children. Currie and Thomas' estimates are reproduced in Appendix Table 1.

There are several plausible explanations of differential fadeout. First, it is possible that Head Start programs do not serve black children as well as white children, perhaps because of differences in program quality. However, the fact that initial gains are identical for black and white children casts doubt on this explanation and suggests that other factors must play a role. A second hypothesis is that the child's experience *after* leaving the program affects the ultimate gains that are obtained from Head Start. These experiences reflect resources available at home, in the neighborhood, and at school.

Given continuing concerns about racial segregation in schooling, and recent evidence about the importance of school quality in affecting economic outcomes (c.f. Boozer *et al.*, 1992; Card and Krueger, 1992, 1994), we focus on the role of race-specific differences in school quality as a possible explanation for different patterns of fade-out among black and white Head Start children. Specifically, we start from the premise that the initial positive effects of Head Start may be undermined if Head Start children are subsequently exposed to inferior schools. We noted above that the beneficial effects of Head Start fade out more quickly for black students

[2]They use the Peabody Picture Vocabulary Test (PPVT), and the Peabody Individual Achievement Test (PIAT) of Reading Recognition in the National Longitudinal Survey of Youth, Child Assessments.

than for white students. This observation suggests a testable hypothesis--if it is subsequent school quality that determines the longer-term impact of Head Start, and if school quality has similar effects on blacks and whites, then the gap in school quality between Head Start and other students must be greater for blacks than for whites. We test this proposition using a sample of 8th graders from the National Educational Longitudinal Study of 1988 (NELS).

We show that black Head Start children are systematically more likely than other black children to subsequently attend schools of poor quality, in the sense that they attend schools in which all children tend to perform poorly. Moreover, among black children, some of this differential in quality can be shown to correspond to observable differences in average test scores between schools. These results suggest that improvements in the quality of schools attended by black Head Start children might help to safeguard the initial gains in cognitive achievement fostered by the Head Start program.

1. Conceptual Framework

The eighth grade outcomes we observe depend on child and family characteristics, initial human capital investments made while the child is in the Head Start program and earlier, and subsequent investments in the child's human capital which will vary with the "quality" of the child's school. Specifically,

$$(1)\ Outcome_{iT} = b_1\Sigma^{T}_{t=0}X_{it} + b_2Hdst_i + b_3f(T)Hdst_i + b_4\Sigma^{T}_{t=0}Q_{it} + e_{it}.$$

The first term on the right hand side captures the influence of all the time invariant and time varying characteristics of children and families that affect outcomes, from "time zero" up to capital T, the age at which the outcome is measured. $Hdst_i$ is a dummy variable equal to one if a child attended Head Start. The coefficient b_2 is the estimated initial effect of Head Start on child outcomes. The next term captures the idea that the human capital acquired by the child at

Head Start will depreciate over time, though not necessarily at a constant rate. Thus, f(T) is some function of the time that has elapsed, while b_3 is expected to be negative. Finally, outcomes will depend on the quality of schooling the child has been exposed to, the sum of the Q_{it}. If all the relevant characteristics of child and family background and school quality are included in the model, then the last term will be an error that is uncorrelated with the other variables included in the model.[3]

Equation (1) cannot be estimated using the NELS data, since the NELS begins with 8th grade children and subsequent waves measure children two and four years later. If fadeout occurs by the 3rd or 4th grade, as previous research has suggested, then it will already have taken place by the time the children are first measured. We are also unable to measure X_{i0} to $X_{i,T-1}$, and Q_{i0} to $Q_{i,T-1}$. Even if we were able to observe some past characteristics of children, families, and schools, it is unlikely that we would be able to adequately measure all of the characteristics that affect outcomes, selection into the Head Start program, and school choice. These limitations of the NELS data set mean that we cannot interpret any of our estimates as measures of the long-term effects of Head Start, since we cannot say how children would have fared in the absence of the program.

What we can look at is whether children who attended Head Start end up at worse schools than other children, and at whether this selection process differs by race. Lee and Loeb (1995) show that the schools attended by Head Start children are of lower quality in several observable dimensions than schools attended by other children, but they do not look at racial differences. Our analysis also extends theirs by considering alternative, more comprehensive, measures of

[3] In principal, interactions between X variables and Q can also be included, but these have been suppressed from (1) in order to simplify the discussion.

school quality.

We measure school quality at time T in two different ways. First, we include a measure of the average test scores of the other children in the school (c.f. Hanushek, 1986).[4] Second, we estimate models that include a fixed effect for each school. The fixed effect captures all observed and unobserved characteristics of schools, and allows us to compare Head Start children to other children within the same school. In some models, we interact mean test scores with the child's Head Start status in addition to including school fixed effects. These models allow us to ask how Head Start children perform (relative to other children) within schools of different qualities.

2. Data

The data for this study are taken from the National Educational Longitudinal Study of 1988. This is one of the few data sets available that combines information about past participation in Head Start with measures of school quality for large numbers of black and white children.[5] A two-stage probability design was used to select a sample of students and schools. In the first stage, 1,734 schools were selected, while in the second, 26,435 students were randomly selected from these schools.[6] We excluded 700 students from a special, supplemental

---

[4] Higher scores may reflect family or neighborhood characteristics or peer effects in addition to any effect of schools *per se*. It will not be possible to disentangle the importance of each factor in this study.

[5] An additional benefit of using the NELS is that Murnane, Willett, and Levy, (1995) show that test scores measured in the 8th grade are significant predictors of future labor market outcomes.

[6] In principal, it is possible to weight in order to obtain a nationally representative sample. When we apply the weights available in the NELS, we obtain results that are, except where specifically noted, qualitatively similar to those discussed below. However, we have several reservations about the sampling weights. First, the weights vary from 2 to over 800, indicating that a few individuals who were unlikely to be surveyed have a lot of influence in the weighted regressions. Excluding the 1% of the sample with the highest weights produces point estimates that are in some cases quite different than those estimated using the weights with the full sample. Second, the major function of the weights is to control for the probability that a particular school was included in the sample. Since this probability should be subsumed in the school fixed effect, weighting should have little impact on the estimated coefficients in the fixed effects models. In view of these considerations, we use the weights when computing the

"hearing impaired" sample, and excluded a further 1,632 students whose parents did not return their questionnaires. Excluding children with missing test scores leaves 2531 black students and 14343 white students available for analysis.[7] Since the focus of our analysis is on racial differences in the way that Head Start children are selected into schools of differing quality levels, we estimate all our models separately for whites and blacks. The mean numbers of students per school included in the analyses of blacks and whites were 5 and 15, respectively.

Although the student is the base unit of analysis in the survey, the NELS surveyed parents, teachers, and school administrators as well as students. Information about student test scores is taken from the student's questionnaire; information about family background and the child's early educational experiences comes from the parent's questionnaire (which was completed by the parent "most knowledgeable" about the child's education); information about the classroom environment was provided by teachers in two of the four test areas (reading, mathematics, science, history); and information about the school was provided by the principal or another school administrator designated by the principal. Note that since two teachers were surveyed for each child, we take the means of each child's teachers' responses. Further information about the sources and the coding of all our variables is shown in a data appendix which is available from the authors. More information about the survey is available in Ingels *et al.* (1989).

Means of some key variables are shown in Table 1, by race. In order to highlight

---

means shown in Table 1, but not when we estimate regression models.

[7] The largest groups excluded from the current analysis are hispanics, asians, and "other race". In an earlier version of this paper, we presented separate estimates for the sample of 2676 hispanic students. We found that these students were more similar to whites than to blacks, in that controlling for school fixed effects eliminated little of the differences between Head Start and other hispanic children that were found in OLS.

potential differences between Head Start children and other children, the means are further stratified by the type of preschool the child attended: Head Start, another preschool, or no preschool. The column marked "Head Start" includes all children who ever attended Head Start, while the column marked "Other Preschool" includes children who only attended non Head Start preschools.

The numbers shown in Table 1 imply an overall Head Start enrollment rate of 9%. Head Start program statistics suggest that 400,000 3 or 4 year old children were enrolled in Head Start in 1978 (Administration for Children and Families, 1992). Assuming that there were approximately 7,000,000 children in this age group, this implies a Head Start enrollment rate of approximately 6%. However, 3 year olds who were not enrolled in 1978 could have become enrolled the next year, so the actual Head Start enrollment rate for this cohort is likely to be higher than 6%. Assuming for example, that three quarters of the children enrolled in any given year are 4 years old leads to an estimated enrollment rate of close to 9%.

Examining breakdowns by race, Table 1 suggests that 34% of black children and 5% of white children attended Head Start. In the National Longitudinal Surveys Child-Mother files, approximately 11% of whites and 31% of black children are reported to have attended Head Start. These numbers include an oversample of poor whites. When this oversample is excluded, the reported participation rate among whites falls to 9%. Some of the discrepancy between this figure and that reported in the NELS may reflect increasing enrollments among whites over time (by 1990 enrollment in the program had risen to about 550,000 children per year but no breakdown is available by race), as well as the fact that the NLSCM is a sample of children born to young mothers whereas the NELS is more representative (this is potentially important given that younger mothers are poorer on average). These considerations suggest that the Head Start

enrollment rates in the NELS are reasonable, and that the large gap in enrollment rates between blacks and whites is real.

The first panel of Table 1 shows that children who attend other preschools typically come from more advantaged backgrounds than Head Start children: their mothers are more likely to be highschool graduates or to have attended college, and their family incomes are much higher. These differences are particularly pronounced among whites, suggesting that white Head Start children are more negatively selected in terms of family background than black Head Start children. Table 1 also shows that Head Start children are less likely to have attended other non-preschool day care programs.[8] In general, the differences between children who attended Head Start and those who attended no preschool are less pronounced. However, even relative to these children, Head Start children have lower family incomes. They are also more likely to have attended other day care programs.

Panel B of Table 1 shows that these differences in background are reflected in differences in child outcomes. The NELS tested students in four areas: reading, mathematics, science, and history.[9] The test scores are expressed in percentage terms so that in principal, scores may vary from 0 to 100. Each score has a standard deviation of 15 to 23 points. Hence, the table shows that children who attended Head Start typically lag more than 1/2 a standard deviation behind

---

[8] Although there is likely to be some noise in the data regarding the distinction between preschools and day care programs, the estimates shown below suggest that the two differ substantively. Children who attended programs described as preschools have significantly higher test scores than those who attended day care programs. In an earlier version of this paper, we also included a variable equal to one if the child had attended kindergarten. This variable had a significantly positive effect on two of the four test scores among blacks; among whites, it was never significant. This result presumably reflects the fact that about 80% of black children attended kindergarten while 90% of white children did. Excluding the kindergarten variable had no effect on the estimated effects of Head Start.

[9] The reading test (21 items, 21 minutes) consisted of 5 short passages followed by comprehension and interpretation questions. The mathematics test (40 items, 30 minutes) consisted of quantitative comparisons and other questions. The science test (25 items, 20 minutes) assessed scientific knowledge and reasoning. The history test (30 items, 14 minutes) asked about U.S. history, civics, and government.

those who attended other preschools. White Head Start children also tend to perform more poorly than children who attended no preschool, though these differences are less pronounced.

3. Results

Table 2 explores the relationship between past Head Start status and current school quality. In the models shown, the school quality relevant to each child is measured using the average reading score taken over all the other children in the school. Very similar results were obtained using math, history, or science scores. For ease of interpretation, the scores are expressed as Z-scores, so that a school one standard deviation below the mean would have a score of -1 (we call this a poor school), while a school one standard deviation above the mean would have a score of 1 (we call this a good school).[10] Note that the standard deviation in school mean scores varies between 10 and 12 points, depending on the score.

Table 2 shows that among blacks, the probability that a given child attended Head Start rises as the mean quality of the current school declines, conditional on observable family background characteristics. No similar relationship exists for whites. Thus, Table 2 suggests that black Head Start children are concentrated in poor schools, relative to other black children, while the same is not true for whites. The rest of Table 2 confirms what we saw in Table 1 but in a multi-variate context: Head Start children are more likely to be in poor families, and to have less educated parents. The coefficients on income and education are greater for blacks than for whites, which may reflect larger differences in these variables between Head Start and non-Head Start children among whites.

---

[10] We do not use the mean test score taken over all the children in the school because this measure would be mechanically correlated with the child's own score. However, for the purposes of computing z-scores, we subtract out the mean of all the school's mean scores, and divide by the standard deviation of school mean scores.

One question raised by Table 2 is, do "better" Head Start children end up in better schools? If white Head Start children were not very disadvantaged relative to other whites, while black Head Start children were very disadvantaged relative to other blacks, then one might expect to see results similar to those we find. The means in Table 1 cast some doubt on this hypothesis, and we do control for many observable aspects of disadvantage in Table 2. However, in order to shed additional light on this issue, we can examine the test scores of the children themselves.

The first panel of Table 3 shows estimates of OLS models of the correlates of test scores which include indicators for whether children attended Head Start, as well as the other covariates listed in Table 2. For clarity's sake, the discussion in Section 1 stressed Head Start enrollment, but there are a number of other indicators of early childhood educational experiences available in the NELS. Hence, in addition to $Hdst_i$ these models also include controls for whether the child attended another preschool or a day care program. The other coefficients have been suppressed in order to focus on the main results.

In view of the discussion in Sections 1 and 2, it is not surprising to find that the estimated effects of Head Start are negative[11]. It bears repeating here that these estimates cannot be interpreted as causal effects of Head Start since they reflect the impact of both unobservable characteristics of the children and fadeout. If unobservable differences between Head Start and other children could also be controlled, then we might find positive effects of Head Start as in Currie and Thomas (1995). Similarly, the positive effects of preschools reflect both human capital investments and positive selection into these programs, while the negative effects of other day care programs may reflect either poor quality or negative selection.

[11] The only result that is qualitatively different when we weight, is that the Head Start coefficient on the math score for blacks becomes statistically insignificant.

The interesting point is that the estimated differences in test scores between the Head Start children and the other children are not significantly different for blacks and whites. This observation shows that by the 8th grade, the white Head Start children are not closer to other white children than is the case among blacks. These estimates offer no support for the idea that white Head Start children are less disadvantaged relative to their same race peers than black Head Start students, at least at 8th grade.[12]

The second panel of Table 3 shows estimates of the correlates of test scores that control for school quality by including school-specific fixed effects. Thus, these models compare the scores of Head Start children to those of other children *within the same school*.[13] Among black children, the results of controlling for school quality in this way are striking: The coefficients on $Hdst_i$ all fall by 50 to 80% and become statistically insignificant. Including school fixed effects has little impact on the estimated coefficients on other preschools, or day care programs. Moreover, although they are not shown, it is interesting to note that the coefficients on the other family background variables included in the model (measures of parent's education, income, and family structure) hardly move when the school fixed effects are added. In contrast, among white children, controlling for school fixed effects has virtually no effect on *any* of the coefficients

---

[12] Given the evidence that white head start children are more negatively selected relative to other white children in terms of family background than is the case among blacks, these estimates suggest that Head Start may be producing greater long-term benefits for whites than for blacks. That is, the white Head Start children may be starting from further behind, but ending up in the same place relative to their peers as the black Head Start children.

[13] Since these models were estimated separately for whites and blacks, the school fixed effects are not constrained to be equal for the two groups. In fact, if there were segregation *within* schools, then the same school might be of higher "quality" for whites than for blacks. Alternatively, if the quality of education was similar for whites and blacks within schools, then one might expect to obtain similar results whether or not one constrained the fixed effects to be equal across racial groups. That is, it would not matter whether the fixed effects were calculated using the sample of whites, the sample of blacks, or using all the children in the school. In fact, models that constrain the fixed effects to be equal across the two groups produce estimates very similar to those shown in Table 3, suggesting that within schools, whites and blacks receive educations of similar quality.

included in the model. Thus, among blacks, there is no within-school difference between Head Start children and other children.

The third panel of Table 3 shows the between-school estimates of the relationship between Head Start and school quality. These estimates can be obtained by estimating the model in terms of school-level means. They indicate that among blacks, all of the significant differences between the Head Start children and other children are between schools rather than within schools. In contrast, among whites, the differences between the Head Start children and the others are observed within schools rather than between schools (except in the case of mathematics scores, where differences exist both within and between schools).

Together these results imply not only that black children tend to attend schools with lower mean scores (as Table 2 showed), but also that they attend schools in which there is little difference between the Head Start children and the other children implying that all of the children in these schools perform poorly. The same is not true for white Head Start children. The differences between the white Head Start children and other white children are observed largely within schools (rather than between schools) implying that despite their underprivileged family backgrounds, the white Head Start children attend the same schools as the average white child.

Thus far we have shown that black Head Start children attend worse schools than other black children both in terms of lower mean scores, and also in terms of having few positive role models (all of the children are doing relatively badly in these schools). What we would like to know, is whether a given child in one of these schools would do better if he or she were moved to a better school? While it is impossible to answer this question using the NELS data, we can ask a related question: Do former Head Start children who happen to be in better schools do better than similar children in poor schools? Given that Head Start children in better schools

may be positively selected, they ought to be doing at least as well as the Head Start children in poorer schools. If we found that they were not, then the idea that outcomes could be improved by moving children to better schools would be cast into doubt.

We address this issue in Table 4 by interacting the dummy variable for Head Start attendance with an indicator of quality, while continuing to control for other unobserved characteristics of the school by including fixed effects. We use the mean scores of all the other students in the school as the measure of quality to be interacted with Head Start.[14] We use the mean reading score in the model for reading, the mean math score in the model for math, etc. Once again, all scores are expressed in Z-scores. The models are identical to those in Table 3 except that mean school scores are interacted with the Head Start dummy, as well as with the dummies for preschool and other day care.[15] These models compare the Head Start children to other children of the same race within the same school, and ask how the gap in test scores varies with school quality.

The interactions of test scores with Head Start and preschool are highly statistically significant, but somewhat difficult to interpret. Thus, in Panel B of Table 4, we show the implied within school differences between Head Start children and no preschool children in schools of different quality levels. Recall that a poor school is one with scores a standard deviation below the mean (i.e. with a z-score of negative 1), while a good school is one with average scores a standard deviation above the mean (i.e. with a z-score of 1). Hence, the

---

[14] For the sake of comparability, we have also estimated models similar to those shown in Panel B of Table 3 except that they included the mean test scores of other children in the school rather than school fixed effects as the measure of quality. This procedure produced estimates for blacks that fell between those shown in Panels 1 and 2, suggesting that the mean test scores did not capture all the relevant attributes of schools. For whites, the estimates were close to those shown in Panels 1 and 2.

[15] There are slightly fewer observations in these tables because schools with only one black or white child could not be used.

coefficients imply that a black Head Start child who attended a poor school has a reading score 1 point less (since -4.53 + 3.53 equals 1) than that school's average score, while a black Head Start child attending a good school typically has a score 8 points less than the school's average score (since -4.53 - 3.53 equals -8.06). By way of comparison, a white Head Start child who attended a poor school has a reading score .7 points less than the average for his/her school, while one who attends a good school scores 7.7 points lower than his/her peers.

This example shows that after controlling for school quality, the within-school gaps between Head Start and other children are similar whether children are black or white. In bad schools, there is little difference between Head Start children and others, while in good schools, the gap is larger. Thus, the fact that on average we do not observe any within-school difference between black Head Start children and other Head Start children (see the discussion of Table 3 above) indicates once again that the black Head Start children are in poor schools. Among whites, the size of the gap between Head Start and non-Head Start children suggests that on average, Head Start children are placed in schools of average quality.

However, despite the fact that the within school gap between the Head Start children and the other children grows with school quality, Head Start children in better schools do better. Recall that a good school is one that has scores a standard deviation, or 10 to 12 points, above the mean for all schools, while a poor school is one with scores a standard deviation lower than this mean. Panel C of Table 4 takes these between school differences into account by adding 11 points to the Panel B figures for Head Start children in the good schools and subtracting 11 points from the figures for Head Start children in the bad schools. For example, although the estimates imply that on average black Head Start children in good schools have reading scores 8 points lower than those of other children in the same school, the other children in the good

school have scores 11 points higher than those of children in average schools so that the black Head Start child in the good school has a reading score 3 points higher than that of the average child in the average school.

4. Conclusions

This paper uses a variety of methods to show that black children who attended Head Start go on to attend schools of worse "quality" than other black children, in the sense that they attend schools in which mean scores are low, and in which all children have worse test scores. The same is not true among whites. These results suggest that the effects of Head Start may fade out more rapidly among blacks than whites because black Head Start children are more likely to subsequently attend schools of poor quality. Unfortunately, given the constraints imposed by the available data, we cannot directly document the effects of school quality on test scores. We note however, that the idea that poor schools can undermine early gains from Head Start is consistent with evidence which shows that continuing enrichment programs into the early grades can help students to retain the initial gains from Head Start (c.f. Reynolds, 1997).

References

Administration for Children and Families. "Project Head Start Statistical Fact Sheet" Washington D.C.: Department of Health and Human Services, January 1992.

Barnett, Steven. "Benefits of Compensatory Preschool Education", Journal of Human Resources, Spring 1992, 27 #2, 279-312.

Boozer, Michael, Alan Krueger, and Sherry Wolkin. "Race and School Quality since *Brown v. Board of Education*", Brookings Papers on Economic Activity: Microeconomics 1992, Washington D.C.: Brookings Institution, 269-338.

Brown, J. Larry and Ernesto Pollitt, "Malnutrition, Poverty, and Intellectual Development", Scientific American, February 1996, 38-43.

Card, David and Alan Krueger. "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States", Journal of Political Economy, #100, Feb. 1992, 1-40.

Card, David and Alan Krueger. "The Economic Returns to School Quality: A Partial Survey", Working Paper #334, Industrial Relations Section, Princeton University, 1994.

Casper, Lynne, Mary Hawkins and Martin O'Connell. "Who's Minding the Kids?", Washington D.C.: U.S. Dept. of Commerce, P70-36E, June 1994.

Currie, Janet and Duncan Thomas. "Does Head Start Make a Difference", American Economic Review, June, 1995.

Currie, Janet and Duncan Thomas. "Nature vs. Nurture? The Bell Curve and Children's Cognitive Achievement", NBER Working Paper #5240, August 1995b.

Currie and Thomas, 1996. "Does Head Start Help Hispanic Children", mimeo, National Bureau of Economic Research, Cambridge MA, Sept. 1996.

Ehrenberg, Ronald and Dominic Brewer. "Do School and Teacher Characteristics Matter? Evidence from High School and Beyond?" Economics of Education Review, #13, March 1994, 1-17.

Grossman, Jean Baldwin. "The Evaluation of Youth Employment and Training Programs", Princeton NJ: Public Private Ventures, November 1992.

Hanushek, Eric. "The Economics of Schooling." Journal of Economic Literature, September 1986 24, pp. 1141-77.

Hayes, Cheryl; John Palmer and Martha Zaslow. Who Cares for America's Children: Child Care

Policy for the 1990s, Washington D.C.: National Academy Press, 1990.

Ingels, Steven, Sameer Abraham, Kenneth Rasinski *et al.* National Educational Longitudinal Study User's Manual, Washington D.C.: U.S. Department of Education National Center for Education, December 1989.

Lalonde, Robert. "The Promise of Public Sector Sponsored Training Programs", Journal of Economic Perspectives, 9 #2, Spring 1995, 149-168.

Lee, Valerie and Susanna Loeb. "Where do Head Start Attendees End Up? One Reason Why Preschool Effects Fade Out", Educational Evaluation and Policy Analysis, Spring 1995, v17 #1, 62-82.

Loeb, Susanna and John Bound. "The Effect of Measured School Inputs on Academic Achievement: Evidence from the 1920s, 1930s, and 1940s Birth Cohorts", NBER Working Paper #5331, November 1995.

McKey, Ruth, Larry Condell, Harriet Ganson, *et al.* The Impact of Head Start on Children, Families and Communities: Final Report of the Head Start Evaluation, Synthesis, and Utilization Project, Washington, D.C.: CSR Inc., 1985.

Murnane, Richard, John Willett, and Frank Levy. "The Growing Importance of Cognitive Skills in Wage Determination", Review of Economics and Statistics, May 1995.

Reynolds, Arthur. "Early Childhood Intervention and Adolescent Social Competence: Findings from the Chicago Child-Parent Centers", mimeo, University of Wisconsin-Madison, 1997.

Smith, Shelley, Mary Fairchild and Scott Groginsky. "Early Childhood Care and Education: An Investment that Works", Washington D.C.: National Conference of State Legislatures, February 1995.

U.S. Department of Health and Human Services, Head Start Program Performance Standards, Washington D.C.: Government Printing Office, 45-CFR 1304, June 1992.

U.S. Department of Health and Human Services, Creating a 21st Century Head Start: Final Report of the Advisory Committee on Head Start Quality and Expansion, Washington D.C.: U.S. Government Printing Office, 1993.

U.S. Department of Labor. What's Working (and What's Not): A Summary of Research on the Impact of Employment and Training Programs, Washington D.C.: Office of the Chief Economist, 1995.

U.S. General Accounting Office, Early Childhood Centers: Services to Prepare Children for School Often Limited, GAO/HEHS-95-21, March 1995.

U.S. General Accounting Office, Child Care: Promoting Quality in Family Child Care, GAO/HEHS-95-36, Dec. 7, 1994.

U.S. House of Representatives, Committee on Ways and Means, 1993 Green Book: Background Material and Data on Programs Within the Jurisdiction of the Committee on Ways and Means, WMCP-103-27, Washington D.C.: Government Printing Office, 1993.

Zigler, E.F. and S. Meunchow. Head Start: The Inside Story of American's Most Successful Educational Experiment, New York: Basic Books, 1992.

Table 1: Means of Key Variables by Race, Ethnicity and Type of Preschool

	Black			White		
	No Pre.	Hdst Start	Other Pre.	No Pre.	Hdst Start	Other Pre.
A: Child and Family Characteristics						
# Obs.	1012	852	621	6774	671	6791
Attended Day Care	.16	.36	.48	.10	.18	.26
Family Income (1000s)	22.12	18.17	35.30	34.55	25.10	54.85
	(22.88)	(18.08)	(28.84)	(25.50)	(23.82)	(42.73)
Mother HS, GED, or Vocational Degree	.44	.41	.35	.51	.45	.36
Mother Any College	.24	.30	.54	.30	.24	.58
B: Child Outcomes						
Reading Score	45.90	45.57	55.66	61.97	56.50	68.99
	(19.07)	(19.46)	(22.75)	(21.76)	(23.01)	(21.22)
Math Score	38.24	38.90	47.57	55.01	49.32	63.61
	(16.55)	(16.26)	(19.89)	(20.59)	(20.38)	(20.53)
Science Score	40.93	40.84	48.19	55.00	50.53	60.40
	(14.15)	(14.49)	(16.32)	(17.21)	(18.22)	(16.95)
History Score	52.31	52.43	59.98	64.16	59.30	70.25
	(15.84)	(15.64)	(17.32)	(17.44)	(18.11)	(16.89)

Note: Standard deviations in parentheses. Column labeled Head Start includes all children who ever attended Head Start, while column labeled "other preschool" includes only children who attended other preschools.

Table 2: Correlates of Past Participation in Head Start

	Black	White
Average School Reading Scores	-.029	-.004
	(3.05)	(1.74)
Child Male	-.006	-.004
	(.33)	(1.25)
Family Income ($1000s)	-1.87	-.026
	(3.91)	(5.37)
Family Income Missing	-.049	-.017
	(1.11)	(1.98)
Foreign Language Spoken at Home	-.090	.007
	(2.30)	(.86)
Child First Born	.048	.006
	(2.23)	(1.57)
Number Siblings	.010	.006
	(1.75)	(4.51)
Mother GED	.042	-.005
	(.67)	(.40)
Mother High School	-.094	-.062
	(2.90)	(8.37)
Mother Vocational Training	-.067	-.056
	(2.00)	(7.00)
Mother 2 Years College	-.039	-.054
	(1.14)	(6.65)
Mother 3 Years College	.011	-.067
	(.28)	(7.14)
Mother 4 Years College	-.210	-.077
	(4.21)	(8.70)
Mother Graduate School	-.180	-.070
	(3.11)	(6.83)
Mother Education Missing	-.092	-.028
	(2.35)	(2.52)
Father GED	.012	.008
	(.13)	(.59)
Father High School	-.028	-.026
	(.68)	(3.32)
Father Vocational Training	-.053	-.019
	(1.15)	(2.18)
Father 2 Years College	-.097	-.031
	(2.02)	(3.62)
Father 3 Years College	-.031	-.036
	(.59)	(3.79)
Father 4 Years College	-.110	-.031
	(1.78)	(3.49)
Father Graduate School	-.110	-.031
	(1.68)	(3.25)
Father Education Missing	-.021	.003

	(.50)	(.30)
No Father	-.007	-.008
	(.21)	(.93)
Intercept	.430	.124
	(9.70)	(13.72)
R-squared	.073	.033
# Observations	2485	14236
Mean of Dependent Variable	.34	.05

Notes: T-statistics in parentheses. Models also included dummy variables equal to one if first born or the number of siblings was missing.

Table 3: Early Childhood Education and 8th Grade Outcomes

	Reading		Math		Science		History	
	Black	**White**	**Black**	**White**	**Black**	**White**	**Black**	**White**
Panel A: OLS								
Head Start	-2.73	-3.46	-1.99	-3.78	-2.32	-2.95	-1.56	-3.43
	(2.66)	(4.02)	(2.21)	(4.66)	(3.06)	(4.26)	(1.90)	(4.99)
Other Preschool	3.72	1.63	4.22	2.68	2.52	1.58	3.12	1.62
	(3.30)	(3.66)	(4.28)	(6.38)	(3.03)	(4.40)	(3.47)	(4.57)
Daycare	-.130	-1.25	-1.78	-1.48	-.977	-1.20	.237	-1.19
	(.119)	(2.50)	(1.86)	(3.12)	(1.21)	(2.97)	(.271)	(2.98)
R-squared	.153	.180	.164	.220	.138	.163	.132	.177
Panel B: Same as 1 but with School Fixed Effects								
Head Start	-.460	-3.64	-.701	-3.91	-.961	-3.14	-.332	-3.28
	(.417)	(4.11)	(.752)	(4.76)	(1.20)	(4.46)	(.380)	(4.76)
Other Preschool	2.60	.965	3.85	1.67	2.26	1.41	2.73	1.15
	(2.14)	(2.09)	(3.75)	(3.91)	(2.56)	(3.85)	(2.84)	(3.21)
Daycare	-.395	-1.17	-1.86	-1.20	-.700	-1.08	-.546	-.954
	(.337)	(2.27)	(1.88)	(2.50)	(.823)	(2.63)	(.588)	(2.37)
R-squared (within)	.072	.102	.068	.104	.057	.090	.061	.099
Panel C: Between School Effects								
Head Start	-9.22	2.26	-5.31	-9.21	-6.41	-3.74	-6.82	-3.65
	(3.43)	(.801)	(2.17)	(3.18)	(3.19)	(1.48)	(3.21)	(1.39)
Other Preschool	4.53	1.92	3.04	1.69	.340	-1.43	1.40	1.36
	(1.59)	(1.05)	(1.18)	(.904)	(.160)	(.880)	(.624)	(.801)
Daycare	1.30	-4.56	-1.53	-1.81	1.66	-2.91	4.12	-1.73
	(.480)	(2.27)	(.623)	(.881)	(.823)	(1.62)	(1.93)	(.931)
R-squared (between)	.333	.550	.375	.598	.335	.480	.302	.494

Notes: There are 2485 observations for blacks in 488 schools and 14236 observations for whites in 934 schools. T-statistics in parentheses. All regression models also include a dummy variable for the child's gender, family income; a dummy variable for whether a foreign language was spoken in the home; the number of siblings; dummy variables for whether or not the child is the firstborn, or whether the birth order is missing. Dummy variables for missing daycare, Head Start, preschool, or kindergarten and for missing family income were also included. Parental education is controlled for by including 16 dummy variables (for maternal and paternal completion of a GED, highschool, a vocational certificate, 2 year of college, 3 years of college, 4 years of college, and graduate work). Dummies were also included for missing education, and for whether or not the household was single-headed. Average reading scores included in equations for reading, average math scores included in equations for math, etc.

Table 4: Early Education and Test Scores Within Schools of Different Quality

	Reading		Math		Science		History	
	Black	**White**	**Black**	**White**	**Black**	**White**	**Black**	**White**
Panel A: Coefficient Estimates								
Head Start	-4.53	-4.21	-3.49	-4.62	-3.24	-3.49	-2.85	-3.86
	(3.02)	(4.77)	(2.58)	(5.61)	(2.82)	(5.00)	(2.44)	(5.58)
Head Start x Mean Score	-3.53	-3.51	-2.41	-4.37	-1.82	-3.22	-2.46	-3.26
	(3.65)	(3.44)	(2.60)	(4.73)	(2.52)	(4.05)	(2.96)	(4.60)
Other Preschool	-.30	1.73	-.20	2.22	-1.23	2.09	-.52	1.61
	(.20)	(3.77)	(.15)	(5.20)	(1.05)	(5.71)	(.44)	(4.51)
Preschool x Mean Score	-2.75	-7.54	-3.82	-6.00	-3.13	-5.69	-3.68	-5.20
	(2.77)	(16.51)	(4.23)	(13.87)	(4.25)	(15.66)	(4.39)	(15.29)
Daycare	-1.34	-1.19	-.88	-1.33	-1.24	-1.46	-1.06	-1.11
	(.93)	(2.26)	(.68)	(2.71)	(1.07)	(2.18)	(.91)	(2.72)
Daycare x Mean Score	-1.06	-1.52	.99	-.79	-.44	-.26	-.54	-.23
	(1.09)	(3.03)	(1.08)	(1.74)	(.58)	(.66)	(.64)	(.59)
R-squared	.40	.29	.45	.34	.41	.29	.40	.33
Panel B: Implied Gaps Between Head Start and No Preschool Children Within Schools, by School Type								
Poor (Mean Score = -1)	-1.00	-.70	-1.08	-.25	-1.42	-.27	-.39	-.60
Avg. (Mean Score = 0)	-4.53	-4.21	-3.49	-4.62	-3.24	-3.49	-2.85	-3.86
Good (Mean Score = 1)	-8.06	-7.72	-5.90	-8.99	-5.06	-6.71	-5.31	-7.12
Panel C: Implied Gaps Between Head Start Children in Various Types of Schools and the Average Child								
Poor (Mean Score = -1)	-12.00	-11.70	-12.08	-11.25	-12.42	-11.27	-11.39	-11.60
Avg. (Mean Score = 0)	-4.53	-4.21	-3.49	-4.62	-3.24	-3.49	-2.85	-3.86
Good (Mean Score = 1)	2.94	3.28	5.10	2.01	5.94	4.29	5.69	3.88

Notes: T-statistics in parentheses. Models similar to those in Panel 2 of Table 3 except for the inclusion of the interactions. We use mean reading scores in the models for reading, mean math scores in the models for math, etc.

Appendix Table 1: Examples of Differential Fadeout from Previous Research

Sample: / Dependent Variable:	Black PPVT Score	White PPVT Score	Black PIAT-Reading Score	White Piat-Reading Score
Effect of Head Start @ 5 Years Old	6.85	6.88	8.36	6.63
	(3.55)	(2.87)	(2.30)	(2.08)
Loss with Each Additional Year of Age	-1.28	-.19	-1.25	-.59
	(4.13)	(.46)	(2.38)	(1.10)

Notes: This table reports coefficient estimates from models in which the test scores were regressed on a dummy variable for participation in Head Start, as well as an interaction of this variable with the child's age less 5 years. It is the coefficients on these two variables that are shown in the table. Each column represents a separate regression--all models were estimated separately for blacks and whites. T-statistics appear in parentheses. The PPVT is the Peabody Picture Vocabulary Test, while PIAT-Reading refers to the PIAT Reading Recognition test. Scores are expressed in percentile terms. These estimates are based on a sample of siblings drawn from the National Longitudinal Survey of Youths Child-Mother file, waves 1986, 1988, and 1990. In addition to the variables shown, the models included a fixed effect for each mother, as well as controls for whether the child attended another preschool, interactions of other preschools and years of age since age 5, child age, child gender, whether the child was first born, and the household income at the time the child was aged 3. Adding controls for maternal marital and employment status at age 3 does not affect these estimates. The fact that the interaction term is statistically significant in the regressions for blacks but not in the regressions for whites shows that fadeout is concentrated among blacks. See Currie and Thomas (1995) for further details.

Data Appendix: Variable Definitions
(Not intended for publication)

This appendix gives the source of the question (i.e. student, parent, teacher, or school questionnaire); the NELS variable name; the question that was asked; and additional notes regarding the way that the variable was coded, if appropriate.

Outcomes

Test Scores (in percent). Student Base Year Questionnaire, bytxrstd, bytxmstd, bytxsstd, bytxhstd.

Early Education

Parent's Questionnaire, byp37a-d. "Did 8th grader attend day care program"?, "Did 8th grader attend nursery/preschool", "Did 8th grader attend Head Start?", "Did 8th grader attend Kindergarten?" Respondents answer yes, no or don't know. Dummy variables for missing values of these variables were defined and included in all regressions.

Child and Family Characteristics

Total Family Income from All Sources, 1987. Parent's Questionnaire, byp81. (1000s)

Foreign Language. Parent's Questionnaire, byp22c13. Coded 1 if a language other than english was spoken in the respondent's home.

 # Siblings. Parent's Questionnaire, byp3a. Total number of child's siblings including step-siblings and adoptive siblings.

First Born. Parent's Questionnaire, byp4. Coded 1 if none of the child's siblings counted in byp3a are older than the sample 8th grader.

Mother and Father's Education. Parent's Questionnaire, byp30, byp31. These variables record the highest level of education completed by the respondent, and the respondent's spouse. Note that the respondent may be the mother, the father, or some other relative. If some other relative answered this question, then the parent's education is missing. For both the mother and the father, we define separate dummy variables for the following educational categories: GED, High school, Vocational Certificate, 2 years of college, 3 years of college, 4 years of college, graduate work, and missing education.

Single Parent Household. Parent's Questionnaire, byp1a2. Question asks about partner's relationship to 8th grader. If the respondent replied that there was no partner than the dummy variable for a single parent household was coded as a one.