Impacts of Early Childhood Programs

BY JULIA B. ISAACS

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BROOKINGS

Forward

Policy-makers nationwide are building on the consensus among researchers and business leaders alike that children who are nurtured from their earliest stages of development have the best chances of achieving life-long success. Whether the objective is reducing crime, increasing high school graduation rates, or providing children with an equal shot at the American Dream, evidence shows that effective early investments can make a real difference by starting children off on the right foot.

Only one penny of every new, non-defense dollar spent by the federal government has gone to children and children's programs over the past five years. Federal investments in early care and education are even less significant, and, in fact, funding for many such programs has decreased in the last five years. For example, funding for Head Start and Early Head Start has decreased by 11 percent in real terms between fiscal years 2004 and 2008.

With the approach of a new administration and Congress, the opportunity to reconsider America's investment priorities is now. But what early investments are effective? How effective are they? In what ways do they improve the well-being and life chances of children?

This series of briefs from First Focus and the Brookings Institution goes beyond rhetoric to provide answers that are concise enough for a busy congressional staffer to digest and detailed enough to inform the decisions made by elected officials.

Not every early childhood program is effective. Successful replication of those that do demonstrate results, such as those described in this series, is a worthwhile endeavor – one worthy of strong consideration by policy-makers at all levels. As decisions are made whether to support early childhood investments, which programs to support, and at what level, we hope this series serves as a helpful resource.

Sincerely,

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Overview

From neuroscientists to economists, a range of researchers have focused attention on the critical importance of children's early years. At the same time, business, education, and political leaders have underscored the goal of ensuring that young children enter school "ready to learn," so that they can succeed in school and as the next generation of workers and citizens. Ideals of equal opportunity provide further impetus for addressing gaps in skills at early ages, so that children from disadvantaged families have a fighting chance to achieve the American Dream.

As a result, there have been increasing calls on federal and state policy-makers to expand public investments in early childhood education. The goal of this set of research briefs, *Impacts of Early Childhood Programs,* is to provide policy-makers with a user-friendly summary of up-to-date, high-quality evidence on several early childhood interventions and their impact on children and families.

New research on early childhood programs continues to emerge. Recent studies demonstrate that state pre-kindergarten (pre-K) programs have had positive effects on children's readiness to learn, with large impacts in some states. Findings from the National Head Start Impact Study, released in 2005, provide more rigorous evidence than previously existed of Head Start's positive impacts on children. An earlier national evaluation of Early Head Start also found a range of small positive impacts on very young children's cognitive skills, behavior, and health.

Long-lasting impacts of early childhood model programs from the 1960s, 1970s, and 1980s are still being reported in follow-up studies. Children participating in Chicago Child-Parent Centers were followed to age 24 in a study released last year, and a 2005 study tracked former participants of Perry Preschools to age 40. Recently issued follow-up studies of nurse home visiting programs also document ongoing positive impacts several years after at-risk mothers and their infants graduate from the programs.

Child and family impacts for these five programs – State Pre-K, Head Start, Early Head Start, Model Early Childhood Programs, and Nurse Home Visiting – are summarized in Table 1 below. As shown in the table, all five early childhood education programs have had positive impacts on children's cognitive skills and/or school outcomes, with the largest effects reported from some state pre-K programs and the model center-based programs.

Most early childhood interventions also have had positive impacts on children's emotional and behavioral outcomes, including long-term reductions in criminal behavior. There also is some evidence of improvements in children's health and safety, and some programs have had positive effects on the children's parents.[1]

Examples of specific improvements (e.g., reduction in special education, higher rates of high school graduation) are provided in the accompanying set of five research briefs, as well as information on the quality of research on each program and pertinent federal legislation. Taken individually or as a set, the research briefs provide evidence-based assessments of the effectiveness of five major early childhood interventions.

TABLE 1: IMPACTS OF EARLY CHILDHOOD PROGRAMS

Program	Overall Outcomes	Cognitive/ School	Emotional/ Behavioral	Health/ Safety	Outcomes for Parents	Long-Term Outcomes
State Pre- K *See Pages 4-8*	**Clear positive impacts on cognitive skills** (size of impacts ranging from large to small across studies), with some evidence of small negative impact on behavior, according to studies that use rigous methods, though not random-assignment.	+ +	(-)	No data.	No data.	Largely unknown; one study suggests impacts fade substantially after 1-2 years of elementary school except among low-income children.
Head Start *See Pages 9-13*	**Small positive impacts across many domains,** according to large, nationally representative, random-assignment evaluation. Earlier literature also finds positive impacts.	+	+	+	+	Much of the earlier literature suggests that impacts fade out after a few years of elementary school, but some analyses find enduring positive effects.
Early Head Start *See Pages 14-17*	**Small positive impacts across many domains,** according to large random-assignment evaluation.	+	+	+	+	Many impacts observed at age three are still present at age five; longer-term effects unknown. One study projects long-term benefits, but not of sufficient size for a positive benefit-cost ratio.
Model Early Childhood Programs *See Pages 18-22*	**Moderate to large positive impacts, particularly on cognitive and behavioral outcomes, many of which persist to adulthood,** according to rigorous evaluations of Abecedarian, Perry Preschool, and Chicago Child-Parent Centers.	+ + +	+ +	+	+	Lengthy follow-up data provides strong evidence of some long-lasting effects (e.g., on education, earnings, crime in adolescence and adulthood), although most differences in IQ and achievement tests diminish after a few years of elementary school. Estimated benefit-cost ratios range from 3:1 to 17:1.
Nurse Home Visiting *See Pages 23-28*	**Small positive impacts, many of which persist through middle to late childhood,** according to three random-assignment evaluations.	+	+	+	+	Follow-up data provides strong evidence of lasting impacts (e.g., on school achievement, crime, and subsequent births). Estimated benefit-cost ratios of about 3:1.

KEY: (-) small negative impacts; + small positive impacts; ++ medium-sized positive impacts; +++ large positive impacts; See Research Briefs for more details.

[1] Comparisons of program impacts across the different programs shown in Table 1 can be problematic because of many differences in evaluation methods. For example, the programs serve different populations of young children, the evaluations use different measures of cognitive skills, and there are differences in the extent to which children not assigned to the specific child intervention gain access to other early childhood services in the local community. Despite these caveats, available evidence suggests that state pre-kindergarten programs and model programs have larger impacts on cognitive skills than Head Start, Early Head Start and Nurse Home Visiting programs.

Research Brief #1: State Pre-Kindergarten

BY: JULIA ISAACS

WHAT ARE STATE PRE-KINDERGARTEN (PRE-K) PROGRAMS?

State pre-kindergarten programs (also called state pre-K) provide state-funded, classroom-based educational services to young children, typically four-year-old children, although some states also enroll three-year-old children. About two-thirds of children are served in public schools, but most states also fund pre-kindergarten programs in community-based settings such as private preschools, local child care agencies, and Head Start centers. Some programs are for low-income children or others at risk of entering school unprepared while some are universally open to all children. Programs are typically half-day programs provided during the academic year, with some extending to full-day services and/or year-round education. Teacher requirements vary across the states.[1]

States are in different phases of implementation, with only a few states providing services statewide. In 2006-2007, 38 states had some form of state pre-kindergarten or preschool program, serving just over one million children in 2006-2007. State spending averaged about $3,600 per child in 2006-2007; total spending, including spending from federal and local sources, was estimated to be at least $4,100 per child.[2]

This research brief is one in a series of research briefs on the impacts of early childhood programs. See the websites for First Focus (www.firstfocus.net) and the Brookings Center on Children and Families (www.bookings.edu/ccf) for the full series including an overview and briefs on State Pre-K, Head Start, Early Head Start, Model Early Childhood Programs, and Nurse Home Visiting.

WHAT ARE THE IMPACTS OF STATE PRE-K ON CHILDREN AND FAMILIES?

A growing body of research provides good evidence that state pre-K programs have positive impacts on children's cognitive skills, including both pre-reading and pre-math skills. While some studies find quite large program impacts, others find smaller impacts. This variation in findings may reflect differences in evaluation design as well as variation in the types and quality of state pre-kindergarten programs. Some studies have found small negative impacts on children's classroom behavior.

Cognitive and School-Related Outcomes: Three recent well-designed studies conclude that children attending state pre-K programs gain in cognitive skills:

- Universal pre-kindergarten in Oklahoma has large impacts on children's ability to identify letters and pronounce words (a 53 percent gain in letter-word identification test scores), as well as medium-sized impacts on both math and spelling skills (an 18 percent gain in applied problems test scores and a 26 percent gain in spelling scores), according to a well-regarded study of pre-K in Tulsa.[3]

- Similar patterns were found in a five-state study of state pre-K programs in Michigan, New Jersey, Oklahoma, South Carolina, and West Virginia. Fairly large effects were reported for children's awareness of the letters of the alphabet (print awareness), accompanied by smaller but still substantial effects on math skills and vocabulary development.[4]

- A study analyzing nationally representative data from the Early Childhood Longitudinal Survey of children entering kindergarten (ECLS-K) found somewhat smaller gains from pre-kindergarten attendance than those found in Oklahoma and the five-state study. The gains were statistically significant, however, and enough to move the

average child from the 50th to the 55th percentile in pre-reading skills and from the 50th to the 54th percentile in pre-math skills.[5] As discussed further below, the gains in the ECLS-K study were higher for disadvantaged children.

A review of 13 evaluations from the 1980s and 1990s of state-funded preschool also reported gains in cognitive skills (though the review noted that the earlier evaluations suffered from many methodological weaknesses). In addition, the review found consistent evidence of reduced grade retention among children attending state pre-kindergarten programs. For example, 26 percent of children attending preschool in Maryland were held back one or more years by third grade, compared to 45 percent of children in the comparison group.[6]

Behavioral and Socio-emotional Outcomes: Kindergarten teachers reported higher rates of classroom behavior problems among former participants in state pre-K when compared to children who were solely cared for by parents, even after controlling for many differences between the two groups of families in the ECLS-K sample. While the change was small and observed among a population with fairly low levels of aggressive behavior overall, the impacts persisted through spring of first grade. Interestingly, behavior problems did not increase noticeably for children whose pre-K and kindergarten classrooms were located in the same public school.[7]

Other studies of preschool programs and child care report both positive and negative effects on children's emotional development and social skills, with a number of studies finding small increases in aggression, in line with those reported above, and other studies emphasizing improvements in self-esteem and motivation, and reductions in later criminal behavior and teen births.[8]

Health and Safety Outcomes: Evaluations of state pre-kindergarten provide no evidence on health and safety outcomes, which are not a focus of state pre-K programs.[9]

Outcomes for Parents: State pre-kindergarten programs generally do not include services to parents among their goals, and there is no evidence on outcomes for parents.[10]

Medium- and Long-term Outcomes: As much as 70 to 80 percent of the observed gains in cognitive skills associated with pre-kindergarten attendance fade out over time, according to analysis of ECLS-K data on children in the spring of first grade, as other children "catch up" in educational skills. An important exception is that the increased skills associated with public preschool attendance persist for children of low-income or low-skilled parents in this nationally representative sample.

There are no data on the medium- or long-term outcomes in Oklahoma or other states in the five-state study of state pre-K. However, earlier studies of state preschool programs have found that many of the cognitive gains fade out by the end of first grade, a problem observed in studies of other early childhood interventions.

While Perry Preschool and other model preschools showed some very positive long-term outcomes despite fadeout in cognitive gains (e.g., higher educational achievement and higher lifetime earnings as an adult despite fadeout in IQ gains), there are no long-term studies of public pre-K outcomes.

Benefit-Cost Estimates: The RAND Corporation has estimated a positive return of $2.62 in societal benefits in return for every $1 spent on preschool services if a universal pre-K program were adopted in California. While this estimate is extrapolated from findings from the Chicago Child-Parent Centers, not a traditional state pre-K program, it provides a reasonable estimate of the economic benefits of state investments in pre-K programs.[11]

HOW DO THE IMPACTS OF STATE PRE-K VARY?

Family Income. Research suggests that children of all income levels gain from pre-K but the impacts are largest among disadvantaged children. For example, the gain in math and reading skills was larger among disadvantaged children than in the overall national sample in ECLS-K, and impacts persisted through the spring of first grade, in contrast to the fadeout observed for the overall population.[12]

Race and Ethnicity. The study of universal pre-K in Oklahoma found that effects were particularly large for Hispanic children across all three cognitive domains tested – pre-reading skills, pre-math skills, and pre-writing skills.[13]

HOW STRONG IS THE EVIDENCE BASE FOR STATE PRE-K?

The three studies central to this review are technically superior to the earlier state pre-K evaluations, while still falling short of the gold standard of random-assignment evaluation.[14] All three evaluations use rigorous study designs to isolate the effects of pre-K from the many other differences between children enrolled in pre-K and children not enrolled in such programs, including differences in the family's motivation levels, as well as more readily observed differences in family income, parental education, maternal employment status, etc. The studies of pre-K in Oklahoma and across the five-state evaluation used a technique called "regression discontinuity design" to control for self-selection,[15] while the national study of ECLS-K data exploits the rich information on child and family characteristics to try to control for demographic differences between children who participate in preschool programs and those who do not participate.

It is possible that outcomes in the typical state may be lower than outcomes in Oklahoma and other states in the five-state study since these states were not randomly selected and have programs that are more mature and higher than average in quality.[16] In fact, impacts are considerably smaller in the national ECLS-K data, although the differences could be due to study design as much as inclusion of states with weaker programs. The national study relied on parental reports of pre-kindergarten attendance (which is easily confused with Head Start, private preschool, and other center-based programs) and its results may suffer from selection bias despite the researchers' efforts.

IS STATE PRE-K GENERALLY VIEWED AS EFFECTIVE?

Most observers agree that pre-K programs are effective at their stated goal of improving children's readiness to learn. Some studies suggest that public pre-K programs have quite large impacts on cognitive skills, as large as those found in more expensive, model childhood interventions, such as the Perry Preschool program. Other studies suggest the impacts are more modest – though still significant, both statistically and when compared to other educational policy interventions. A number of studies find evidence that the positive impacts may diminish over time, though not for all subgroups. Some research suggests that positive impacts on cognitive development may be larger or more long-lasting for low-income or at-risk children. Finally, there is some evidence that increases in cognitive skills are accompanied by small increases in classroom behavior problems, prompting some observers to call for increased attention to the socio-emotional dimensions of preschool learning.

WHAT FEDERAL LEGISLATIVE ACTION LIES AHEAD FOR STATE PRE-K?

Three major legislative proposals providing grants to states to support, establish, or expand public pre-kindergarten program were introduced in 2007:

- S. 1374/H.R. 2859, the Prepare All Kids Act of 2007, introduced by Senator Casey (D-PA) and Representative Maloney (D-NY).
- S. 1823, The Ready to Learn Act, introduced by Senators Clinton (D-NY) and Bond (R-MO); and
- H.R. 3829, the Providing Resources Early for Kids or Pre-K Act, introduced by Representative Hirono (D-HI).

The House bills have been referred to the House Committee on Education and Labor, which approved H.R. 3829, the Providing Resources Early for Kids Act in late June 2008. The Senate bills have been referred to the Senate Committee on Health, Education, Labor, and Pensions. Since the fall of 2007, there has been discussion of incorporating pre-K legislation into the reauthorization of the No Child Left Behind Act and the Elementary and Secondary Education Act. Alternatively, pre-K legislation could move forward independently of action on elementary and secondary education.

NOTES:

[1] Pre-K Now, *Pre-K Across the Country*, http://preknow.org/policy/factsheets/snapshot.cfm.

[2] W. Steve Barnett, Jason Hustedt and others, *The State of Preschool 2007* (New Brunswick, N.J.: National Institute for Early Education Research (NIEER), 2007), http://nieer.org/yearbook/.

[3] In Oklahoma, effect sizes were large for letter-word identification (0.79) and medium for spelling (0.64) and applied problems or pre-math (0.38). (Note that this review follows common convention in considering an effect size of 0.80 as "large," 0.50 as "medium" and 0.20 as "small.") William T. Gormley Jr., Ted Gayer, Deborah Phillips, and Brittany Dawson, "The Effects of Universal Pre-K on Cognitive Development," *Developmental Psychology* 41 (2005): 872-884.

[4] The state pre-kindergarten programs increased print awareness by an effect size of 0.70 (averaged across the five states). Effect sizes for math and vocabulary were 0.29 and 0.14 respectively. Vivian Wong, Thomas Cook, W. Steven Barnett, and Kwanghee Jung, "An Effectiveness-Based Evaluation of Five State Pre-Kindergarten Programs," Journal of Policy Analysis and Management 27 (2008): 122-154. NIEER researchers have also used similar research techniques (the regression discontinuity research design described in footnote 15) and found positive impacts in two additional states (Arkansas and New Mexico). A comprehensive but less methodologically rigorous evaluation in Georgia also shows increases in cognitive skills for children enrolled in public pre-K programs. See Gary T. Henry and Dana Rickman with four other authors, *The Georgia Early Childhood Study, 2001-2004 Final Report* (Atlanta, GA: Georgia State University, 2005), http://aysps.gsu.edu/publications/2005/EarlyChildhoodReport.pdf.

[5] Effect sizes were small: 0.12 in reading and 0.10 in math. The comparison is between children in prekindergarten (not including Head Start, private preschool or center-based child care) to children who are only in parental care. See Katherine Magnuson, Christopher Ruhm, and Jane Waldfogel, "Does Prekindergarten Improve School Preparation and Performance?" *Economics of Education Review* 26 (2007): 33-51.

[6] The recent study of ECLK-K by Magnuson et al., 2007 also found that children attending pre-K were less likely to be held back in kindergarten, although being held back was an infrequent event (affecting only 3% of children) and the observed change was not statistically significant, except among children whose mothers were welfare recipients. For the earlier review, see Walter Gilliam and Edward Zigler, "A Critical Meta-Analysis of All Evaluation of State-Funded Preschool from 1977 to 1998: Implications for Policy, Service Delivery and Program Evaluation," *Early Childhood Research Quarterly* 15 (2001): 441-473.

[7] The effect sizes on classroom behavior were small, an 0.11 increase in externalizing behavior and an -0.07 decrease in self control. This is equivalent to raising children from the 50th to the 54th percentile in externalizing (aggressive) behavior and from the 50th to the 47th percentile in self-control. Magnuson et al., 2007.

[8] Studies of child care settings more generally also indicate that time spent in non-maternal care between birth and age five is associated with small increases in aggression and non-compliance, and that this effect may persist longer for children who attend center-based settings for more than two years. Evaluations of model preschool programs for low-income children provide mixed evidence of effects on behavior problems; the Abecedarian program, which involved center-based care from infancy onward, found some increase in elementary school classroom behavior problems among early cohorts of participants, while the Perry Preschool and Chicago Parent-Child Centers found less behavioral problems as measured by rates of juvenile and adult criminal activity. Lisa A. McCabe and Ellen C. Frede, "Challenging Behaviors and the Role of Preschool Education," NIEER Preschool Policy Brief 16 (2007), http://nieer.org/resources/policybriefs/16.pdf.

[9] Only one of the thirteen evaluations reviewed by Gilliam and Zigler, 2001 included health outcomes; it found no significant difference between pre-kindergarten and a comparison group of similar children.

[10] Three of the thirteen evaluations reviewed by Gilliam and Zigler, 2001 collected data on parental involvement in elementary school; two found small positive impacts (effect size of 0.15) but only one of them was statistically significant.

[11] This benefit-cost estimate is based on an extrapolation of results from the Chicago Child-Parent Centers, a preschool intervention which, while located in the Chicago Public Schools, differs in some ways from state pre-kindergarten programs. For example, the Chicago Child-Parent Centers serve an economically disadvantaged population, have a fairly low student to staff ratio, higher spending per child than most state pre-K programs, and include an active parent involvement component.

The RAND estimate for universal pre-K in California included an explicit downward adjustment in benefits to reflect the likelihood that the benefits of preschool interventions will be lower for a universal population than for a population at risk for economic failure. Lynn Karoly and James H. Bigelow, *The Economics of Investing in Universal Preschool Education in California*, (Santa Monica, CA: Rand Corporation, 2005).

[12] The effect sizes on pre-reading and pre-math scores were 0.24 and 0.20, respectively, for disadvantaged children, compared to 0.12 and 0.10 for all children The predicted increase in reading was from the 39th to the 44th percentile in reading for children whose parents had low income (less than poverty) or low skills (less than a high school diploma). Note that even after the pre-K gain, the average disadvantaged child would still score below the 50th percentile. (Magnuson et al., 2007).

[13] Gormley et al., 2005 report effect sizes for Hispanic children of 1.50 for letter-word identification, 0.98 for spelling, and 0.99 for applied problems. These effect sizes are large and higher than those reported for all children (see footnote 3).

[14] Under random-assignment evaluations, children would be randomly assigned to the program intervention (pre-K) or a control group of non-participants. This method would make it highly likely that observed differences are caused by the intervention rather than merely reflecting pre-existing differences in participating and non-participating children (such as the motivation of their parents to send them to educational programs).

[15] Under the regression discontinuity design (RDD), pre-K alumni entering kindergarten are compared with pre-K entrants, controlling for age and demographic differences and exploiting the fact that with strict birthday cut-off rules for pre-K entry, the pre-kindergarten treatment is the key difference between children a few weeks shy of the birthday cutoff and children a few weeks past the cut-off.

[16] Although the five states may not be nationally representative, classrooms within each state, and children within each classroom, were drawn randomly, and so the outcomes can likely be generalized for the five states.

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Research Brief #2: Head Start

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WHAT IS HEAD START?

Head Start is a national program that provides comprehensive child development services to disadvantaged children ages three and four in an effort to break the cycle of poverty. Local agencies, operating under direct federal grants, provide preschool education; medical, dental, and mental health care; nutrition services; and services for parents. The majority of children enrolled in Head Start are poor and 12 percent of enrolled children are disabled. Most children attend half-day center-based programs during the academic year, although some programs are full-day or year-round and some provide home-based services. Quality varies considerably across the more than 1,600 Head Start grantees.

In 2006, federal spending per child averaged $7,200 for an estimated 909,000 enrolled children.[1] In 1995, a separate Early Head Start program was established to serve children from birth to three years.[2]

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WHAT IS THE IMPACT OF HEAD START ON CHILDREN AND FAMILIES?

A national random-assignment evaluation of Head Start found small to moderate positive effects for children assigned to Head Start compared to a control group of children not assigned to the program, similar to earlier studies that found short-term positive impacts.[3]

Cognitive and School-Related Outcomes: There were small to moderate positive impacts for children assigned to Head Start in pre-reading, pre-writing, vocabulary, and literacy skills.[4] Impacts were not significant, however, in the areas of early math skills or oral comprehension. Even after enrollment in Head Start, three- and four-year-old children in the evaluation fell below national norms for school readiness.

- Children enrolled in the program know more letters, are better at naming colors, and have higher vocabularies than children who did not participate in Head Start. For example, Head Start four-year-olds could identify an average of 2.3 more letters than control group children.
- Although Head Start children fell below national norms, enrollment in Head Start helped them cut the achievement gap in half (45 percent) in letter-word identification (pre-reading skills) and one-fourth in pre-writing skills.

Behavioral and Socio-emotional Outcomes: There were relatively few impacts on children's behavior or social skills. There was a small reduction in problem behaviors among certain subgroups of Head Start enrollees:

- Three-year-olds assigned to Head Start were less likely to exhibit behavior problems, such as hyperactive behavior, one year later than children in the control group.
- Head Start four-year-olds also had fewer behavior problems than control group children, although this reduction was limited to those from English-speaking families.

Health and Safety Outcomes: Head Start was associated with small to moderate positive impacts on parent reports of children's access to health care, health status, and use of dental care. Health

outcomes were slightly more positive for children who were enrolled at age three than those who enrolled at age four.[5]

- Head Start enrollment increased use of dental care by 16 to 17 percentage points (73 percent of four-year olds and 69 percent of three-year olds in Head Start saw a dentist compared to 57 and 52 percent of children in the control group).

- An earlier study comparing children in Head Start to children on the wait list suggests that Head Start children were more likely to be up-to-date on immunizations.[6]

In addition, a longitudinal study of child mortality rates by county found evidence that mortality rates for children ages five to nine resulting from certain causes and diseases fell in counties with strong Head Start enrollment in the 1960s and 1970s, suggesting that health improvements were dramatic enough to reduce death rates.[7]

Outcomes for Parents: The program had modest success in teaching Head Start parents to engage in educational activities with their children and to reduce the use of physical discipline:

- Head Start participation led to a 7 percent increase in the average number of times parents read to their four-year old children in a week.[8]

- Parents of Head Start children were less likely to spank their children than parents in the control group, although the reduction in spanking was small and limited to parents of three-year-old children.[9]

Long-Term Outcomes: Follow-up data from the Head Start Impact Study are not yet available. A number of earlier studies of Head Start found that the program's positive impacts on cognitive development, including IQ and school readiness, faded over time, largely disappearing by third grade.[10] There is some debate over the fadeout findings, with some researchers suggesting the fadeout would be less if school achievement results were appropriately adjusted for the lower rates of special education placement and grade retention among Head Start participants[11] and other researchers pointing to the negative impact of subsequent schooling, particularly for Black children went on to attend poorer schools than White children.[12] The earlier literature does find some evidence of long-term positive outcomes such as reductions in grade repetition, high school dropout rates, and teen pregnancies.[13]

In addition, some recent, sophisticated analyses of historical data suggest that Head Start has had long-term positive impacts on education and crime, with some impacts varying by race:

- Whites who participated in Head Start in the 1970s were 22 percentage points more likely to finish high school and 19 percentage points more likely to attend college than siblings who were not in Head Start. Black young adults who participated in Head Start did not see the same educational impact, but were about 12 percentage points less likely to have been booked or charged with a crime than non-participating siblings.[14]

- Another study found that educational attainment of both Blacks and Whites ages 18 to 24 increased by a half year in counties with higher levels of Head Start funding in the 1960s and 1970s.[15]

HOW DO HEAD START IMPACTS VARY?

Age of Child. The Head Start Impact Study found more positive impacts for children assigned to Head Start at age three than for four-year-old children, based on observations one year after enrollment.

Primary Language. Larger effects were found for children whose primary language was English than children whose primary language was Spanish. For English-speaking children, there were positive impacts in all areas (cognitive outcomes, socio-emotional outcomes, health outcomes, and parental behavior). Positive impacts for Spanish-speaking children were primarily in the area of health; there were fewer effects on cognitive skills.[16]

Race and Ethnicity. There was more evidence of positive impacts on African-American and Hispanic

children than for White/Other children, particularly for those assigned to Head Start at age three. See above for differences in long-term outcomes among Blacks and Whites.

HOW STRONG IS THE EVIDENCE BASE FOR HEAD START?

There have been hundreds of studies of Head Start, providing a large body of evidence of positive short-term outcomes. However, most of the earlier studies suffered from methodological problems, including the lack of an appropriate comparison group.[17] The best evidence comes from the recent Head Start Impact Study, which was based on a large, nationally representative sample of 4,700 Head Start applicants (ages three to four) who were randomly assigned to a Head Start group or a control group. The evaluation did not focus on a few model programs, but encompassed 84 programs, capturing much of the diversity of quality that is found in local programs and allowing results to be generalized to the entire Head Start program.[18]

The use of random assignment, combined with the national scope of the sample, provides a very strong evidence base for evaluating Head Start. It is important to note however, that a large proportion of the "untreated" control group was enrolled in other center-based programs, and so the "Head Start impact" is the impact of the program above other center-based programs in the community, not compared to a non-intervention alternative.[19] The effects found in the national study would be larger if results were adjusted to reflect the fact that some children in the experimental group did not enroll in Head Start and some children in the control group did receive Head Start services.[20]

IS HEAD START GENERALLY VIEWED AS EFFECTIVE?

Debate over the effectiveness of Head Start continues even after completion of the Head Start Impact Study. While the study did find positive impacts, many of the observed effects are small, particularly compared to the larger impacts on cognitive skills of certain model preschool programs and state pre-K programs.[21] Moreover, Head Start children still lag very far behind national norms after enrollment and there is concern that immediate impacts may fade after a few years of elementary school.[22]

Despite these concerns, the program has been shown to improve the cognitive development and general school readiness of low-income children, compared to the alternative services available in the community. Moreover, even small to modest impacts such as those observed in the Head Start Impact Study can generate significant benefits over the long term. A recent comprehensive review of the literature on Head Start's impacts concludes that small short-term impacts could generate benefits that exceed costs in the short- and long-run, just as occurred in the well-known Perry Preschool program.[23]

WHAT FEDERAL LEGISLATIVE ACTION LIES AHEAD FOR HEAD START?

Head Start was just reauthorized in December 2007, after several years of legislative debate, and so future legislative action will focus on the annual appropriations battle over funding levels. Increases are needed if the program is to keep pace with inflation, fund the quality improvements authorized in 2007, and/or expand to serve more eligible children in both the three to four (Head Start) and birth to three (Early Head Start) age groups. Congress will also be interested in implementation of the recent reauthorization, which includes provisions to expand Head Start and Early Head Start and invest in Head Start quality.[24]

NOTES:

[1] See Office of Head Start, Head Start Program Fact Sheet, Fiscal Year 2007, http://www.acf.hhs.gov/programs/ohs/about/fy2007.html. Head Start funds are awarded directly to local grantees, which must contribute a 20 percent match in cash or in-kind benefits. Melinda Gish, Head Start: Background and Issues (Washington, D.C.: Congressional Research Service, 2008).

[2] See I*mpacts of Early Childhood Programs*, Brief #3: Early Head Start.

[3] U.S. Department of Health and Human Services, Administration for Children and Families, *Head Start Impact Study: First Year Findings*, (Washington, D.C.: Westat and others, 2005), http://www.acf.hhs.gov/programs/opre/hs/impact_study/reports/first_yr_finds/first_yr_finds.pdf.

[4] Small to moderate impacts reflects the fact that effect sizes were 0.2 to 0.3 for many impacts. Effect sizes of < 0.2 are generally considered small; effect sizes of 0.2 to 0.5 are generally considered moderate. The largest impacts (0.19 to 0.34) were for pre-reading skills and literacy skills. There were small impacts (about 0.2 effect sizes) for direct assessments of pre-writing and vocabulary. Note that pre-reading, pre-writing and vocabulary were based on direct measures while literacy skills were reported by parents.

[5] Three-year-olds had positive gains across all three health-related impacts. Among four-year-olds, there were increases in access to health care and dental care but no observed differences in health status (DHHS, 2005).

[6] Martha Abbott-Shim, Richard Lambert, and Frances McCarty, "A Comparison of School Readiness Outcomes for Children Randomly Assigned to a Head Start Program and the Program's Wait List," *Journal of Education for Students Placed at Risk* 82 (2003): 191-214.

[7] Note that Head Start is unlikely to have as dramatic an impact on child health and mortality rates today as forty years ago because of overall improvements in child immunization rates and access to health services. Jens Ludwig and Douglas L. Miller, "Does Head Start Improve Children's Life Chances? Evidence from a Regression Discontinuity Design," *The Quarterly Journal of Economics* 122 (2007): 159-208.

[8] The average number of times parents read to their four-year-olds increased from 2.8 to 3.0 times per week. There was a slightly smaller increase, from 2.8 to 2.9 times, among parents of three-year-old children.

[9] The effect size was -0.10 for this age group. There was no effect on spanking for children enrolled in Head Start at age four.

[10] William T. Gormley., "Early Childhood Care and Education: Lessons and Puzzles," *Journal of Policy Analysis and Managemen*t 26 (2007): 633-671.

[11] Steve Barnett, "Does Head Start Fade Out?" *Education Week* May 19, 1993.

[12] See Janet Currie and Duncan Thomas, "School Quality and the Longer-Term Effects of Head Start," *The Journal of Human Resources* 35 (2000): 755-774.

[13] Janet Currie and Duncan Thomas, "Does Head Start Make a Difference?" *The American Economic Review* 85 (1995): 341-364 and Barnett, 1993.

[14] See Currie and Thomas, 1995 and Eliana Garces, Duncan Thomas, and Janet Currie, "Longer-Term Effects of Head Start," *The American Economic Review* 92 (2002): 999-1012. The Currie studies were based on comparisons between siblings, leading to questions about how parents choose which sibling to send to Head Start. If parents choose to send the more promising sibling or the slower learner to Head Start, then impacts might be lower or higher than those observed. In addition, siblings who do not attend Head Start might benefit from spillover effects. Currie has argued that her estimates are likely to be lower bounds on the true positive effects of Head Start (Janet Currie, "How Should We Interpret the Evidence about Head Start?" *Journal of Policy Analysis and Management* 26 (2007): 673-689).

[15] Ludwig and Miller, 2007.

[16] FACES, a longitudinal study comparing Head Start children in the fall and spring, did find evidence of increased English vocabulary skills for Spanish-speaking children. These results are limited to children who had sufficient English to pass the English-language screener in both the fall and spring. U.S. Department of Health and Human Services, *FACES Findings: New Research on*

Head Start Outcomes and Program Quality (Washington, D.C.: Department of Health and Human Services, 2006), http://www.acf.hhs.gov/programs/opre/hs/faces/reports/faces_findings_06/faces_findings_bw.pdf.

[17] Gormley, 2007 and U.S. General Accounting Office, *Head Start: Research Provides Little Information on Impact of Current Program*, GAO/HEHS-97-59, (Washington, D.C. U.S. General Accounting Office, 1997), http://www.gao.gov/archive/1997/he97059.pdf.

[18] Programs operating less than two years were excluded from the study, as were programs operating in areas where a control group could not be formed because there was sufficient space in Head Start centers to serve all new applicants. Head Start grantees exclusively serving migrant children, Native Americans, or children under Early Head Start also were excluded. Even with these exclusions, the sample represents 85 percent of all Head Start children. (DHHS, 2005).

[19] The proportion of non-Head Start children enrolled in center-based settings was 43 percent of three-year-olds and 48 percent of four-year-olds. This includes 18 percent of four-year-olds in the control group who ended up in Head Start. Also note that 14 percent of the four-year-old children in the experimental group did not end up enrolling in Head Start, further diluting impacts (DHHS, 2005; Jens Ludwig and Deborah Phillips, "The Benefits and Costs of Head Start," *Social Policy Report* 21 (2007): 3-19.

[20] If all of the children assigned to Head Start enroll in Head Start, but all of the children in the control group also enroll in Head Start, and assuming the average quality of the Head Start programs attended by children in both groups is the same, the effects of being assigned to Head Start would be zero. This does not mean that Head Start has no impact on children; the impact would have been larger if the control group children had not enrolled in Head Start. Ludwig and Phillips, 2007.

[21] Most effect sizes were 0.20 and smaller. See Ron Haskins, *Testimony for the House Committee on Education and Labor*, January 23, 2008, http://www.brookings.edu/testimony/2008/0123_education_haskins.aspx.

[22] See Gormley, 2007 and Douglas J. Besharov and Caeli A. Higney, "Head Start: Mend It, Don't Expand It (Yet)," *Journal of Policy Analysis and Management* 26 (2007): 673-689.

[23] Small short-term impacts means effect sizes of 0.1 to 0.2. Ludwig and Phillips, 2007.

[24] The reauthorization allows grantees to serve children between 100 and 130 percent of poverty. In addition, the bill requires all Head Start teachers to have an associate's degree by 2011 and half of all teachers to have a bachelor's degree in early education and experience teaching preschoolers by 2013. The bill also introduces more competition into the grant application process in an effort to cut funding from low-performing grantees and provide incentives for all grantees to maintain high quality programs. The reauthorization bill improves collaboration with states by maintaining and expanding Head Start Collaboration Offices in each state and requiring states to create State Advisory Councils on Early Education and Care to develop recommendations for coordination between early childhood programs.

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Research Brief #3: Early Head Start

BY: JULIA ISAACS & EMILY ROESSEL

WHAT IS EARLY HEAD START?

Early Head Start (EHS) provides child development services to low-income pregnant women and families with young children under age three. Begun in 1994 as an extension of Head Start, the program promotes healthy prenatal outcomes; the health, cognitive and language development and socio-emotional well-being of infants and toddlers; and family development and a supportive parent-child relationship. Local EHS agencies offer services in centers and through home visits, with some programs combining both center-based and home-based approaches. In 2006, the program served an estimated 61,647 children, at an estimated annual federal cost of about $10,500 per child.[1]

This research brief is one in a series of research briefs on the impacts of early childhood programs. See the websites for First Focus (www.firstfocus.net) and the Brookings Center on Children and Families (www.bookings.edu/ccf) for the full series including an overview and briefs on State Pre-K, Head Start, Early Head Start, Model Early Childhood Programs, and Nurse Home Visiting.

WHAT IS THE IMPACT OF EARLY HEAD START ON CHILDREN AND FAMILIES?

There has been a large-scale, random-assignment evaluation of Early Head Start that found the program had positive impacts on many dimensions of parenting and child development at ages two and three years. Overall, program impacts were mostly small, with larger impacts for some population subgroups.[2]

Cognitive and School-Related Outcomes: Early Head Start children scored higher on standardized assessments of cognitive development and language development than a control group of children not assigned to the program. Significantly fewer Early Head Start children scored in the at-risk range on these two measures of cognitive skills. Even with these gains, however, EHS children scored below national norms and many remained in the at-risk range of developmental functioning.

- *Improved cognitive development.* On average, Early Head Start children scored 91.4 on an assessment of cognitive development compared to a score of 89.9 for children in the control group (a score of 100 is the population average). Those receiving EHS services were less likely than those in the control group to fall in the "at-risk" range of developmental functioning (27 percent compared to 32 percent had a score of 85 or lower).[3]
- *Better language skills.* The percentage of children with "at risk" scores on language development skills fell significantly but remained high: 51.1 percent after EHS participation compared to 57.1 percent without the intervention.[4]

Behavioral and Socio-emotional Outcomes: Early Head Start children engaged their parents more, were less negative to parents, and were more attentive to objects during play. EHS children were also less aggressive than the control group of children not assigned to the program. More positive impacts on socio-emotional development were observed at age three than at age two.

Health and Safety Outcomes: There were small but significant impacts on children's health. More Early Head Start children visited a doctor for treatment of an illness or immunizations. Fewer children were hospitalized for an accident or injury.

- *Doctor visits.* The study found that 83 percent of EHS children visited a doctor for treatment of an illness, compared to 80 percent of children in the control group.

- *Hospitalizations.* Hospitalizations were relatively rare: 0.4 percent of EHS children and 1.6 percent of children not assigned to EHS were hospitalized for an accident or injury.

Outcomes for Parents: After participating in Early Head Start, parents were more emotionally supportive in play with the child and showed more warmth toward the child. They were also more likely to read daily to children and were less likely to engage in negative parenting behaviors. In addition, EHS parents were more likely to participate in education or job training, and some impacts on employment were observed later in the study.[5] However, there were no significant improvements in parental income.

- *Reading to children.* The study found that 56.8 percent of EHS parents compared to 52.0 percent of parents in the control group reported reading to their child every day.

- *Spanking children.* Early Head Start parents were less likely to spank their children: 46.7 percent of EHS parents and 53.8 percent of parents in the control group reported spanking their children in the past week.

- *School attendance.* Early Head Start increased school attendance among parents who were teens.

- *Subsequent births.* Early Head Start mothers were less likely to have subsequent births during the first two years after enrollment (22.9 percent of Early Head Start mothers compared to 27.1 percent of mothers in the control group).

Early Head Start had positive effects on fathers as well as mothers. Fathers were less intrusive when playing with children and children were better able to engage their fathers. In addition, EHS fathers were also more likely to participate in home visits and parenting classes than other fathers.

Medium- and Long-Term Outcomes: EHS children were more likely to enroll in Head Start and other formal programs (prekindergarten or child care) than control group children.[6] Many impacts on children and parenting observed at age three are still present at age five, though overall impacts are still modest in size.[7] A follow-up report with findings through the end of kindergarten for children enrolled in Early Head Start is due out in the second half of 2008.

HOW DO EARLY HEAD START IMPACTS VARY?

Race and Ethnicity. There were more positive impacts for African American and Hispanic families than for White families. Early Head Start brought African American children and families closer to the levels of other racial groups in development outcomes.

Parental Characteristics. Impacts were greater for children whose mothers enrolled while they were pregnant. Among parents at risk of depression at the beginning of the program, EHS parents were less depressed than control group parents when children were age three.

Program Type. Impacts varied by program type, depending on whether services were offered through a center-based program, a series of home visits, or a mixed approach of center-based and home-based services. The impacts of center-based programs were concentrated in cognitive and socio-emotional development, with some favorable impacts on parenting as well. Home-based programs had impacts on socio-emotional development, and also reduced parenting stress.[8] Mixed-approach programs had the strongest impacts, with a wide range of impacts across cognitive and socio-emotional development, parenting behaviors, and participation in self-sufficiency activities. In addition, programs that were fully implemented early on had more significant impacts than programs that were not fully implemented by 1999.

HOW STRONG IS THE EVIDENCE BASE FOR EARLY HEAD START?

Early Head Start has been subject to only one national evaluation, but it was sufficiently large and rigorous to provide a solid evidence base. A large sample of 3,000 children and families across seventeen sites were randomly assigned, with half assigned to receive EHS services and half assigned to a control group that did not receive Early Head Start

services.[9] Multiple methods, including direct child assessments, direct observations of children's behavior, videotaped parent-child interactions, and parent reports, were used for measuring outcomes. The seventeen programs themselves were not randomly selected, although their features (program approaches, family characteristics, and geographic distribution) were similar to those of all 143 programs initially funded in 1995 and 1996. Note that the program has continued to expand and evolve in the past ten years, and so its impacts may have changed as the program has matured.

IS EARLY HEAD START GENERALLY VIEWED AS EFFECTIVE?

The EHS evaluation found positive impacts, although most are small.[10] The small size of the benefits, compared to relatively high costs, has led one team of analysts to extrapolate that the program's benefits will not exceed the program's costs.[11] However, the existence of positive impacts across a broad range of measures, and the fact that many impacts observed at age three were still present at age five, leads others to conclude that Early Head Start is working.[12]

WHAT FEDERAL LEGISLATIVE ACTION LIES AHEAD FOR EARLY HEAD START?

As with Head Start, the major issue facing Early Head Start is the level of funding provided in annual appropriations. The recent reauthorization of Head Start in December 2007 included provisions to strengthen and expand Early Head Start, such as requiring half of all new funds to go towards Early Head Start, providing increased flexibility to Head Start programs to convert slots for preschool children into slots for infants and toddlers and requiring at least one infant and toddler specialist in every state.

NOTES:

[1] U.S. Department of Health and Human Services, Administration for Children and Families, *Justification of Estimates for Appropriations Committees*, *FY2008*, page D-38. http://www.acf.hhs.gov/programs/olab/budget/2008/cj2008.html. The FY 2009 Congressional Justification reported that enrollment increased to 61,788 children in 2007 (annual cost data not provided for 2007).

[2] This review follows common convention in considering an effect size of 0.80 as "large," 0.50 as "medium" and 0.20 as "small." Unless noted otherwise, all impacts are from John M. Love, Ellen Eliasan Kisker, Christine M. Ross, and others, *Making a Difference in the Lives of Infants and Toddlers and Their Families: The Impacts of Early Head Start* (Washington, DC: Department of Health and Human Services, 2002).

[3] The effect size for average scores on the Bayley Scales of Infant Development Mental Development Index was 0.12, a small effect.

[4] Overall scores on the Peabody Picture Vocabulary Test increased from 81.1 to 83.3 on a scale of 100. This increase has an effect size of 0.13.

[5] Note that 60.0 percent of Early Head Start parents participated in job training or education, compared to 51.4 percent of control group parents (an impact with an effect size of 0.17). Also, 86.8 percent of Early Head Start parents were employed at some point during the first 26 months, compared to 83.4 percent of control group parents (an effect size of 0.09 and significant at 90 but not 95 percent confidence).

[6] Forty-seven percent of Early Head Start children and 42 percent of control group children were in formal programs at ages three and four.

[7] U.S. Department of Health and Human Services, Administration for Children and Families, *Research to Practice: Preliminary Findings from the Early Head Start Prekindergarten Followup* (Washington, D.C.: U.S. Department of Health and Human Services, 2006), http://www.acf.hhs.gov/programs/opre/ehs/ehs_resrch/reports/prekindergarten_followup/prekindergarten_followup.pdf.

[8] Home-based programs that were fully implemented had favorable impacts on cognitive and language development at age three that have not been found in evaluations of home-visiting programs.

[9] The control group children could have received services other than Early Head Start, and about 0.7 percent of the control group actually did enroll in Early Head Start.

[10] Effect sizes ranged from 0.10 to 0.20.

[11] Steve Aos, Roxanne Lieb, Jim Mayfield, and others, *Benefits and Costs of Prevention and Early Intervention Programs for Youth* (Olympia, WA: Washington State Institute for Public Policy, 2004).

[12] See for example, Zero to Three Policy Center, Early Head Start Research and Evaluation Project: Early Head Start Works, Policy Brief, January 2007, http://www.zerotothree.org/site/DocServer/Jan_07_EHS_Policy_Brief.pdf?docID=2623.

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Research Brief #4: Model Early Childhood Programs

BY: JULIA ISAACS

This research brief is one in a series of research briefs on the impacts of early childhood programs. See the websites for First Focus (www.firstfocus.net) and the Brookings Center on Children and Families (www.bookings.edu/ccf) for the full series including an overview and briefs on State Pre-K, Head Start, Early Head Start, Model Early Childhood Programs, and Nurse Home Visiting.

WHAT ARE MODEL EARLY CHILDHOOD PROGRAMS?

Much of the support for early childhood interventions comes from the strong evidence of impacts gathered from rigorous evaluations of three comprehensive, center-based programs:

- The **Abecedarian project** was a very intensive intervention enrolling children in a full-day, full-year program from infancy through kindergarten. The center-based program had low child-teacher ratios (3:1 for infants and 6:1 for preschoolers) and was supplemented by home visits during the first three years. Costs per child averaged $42,871 for the full multi-year program.[1]

- The **High Scope/Perry Preschool** enrolled three- and four-year-old children at risk for academic failure in preschool classes that operated five days a week during the academic year. Teachers used a curriculum designed to support children's self-initiated learning and conducted weekly home visits. The average child-teacher ratio was less than 6:1, and program costs averaged $14,830 per child for the two-year program.[2]

- The **Chicago Child-Parent Centers** provided a half-day, center-based preschool program at twenty centers run by the Chicago Public Schools. The preschool program, which averaged $6,913 per child over two years, included an active family involvement component and a six-week summer program.[3]

WHAT IS THE IMPACT OF THESE MODEL PROGRAMS ON CHILDREN AND FAMILIES?

Cognitive and School-Related Outcomes:

Abecedarian, Perry, and Chicago Child- Parent Centers all had strong effects on school outcomes, including reductions in special education placement and grade retention, and increases in high school graduation (see long-term outcomes for information on high school graduation). One of the programs – Abecedarian – also was associated with long-lasting gains in IQ scores:

- *Reduced use of special education.* Special education placement rates fell dramatically, from 48 percent to 25 percent for Abecedarian participants and from 22 percent to 12 percent for participants at the Chicago Child Parent Centers.

- *Less grade retention.* Grade retention rates also fell for children enrolled in the three programs, with a particularly large decline for participants of the Abecedarian program (from 55 percent to 31 percent).

- *Less special education or grade retention.* The likelihood of either being placed in special education or being held back a year fell by more than half for Perry Preschool children, from 38 percent to 17 percent.

- *Higher IQ scores.* Average IQ scores of Abecedarian participants were 4.5 percentage points higher than scores of comparable children not assigned to the program (89.7 compared to 85.2, measured at age 21).[4]

Behavioral and Socio-emotional Outcomes: The model programs had positive long-term effects on criminal activity, teen childbearing, and other social behaviors, as discussed under long-term outcomes below.

Health and Safety Outcomes: Evaluations of these three model programs generally did not report positive or negative impacts on health outcomes. With respect to safety, children participating in Chicago Child Parent Centers had much lower rates of child abuse and neglect than the comparison group of children (5 percent compared to 10 percent).[5] Similarly, they had lower rates of out-of-home placement.[6]

Outcomes for Parents: The evaluations of these three model programs reported limited impacts on the children's parents. The Chicago Child-Parent Centers reported positive impacts on the parenting behaviors of mothers some years after program participation;[7] and a survey of younger Abecedarian mothers (those who were under 18 when their children were born) found positive effects on the mother's education levels and decreased likelihood of subsequent births.[8]

Long-term Outcomes: All three programs have had long-lasting effects on participants' education, earnings, criminal activity, and other behaviors, according to lengthy follow-up data tracking participants to age 21 and older. Substantial differences in adult outcomes are observed across numerous dimensions, even though gains in IQ and achievement test scores tended to diminish during the children's elementary school years.

- **High school graduation rates** increased under all three programs, whether measured at age 21 or older ages. For example, 66 percent of Perry preschoolers ended up with a high school degree by age 27, compared to 45 percent of the control group.[9]

- **Labor force performance** also was higher for participants in early childhood interventions, as measured by higher earnings (Perry and Abecedarian), higher employment rates (Perry, at age 40), higher rates of placement in high-skilled jobs (Abecedarian, at age 21) and marginally higher rates of full-time employment or college attendance (Chicago Child-Parent Centers, at age 24).[10]

- Preschool attendance reduced **criminal activity** under two of the model programs: Perry preschoolers were less likely than non-preschoolers to be arrested as adults and students in Chicago Child-Parent Centers had lower rates of both juvenile and adult criminal activity (on such measures as juvenile criminal charges, juvenile violent offense charges, adult felony arrests, adult felony convictions, overall adult convictions, and adult incarceration).[11]

- **Teen parenting rates** among females fell from 45 to 26 percent in Abecedarian; single motherhood rates for female Perry Preschoolers dropped from 83 to 57 percent.[12]

- There also was some evidence of other long-term effects on **social and health behaviors**, including less receipt of welfare or social services (Perry, at age 27); reductions in use of marijuana (Abecedarian, at age 21); and fewer depressive symptoms (Chicago Child-Parent Centers, at age 24).[13]

Benefit-Cost Estimates: All three programs were found to return overall benefits that exceeded program costs, with the return per dollar invested estimated as $3.23 for the Abecedarian model, between $5.15 to $17.1 for Perry Preschool, and $7.14 for Chicago Child Parent Centers.[14] Expressed differently, the Perry Preschool program provides a savings stream equivalent to a 16 percent internal rate of return.[15]

HOW DO THE IMPACTS OF THESE MODEL PROGRAMS VARY?

Separate outcomes by the children's race or family income are not available; all three programs served predominantly African-American children from low-income families. Sample sizes were generally too small to support analysis among different subgroups. However, the evaluation of Chicago Child-Parent Centers has found larger impacts for children with

more years of participation (entering preschool earlier and/or receiving more years of follow-up services in early elementary school).

HOW STRONG IS THE EVIDENCE BASE FOR THESE MODEL PROGRAMS?

The evidence base for these three programs is quite strong, particularly for the Abecedarian and Perry Preschool programs, where children were randomly assigned to either a program participation group or a control group of non-participants. The third program, the Chicago Child-Parent Centers, has a somewhat weaker study design, relying on a matched comparison group rather than random assignment. All three evaluations, however, are highly regarded and measure a diverse set of child and adult outcomes based on rich data collected on both participants and non-participants over a long period of time. Still, there are some methodological concerns, most notably the small sample sizes in the Abecedarian and Perry Preschool studies and the lack of random-assignment in the Chicago Child-Parent Centers.[16]

ARE THESE MODEL PROGRAMS GENERALLY VIEWED AS EFFECTIVE?

All three programs – Abecedarian, Perry, and Chicago Child-Parent Centers – are viewed as highly effective, providing a consistent pattern of moderate to large impacts on children's school experiences (less special education and grade retention, higher school achievement and high school graduation rates). In addition, the programs had a range of enduring impacts on participants as adults (increasing earnings and employment, reducing rates of criminal activity, and reducing teen and single motherhood).

A broader question is whether other programs for three- and four-year olds are likely to be as effective as these model programs. Abecedarian and Perry Preschool were intensive pilot programs, achieving successes that may be difficult to replicate. However, as a recent analysis notes, even if outcomes only half as large as those of Abecedarian and Perry Preschool and further diluted by averaging in less effective programs, the long-term benefits of early childhood education for low-income three- and four-year olds would still outweigh costs by more than two to one.[17]

In addition, while first-year impacts of the Head Start program have been smaller than for the model programs (see Research Brief #2 on Head Start), the Chicago Child-Parent Centers provide an example of successful impacts of a large-scale, ongoing program. Started with federal Title I funding in 1967, the centers were operating in 20 Chicago public schools when evaluated in the 1980s.

Finally, a recent report identifies common elements across the three studies that may guide replication efforts: all three programs intervened at early ages, used well-educated, well-trained, and well-compensated staff; maintained small class sizes and low child-teacher ratios; were intensive programs (meaning they had many contact hours with the child, a transition component and/or a parent involvement component), and had a clarity of focus on the way the program and its teachers would interact with children and families.[18]

WHAT FEDERAL LEGISLATIVE ACTION LIES AHEAD FOR EARLY CHILDHOOD INTERVENTIONS?

As noted in other research briefs in this series, there is considerable legislative activity related to early childhood education for three- and four-year olds, including perennial questions over funding levels for Head Start (Research Brief #2), and new bills that would authorize federal support for state pre-kindergarten programs (Research Brief #1).

NOTES:

[1] Costs are in 2003 dollars. See Table 2 of Julia Isaacs, *Cost-Effective Investments in Children* (Washington, D.C.: Brookings Institution, 2007), http://www.brookings.edu/papers/2007/01childrenfamilies_isaacs.aspx and Table 4.4 of Lynn M. Karoly, Rebecca Kilburn, and Jill Cannon, Early Childhood Interventions. Proven Results, Future Promise (Santa Monica, CA: RAND, 2005).

[2] Costs are in 2003 dollars. See Table 2 of Isaacs, 2007 and Table 4.4 of Karoly et al., 2005, op. cit.

[3] Costs are in 2003 dollars. See Table 2 of Isaacs, 2007 and Table 4.4 of Karoly et al., 2005, op. cit.

[4] The cognitive and school-related outcomes for all three programs are summarized in Appendix I of Robert Lynch, *Exceptional Returns* (Washington, DC: Economic Policy Institute, 2004). All reported impacts are statistically significant.

[5] Ibid. Rates of child abuse and neglect were measured between ages four and seventeen years.

[6] Arthur Reynolds, Judy Temple, Suh-Ruu Ou and others, "Effects of a School-Based, Early Childhood Intervention on Adult Health and Well-Being," *Pediatric Adolescent Medicine* 161 (2007): 730-739.

[7] Parenting behavior was measured when the children were nine. Figure 2.2 of Lynn Karoly, Peter Greenwood, Susan Everingham, and others, *Investing in Our Children* (Santa Monica, CA: RAND, 1998).

[8] Only 23 percent of these young mothers had an additional birth (by the time the program child was age four and a half) compared to 40 percent of control group mothers; Lynch, 2004.

[9] Table 3.6 of Karoly et al., 2005.

[10] Table 3.6 of Karoly et al., 2005; Table 3 of Reynolds et al., 2007. The employment/college measure in the Child-Parent Center evaluation (percent ever attended college or reported >=4 quarters of income) was significant at the 90th but not the 95th level.

[11] Table 3.6 of Karoly et al., 2005; Table 1and Table 3 of Reynolds et al., 2007. The adult measures of criminal activity for Chicago Child-Parent Center participants are measured at age 24.

[12] Teen parenting rates also were lower for students in Chicago Child-Parent Centers and Perry Preschools, but the reductions were not statistically significant.

[13] Appendix I of Lynch, 2004; Table 3 of Reynolds et al., 2007.

[14] The benefit-cost ratio for Perry Preschool rises from 5.15:1 to 8.74:1 if one includes the value of intangible losses due to crime (i.e., pain and suffering of crime victims), and it rises to 17.1:1 when including intangible losses and following the children to age 40. The lower estimates are based on data through age 21; the data through age 40 revealed even larger than expected differences in adult earnings and rates of criminal activity. Isaacs, 2007.

[15] The 16 percent internal rate of return, calculated by Art Rolnick and Rob Grunewald of the Federal Reserve Bank of Minneapolis, was based on the 8.74:1 benefit-cost ratio of the Perry Preschool program (see footnote 14). If the earnings gains of participants are excluded, the estimated rate of public return is 12 percent. The internal rate of return is a capital budgeting measure that shows the interest rate received for an investment involving payment and revenue streams that stretch over time. Art Rolnick and Rob Grunewald, "Early Childhood Development: Economic Development with a High Public Return," *Fed Gazette* December (2003): 6-12.

[16] There were 111 children in the Abecedarian study and 123 in the Perry Preschool study, counting both program and control groups. In contrast, there were over 1,500 children in the study of Chicago Child-Parent Centers (CPC). The CPC program group was 989 children who completed preschool and kindergarten in the 20 public schools with Child-Parent Centers; the comparison group was 550 students who did not attend CPC preschools but did attend full-day kindergarten for low-income families.

[17] Specifically, the analysis by Steve Aos and colleagues at the Washington State Institute for Public Policy estimated average impacts of early childhood education for low-income three- and four-year olds, based on findings from 48 evaluations. The researchers applied a 50 percent adjustment to outcomes from small-scale, model programs such as Abecedarian and Perry Preschool (assuming

outcomes would be lower in real-world circumstances) and a 25 percent reduction for quasi-experimental programs such as the Chicago Child-Parent Centers (in case the lack of random-assignment led to an overstatement of program impacts). Even with these adjustments, the analysis resulted in a benefit-cost ratio of 2.36: 1. Steve Aos, Roxanne Lieb, Jim Mayfield, Marna Miller, and Annie Pennuci, Benefits and Costs of Prevention and Early Intervention Programs for Youth (Olympia, WA: Washington State Institute for Public Policy, 2004).

[18] Ellen Galinsky, *The Economic Benefits of High-Quality Early Childhood Programs: What Makes the Difference?* (Washington, D.C.: Committee for Economic Development (CED), 2006).

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Research Brief #5: Nurse Home Visiting

BY: JULIA ISAACS

WHAT IS NURSE HOME VISITING?

Under the Nurse-Family Partnership program, the most well-developed nurse home visiting program in the United States, nurses conduct a series of home visits to low-income, first-time mothers, starting during pregnancy and continuing through the child's second birthday. Registered nurses work closely with first-time mothers following a curriculum that focuses on 1) healthy behaviors to improve pregnancy outcomes; 2) parenting skills to improve child health and development; and 3) plans for the mother's life (delaying second pregnancies, finishing school, getting a job). Initially visits are weekly, but then they taper to once a month through the child's second birthday. Adherence to the Nurse-Family Partnership intervention model is closely monitored through a web-based management information system. By restricting eligibility to low-income, first-time mothers, the program serves those whose children are at highest risk; many in the client population are single and/or teen parents. The program is currently serving approximately 13,000 families in 23 states with operating costs of approximately $4,500 per family per year.[1]

This research brief is one in a series of research briefs on the impacts of early childhood programs. See the websites for First Focus (www.firstfocus.net) and the Brookings Center on Children and Families (www.bookings.edu/ccf) for the full series including an overview and briefs on State Pre-K, Head Start, Early Head Start, Model Early Childhood Programs, and Nurse Home Visiting.

WHAT IS THE IMPACT OF NURSE HOME VISITING ON CHILDREN AND THEIR MOTHERS?

Random-assignment evaluations in three sites (Elmira, New York; Memphis, Tennessee; and Denver, Colorado) have documented positive effects on both mothers and children.

Cognitive and School-Related Outcomes: The positive impacts of nurse home visitation on children's IQ scores and school achievement have been limited largely to children born to mothers who were low in psychological resources, that is, mothers who scored low on measures of intelligence, mental health, and self-confidence:

- *Higher achievement scores.* In Memphis, home-visited children born to mothers with low psychological resources had higher achievement scores on state math and reading tests in grades one to three than a control group who were not visited, as well as higher grade point averages (increase from 2.44 to 2.68 in math and reading GPA).[2]
- *Higher language skills.* In Denver, children of mothers low in psychological resources had higher scores on language and intellectual functioning after nurse home visiting.[3]

Behavioral and Socio-emotional Outcomes: There is some scattered evidence that nurse home visits have positive impacts on children's behavior in early years.[4] In addition, the fifteen-year follow-up in Elmira, New York, found a significant reduction in criminal behavior among children of nurse-visited mothers (see below under long-term outcomes).

Health and Safety Outcomes: Nurse home visitation has been successful in improving the health of pregnant mothers, with enough improvement in one site to lead to noticeable improvements in birth outcomes. In addition, the program has led to a noticeable reduction in health care encounters for injuries after the child is born, an indication of improved child safety practices and quite possibly a reduction in child abuse and neglect. Specific outcomes include:

- *Reduced smoking and fewer preterm deliveries.* Mothers visited by nurses smoked fewer cigarettes and showed dietary improvements over the course of the pregnancy. Rates of preterm births were lower among younger adolescent mothers and mothers who smoked upon program entry in Elmira.[5]

- *Fewer emergency room visits.* When compared with children not visited by nurses, nurse-visited children in Elmira had fewer emergency room visits and children in Memphis had fewer physician or hospital visits to treat injuries and ingestions.[6]

- *Reduced rates of child abuse and neglect.* The fifteen-year study in Elmira found a 48 percent reduction in rates of child abuse and neglect among low-income families.[7] Rates of substantiated child abuse and neglect were too low in the other sites to adequately assess the impact, but as noted above, the programs did show reductions in emergency room visits and child mortality.

- *Some evidence of lower child mortality rates.* The Memphis site found suggestive evidence of lower child mortality – one death among those who were visited by nurses compared to ten deaths among children in the control group. The one death in the nurse-visited group was due to a chromosomal anomaly, while nine out of the ten deaths in the other group involved preterm delivery, sudden infant death syndrome, or injuries that were potentially preventable.[8]

Outcomes for Parents: As noted above, mothers' health improved during pregnancy. In addition, program participants had the following outcomes:

- *Fewer subsequent births and longer duration between births.* The number of months between first and second births increased by 4.1 months in Denver, 6.6 months in Memphis, and 27.5 months for the unmarried, low-income sample in Elmira (by 4.4 months for the full Elmira sample). The total number of subsequent births also declined.[9]

- *Lower rates of criminal behavior.* Nurse-visited mothers had 61 percent fewer arrests and 72 percent fewer convictions than mothers not visited by nurses over the 15-year follow-up period in Elmira.[10]

Other positive outcomes for nurse-visited families include reductions in welfare and food stamp use, increased maternal employment, more father involvement, and less domestic violence. These impacts were not observed consistently across all three sites, however.[11]

Long-term Outcomes: Currently, published findings track children through age four in Denver, through age nine in Memphis, and through age fifteen in Elmira, providing good evidence that impacts have lasted over time:

- Positive impacts on children's school achievement have been observed through age nine in Memphis (see above under cognitive outcomes);

- At age fifteen, nurse-visited children in Elmira had 59 percent fewer arrests than children not visited by nurses, as well as fewer convictions. They also were less likely to be adjudicated as a "Person in Need of Supervision" because of incorrigible behavior.[12]

- Many of the positive outcomes for mothers, including reduced subsequent births and longer delays between births, persist over the long term.

Benefit-Cost Estimates: Two benefit-cost analyses suggest benefits exceed costs. Analysts at RAND calculated a benefit-cost ratio of $5.68 for the high-risk sample in Elmira (and $1.26, lower but still cost-effective, for the low-risk sample). An analysis of costs across the full samples at all three sites conducted for the Washington State legislature resulted in a benefit-cost ratio of $2.88.[13]

HOW DO NURSE HOME VISITING IMPACTS VARY?

At-Risk Mothers. All mothers enrolled in the program are first-time mothers. Results from the first

site (Elmira) indicate that impacts were larger for first-time mothers who faced additional risk factors (specifically, being low-income, unmarried, or teen mothers). Following this finding, the nurse home visiting program has limited enrollment to low-income first-time mothers, a population that also is predominantly unmarried and adolescent.

Race and Ethnicity. It is not possible to compare impacts across different racial and ethnic groups. However, it is important to note that positive impacts have been found in locations serving diverse racial and ethnic groups: semi-rural upstate New York (largely White); Memphis, Tennessee (predominantly Black); and Denver, Colorado (a population including a large number of Hispanics).

Professional Credentials of Home Visitors. Program impacts were smaller and often statistically insignificant when the intervention was provided by paraprofessionals in place of nurses, according to a careful randomized study of the two types of home visitors. [14]

HOW STRONG IS THE EVIDENCE BASE FOR NURSE HOME VISITING?

The research evidence on nurse home visiting is quite strong, drawing on rigorous, random-assignment evaluations of nurse home visiting programs in three different sites, operating in a variety of settings and serving populations of diverse racial and ethnic backgrounds.[15] All three evaluations had fairly large samples (400 in Elmira, 735 in Denver, and 743 in Memphis), gathered data over a broad range of outcomes (interview data was supplemented by various health, crime, and education administrative records), and followed participants for many years (through age fifteen in Elmira, and at this point, through age nine in Memphis, and age four in Denver), with relatively little attrition.

Critics point out that results are not found consistently across all three sites, and that the programs in Memphis and Denver, while showing significant effects on some outcomes, did not have as strong results as those shown for the low-income sample in Elmira, New York. Another potential concern is that the principal investigator, David Olds, is also the architect of the program, and, thus, the program has not been evaluated by an independent investigator. This concern is lessened by the fact that the research staff were blind to whether participants were in the nurse-visited or control groups, results have been published in peer-reviewed journals, and the overall quality of the trials is generally viewed as high. A final critique is that nurse home visiting, like other home visiting programs, does not have as much effect on children's cognitive outcomes as center-based preschool programs, where the intervention is directly targeted to the child, rather than focused on changing the behavior of the parent.

IS NURSE HOME VISITING GENERALLY VIEWED AS EFFECTIVE?

Overall, the evidence of effectiveness for nurse home visiting, and specifically, the Nurse-Family Partnership program, is very strong, given the range of positive outcomes across three different randomized trials – and given the extensive follow-up data showing that effects, while modest, endure over time and outweigh program costs. The program has been named as an "effective" or "cost-effective" program in reviews by researchers at a variety of organizations, including the Coalition for Evidence-Based Policy, the Committee for Economic Development, the Brookings Institution, the RAND Corporation, the Washington State Institute for Public Policy, and Blueprints for Violence Protection. Note that most of these reviews focus on *nurse* home visiting, not home visiting overall, in their citation for effectiveness.

WHAT FEDERAL LEGISLATIVE ACTION LIES AHEAD FOR NURSE HOME VISITING?

Both the President and Congress demonstrated support for nurse home visiting by appropriating $10 million for home visitation models in fiscal year 2008, a year when many other discretionary programs were being cut. Until these funds were appropriated, there was no direct federal funding source for nurse home visiting programs, although many state and local programs drew on federal funding under Medicaid and Temporary Assistance for Needy Families, as well as state, local, and private funding. Bills have been

introduced to expand funding for nurse home visiting specifically, and for home visiting more generally:

- S. 1052/H.R. 3024, the Healthy Children and Families Act, introduced by Senator Salazar (D-CO) and Representative DeGette (D-CO) would allow states the option of providing nurse home visitation services under Medicaid and the State Children's Health Insurance Program.

- S. 667/H.R. 2343, the Education Begins at Home Act, introduced by Senator Bond (R-MO) and Representative Davis (D-IL), would authorize grants to states to fund home visitation services during early childhood. H.R. 2343 was reported out of the House Committee on Education and Labor on June 18, 2008.

In addition, presidential candidate Barack Obama has declared his support for providing nurse home visiting to all low-income first-time mothers.[16]

NOTES:

[1] Nurse Family Partnership National Service Office, *Nurse-Family Partnership: Effective and Affordable -What's Not to Like About It?* (Denver: Nurse Family Partnership, 2008), http://www.nursefamilypartnership.org/resources/files/PDF/Fact_Sheets/NFPCostBrief.pdf.

[2] The cognitive outcomes of children in Memphis have been studied at ages two, six, and nine. There were no statistically significant differences in cognitive skills at age two; small positive gains at age six on IQ, particularly among the low-resource sample; and gains in achievement tests at age nine (only significant for the low-resource sample). See Kitzman et al. 1997; Olds et al., 2004a; Olds et al., 2007 (full citations in reference table below).

[3] The children in Denver have been observed at ages two and four (published results thus far). There was some evidence of small positive gains at age two (in overall sample, and to a greater extent in low-resource sample) and at age four (among the low-resource sample). The effect sizes of nurse home visiting were 0.31 on language skills and 0.47 on executive functioning among the low-resource children at age four. See Olds et al., 2002 and 2004b.

[4] There were no significant effects on mothers' reports of children's behavior at age four in Denver (although testers reported that nurse-visited children born to low-resource mothers regulated their behavior better during testing), nor at ages two or nine in Memphis. However, at age six, nurse-home visited mothers in Memphis reported fewer children exhibiting severe behavioral problems (1.8 percent vs. 5.4 percent) and children born to low-resource mothers revealed less dysregulated aggression and incoherence in response to story stems. See Olds et al., 2004a.

[5] The improvement in pregnancy outcomes was strongest in Elmira, where nurse-visited women improved their diets and reduced cigarette smoking, and there were significant reductions in preterm births among smokers and adolescents (but not older non-smokers). In addition, nurse-visited women in Memphis had fewer prenatal hypertensive disorders, and nurse-visited women in Denver had lower levels of cotinine (a biological marker for cigarette smoking). See Olds et al, 1986, Kitzman et al, 1997, and Olds et al., 2002.

[6] Differences in days of hospitalization and health care encounters for injuries and ingestions are based on observations during the first four years in Elmira and two years in Memphis. Such data were not tracked in Denver because researchers were unable to access similar health system records. See Olds et al., 1986b; Olds et al., 1994; Kitzman et al., 1997.

[7] Ibid.

[8] The difference in mortality in Memphis at age nine was statistically significant at the 0.10 confidence level but not the 0.05 level. See Olds et al., 2007.

[9] The reduction in subsequent births was significant in Memphis and Elmira but was not statistically significant in Denver, at least not as of data collected when the first child was four years old. See Olds et al., 2007; Olds et al., 1997; and Olds et al., 2004b.

[10] See Olds et al, 1997 (Elmira, age 15).

[11] Reductions in welfare use were observed in Elmira (child age fifteen) and Memphis (child age six and age nine), but not Denver (child age four). Increases in father involvement and partner stability were observed in Memphis (age six and nine), but not in Denver (age four). Reductions in domestic violence against mothers were observed in Denver. Differences in populations served, available measures, and historical context (e.g., before and after welfare reform) may explain some of the differences observed across sites. See Olds et al., 1998, Olds et al, 2004a, Olds et al, 2007, Olds et al, 2004b.

[12] These outcomes are for the full sample; similar outcomes occurred for the low-income sample. See Olds et al, 1998, and Coalition for Evidence-Based Policy, *Nurse-Family Partnership*, http://www.evidencebasedprograms.org/Default.aspx?tabid=35.

[13] Benefit-cost evidence is summarized in Julia Isaacs, *Cost-Effective Investments in Children* (Washington, D.C.: Brookings Institution, 2007), http://www.brookings.edu/papers/2007/01childrenfamilies_isaacs.aspx.

[14] Olds et al., 2002.

[15] The first site, Elmira, served a largely White, semi-rural population in upstate New York and included first-time mothers of varying levels of socioeconomic advantage. Program effects were

concentrated in low-income populations, and services were restricted to such mothers in the second and third site. The second site, Memphis, served many African American mothers and was implemented in the "real-world" setting of the county health department. The third site, Denver, served a sizable Hispanic population and experimented with using paraprofessionals in place of professional nurses (outcomes above are reported for nurses, who had stronger impacts than paraprofessionals).

[16] Julia Isaacs, *Candidates Issue Index: Children* (Washington, D.C.: Brookings Institution, 2008), http://www.brookings.edu/papers/2008/0515_children_isaacs_opp08.aspx.

References:

Kitzman et al. 1997	Memphis age two	Harriet Kitzman, David Olds, Charles Henderson and others, "Impact of Prenatal and Infancy Home Visitation by Nurses on Pregnancy Outcomes, Childhood Injuries, and Repeated Childbearing," *JAMA* 278 (1997): 644-632.
Kitzman et al. 2000	Memphis age four	Harriet Kitzman, David Olds, Kimberly Sidora and others, "Enduring Effects of Nurse Home Visitation on Maternal Life Course: A 3-Year Follow-up of a Randomized Trial," *JAMA* 283 (2000): 1983-1989.
Olds et al. 1986a	Elmira prenatal	David Olds, Charles Henderson, Robert Tatelbaum, and Robert Chamblin, "Improving the Delivery of Prenatal Care and Outcomes of Pregnancy: A Randomized Trial of Nurse Home Visitation," *Pediatrics* 77 (1986): 16-28.
Olds et al. 1986b	Elmira age two	David Olds, Charles Henderson, Robert Tatelbaum, and Robert Chamberlin, "Preventing Child Abuse and Neglect: A Randomized Trial of Nurse Home Visitation," *Pediatrics* 78 (1986): 65-78.
Olds et al. 1994	Elmira age four	David Olds, Charles Henderson, and Harriet Kitzman, "Does Prenatal and Infancy Nurse Home Visitation Have Enduring Effects on Qualities of Parental Caregiving and Child Health at 25-50 Months of Life?" *Pediatrics* 93 (1994): 89-97.
Olds et al. 1997	Elmira age fifteen (mother)	David Olds, John Eckenrode, Charles Henderson and others, "Long-Term Effects of Home Visitation on Maternal Life Course and Child Abuse," *JAMA* 278 (1997): 637-643.
Olds et al. 1998	Elmira age fifteen (child)	David Olds, Charles Henderson, Robert Cole, and others, "Long-Term Effects of Nurse Home Visitation on Children's Criminal and Antisocial Behavior: 15-Year Follow-up of a Randomized Controlled Trial," *JAMA* 280 (1998): 1238-44.
Olds et al. 2002	Denver age two	David Olds, JoAnn Robinson, Roth O'Brien and others, "Home Visiting by Paraprofessionals and Nurses: A Randomized, Controlled Trial," *Pediatrics* 100 (2002): 486-496.
Olds et al. 2004a	Memphis age six	David Olds, Harriet Kitzman, Robert Cole and others, "Effects of Nurse Home-Visiting on Maternal Life Course and Child Development: Age 6 Follow-Up Results of a Randomized Trial," *Pediatrics* 114 (2004): 1550-1559.
Olds et al. 2004b	Denver age four	David Olds, JoAnn Robinson, Lisa Pettitt, and others, "Effects of Home Visits by Paraprofessionals and by Nurses: Age 4 Follow-Up Results of a Randomized Trial," *Pediatrics* 114 (2004): 1560-1568.
Olds et al. 2007	Memphis age nine	David Olds, Harriet Kitzman, Carole Hanks, and others, "Effects of Nurse Home Visiting on Maternal and Child Functioning: Age 9 Follow-up of A Randomized Trial," *Pediatrics* 120 (2007): e832-e845.

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- The key role of education at all levels in creating the skills needed to promote opportunity and reduce poverty;
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- The growing fiscal problems at the federal and state levels and steps that might be taken to ensure fiscal responsibility while minimizing cuts in effective programs targeted to this low-income families and children.

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