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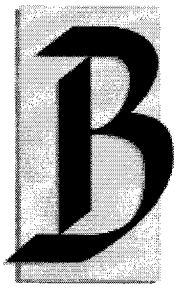

THE BROOKINGS INSTITUTION

1775 Massachusetts Avenue, NW Washington, DC 20036-2103
Tel: 202-797-6000 Fax: 202-797-6004
www.brookings.edu

Cost-Effective Investments in Children

Julia B. Isaacs

BUDGET OPTIONS SERIES

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PAPER SUMMARY

Based on a review of benefit-cost evidence, this paper identifies four areas of investment that merit expanded federal funding even in a time of fiscal austerity. America's future economic well-being will benefit from targeted investments to ensure that children have the skills to become tomorrow's adult workers, caregivers, taxpayers, and citizens. Target areas for a package of proposals totaling about $25 billion annually and $133 billion over a five-year period are the following:

- High-quality early childhood education programs for three- and four-year-old children ($94 billion over five years);
- Nurse home-visiting programs to promote sound prenatal care and the healthy development of infants and toddlers ($14 billion over five years);
- School reform with an emphasis on programs in high-poverty elementary schools that improve the acquisition of basic skills for all students ($17 billion over five years); and
- Programs that reduce the incidence of teenage pregnancy ($8 billion over five years).

Julia B. Isaacs is a First Focus Fellow and the Child and Family Policy Fellow at the Brookings Institution.

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The views expressed in this paper are those of the author and should not be attributed to the staff, officers, or trustees of the Brookings Institution.

Other papers in this series:

Taming the Deficit, William Frenzel, Charles Stenholm, William Hoagland, and Isabel Sawhill

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Introduction

American children are facing an uncertain economic future. Rising spending for health and retirement benefits for an aging population, combined with falling tax revenues after several rounds of tax cuts, have led to a fiscal crisis. If the current generation fails to take on the responsibility for balancing the budget, future generations will pay the cost—plus interest—of paying off the debt and addressing unfunded financial commitments. Balancing the budget will require a combination of reductions in entitlement spending, reforms in defense and other discretionary spending, and increases in revenues. While the major focus of a responsible, future-oriented budget plan should be deficit reduction, a good budget strategy also needs to make targeted investments in programs that will improve America's future economic well-being. Chief among these is effective investments in children to ensure they have the skills to become tomorrow's adult workers, caregivers, taxpayers, and citizens.

At the most basic level, we share the same imperative as that of our cousins in the animal kingdom—that each adult generation must devote considerable resources to the healthy development of the young to ensure the ongoing survival of the animal community. One view of human society is that the responsibility for investing in the young should lie with parents, as private individuals, at least until the child is old enough for school.[1] An alternative view is that investment in children—by governments as well as parents—has the potential to yield future economic benefits for the country as a whole (in addition to the immediate social benefit of improving the quality of life of children). Under the "productivity argument" of public investments in children, programs that help children acquire the skills needed for success in the adult workforce are viewed as sound investments because of their positive effects in terms of economic growth, global competitiveness, and reductions in levels of criminal activity and welfare use.[2] From this viewpoint, the prudence of investment in a particular program depends to a large extent on whether the program has been demonstrated to have positive outcomes that result in long-term economic benefits that are larger than the program's initial costs.

This paper identifies four areas of investment in children where there is sufficient evidence of positive outcomes and sound benefit-cost ratios to merit greater federal funding at a time when balancing the budget is a national imperative. For each of these four areas, the paper reviews the social science evidence regarding program effectiveness—particularly cost effectiveness—and outlines a specific proposal with a budgetary estimate. As shown in table 1, and detailed in the paper, the total package of investments would cost about $25 billion annually, representing an investment of less than 0.2 percent of gross domestic product.

Table 1. Costs of Cost-Effective Investments in Children: Summary
(in billions of dollars)

	2008	2009	2010	2011	2012	Five-Year
Early Childhood Education	18	18	19	19	20	**94**
Infant and Toddler Programs	1	2	3	4	4	**14**
K-12 School Reform	3	3	3	3	4	**17**
Teen Pregnancy Prevention	1	1	2	2	2	**8**
Total	**24**	**25**	**27**	**28**	**29**	**133**

Note: Details may not add to totals due to rounding. Futher detail provided in table 6.

The first and largest area of investment is federal funding to support high-quality early education experiences for three- and four-year-old children, providing them with foundational skills to be successful in school, the workforce, and society. A large research literature has documented many positive effects of preschool programs, including greater school readiness and higher educational attainment, as well as reduced criminal activity and increased employment as an adolescent and adult. The proposal in this paper would provide full subsidies for low-income children to enroll in high-quality programs, with partial subsidies for all other children, at an estimated cost of $18 billion in 2008 and $94 billion over five years. This is the first priority for investment, because early childhood education programs for three- and four-year-olds have the strongest evidence of returning economic value in return for investment. Estimated benefit-cost ratios range from 2:1 for a conservative estimate of a generic "real-world" early childhood education program to 17:1 for one estimate of a model program.

The second priority is providing services to pregnant women and children under age three to promote sound prenatal care and the healthy development of infants and toddlers. An investment of $1 billion in 2008, increasing to $3 billion in 2010, would fully fund a nurse home-visiting program to improve outcomes for at-risk infants and toddlers. Following the model developed by David Olds and his colleagues, registered nurses would make repeated home visits to pregnant women and new mothers, delivering a curriculum focusing on healthy development from prenatal care through the child's second birthday, with a focus on first-time mothers with low family income. Rigorous, random-assignment evaluation has found positive outcomes, with program returns estimated at $2.88 in benefits for every $1.00 spent in costs, including savings due to reduced criminal activity, greater employment, higher tax revenues, and reduced costs for welfare payments and child welfare programs. Found to be effective in three diverse settings (Elmira, New York; Memphis, Tennessee; and Denver, Colorado), the program has already been replicated in 150 sites across 21 states, making it a leading candidate for investment in the healthy development of the next generation. An additional $0.3 billion each year will fund large-scale demonstrations of other home-based and center-based approaches to serving infants and toddlers, bringing total investments for this age group to $14 billion over five years.

Initiatives to improve educational outcomes for students in America's public schools are a third priority. Most of the federal investment of $3.2 billion in 2008 and $17 billion over five years would address the pressing need for improvement in high-poverty elementary schools by focusing on the acquisition of reading and other basic skills by all students in the early elementary years. Benefit-cost analysis suggests that these reforms will be offset, roughly 1:1, by savings in special education and grade retention. In addition, funding would be provided for a five-state demonstration of improving teacher quality across all grade levels.

The final priority is reducing teen pregnancy in order to help young people make successful transitions to adulthood and to reduce the number of children born into the disadvantaged circumstances of teen parenthood. Specifically, this paper calls for an investment of $1.5 billion in 2008 and $7.7 billion over five years to reduce the incidence of teenage pregnancy through involving teens in a structured volunteer service and youth development program, following the model of the Teen Outreach Program. Random-assignment evaluation of the Teen Outreach Program has demonstrated its effectiveness in reducing teen pregnancy rates and improving academic outcomes; a benefit-cost analysis suggests that the savings from reduced teen births and reduced academic problems outweigh the program's modest costs.

Much of the paper focuses on program effectiveness, as measured through benefit-cost analysis, in order to identify prudent investments. Several steps are involved in estimating benefit-cost ratios (e.g., evaluating program impacts or benefits, translating program impacts into dollar values, projecting program impacts forward into the future, measuring program costs, applying appropriate discount rates to calculate the present value of future benefits, etc.). Each step introduces uncertainty, making the final measure much less precise than is suggested by the exact numerical estimate.[3] While benefit-cost ratios can serve as a general guide to the cost-effectiveness of a program, a program with a reported benefit-cost ratio of 3.5:1 is not necessarily a stronger program than one with a rating of 2.5:1, particularly if the estimates were made by different analysts. Another caution to basing program selection on benefit-cost analysis is the necessary exclusion of potentially promising programs that have not (yet) been evaluated rigorously or had their outcomes analyzed from a benefit-cost perspective. Finally, positive benefit-cost ratios are not the sole criteria on which policymakers may choose to make investments—to state the obvious, most Americans would not limit health interventions to those citizens with remaining earnings potential, but would also provide health care to save lives of eighty-five-year-old citizens. Despite these caveats, benefit-cost analysis will be used as the primary tool for identifying appropriate federal investments in children.

Early Childhood Education for Three- and Four-Year-Old Children

The centerpiece for targeted investments in the next generation is federal support for high-quality, center-based preschool programs for both three- and four-year-old children. This is of first priority—and important enough to warrant $18 billion in new spending in 2008 plus $6 billion in existing spending—because of the strength of the research evidence regarding positive child outcomes and long-term social benefits. Enrolling poor children in early childhood programs improves outcomes in elementary school, with benefits including higher scores on achievement tests, lower use of special education, and lower rates of grade retention, according to reviews across many evaluations. The consensus of this same literature is that short-term cognitive benefits (e.g., gains in IQ scores) decline over time (a phenomenon referred to as fade-out), but children continue to have better academic experiences. Studies following preschool children through adolescence find higher rates of high school completion and higher years of educational attainment when compared to a control group of low-income children not enrolled in preschool programs. When former preschool children become adults, they have higher rates of employment, greater earnings, lower levels of criminal activity, and in some cases, less use of welfare, according to these same studies. Some, but not all, studies find lower rates of child maltreatment and higher rates of employment among the mothers of the children enrolled in preschool.[4]

Benefit-Cost Evidence on Early Childhood Education

A number of analysts have estimated the economic benefits of early childhood education, comparing the stream of long-term benefits against the initial costs of the intervention.[5] Four such estimates are summarized in table 2, showing benefit-cost ratios that range from well over 5:1 for two programs (Perry Preschool and Chicago Child-Parent Centers) to 3:1 for the Abecedarian project and more than 2:1 for an estimate of a generic real-world high-quality early childhood education program based on meta-analysis of forty-eight different program evaluations.

Table 2. Benefit-Cost Ratios of Early Childhood Education Programs for Low-Income Three- and Four-Year-Old Children

	Abecedarian Project	Perry Preschool	Chicago Child-Parent Centers	Meta-Analysis[a]
Age of child	0 to 5	3 and 4	3 and 4	3 and 4
Cost per child	$42,871[b]	$14,830	$6,913	$6,681
Length of program	5 years of full-day, full-year schooling	2 years of half-day schooling for 8 months	2 years of half-day schooling for 9 months	2 years of half-day schooling for 9 months
Benefits	$138,635	$76,426 to $253,154	$49,337	$15,742
Benefit-Cost Ratio	**3.23**	**5.15 to 17.1**	**7.14**	**2.36**
	Benefit-Cost Ratio, by Category			
Government:				
Criminal Justice	n/e	.61	1.07	0.31
Taxes	n/m	.39	1.08	0.18
Education (K-12)	0.21	.38	0.73	0.04
Welfare	<0.01	.14	n/m	0.0
Child Welfare	n/m	n/m	0.07	0.03
Other Government[c]	*	none	-0.06	0.08
Subtotal	**< 1.0**	**1.52**	**2.89**	**0.65**
Participant/Society:				
Crime Victims[d]	n/e	2.27 to 5.91	0.92	0.37
Earnings	2.79	2.93	3.07	0.70
Child Abuse Victims	n/m	n/m	0.04	0.21
Other Benefits[e]	0.23	none	0.22	0.42
Total	**3.23**	**5.15 to 8.74 at age 27 17.1 at age 40**	**7.14**	**2.36**

* For Abecedarian, other government savings are included in the "other benefits" category.
n/e: No significant effect
n/m: Not measured

Note: All costs and benefits are shown in 2003 dollars and benefits are the net present value at age zero using a 3 percent discount rate.
a. Adjusted for real-world effects.
b. Costs are the marginal cost above the cost of child care used by children in the control group. Total costs are higher, an estimated $73,646 in 2002 dollars (before discounting) for operating the Abecedarian project in a public school setting.

c. Other government savings of Chicago Child-Parent Centers are the cost (negative savings) of additional college expenses; other governmental savings in the meta-analysis are associated with reduced need for publicly funded child care and savings due to lower alcohol and drug abuse.
d. Costs of crime losses are higher when one includes a dollar value of the intangible losses of pain and suffering in addition to the tangible costs of lost property, health care, and lost earnings. Intangible losses are included in the higher values for Perry Preschool and the estimate for the meta-analysis, but not in the lower estimate for Perry or the estimate of Chicago Child-Parent Centers. Such intangible losses also are included in the meta-analysis estimate of losses of child abuse victims.
e. Other benefits of Abecedarian include savings from reduced smoking (and smoking-related health care), offset by increased costs for college. Other benefits of Chicago Child-Parent Centers include the value of child care to the mother, less the additional costs of college for the adult participant. Other benefits of the meta-analysis include the value of child care to the mother, the effects of reduced alcohol and drug use, and the estimated non-earnings effects of higher education (e.g., effects on health, fertility, next generation's education, etc.).

Source: Benefit-cost ratios in top half of table are from Karoly, Kilburn, and Cannon (2005); benefit-cost ratios by category, shown in the bottom half of the table, are the author's calculations based on Karoly et al. (1998) for Perry Preschool and Abecedarian, Reynolds et al. (2002) for Chicago Child-Parent Centers, and Aos et al. (2004) for the meta-analysis.

Abecedarian and Perry Preschool were high-quality, model programs with the advantage of being evaluated under the rigorous conditions of randomly assigning children to treatment and control groups to ensure that observed differences were truly due to the intervention. The Abecedarian project in North Carolina was a very intensive intervention that enrolled young infants in a full-day, full-year, program with an infant-teacher ratio of 3:1 (and a child-teacher ratio of 6:1 as children grew older). The center-based program was continued until kindergarten and was supplemented by home visits during the first three years.[6] The High Scope/Perry Preschool program in Ypsilanti, Michigan, was a half-day (two-and-a-half hour) program five days a week, plus one weekly home visit by the teacher, operating fewer than nine months a year. Three- and four-year-old children at risk for academic failure were enrolled in preschool classes that had an average child-teacher ratio of less than 6:1 and used a curriculum designed to support children's self-initiated learning.[7]

Both Abecedarian and Perry Preschool were found to return benefits that exceeded program costs, with benefit-cost ratios estimated at 3.23:1 for the Abecedarian model and at least 5.15:1 for Perry Preschool. The benefit-cost ratio for Perry Preschool rises to 8.74:1 if one includes the value of intangible losses due to crime, that is, pain and suffering of crime victims, and to 17.1:1 including intangible losses and the most recent data from a longer follow-up period.[8] The random-assignment research design of these two programs gives considerable confidence to the results, although both studies had small samples of children (111 in the Abecedarian study and 123 in the Perry Preschool study, counting both program and control groups). Another concern is that both Abecedarian and Perry Preschool were intensive pilot programs implemented in the 1960s and 1970s, and so it may be hard to fully replicate their results in large-scale programs operating under current conditions.

In contrast, the Chicago Child-Parent Centers program is a multi-site preschool program, run at more than twenty centers in the Chicago Public Schools, still operating today, and the subject of a longitudinal study following more than 1,500 children (989 in the treatment group and 550 in the control group). The preschool component is a half-day, center-based preschool program during the school year, with an active family involvement component and a six-week summer program. A benefit-cost analysis based on outcomes at age twenty-two found a benefit-

cost ratio of 7.14:1. While the Child-Parent Centers program is a good model of a high-quality program run in the real world, its results may be overestimated because of the quasi-experimental design of the longitudinal study. Without random assignment, it is possible that some of the measured differences between the intervention group and the matched comparison group are due to unobserved pre-existing differences.

A conservative estimate of the benefit-cost ratio of early childhood education is shown in the last column of table 2. In this estimate, analysts at the Washington State Institute for Public Policy (WSIPP) did a meta-analysis of forty-eight program evaluations, including the full range of programs, from the Abecedarian project, Perry Preschool, and the Chicago Child-Parent Centers to programs that had smaller, or in some cases, negligible impacts.[9] The researchers made the following adjustments to reported outcomes: they assumed real-world programs will have only 50 percent of the impact of model programs such as Abecedarian and Perry Preschool, they applied a 25 percent reduction to the reported effects of quasi-experimental studies such as Chicago Child-Parent Centers because of concerns about research design, and they applied a decay rate to achievement effects observed only at younger years. Applying such a decay rate reduces the likelihood that they will overestimate adult outcomes that are projected on the basis of child outcomes observed at different ages. Even under these conservative assumptions, a program for low-income three- and four-year-olds is estimated to return $2.36 in benefits for every $1.00 in costs. Another careful meta-analysis of program effects of sixteen well-designed studies of early childhood interventions also concluded that early childhood intervention has a net positive impact, even when factoring in the disappointing lack of effects found in a few key studies.[10]

In the bottom half of table 2, the total benefits per dollar in cost are split across major categories (criminal justice, taxes, education, earnings, etc.) to provide more information about program impacts. For example, the $3.23 in benefits of Abecedarian includes $0.21 in reduced costs for public education, negligible amounts in welfare savings, $2.79 in increased earnings, and $0.23 in other benefits (primarily due effects of reduced smoking). Savings to governmental budgets (the "government subtotal") generally comprise less than half of total benefits, because of large benefits to the participating child and mother (e.g., increased earnings) and to the rest of society in their non-taxpayer role (e.g., avoidance of losses due to crime).

From the narrow perspective of governmental budgets, estimates for two programs—Perry Preschool and the Chicago Child-Parent Centers—suggest that benefits exceed costs, while estimates for two other programs—Abecedarian and the conservative meta-analysis—suggest a *governmental* benefit-cost ratio less than one. Reduced costs to the criminal justice system (costs for arrests, judicial proceedings, and incarceration) are the largest component of government savings in all programs except Abecedarian, where reductions in criminal activity did not rise to the level of statistical significance and so are not included. Increased tax revenues resulting from the increased earnings of the child and/or mother are also substantial (except in Abecedarian where taxes were not included in the analysis). All four benefit-cost analyses also include savings to local school budgets, primarily resulting from reduced placements in special education, but also due to reduced grade retention. There also were scattered findings of small savings from lower welfare payments, reduced costs associated with child abuse and neglect, and savings to other government agencies. Looking beyond the government, the two largest benefits are higher earnings of participants and their parents and reduced losses for crime

victims (property loss, medical expenses, lost time from work, and in some analyses, the estimated value of losses due to pain and suffering).

Art Rolnick and Rob Grunewald of the Federal Reserve Bank of Minneapolis have expressed the savings stream implied by the 8.74:1 benefit-cost ratio of the Perry Preschool program as a 16 percent internal rate of return, or interest rate paid back on the initial investment.[11] If the earnings gains of participants are excluded, the estimated public rate of return is 12 percent. Because this is a higher rate of return than yielded by many public and private investments, they conclude that there is serious underinvestment in early childhood education as a form of economic development. James Heckman, Nobel Laureate at the University of Chicago, and his colleague Dimitriy Masterov concur that "at current levels of public support, America underinvests in the early years of its disadvantaged children."[12] They argue that investing in children at early ages, before they enter school, is a more cost-effective approach to improving skills of disadvantaged individuals than addressing gaps in skills once children are school-age or when they get to be adults. Even if large-scale programs were to have only half the effects of the Perry Preschool program, an 8 percent real rate of return would still be a sound investment.

While a 50 percent reduction between model programs and real-world effects is somewhat arbitrary, it may be appropriate. A recent random-assignment study of the Head Start program, which serves more than 900,000 children in 18,865 local programs, found positive, but modest, short-term impacts on some measures of school readiness among children.[13] An earlier, non-experimental study of longer-term effects found that when Head Start participants became adults, they were more likely to complete high school and attend college, and less likely to be arrested or convicted of crime than their siblings who did not participate in Head Start.[14] Thus there is some suggestion that Head Start has long-term savings in the same general areas as the model programs, but the evidence is not as strong. Moreover, the effects are likely smaller than in model programs because of the lower and more variable quality of Head Start programs. A new national preschool initiative requires improving the quality of Head Start programs, as well as opening the program to a broader group of preschool children.

Early childhood programs may provide benefits beyond those economic benefits quantified in a benefit-cost analysis. Chief among these is promoting greater equality of opportunity by narrowing the differences in skills among children of different family backgrounds as they enter school. Additional potential benefits include improved quality of life during childhood, increased engagement in civic society as adults, and greater capacity for making informed decisions in personal and family life when becoming heads of household.[15] Finally, early childhood education may have positive effects on national economic growth, by raising the overall education level of the country and better preparing future workers to compete in the global economy.[16]

As many as forty states are already investing in state preschool programs, some available to all four-year-old children, and some targeted to low-income children and others at risk for school failure.[17] The proposal outlined in this paper would support state efforts, with federal aid most strongly targeted to low-income children, but also providing partial federal support to children across the income ranges. Programs would be encouraged to enroll three-year-old as well as four-year-old children in center-based programs providing high quality care and education. Programs could be operated by local school districts, existing Head Start centers, or other non-

profit organizations. Additional child care funding would be provided for preschool-aged children with working parents to extend care during working hours and in the summer time.

Early Childhood Education Proposal

More specifically, I propose providing federal funding for high-quality, half-day, center-based programs for both three- and four-year-old children. Children qualifying for free school lunches (that is, below 130 percent of poverty) would receive a half-day of pre-kindergarten services at no cost; services to children of moderate and higher incomes would receive a partial federal subsidy, supplemented by a combination of state and local funding and parental fees. To be eligible for federal funding, programs would have to meet national standards for critical design elements such as class size (e.g., no more than 16 children), child to staff ratios (e.g., no more than 8:1), staff qualifications (a minimum of a bachelor's degree for the head teacher and an associate's degree for the assistant teacher, as well as specific training in child development), and parental involvement activities. Curriculum choices would be left to local programs but should meet state guidelines for early learning and school readiness.

Estimates of the costs of early childhood education programs vary considerably. Both the Perry Preschool and Chicago Child-Parent Centers had benefit-cost ratios of 7:1 or higher, but with differential costs—$8,520 per year for Perry Preschool compared to $4,460 per year for the Child-Parent Centers (in 2003 dollars).[18] Both programs provided half-day, part-year programs with well-qualified teachers and substantial levels of family support activities. Costs were higher in the full-day, full-year Abecedarian project, which cost $13,170 per year in 2002 dollars for three- and four-year-old children in a public school setting.[19] On the other hand, the median state spent only about $3,500 per pre-kindergarten student in 2003,[20] and Head Start costs per child averaged about $7,000 for a mix of half-day and full-day programs (not counting the additional 20 percent of costs—usually in-kind benefits of volunteer time or facilities—provided by local agencies). Head Start provides more health, transportation, and social services than do other programs; an estimated 29 percent of Head Start funding is for such costs.[21] However, Head Start also pays lower teacher salaries and has lower levels of teacher qualifications—about one-third of Head Start teachers hold a bachelor's degree, according to 2003 data.[22]

Annual costs for the new program are estimated to be $8,200 per child in 2003 dollars ($9,200 in 2008 dollars), roughly equivalent to costs for Perry Preschool and calculated by averaging costs for Abecedarian, Perry Preschool, Chicago Child-Parent Centers, and Head Start. (The lower-cost state pre-kindergarten programs were not included in the average because at lower funding levels the programs could not afford the combination of high teacher qualifications and low class sizes and full array of services likely to produce the benefits of the higher-quality and more intensive programs.) Total federal costs for the "free" portion of the preschool program are estimated to be $13.3 billion, based on an eligible population of 2.1 million children and assuming participation rates of 75 percent for four-year-old children and 60 percent for three-year-old children.[23]

In addition, the proposal would include a partial federal subsidy for children from families at higher income levels. Federal funding would cover 33 percent of the full cost of preschool enrollment, or about $3,000 per child in 2008. The remaining costs of roughly $6,000 per child would be paid by a combination of state and local funding and/or parental fees, as determined by each state or locality. For example, states could set a general sliding scale where fees vary

by income, or could choose to target state funding to children of particular age group (e.g., four-year-olds), geographic areas (e.g., economically stressed areas) or income levels (e.g., up to 200 percent of poverty). Current state funding of preschool programs—roughly $3 billion—would cover only a fraction of the non-federal program costs for the 5.9 million preschool children with incomes above 130 percent of poverty, and so many families are likely to face program fees. One would generally expect fees for services to dampen demand; in this case, parents may choose to place children in private preschools, family-based child care arrangements, or parental care. Federal costs for the "partial subsidy" portion of the preschool program are estimated to total $8.6 billion, assuming that fees cause participation rates to drop from 75 to 60 percent for four-year-old children and from 60 to 35 percent for three-year-old children.[24] Under these assumptions, about one-third of children in the public preschools would be from families below 130 percent of poverty and two-thirds from families with incomes above that limit.

The third program component is "wrap-around" child care, that is, extended care past the half-day preschool and into the summer for children whose parents are working. This care could be provided through the existing federal child care assistance program, the Child Care and Development Fund (CCDF), which gives vouchers to allow parental choice in child care arrangements. Some children may remain in the same center-based programs providing the enriched pre-kindergarten experience in the morning; others may receive child care through family day-care homes or other providers. The federal cost for this wrap-around child care is estimated to be $2.4 billion, assuming that eligibility rules, sliding fee scales, and federal-state matching rates for funding are the same as under the existing CCDF child care assistance program. This estimate assumes that 1.2 million preschoolers meet the CCDF eligibility requirements in their state and have a need for full-time, full-day care and that the average annual subsidy for wrap-around care is $3,500 in 2008.[25]

Finally, the preschool proposal includes $20 million annually in research and demonstrations to continue studying and refining the key dimensions of program quality. Such research, for example, could compare costs and outcomes of half-day and full-day preschool interventions, assess whether program design should be modified for three-year-old children; and further study the extent to which years of formal education and specific training in child development affect teacher quality and child outcomes.

In total, the program is estimated to cost $24.3 billion, including $13.3 billion for the free preschool for low-income children, $8.6 billion for the partially subsidized preschool program for other children, $2.4 billion for extended hours of care for children of working parents in the afternoon and in the summer, and $20 million for research on program quality. Not all these funds would be new funds, however. Baseline spending in 2008 already includes $6.5 billion in federal spending for three- to five-year-olds in the Head Start program, as well as some level of child care funding for three- and four-year-old children in the CCDF. Once the new program is implemented, it will absorb the existing Head Start program (other than the Early Head Start program for children under three). Given that the federal government already spends $6.5 billion, net new spending on early childhood education is $17.8 billion in 2008. In the case of the child care funding, it is hard to know how much of the $2.4 billion is for new child care services as compared to services already funded with federal child care assistance; as a simplifying assumption the entire $2.4 billion cost is treated as new child care funding. In essence, this new funding will free up some unknown amount of child care assistance for child

care at other ages, including child care for infants and toddlers, a need discussed in more detail below.

Investing in early childhood education will not help reduce the federal budget over the ten-year horizon. Economist Robert Lynch examines the government savings in the Perry Preschool benefit-cost analysis and concludes that if the program were ongoing and incurring up-front costs for a new group of children each year, governmental costs would exceed savings for the first seventeen years.[26] After this seventeen-year mark, however, government savings would increasingly exceed costs, as successive cohorts of preschool children entered employment with higher earnings and were less involved in criminal activity. The largest savings would go to state and local governments (for criminal justice and education costs), but the federal government would also benefit (through higher tax revenues and lower child welfare and other social service expenses). While the delay in governmental savings is not ideal, savings that accrue seventeen years from now will be opportunely timed to help offset the growing costs of entitlement programs for the elderly.

Supporting Healthy Development of Infants and Toddlers

Children under age three are the second priority for targeted investments. A $3 billion annual investment would provide sufficient funding to send public health nurses into the homes of all low-income first-time mothers, following a carefully designed home-visiting program that supports young mothers in making healthy choices for themselves and their infant. This funding would also support demonstrations of other approaches to serving infants and toddlers.

Much of the same rationale for intervening with disadvantaged three- and four-year-old children also applies to infants and toddlers—and to prenatal development. Research has shown the importance of healthy environments and interactions in early years to the life-long development of an individual.[27] The development of the brain itself is influenced by the stimuli to which the infant is exposed, in utero and in early years.[28] By age three, significant differences in children's skill levels by family income level are already evident, reflecting differences in home environments and parent-child interactions.[29] Therefore, interventions before age three can play a critical role in increasing the lifetime trajectory of skill development of children from families that are low in economic and family resources.

While the potential benefits of serving very young children are clear, there is less evidence on the best intervention strategy for this age group. One popular approach is home visiting, where services are delivered in the home, in an attempt to change parental behaviors and improve the environment in which the child spends most of his or her time. Because parents are a child's primary teachers, the theory is that changes in parental behavior can have large and life-long impacts on children. However, program results have been more modest than the gains documented for center-based programs with three- and four-year-old children. While some home-visiting programs have had positive effects in random-assignment evaluations, others have had little effect. An influential meta-analysis published in 1999 cautioned against large expansion of home-visiting programs, given their mixed and modest impacts.[30] There also is mixed evidence of the effectiveness of center-based programs serving at-risk infants and toddlers. While the Abecedarian project has a positive benefit-cost ratio as described above, the Infant Health and Development Program, which provided center-based care and home visiting for low birth-weight infants from ages one to three, has not had as clear evidence of positive

impacts. Moreover, providing center-based services to infants and toddlers is quite expensive, given the need for low child to staff ratios. Total costs of the Abecedarian project, for example, were $17,800 per year for one- and two-year-olds, compared to $13,200 per year for three- and four-year-olds.[31]

There is one home-visiting program, the Nurse-Family Partnership, which has had demonstrated positive impacts on health and education outcomes for children and first-time mothers. Developed by David Olds and his colleagues, the Nurse-Family Partnership differs from other home-visiting programs in the following critical design elements: It enrolls first-time pregnant women before they give birth; it focuses on low-income populations whose infants are at higher risk for adverse outcomes; it uses registered nurses trained in a curriculum covering specific health and development topics; and visits are tracked through a web-based management information system that monitors adherence to the intervention model. Nurses make visits of 75 to 90 minutes, typically weekly during the second trimester of pregnancy, and gradually declining to once a month as the child ages to two years old. The curriculum is focused on the following major goals: 1) improving pregnancy outcomes through attention to prenatal health; 2) improving healthy development of the infant by teaching parents about sensitive and competent ways of childrearing; and 3) improving maternal life course by encouraging parents to plan future pregnancies, complete education, and find work.[32]

Benefit-Cost Evidence on the Nurse-Family Partnership

Program effects have been measured in three different cities (Elmira, New York; Memphis, Tennessee; and Denver, Colorado). Documented results include delays in second births, reduced risks of abuse and injury, improvements in the child's cognitive and socio-emotional outcomes, and higher levels of maternal employment. Analysts at the RAND Corporation and WSIPP have quantified these impacts as dollar savings, resulting in the benefit-cost ratios shown in table 3. RAND analyses, shown in the first two columns, are based on the original Elmira study that followed children until age fifteen. The benefit-cost ratio was quite high—5.68:1—for mothers deemed at "high risk" (that is, being a low-income, teenaged single parent, or having at least two of those income, age, and family structure risk factors). Yet even among the low-risk sample at Elmira, benefits exceeded costs at a society-wide level (1.26:1).[33] The WSIPP analysis reported a benefit-cost ratio of 2.88:1 in a meta-analysis that combined the findings at age fifteen from Elmira (the full sample of low- and high-risk mothers) with the findings at age six in the more recently implemented nurse home-visiting programs in Memphis, Tennessee, and Denver, Colorado.[34] Because of the rigorous research design of its evaluations, the replication of successful results in three different settings, and the positive benefit-cost ratios, the Nurse-Family Partnership is included in numerous lists of effective programs, including lists developed by Blueprints for Violence Protection, the Coalition for Evidence-Based Policy, and the Committee for Economic Development.

As in the earlier table on early childhood education, the overall benefits in table 3 are split between benefits to taxpayers and benefits to participants and the rest of society in their non-taxpayer role. With the exception of the Elmira low-risk sample, the Nurse-Family Partnership model pays for itself at a governmental level, with a government savings ratio of 4.44:1 under one estimate and 1.05:1 under another. (The difference across the three estimates is due to several factors, including different samples of the Elmira trial, the inclusion of all three sites in the third estimate, and differences in estimating techniques and assumptions used by RAND and WSIPP.) As with center-based early childhood education programs, reduced criminal

Table 3. Benefit-Cost Ratios of the Nurse-Family Partnership for First-Time Mothers and their Infants

	Elmira High-Risk Sample	Elmira Low-Risk Sample	Elmira, Memphis, and Denver
Age of child	0 to 2	0 to 2	0 to 2
Cost per child	$7,271	$7,271	$9,118
Length of program	2.5 years of home visits	2.5 years of home visits	2.5 years of home visits
Benefits	$41,419	$9,159	$26,298
Benefit-Cost Ratio	**5.68**	**1.26**	**2.88**
	Benefit-Cost Ratio, by Category		
Government:			
Criminal Justice	0.87	0.23	0.87
Taxes	1.03	.21	.06
Education (K-12)	n/m	n/m	0.005
Welfare	2.54	0.24	0.0
Child Welfare[a]	n/d	n/d	0.09
Other Government[a]	n/e	0.02	0.02
Subtotal	**4.44**	**0.70**	**1.05**
Participant/Society:			
Crime Victims	1.03	0.25	0.93
Earnings	0.21	0.31	0.23
Child Abuse Victims	n/d	n/d	0.54
Other Benefits[b]	n/d	n/d	0.14
Total	**5.68**	**1.26**	**2.88**

n/d: Not monetized
n/e: No significant effect
n/m: Not measured

Note: All costs and benefits are shown in 2003 dollars and benefits are the net present value at age zero using a 3 percent discount rate.
a. Possible savings related to child welfare systems were not directly monetized in the two Elmira estimates. See Karoly et al. (1998). Note that other government savings of the Elmira low-risk sample include reductions in emergency room visits when child is twenty-five to fifty months. Other government savings in the meta-analysis include savings due to lower alcohol and drug abuse.
b. Other benefits in the meta-analysis include the effects of reduced alcohol and drug use, and estimated non-earnings effects of higher education (e.g., effects on health, fertility, next generation's education, etc.).

Source: Benefit-cost ratios in top half of table are from Karoly, Kilburn, and Cannon (2005); benefit-cost ratios by category, shown in the bottom half of the table, are the author's calculations based on Karoly et al. (1998) for Elmira high- and low-risk samples and Aos et al. (2004) for analysis across the Elmira, Memphis, and Denver studies.

justice costs and the avoidance of losses due to crime result in significant savings (based on juvenile arrest records through age fifteen as well as arrest records of the mother of the child). Welfare use declined significantly among the at-risk mothers of the children in Elmira and all three analyses show higher tax revenues, reflecting the positive impacts on earnings (the RAND estimates were based on observed increases in maternal employment; the WSIPP analysis used estimated effects on the child, based on increased school achievement). However, the program had no measured impact on use of special education and minimal effects on rates of grade retention. This lack of savings for the education system seems consistent with the relatively weak impact of home-visiting programs on cognitive development.

The Nurse-Family Partnership had a stronger health and safety focus than early center-based care, and some sites had statistically significant reductions in rates of tobacco smoking among pregnant women, emergency room visits for childhood injuries, and rates of child abuse and neglect. Savings from these impacts were relatively small, partly because the impacts were not found consistently across all three sites.

The benefits of nurse home-visiting programs extend beyond those benefits captured in the benefit-cost ratio. Most importantly, the Nurse-Family Partnership delayed the time between first and subsequent births; Olds believes this effect may explain some of the other positive effects as more widely spaced births increase the parental resources available to each child. In addition, mothers who were visited at home provided more developmentally appropriate play materials and used less punishment with their infants. At age four, children in the Nurse-Family Partnership were living in safer homes and in environments that were rated as more conducive to child development.[35]

Nurse Home-Visiting Proposal

The strong evidence of effectiveness of the Nurse-Family Partnership, combined with its replication in 150 sites across 21 states, makes it a leading candidate for a prudent investment in children and the country. I propose a nationwide program of nurse home visiting for all low-income pregnant women expecting a first birth, with the federal government providing 80 percent of program funding. A federal investment of $1 billion in 2008, increasing to $3.1 billion in 2010, would fully fund the program, as follows. In 2004, there were 1.63 million first births (out of 4.11 million births overall)[36] and about 30 percent of these first births were to mothers with income below 185 percent of poverty.[37] This suggests a client population of 367,000 first-time mothers, assuming that 75 percent of pregnant women invited to join the program actually enroll, as was the experience in the first three Nurse-Family Partnership sites.[38] Costs per family are assumed to be $10,083 in 2008 dollars, based on Nurse-Family Partnership costs of $9,000 in 2003 dollars. When fully phased in, total costs would be $3.7 billion, of which 80 percent ($3.0 billion) would be federally funded, with the remainder funded by states or localities. Because costs per family would be spread over a two-and-a-half-year period, from pregnancy through age two, the program would take three years to be fully phased in. That is, costs would be about $1 billion in 2008 and $2 billion in 2009.

One advantage of the nurse home-visiting program is that pregnant women will be encouraged to access health care for themselves and their infants. While this paper does not propose funding for any new child health initiatives, it does recommend continued federal funding of programs providing important health and nutrition services to pregnant women and children. Specifically, the Supplemental Feeding Program for Women, Infants, and Children (WIC) and

the pregnant women and children's portions of Medicaid and the State Children's Health Insurance Program (SCHIP) should not be subject to budgetary cuts. A number of studies have established the cost-effectiveness of the WIC program; in particular, each WIC dollar spent on nutrition and counseling services to pregnant women on Medicaid has been estimated to return $1.77 to $3.13 in savings in neonatal and other medical care expenses.[39] Preventive services funded through Medicaid, such as prenatal care, childhood immunizations, visits to primary care providers, and the Early and Periodic Screening, Diagnosis, and Treatment program also are sound investments in child health and development. As with the WIC program, the strongest evidence of cost-effectiveness is in the area of prenatal care.[40] Finally, SCHIP has played a key role, along with Medicaid, in providing health insurance to children who otherwise would be uninsured.

Additional Demonstrations

In addition to funding for nurse home visiting, I propose $0.3 billion per year in competitive grants to test alternative approaches to serving children zero to three years. Most of these funds would be provided to states on a competitive basis, with some funds reserved for national multi-site demonstrations. Funding would be contingent upon agreement to rigorously evaluate the program interventions. Approaches to be tested might fall into the following five priority areas:

1. *Adapting the high-quality center-based care planned for three- and four-year-olds to serve two-year-old children or even younger infants.* A demonstration that enrolled children in high-quality early childhood programs at different ages, ranging from zero to three, could improve our knowledge of the cost-effectiveness of using such center-based programs for younger children.

2. *Developing and testing models that integrate the Nurse-Family Partnership model of home visiting with center-based programs.* There is some evidence suggesting that a combination of home-visiting and center-based programs is more effective than home-visiting programs alone.[41] In fact, children in the Nurse-Family Partnership are more likely than other children to be enrolled in preschools and licensed day-care programs; more explicit linkages between home-visiting programs and center-based programs should be developed and tested. These models also could test approaches for serving children when they reach their second birthday and lose eligibility for nurse home visiting.

3. *Expanding the Early Head Start program and developing models to integrate such services with the Nurse-Family Partnership model.* About 62,000 at-risk children ages zero to three currently receive services through the Early Head Start program, which began as an expansion of Head Start in 1995. A random-assignment evaluation has shown that the Early Head Start program has positive, though modest, effects on cognitive outcomes.[42] Impacts were larger for families who enrolled during pregnancy, were served in programs using a mixture of center-based and home-based approaches, and were served by programs that were more faithful in adhering to national standards for program design. An expanded program should focus on these areas and explore models that combine the Nurse-Family Partnership with Early Head Start.

4. *Improving quality across the diverse spectrum of center-based and family-based settings that provide child care to infants and toddlers by testing approaches to professional development and training.* An estimated 57 percent of mothers of children under age three are in the labor force and although home-visiting programs can successfully engage with employed mothers, their children spend much of their day in out-of-home settings.[43] Alternative strategies for improving the quality of child care might include providing personalized mentoring to center-based providers and home visiting to family-based providers, testing the advantages of for-credit and non-credit approaches to provider training, and further developing age-appropriate curriculum for infants and toddlers.[44]

5. *Continuing to refine and test other home-visiting models, such as the Parents as Teachers program, which has a focus on school readiness, or Healthy Families America, which has a focus on prevention of child abuse and neglect.* Both these programs have demonstrated some effectiveness in early childhood interventions; Steve Aos and his colleagues at WSIPP estimated a benefit-cost ratio of 1.23:1 for Parents as Teachers and 0.62:1 for Healthy Families America.[45]

Elementary and Secondary School Reform

Cost-effective investments are also needed in public schools, which are not living up to their promise of educating our nation's children. More than one-third of fourth-grade children in public schools do not read at even a basic reading level, according to the National Assessment of Educational Progress.[46] Moreover, there is an educational gap between poor and minority students and their peers. Over half of low-income, public fourth-grade students failed to read at a basic level, compared to 23 percent of those of higher incomes; differences between black and white students were similar (59 percent compared to 25 percent).[47] Also troubling is that an estimated 30 percent of ninth graders fail to receive a regular high school diploma four years later, with high drop-out rates again concentrated among poor and minority populations.[48]

To address these challenges, I propose a federal investment focusing on the early years of elementary school in low-income communities. Specifically, I propose investing $2.9 billion in an enriched program for children in elementary school (kindergarten through third grade) that would use proven school reform approaches to ensure all children acquire basic reading skills, laying the foundation for success in the rest of school. Combined with high-quality preschool programs, at-risk children would be supported from pre-kindergarten through third grade, and schools with high concentrations of low-income children would receive additional resources to achieve the goals of the No Child Left Behind Act of 2001. In addition, $0.3 billion annually would be allocated for five state-wide demonstrations to test innovative policy proposals for improving the quality of the teaching workforce throughout the K-12 public education system.

Early Elementary Years

One reason to focus on early elementary years is so that gains made by disadvantaged preschool children will not fade out due to enrollment in dysfunctional schools. One study of the long-term effects of Head Start found that black children participating in Head Start enroll in poor quality schools after the program, possibly explaining why IQ gains due to Head Start participation fade out more quickly for black children than for white children.[49] Another reason to focus on early elementary years is that reforms such as smaller class sizes have also been found to have more of an effect in lower grades than higher grades.[50] Furthermore, Heckman

and Masterov suggest a technology of skill acquisition, stating, in essence that "skill begets skill."[51] Although their argument was made to support investment in early childhood education, the same rationale applies to school reform. Earlier interventions are likely to be more cost-effective, because they adjust the trajectory of skill development before children fall too far behind their peers. If children do not learn to read in early elementary school, they will be behind the rest of their school years.

Some intervention models continue providing educational enrichment and parental involvement services to children as they move from preschool into kindergarten and up to third grade, following what is often called a PK-3 model. This model was followed by both the Abecedarian project and the Chicago Child-Parent Centers. An alternative approach is to completely reform a low-income elementary school, using a comprehensive school reform model with proven effectiveness. One model with good evidence of effectiveness is the Success for All model developed in the Baltimore Public Schools by Robert Slavin and his colleagues. Widely replicated in a number of schools with large populations of low-income and minority students, Success for All is a school-wide program that focuses school resources on acquisition of basic skills by all children by third grade. While children spend most of their day in traditional classes, they are re-grouped across ages in a daily 90-minute reading period, assigned by reading skill, with periodic testing of reading results every eight weeks. Students who are not making adequate progress receive twenty minutes of additional instruction daily. Cooperative learning, family support teams to increase parental involvement, a school-based facilitator, and specific curricula for reading, writing, and math are also key components of the program.[52]

A recent report reviewing twenty-two widely adopted comprehensive school reform models ranked the Success for All program as being among the top two programs in terms of direct evidence of success.[53] Second-year outcomes of an ongoing multi-site random-assignment evaluation found positive impacts on some literacy outcomes, with an average effect size of 0.17 on reading achievement.[54] A meta-analysis of forty-two different studies of Success for All found a similar average effect size, 0.18, for impacts on student achievement.[55]

Benefit-Cost Analysis of Interventions in the Early Elementary Years

A benefit-cost analysis of Success for All found that program costs of about $3,000 per student were fully offset by $3,000 in reduced expenditures for special education and grade retention.[56] On the one hand, these savings may be overestimated, because the analysis relied on quasi-experimental findings (the only findings available at the time). On the other hand, it ignored any potential savings beyond the public school system, and so the total benefit-cost ratio may be higher than the 1:1 ratio shown in table 4. It may not be much higher, however, if the school-age component of the Chicago Parent-Child Centers is a guide. A benefit-cost analysis of that program also found education savings (in special education and grade retention) approximately equal to program costs of about $3,000. There were additional savings in other areas—increased employment and taxes, reduced crime, and reduced child abuse and neglect—but these were relatively modest, leading to a total benefit-cost ratio of 1.66:1.[57] This is much smaller than the 7.14:1 benefit-cost ratio for the preschool component, estimated in the same analysis of the Chicago Parent-Child Centers.[58] School-age interventions appear to have lower rates of return than investments in early childhood education. Still, the positive benefit-cost ratio and the demonstrated ability to improve achievement of low-income students who often are ill-served by the public school system provide support for programs such as Success for All or the school-age component of the Child-Parent Centers.

Table 4. Benefit-Cost Ratios of Programs for Early Elementary Years
(Success for All and Chicago Child-Parent Centers School-Age Component)

	Success for All (Baltimore)	Chicago Child-Parent Centers (School-Age Component)	Chicago Child-Parent Centers (Preschool Component)
Age of child	Grades K to 5	Ages 6 to 9	Ages 3 and 4
Cost per child	$3,054 (2000$)	$2,981 (1998$)	$6,913 (2003$)
Length of program	average of 3.84 years	5 years of full-day, full year	2 years of half-day, 9 months
Benefits	≥ costs	$3,709	$49,337
Benefit-Cost Ratio	**≥ 1.0**	**1.66**	**7.14**
	Benefit-Cost Ratio, by Category		
Government:			
Criminal Justice	n/m	n/e	1.07
Taxes	n/m	0.09	1.08
Education	1.00	1.12	0.73
Welfare	n/m	n/m	n/m
Child Welfare	n/m	0.04	0.07
Other Government[a]	n/m	-0.004	-0.06
Subtotal	**≥ 1.0**	**1.24**	**2.89**
Participant/Society:			
Crime Victims	n/m	0.14	0.92
Earnings	n/m	0.25	3.07
Child Abuse Victims	n/m	.03	0.04
Other Benefits[b]	n/m	-.003	0.22
Total	**At least 1.0**	**1.66**	**7.14**

n/e: No significant effect
n/m: Not measured

Note: Benefits are shown in the same dollars as costs (2000 dollars for Success for All, 1998 dollars for the school-age component of Chicago Child-Parent Centers and 2003 dollars for the preschool component of Chicago Child-Parent Centers).
a. Other government savings of Chicago Child-Parent Centers are negative, reflecting the costs associated with higher rates of college attendance.
b. Other benefits of Chicago Child-Parent Centers include the value of child care to the mother (for preschool component), less the additional costs of college for the adult participant (for both components).

Source: Borman and Hewes (2002), Reynolds et al. (2002), and author's calculations.

Specific Proposal for Early Elementary Years

Success for All is not the only model for comprehensive school reform nor the only approach to improving reading skills by third grade.[59] However, the research evidence and benefit-cost analysis supporting it, although below the level of evidence of the early childhood education and nurse home visiting literature, is higher than for most other education programs. I therefore propose making expansion of Success for All a major focus of $2.8 billion in competitive grants to high-poverty schools seeking to improve reading and other basic skills by the third grade. At the same time I would provide states and localities with some flexibility in selecting alternative interventions, and I propose $0.1 billion annually for demonstrations and evaluations to improve the scientific research base on educational interventions targeted to the elementary school years.[60]

At the $2.8 billion level, the new grants to elementary schools would fund Success for All or equivalent enrichment services for half of the estimated 5.9 million children in kindergarten to third grade in high-poverty public schools (that is, schools where at least half of the children are eligible for free or reduced-price lunches). This estimate is based on enrollment projections for 2008 and statistics on family income of fourth graders.[61] Annual per student costs are estimated to be $947 in 2008 dollars, based on Success for All costs of $795 in 2000 dollars. Though costs are expressed as per-student costs, grants would be provided to high-poverty schools, not individuals, and so would serve students of diverse economic backgrounds if they attend schools with high concentrations of poverty (and would not serve students with low family incomes if they attend schools with low concentrations of poverty). The funding level would fund only one-half of eligible schools, requiring schools and school districts to actively request funding from their state education agencies, ensuring some degree of competition and limiting grants to those where there is active buy-in by relevant stakeholders. For example, grants might be restricted to schools where at least 80 percent of teachers vote to adopt Success for All by secret balloting, as Slavin currently requires to bring his model into a school.

Ideally, schools should have choices of alternative models with proven success if they do not want to adopt the Success for All model. One option is to allow schools to request grants to implement any comprehensive school reform model that had at least "moderate" evidence of positive effects on student achievement (nine such models met this criteria in November 2006, including two—Success for All and Direct Instruction—that had "moderately strong" evidence).[62] Another option is to allow a limited portion of the grants to be spent on other types of reading intervention strategies, provided they meet some standard of scientific evidence, or to extend enrichment services for preschool children into early elementary years as under the Chicago Child-Parent Centers. Grants might also be used to provide "Summer Opportunity Scholarships" to low-income students in kindergarten to third grade to counter the larger decline in skills that occurs for low-income children over the summer, when children are not in school, as proposed by researchers Molly Fifer and Alan Krueger.[63]

There is a clear tension between providing some flexibility to local schools and restricting funding to proven interventions, given the paucity of education research that meets the highest standards of social science evidence, such as random-assignment experiments. To partially address this problem, I propose spending $0.1 billion annually to test additional approaches to improve educational outcomes for children in elementary years. As noted above, additional approaches could include comprehensive school reform, PK-3 models of enrichment services, specific reading strategies, and summer school programs. A limited proportion of the $2.8

billion could also be spent on these approaches in the initial years. However, as the evidence grows, the vast majority of grants to high-poverty schools should be restricted to programs meeting high standards of proven effectiveness.

State-wide Demonstrations on Teacher Quality

In addition to the $2.9 billion investment in early elementary education, I propose allocating $0.3 billion per year to fund demonstrations of education reforms that propose to improve education outcomes for children and youth by improving the quality of the teachers throughout the public schools. More specifically, I propose allowing up to five states to conduct state-wide experiments of ways to reform the interrelated systems of teacher preparation, evaluation, compensation, and tenure in their state.

Social science research is confirming what parents already know at an intuitive level, that children's success in school depends to a large degree on whether they have a good or bad teacher in the classroom. Statistical analysis of new longitudinal databases is providing mounting empirical evidence that some teachers are demonstrably more effective than others in raising the achievement scores of students assigned to their classrooms, after adjusting for the students' previous academic performance and demographic characteristics. Moreover, these differences do not appear to be correlated to teacher education or credentials, but are best measured by performance on the job. A second strand of research on teacher quality concerns the quality of teachers found in the poorest school districts, suggesting that many teachers in high-poverty schools are less-experienced and weaker teachers who do not have the seniority or credentials to compete for the more attractive jobs in the wealthier schools. This evidence suggests that American public schools are systematically providing a lower-quality education experience to students from lower economic backgrounds, exacerbating differences in student achievement associated with family background.

Significant change in the way in which teachers are hired and compensated is needed to attract and retain better teachers, both in public schools overall and in high-poverty schools. Recent proposals for reform of teacher labor markets include a combination of one or more of the following changes:

- Reduce barriers to entry into the teaching profession;
- Develop longitudinal databases of student achievement and modify the teacher evaluation process to include measures of effectiveness in raising student achievement;
- Abandon the uniform pay scale and provide differential pay tied to teacher effectiveness, service in hard-to-serve schools, and/or placement in hard-to-staff subjects;
- Streamline processes for dismissing ineffective teachers; and
- Improve professional development to enhance teacher effectiveness and opportunities for career advancement within the teaching profession.

Three examples of reform proposals—Teach for America, the Teacher Advancement Program, and a new proposal by Robert Gordon, Thomas Kane, and Douglas Staiger to identify effective teachers through performance on the job[64]—are described in Appendix A, which also provides a more extensive discussion of the emerging research on teacher quality. Under the proposed state-wide demonstrations, states could adopt one of the reforms described in Appendix A, or design their own packages of systemic reforms to teacher labor markets, provided they

incorporate some of the elements above. States seeking demonstration funding must agree to test the reforms under rigorous evaluation conditions, preferably including random assignment of schools or districts to treatment conditions.

Supporting Youth Development and Reducing Teen Pregnancy

The final area of investment targets teens, and in particular, the problem of teen pregnancies and teen births. Reducing teen pregnancies may be seen a way to support youth in making a successful transition to adulthood without the challenges posed by teen parenthood. It also can be framed as an extremely early investment in improving child well-being, reducing the number of children starting life from the disadvantaged status of having a young and often unmarried teen mother.

Although teen birth rates have dropped in recent years (from 62 births per thousand teen females in 1991 to 41 births per thousand teen females in 2004), teen birth rates in the United States are still higher than in most other industrialized countries.[65] High teen birth rates impose significant personal and social costs, primarily because of negative outcomes for the children of teen mothers. A body of research literature documents that these children grow up in less supportive home environments and are at higher risk for child abuse and neglect, poor educational outcomes (including less likelihood of completing high school), elevated levels of problem behaviors, including increased rates of criminal activity, and also have an increased likelihood of becoming single mothers and going on welfare themselves.[66] Many of these outcomes—child abuse rates, criminal activity, lower educational outcomes and thus lower earnings and taxes—have strong potential for having a negative impact on federal, state, and local budgets, as well as on the child born to a teen mother. Researcher Saul Hoffman estimated that teen childbearing cost taxpayers $9.1 billion in 2004, with most of these costs attributable to negative outcomes for children of teens seventeen and under.[67]

To reduce the number of teen pregnancies and teen births, I propose to invest $1.5 billion in 2008 and a total of $7.7 billion over five years to provide teens with the opportunity to participate in the Teen Outreach Program, a structured volunteer service and youth development program that has documented success in reducing teen pregnancy rates. Funds would also be available to support alternative pregnancy prevention programs on a demonstration basis.

Benefit-Cost Evidence on Preventing Teen Pregnancy

Relatively few of the programs designed to prevent teen pregnancy have been shown to work when evaluated under rigorous scientific conditions. However, the National Campaign to Prevent Teen Pregnancy has identified sixteen programs that have demonstrated positive results according to rigorous evaluations using random-assignment research designs.[68] Two programs identified by the Campaign—the Teen Outreach Program and the Children's Aid Society/Carrera program—deserve particular attention because of their success in reducing teen pregnancy rates (many other programs had documented effects on attitudes, use of contraception, and other behaviors, but did not measure effects on pregnancies). Both programs are included in a review of "what works" by Child Trends and have been subject to benefit-cost analysis by WSIPP.[69] Interestingly, both programs have a broad focus on youth development rather than a narrow focus on family planning.

The Teen Outreach Program (TOP) is a classic example of a service-learning program, which combines voluntary community service with structured opportunities for learning before and after the service. Under the TOP, teens participate in volunteer service activities, as well as weekly classroom-based discussions where students talk about the service activities and about youth development topics such as decisionmaking and coping with challenges. Programs may be offered as a health or social studies elective in schools, or as an after-school program led by a community organization. Developed as a project of the Junior League of St. Louis in the late 1970s, the Teen Outreach Program was the subject of a twenty-five-site random-assignment evaluation in the mid 1990s, and is currently found in more than four hundred schools and organizations across the country.[70]

The Children's Aid Society (CAS)/Carrera program is a more intensive program, with daily after-school classes provided over a three-year period. It also has a community service component (for which youth are paid stipends), but this is just one component of a comprehensive program that also includes classes in family life and sexuality, academic assistance, sports activities, and medical services.[71]

One difference between the two programs is that the TOP curriculum places less emphasis on sexuality education; less than 15 percent of the written curriculum addresses issues of sexuality and many sites exercise their discretion not to use these sections of the curriculum, because of community norms or overlap with health education offered in other school classes. Researchers evaluating the TOP note:

> One of the most striking features of the Teen Outreach program is that it does not explicitly focus upon the problem behaviors it seeks to prevent but rather seeks to enhance participants' competence in decision making, in interacting with peers and adults, and in recognizing and handling their own emotions. Particularly in the field of teen pregnancy prevention, this focus has important practical implications, as it means the program may be politically acceptable in communities where programs that explicitly focus upon sexual behavior may not be feasible to implement.[72]

A number of researchers have commented on the success of service-learning programs in reducing teen pregnancy. Brookings Institution researchers Andrea Kane and Isabel Sawhill speculate that the positive impacts of such programs may come from providing opportunities for teens to feel needed and valued, keeping young people occupied and supervised during free time, and fostering positive relationships between teens and the adults operating the programs.[73] Beyond the teen pregnancy prevention literature, there is a broader research literature suggesting that volunteerism or community service has positive impacts on young people's overall psychological health and well-being, as well as contributing direct service benefits to local communities.[74] "Opportunities to help others" is one of the five fundamental resources needed by youth, according America's Promise, a collaborative network of communities and partners working for youth development.[75] Thus investment in service-learning programs may bring social benefits beyond the benefit of reducing teen births.

Female teens who were randomly assigned to participate in the TOP had 41 percent as many pregnancies as comparable young women in the control group.[76] Similar evidence of effective pregnancy reduction was found in quasi-experimental studies of the TOP published in 1990

and 2001. For example, the pregnancy rate in the 2001 study was 4.2 percent among TOP participants, or half the 9.8 percent pregnancy rate of the comparison group. The 2001 study also found a positive effect on male fertility (which was not measured separately in the random-assignment study due to small sample sizes). Significant drops in school-related problems (school drop-out rates, school suspension, and other behavioral problems) were found for both males and females participating in the program, according to both the random-assignment and quasi-experimental studies. Finally, the program had particularly strong positive effects on at-risk teens, including reductions in second births (or fathering a second time) among teens who were already teen parents.[77]

A random-assignment evaluation of the CAS/Carrera program also showed significant effects for female teens; pregnancy rates measured over a three-year period were 10 percent among program participants, compared to 22 percent among the control group. The program had no significant effect, however, on the likelihood that teen males would cause pregnancies. In addition to pregnancy effects, the CAS/Carrera program reduced sexual behavior among teens, increased contraceptive use among those who were sexually active, increased Hepatitis B vaccination rates, and more generally increased use of health-care services outside of emergency rooms.[78]

Reducing teen pregnancies and improving teen's academic success can result in dollar savings, including lower costs associated with criminal activity, remedial education, child abuse and neglect, and public assistance, as well as higher earnings and taxes associated with teens and children born to teens.[79] As shown in table 5, estimates by WSIPP suggest savings of about $800 for each teen participating in the TOP and $2,400 for each teen participating in the CAS/Carrera Program.[80] More than half of these savings are due to the increased educational outcomes and likely earnings prospects of the teen parents and their children. While the savings per participant are three times higher for CAS/Carrera than for the Teen Outreach Program, the difference in costs is even larger—$11,500 for the intensive three-year CAS/Carrera program that met daily after school and in summers, compared to $620 for the one-year TOP operating weekly during the school year. In other words, the Teen Outreach Program is cost-effective, with a benefit-cost ratio of 1.29:1, but the CAS/Carrera program is not. Its benefit-cost ratio is considerably less than 1:1 (0.21:1).

The TOP and the CAS/Carrera program may have additional benefits beyond those included in the WSIPP benefit-cost analysis. Possible effects of the programs on juvenile delinquency or the teen's employment after high school were not measured in either evaluation, even though it seems quite possible that community service activities could affect these areas (and even small reductions in criminal activity can result in large savings to the government and society, as seen by the early intervention literature). The volunteer service may itself have some value, in terms of services provided to people in the hospitals, nursing homes, child care centers, and other agencies served through the volunteer activity. Monetizing these benefits might provide for a fuller accounting of the benefit-cost ratios of service-learning programs. There also may be non-monetary benefits to promoting community service among young people.

Table 5. Benefit-Cost Ratios of Two Teen Pregnancy Prevention Programs

	Teen Outreach Program	Children's Aid Society/ Carrera Program
Age of teens	12 to 17	13 to 15
Cost per teen	$620	$11,501
Length of program	one year	three years of participation
Benefits	$802	$2,409
Benefit-Cost Ratio	**1.29**	**0.21**
	Benefit-Cost Ratio, by Category	
Government:		
Criminal Justice	.04	0.01
Taxes	.18	0.03
Education	.01	0.002
Welfare	.01	0.001
Child Welfare	.01	0.001
Other Government	none	none
Subtotal	**0.25**	**0.04**
Participant/Society:		
Crime Victims	0.05	0.01
Earnings	0.73	0.12
Child Abuse Victims	0.04	0.01
Other Benefits[a]	0.22	0.04
Total[b]	**1.29**	**0.21**

Note: All costs and benefits are shown in 2003 dollars and benefits are the net present value at age zero using a 3 percent discount rate.
a. Other benefits include non-earnings effects of higher education (e.g., effects on health, fertility, next generation's education, etc.).
b. The benefit-cost analysis does not include the value of volunteer time provided by participants.

Source: Aos et al. (2004), with the ratios by category based on author's calculations.

Teen Pregnancy Prevention Proposal

Given its success in reducing teen pregnancies, its positive benefit-cost ratio, its promotion of volunteer service among young people, and its proven ability to be replicated, the Teen Outreach Program is proposed as the primary model for federal investment in teen pregnancy prevention programs. Costs for fully funding the program would be $1.4 billion in 2008, assuming half of all teens would participate in a Teen Outreach Program offered in their school or community. This estimate is based on costs of $675 per participant in 2008 (the average cost for the TOP, adjusted for inflation) and projections of 4.2 million ninth graders and 3.8 million tenth graders in 2008, or an average of 4 million students eligible for enrollment. (Programs would also be open to younger and older teens, but the typical teen would take it while in ninth or tenth grade.)

In addition, $0.1 billion is allocated annually to test other pregnancy prevention programs, allowing local communities to apply for funds to further develop and test teen pregnancy prevention programs that have some promising results but need additional evaluation. On a demonstration basis, it may be useful to allow a few schools or communities to develop and test a more intensive service model, following elements of the CAS/Carrera approach. It would be useful to learn whether a program that is between the intensity of a TOP model and a CAS/Carrera model would be a more cost-effective approach to reducing teen pregnancies. As more programs are demonstrated to have positive impacts under a cost-effective program, the basic program could be amended to allow communities the choice of whether to use these programs in place of the Teen Outreach Program.

Conclusion

The full package of proposals discussed above would cost $24 billion in 2008, rising to $28 billion in 2012, as is shown in table 6. This represents less than 0.2 percent of projected gross domestic product under projections of the Congressional Budget Office.

Over five years, the investment in cost-effective programs for children would total $133 billion. The majority of these funds ($18 billion in 2008 and $94 billion over five years) would be for early childhood education for three- and four-year-olds, the program with the strongest evidence of economic returns to investment. An investment of $1.3 billion in 2008 increasing to $3.6 billion in 2012 ($14 billion over five years) would provide a program of nurse home visiting to all first-time pregnant mothers below 185 percent of poverty and would fund large-scale demonstrations of other home-based and center-based approaches to serving infants and toddlers. At the elementary and secondary level, three initiatives would be funded: grants to adopt proven methods of school reform, such as Success for All, in half of the nation's high-poverty elementary schools; demonstration of other effective programs for children in early elementary years; and a five-state demonstration of improving teacher quality across all public school grades. Investments in this age group require $3.2 billion in federal funding in 2008 and $17 billion over five years. Finally, this paper allocates $1.5 billion in 2008 and $7.7 billion over five years to reduce the incidence of teenage pregnancy through involving teens in structured volunteer service and youth development programs.

Table 6. Costs of Cost-Effective Investments in Children: Detailed Provisions
(in billions of dollars)

	2008	2009	2010	2011	2012	Five-Year
Early Childhood Education	21.9	22.5	23.1	23.8	24.4	115.8
Extended/Summer Care	2.4	2.5	2.5	2.6	2.7	12.8
Demonstrations	*	*	*	*	*	0.1
Head Start 3-5 Years	-6.5	-6.7	-6.9	-7.1	-7.3	-34.5
ECE for Ages 3 to 4 Subtotal	**17.8**	**18.3**	**18.8**	**19.3**	**19.8**	**94.1**
Nurse Home Visiting	1.0	2.0	3.1	3.2	3.3	12.6
Demonstrations	0.3	0.3	0.3	0.3	0.3	1.6
Ages 0 to 2 Subtotal	**1.3**	**2.3**	**3.4**	**3.5**	**3.6**	**14.2**
Success for All	2.8	2.9	3.0	3.0	3.1	14.8
Demonstrations:						
School Reform	0.1	0.1	0.1	0.1	0.1	0.5
Teacher Quality	0.3	0.3	0.3	0.3	0.3	1.6
K-12 Subtotal	**3.2**	**3.3**	**3.4**	**3.5**	**3.6**	**16.9**
Effective Programs	1.4	1.4	1.4	1.5	1.5	7.1
Demonstrations	0.1	0.1	0.1	0.1	0.1	0.5
Teen Pregnancy Subtotal	**1.5**	**1.5**	**1.5**	**1.6**	**1.6**	**7.7**
Total	**23.8**	**25.4**	**27.2**	**27.9**	**28.6**	**132.9**

* 20 million annually

Note: Full-year costs for 2008 are explained in the relevant portions of the text; out-year costs are adjusted for inflation (using the GDP implicit price deflator) and population growth consistent with the adjusted baseline assumptions for domestic discretionary spending used in the Urban-Brookings Tax Policy Center model. Note that the nurse home-visiting program is phased in over a three-year period.

Decisions about investments were largely driven by available information about the cost-effectiveness of different interventions for children and youth. The largest investments would be made for programs with demonstrated effectiveness—high-quality, center-based early childhood education for three- and four-year-old children (71 percent of the five-year total), the Nurse-Family Partnership program for first-time pregnant mothers and their zero to two-year-old children (10 percent), elementary school reform using models with proven effectiveness, such as the Success for All model (11 percent), and the Teen Outreach Program (5 percent). There are, in fact, relatively few programs that meet the test of proven cost-effectiveness, in part because of the challenge of providing effective social interventions, but also because many programs are not evaluated, or do not have sufficiently rigorous evaluations to determine true effects. An additional 3 percent of total funding is set aside for demonstrations of interventions that have preliminary signs of effectiveness, but do not yet have demonstrated benefits in excess of costs. These demonstrations would explore promising, evidence-based policies to

address the critical developmental needs of infants and toddlers, improve educational experiences in the public schools, and reduce the number of children born into the disadvantages of teen parenthood.

Early childhood education for three- and four-year-olds is the area with the smallest proposed demonstrations ($20 million annually) and the largest investment in a national program. While further research and evaluation is important to learn more about how to provide young children with high-quality educational experiences in a cost-effective manner, there already is sufficient knowledge of program practice and positive benefit-cost ratios to move forward on a national scale. Investing an additional $18 billion to $20 billion annually (above the $7 billion already budgeted for the Head Start program) would provide a voluntary preschool enrichment program for three- and four-year-old children, with full federal funding for all low-income children, and partial federal subsidies to open access to children from families of all income levels.

Endnotes

1. Olsen, 2005.
2. Heckman and Masterov, 2004; Lynch, 2004; Rolnick and Grunewald, 2003.
3. Steps and sources of uncertainty in benefit-cost ratio may be summarized as follows. First, there must be a rigorous program evaluation which produces reliable and unbiased estimates of program outcomes. Another, challenging, step is to estimate the financial impact of various outcomes of intervention programs, expressing effects in terms of dollar savings. Program costs must also be estimated. The final step is to compare savings—often accrued in future years—with program costs. When aggregating future benefits over a multi-year period, the analyst faces the task of choosing an appropriate discount rate to reflect the fact that a future dollar is worth less than a current dollar, even when using inflation-adjusted dollars. Many benefit-cost analyses of early childhood programs use a 3 percent discount rate, implying that a benefit of $100 that is not accrued until one year from now has a present value of only $97 (and the present value continues to decline by 3 percent each year, such that a $100 benefit received 20 years from today has a present value of $55).

From the outset, the benefit-cost ratio may be overestimated if program impacts are overstated—as can occur in quasi-experimental evaluations that do not use a random-assignment research design to measure program impacts. On the other hand, because no evaluation can measure all possible outcomes, and not all measured outcomes can be monetized, many benefit-cost ratios understate the true benefits of a program. In particular, it is hard to assign a dollar value to improvements in cognitive development and improvements in the parent-child relationship, and so these benefits are left out of most benefit-cost analyses, even when these outcomes are the most immediate goal of many childhood intervention programs. Many of the more easily quantified benefits (e.g., increased earnings) do not emerge until the child reaches adulthood, meaning that early childhood intervention studies with longer follow-ups tend to have higher benefit-cost ratios. Even when there is a fifteen- or twenty-year follow-up in which to observe outcomes, there still is need for continued projection into the future (e.g., predicting rates of adult criminal activity based on juvenile arrest records through age eighteen), and as noted above, selecting a discount rate for the valuation of benefits that may be accruing for as many as sixty years into the future. See Karoly, Kilburn, and Cannon, 2005; and Karoly and Bigelow, 2005.
4. Shonkoff and Phillips, 2000; Karoly, Kilburn, and Cannon, 2005; Karoly et al., 1998; Aos et al., 2004; Currie, 2001.
5. Karoly et al., 1998; Karoly, Kilburn, and Cannon, 2005; Aos et al., 2004.
6. Masse and Barnett, 2002.
7. Schweinhart, Barnes, and Weikart, 1993.
8. The near doubling of the benefit-cost ratio based on additional data (observations at age 40 in addition to those at age 27) shows the sensitivity of estimates to future projections, and the fact that earlier estimate was conservative in estimating the program's long-term effects on adult employment and criminal activity. See Karoly, Kilburn, and Cannon, 2005; Masse and Barnett, 2002; Schweinhart, Barnes, and Weikert, 1993; Schweinhart, 2005.
9. Aos et al., 2004.
10. Karoly, Kilburn, and Cannon, 2005.
11. Rolnick and Grunewald, 2003.
12. Heckman and Masterov, 2004, p. 3.
13. U.S. Department of Health and Human Services, 2005.
14. Garces, Thomas, and Currie, 2002.
15. Karoly, Kilburn, and Cannon, 2005.
16. Heckman and Masterov, 2004; Dickens, Sawhill, and Tebbs, 2006.
17. Barnett and Robin, 2006.
18. Annual costs for Perry Preschool and Chicago Child-Parent Centers were calculated by dividing total costs in table 2 by 1.74 and 1.55 average years of intervention, respectively. See Borman and Hewes, 2002, for average years of intervention.
19. Masse and Barnett, 2002.
20. Barnett and Robin, 2006.
21. Brandon, 2004.
22. Hamm and Ewen, 2005.
23. The 2.1 million eligible children is based on Census Bureau estimates that 26.6 percent of children under age five were below 130 percent of the poverty line in 2004, and that there were 8.0 million three- and four-year-olds. See pubdb3.census.gov/macro/032005/pov/new02_000.htm for the Census Bureau's Detailed Poverty Tables for 2004. The 75 percent participation rate for four-year-olds is close to the ratio of public school kindergarteners compared to five-year-olds (3.139 million divided by 3.987 million, or 78 percent) in 2001. (Note that some public

school kindergarteners are actually age four or six; the rate would be even lower if restricted to five-year-old kindergarteners.) The participation rate for three-year-olds is assumed to be 15 percentage points lower (60 percent); currently there is a 26 point differential between three- and four-year-old participation in center-based care, but some of that is assumed to disappear when preschool programs for three-year-old children are widely available. Also note that the 75 percent and 60 percent participation rates assume that all existing publicly funded programs (Head Start and state-funded preschool) are incorporated within the new program.

24. It is difficult to estimate the extent to which parental fees will dampen demand, and so the estimated cost for this component is fairly uncertain. Note that the likely drop in participation rates is partially mitigated by the fact that children of more highly educated and wealthier parents tend to have higher preschool enrollment rates. In fact, the 75 percent participation rate assumed for four-year-olds in the cost estimate of the "free" portion of the program may be high, given the pattern of lower participation among lower-income groups.

25. The 1.2 million children assumes that 50 percent of low-income children and 67 percent of the other-income children enrolled in the half-day pre-kindergarten programs need full-day, full-year child care. These estimates are based on based on data in the Head Start Program Information Report and statistics on maternal labor force participation from the Bureau of Labor Statistics. See Hart and Schumacher, 2004; Bureau of Labor Statistics, 2006. All the low-income children and 25 percent of the higher-income children are assumed to meet the CCDF eligibility requirements for child care assistance. The $3,500 cost is based on average CCDF payments for three- and four-year-old children ($385 per month in 2003, according to Appendix Table 7b of the Child Care and Development Fund Report to Congress, annualized and adjusted for inflation, reduced by 10 percent to net out estimated co-payments, and then reduced an additional 25 percent because children will not need as much child care when they are in preschool three hours or more daily). See U.S. Department of Health and Human Services, 2006.

26. Lynch, 2004.

27. Shonkoff and Phillips, 2000.

28. Nelson, 2000.

29. Shonkoff and Phillips, 2000.

30. Gomby, Culross, and Behrman, 1999.

31. Costs for infants under age one were two-thirds the cost of one-and two-year-olds, probably because the children were enrolled for an average of eight months. See Masse and Barnett, 2002.

32. Olds, 2006.

33. Karoly et al., 1998.

34. The benefit-cost ratios by Lynn Karoly of the RAND Corporation were done with similar assumptions as those used in the estimates of the Perry Preschool program; the WSIPP approach was designed to be internally consistent with their meta-analysis of early childhood education program. Note that WSIPP did not have to adjust the Nurse-Family Partnership findings downward for either research design or real world concerns because it was studied with random assignment and has an off-the-shelf curriculum that is being replicated in many states. See Karoly et al., 1998; Aos et al., 2004.

35. Olds, 2006; Karoly et al., 1998.

36. Martin et al., 2006.

37. Tabulations of the March 2006 Annual Social and Economic Supplement to the Current Population Survey, produced by the author with the research assistance of Emily Roessel.

38. The figure 367,000 mothers was determined by multiplying 1.63 million births by a 0.30 rate income eligible by a 0.75 participation rate. For participation rate see Olds et al., 2004 and Olds et al., 2002.

39. Devaney, Bilheimer, and Schore, 1992.

40. Ripple and Zigler, 2003.

41. Karoly, Kilburn, and Cannon, 2005.

42. A summary chart of program impacts prepared by Lynn Karoly and her colleagues at RAND shows an effect size of 0.10 for Early Head Start on cognitive outcomes, somewhat lower than the 0.18 effect size for the Nurse-Family Partnership, and much lower than the effect sizes for Perry Preschool (0.97), Abecedarian (0.62), and Chicago Child-Parent Centers (0.35) in terms of effects on cognitive outcomes near or in elementary school. (Effect sizes are standardized measures, expressing impacts in terms of changes in standard deviation units. An effect size of 0.10 means that the impact was 10 percent of a standard deviation, which is a relatively small impact.) These modest cognitive outcomes alone are unlikely to lead to economic benefits greater than program costs ($10,544 per child in 2002), and the analysts at WSIPP estimate a benefit-cost ratio for Early Head Start of only 0.23:1, based on evidence to date. Still, the program may have long-term positive effects on crime, child abuse and neglect, and maternal employment and welfare, as were found for the Nurse-Family Partnership program, which also had modest impacts on cognitive outcomes. One promising sign is that Early Head Start does appear to reduce the

number of subsequent second births within two years of enrollment in the program. See Karoly, Kilburn, and Cannon, 2005; Aos et al., 2004; U.S. Department of Health and Human Services, 2002.
43. Bureau of Labor Statistics, 2006.
44. Kreader, Ferguson, and Lawrence, 2005.
45. Aos et al., 2004.
46. National Center for Education Statistics, 2006a.
47. National Center for Education Statistics, 2006a.
48. "Diplomas Count: An Essential Guide to Graduation Policy and Rates," *Education Week*, June 22, 2006.
49. Currie and Thomas, 2000.
50. Borman and Hewes, 2002.
51. Heckman and Masterov, 2004, p. 3.
52. Borman and Hewes, 2002; Comprehensive School Reform Quality Center, 2005; Ludwig and Sawhill, 2007.
53. Comprehensive School Reform Quality Center, 2005.
54. Borman et al., 2005.
55. Borman et al., 2003.
56. Borman and Hewes, 2002.
57. Reynolds et al., 2002.
58. Reynolds et al., 2002.
59. In fact, other reading strategies have been so favored within the Department of Education that Success for All and a few other well-known programs were largely shut out of funding under the first few years of the new Reading First program, prompting formal complaints and a critical report by the Department's Inspector General. This controversy provides a sober reminder of the challenge of implementing the requirement that education interventions be limited to those based on "scientifically based research." However, the solution is not to reject the requirement for scientific research, but to follow the Inspector General's recommendations to improve management integrity and, in addition, to expand the knowledge base by conducting more rigorous evaluations of education interventions. See McCallion, 2006; U.S. Department of Education, 2006.
60. The $15 billion cost for improving basic skills in high-poverty schools is shown here as new funding; however, the cost could be fully offset by freezing Title I spending at current levels (such a freeze is proposed by researcher James C. Capretta in another paper in this Budget Options Series). In other words, adopting the proposals in both papers would result in no change in federal funding for elementary and secondary schools.
61. National Center for Education Statistics, 2005; National Center for Education Statistics, 2006b.
62. Comprehensive School Reform Quality Center, 2006, p. 4.
63. Fifer and Krueger, 2006.
64. Gordon, Kane, and Staiger, 2006.
65. Manlove et al., 2002.
66. Kirby, 2001; Aos et al., 2004.
67. Hoffman, 2006.
68. National Campaign, undated.
69. Manlove et al., 2002 and Aos et al., 2004.
70. See Kirby, 2001; Allen et al., 1997; Allen and Philliber, 2001; and Wyman Center Teen Outreach Program webpage, www.wymancenter.org/teenoutreach.htm [accessed June 14, 2006].
71. Philliber et al., 2002.
72. Allen et al., 1997.
73. Kane and Sawhill, 2003.
74. Michelson, Zaff and Hair, 2002.
75. America's Promise, 2006.
76. Allen et al., 1997.
77. Allen and Philliber, 2001.
78. Philliber et al., 2002.
79. Aos et al., 2004.
80. Aos et al., 2004.

Appendix A. Detailed Description of Reforms to Improve Teacher Quality

Emerging research on teacher effectiveness has led to a number of proposals to improve teacher quality by restructuring the labor market for teachers. Most of these reforms have not yet been evaluated as fully as those discussed in the main body of the text, and so they are described in this appendix, and proposed to be tested in five state-wide demonstrations.

Research on Teacher Quality

Social science research is confirming what parents already know at an intuitive level, that children's success in school depends to a large degree on whether they have a good or bad teacher in the classroom. The emphasis on student performance and school accountability embodied in the No Child Left Behind legislation and in earlier state initiatives has provided both the data and the impetus for research and proposals related to teacher quality.

To track student performance and school accountability, a number of districts and states have developed longitudinal databases of student test scores that have led to new research on student achievement. Statistical analysis of these databases is providing mounting empirical evidence that some teachers are demonstrably more effective than others in raising the achievement scores of students assigned to their classrooms, after adjusting for the students' previous academic performance and demographic characteristics. Teachers who rank highly on value-added modeling measures of effectiveness with one group of students in one year tend to rank as effective teachers with other students in other years. Moreover, these differences in teacher effectiveness are not strongly correlated with either certification status or presence of a master's degree—the primary credentials that determine entry into the teaching labor market and access to differential salaries.[1]

Observed differences among teachers, within schools as well as across schools, are large enough that replacing ineffective teachers with effective ones could make a real difference in educational outcomes. For example, researchers Robert Gordon, Thomas Kane, and Douglas Staiger find that the average student in Los Angeles Public Schools lost 5 percentile points relative to other students when assigned to an ineffective teacher, and gained 5 percentile points in achievement when assigned to an effective teacher. They argue that this 10 percentile gap is quite large—almost one-third the 34 point achievement gap between black and white students.[2] There also is evidence that teacher effects on student achievement accumulate over time. Sanders and Rivers estimate that elementary students in Tennessee with effective teachers three years in a row score 52 to 54 percentile points higher than similar students taught by ineffective teachers for three years.[3] A review of this dramatic finding by researchers at the RAND Corporation concluded that while the size of the effect may be overestimated, there is evidence that teacher effects do persist over time.[4]

A second strand of research on teacher quality concerns the quality of teachers found in the poorest school districts. From the perspective of a teacher in the labor market, jobs in schools with high proportions of low-income and minority students are typically less attractive, because of lower quality facilities and equipment, more dangerous neighborhoods, higher numbers of low-achieving students, and lower pay than other schools. As one advocate of large-scale revisions to teacher labor markets puts it, "When the suburbs (1) pay more, (2) have better working conditions, and (3) serve easier-to-reach kids who bring fewer problems, we're essentially relying on missionaries to bring quality instruction to urban America."[5] While some

teachers in high-poverty schools may have a missionary enthusiasm, others may be less-experienced and weaker teachers who do not have the seniority or credentials to compete for the more attractive jobs in the wealthier schools. Studies suggest that teachers in high-poverty schools are more likely than their counterparts in low-poverty schools to be a new teacher and more likely to have attended non-competitive colleges; they are less likely to be teaching in the field of their college major and less likely to be certified; and they do not score as highly on licensing tests and standardized tests such as the SATs.[6] With all these differences, American public schools are systematically providing a lower-quality education experience to students from lower economic backgrounds, exacerbating differences in student achievement associated with family background, undermining the promise of equal opportunity, and threatening America's future economic prosperity.

Proposals to Improve Teacher Quality

Significant changes in the way teachers are hired and compensated are needed to attract and retain better teachers, both in public schools overall and in high-poverty schools. Recent proposals for reform of teacher labor markets include a combination of one or more of the following changes:

- Reduce barriers to entry into the teaching profession;
- Develop longitudinal databases of student achievement and modify the teacher evaluation process to include measures of effectiveness in raising student achievement;
- Abandon the uniform pay scale and provide differential pay tied to teacher effectiveness, service in hard-to-serve schools, and/or placement in hard-to-staff subjects;
- Streamline processes for dismissing ineffective teachers; and
- Improve professional development to enhance teacher effectiveness and opportunities for career advancement within the teaching profession.

Many initiatives on teacher quality—including two of the three described below—focus on the incoming stream of new teachers, a group that is large enough to present a real opportunity for change. Over the next five years, an estimated 40 percent of public school teachers are expected to exit the profession, because of a combination of retirement and high attrition, as teachers who entered in the 1960s age out of the system and many younger teachers leave for other professions.[7] Turnover is even higher in high-poverty schools, where half of all new teachers leave within three years.[8]

One initiative for improving teacher quality is the Teach for America (TFA) program, which recruits highly qualified college seniors and recent graduates to teach in low-income schools. Sidestepping the traditional teacher education and certification process, new teachers are given intensive training at a five-week summer institute that averages seventy hours a week, including four weeks of taking full responsibility for teaching in a summer-school classroom. Teach for America has been identified as an effective program by the Coalition on Evidence-Based Policy, based on findings from a rigorous national evaluation by Mathematica Policy Research. According to the evaluation, elementary school students randomly assigned to TFA teachers achieved higher math scores than students randomly assigned to other teachers; the impact was modest, with an effect size of 0.15. There were no effects (positive or negative) on reading achievement or grade retention, at least not in the one-year observation period of the study.[9] The TFA Foundation estimates a $5,000 annual cost for recruiting, training, and

offering financial support during the summer institute (TFA teachers receive the same salaries as other novice teachers once placed in school).[10] The study did not evaluate the program's cost-effectiveness; such analysis, as well as longer-term follow-up, would be an important component of any future state demonstration.

Another proposal to improve teacher quality is outlined by Gordon, Kane, and Staiger in an April 2006 Brooking Institution white paper. As in Teach for America, one suggested reform is to allow recent college graduates (and mid-career professionals) to enter the teaching profession without undergoing certification. However, this reform is just part of a bold five-point plan to identify effective teachers using performance on the job. The authors propose federal funding of data systems for tracking student performance and teacher effectiveness over time, and they advocate for locally designed teacher evaluation systems in which statistical measures of teacher impacts on growth in student achievement would form a substantial portion of teacher evaluations. The authors also propose providing federally funded bonuses of at least $15,000 per year to teachers who have high effectiveness ratings and are willing to teach in high-poverty schools. Finally, and perhaps most controversially, new teachers that ranked in the bottom quartile of effectiveness under their state or district's evaluation system after two years would be denied tenure, unless their principal argued for a special exception. They estimate that full implementation of their proposal across all states would cost $3 billion annually, if the federal government bore full cost of the data systems and teacher bonuses.

Another model for using value-added measures of student performance to improve teacher quality is provided by the Teacher Advancement Program (TAP), funded by the Milken Family Foundation and operating in schools across several states. Teacher evaluations under TAP include both teacher effects on growth in student achievement, and school effects—the extent to which some schools in the district have a greater impact on student achievement than others—under the theory that each teacher should have a stake in the achievement growth of all students in the school. Another key factor in teacher evaluations is the quality of the teacher's classroom skills, as observed by multiple, trained evaluators who observe each teacher several times a year. The inclusion of classroom observation addresses the concerns of many in the education community that teacher performance not be solely tied to a statistical measure that may be the best available measure of teacher effectiveness, but is still an imperfect measure.[11] TAP also emphasizes ongoing professional development of both new and existing teachers, provided on-site on a weekly or daily basis by school-based mentor and master teachers, rather than through one-time special workshops. TAP establishes multiple career paths for teachers, including mentor and master as well as regular career teachers, providing an opportunity for teaches to grow and excel without leaving the profession. Finally, the model includes differential pay, with higher pay for mentor and master teachers, bonuses for those who score highly on performance-based evaluations, as well as options for differential pay for hard-to-serve schools or hard-to-staff subjects. A program evaluation by the Milken Family Foundation estimated costs of $415 per student per year.[12]

These three initiatives offer ideas for structural reforms proposed to improve teacher quality. While TFA has been independently evaluated, the Gordon, Kane, and Staiger proposal has not yet been implemented, let alone evaluated, and TAP has not been evaluated by an independent evaluator using rigorous evaluation methodologies. Much could be learned from carefully designed evaluations of state demonstrations to implement these initiatives, or variants of them. If the programs are found to be cost-effective in rigorous evaluations, federal funding for

teacher quality initiatives should be increased after the five-year demonstration period, perhaps to as much as $3 billion annually, the estimated cost of the plan for identifying effective teachers using performance on the job proposed by Gordon, Kane, and Staiger.[13]

Appendix Endnotes

1. Gordon, Kane, and Staiger, 2006; Carey, 2004; The Teaching Commission, 2004.
2. Gordon, Kane, and Staiger, 2006.
3. Sanders and Rivers, 1996.
4. McCaffrey et al., 2003.
5. Miller, 2003, p. 122.
6. Carey, 2004; Haycock, 1998.
7. Gordon, Kane, and Staiger, 2006.
8. The Teaching Commission, 2004.
9. Decker, Mayer, and Glazerman, 2004.
10. See the Teach for America website at www.teachforamerica.org [accessed June 1, 2006].
11. An extensive study of statistical measures of teacher effectiveness from value-added models, conducted by Daniel McCaffrey and other researchers at the RAND Corporation, identifies some concerns with the measures. One problem is that the statistical system assumes random assignment of students to classes. In fact, students are not randomly assigned to teachers in the real world, and so it is possible that observed variation by classroom is not due to the teacher, but to other effects such as the composition of students in the classroom. For example, it may be easier to increase achievement of higher-income students than of lower-income students, even after controlling for level of prior achievement. Another concern is that teacher quality may not be synonymous with increasing student achievement scores; for example, a teacher who excelled in teaching test-taking skills (an extreme form of "teaching to the test") would score very highly on a student-achievement-based measure of teacher effectiveness, but may not be an effective teacher in terms of enhancing real knowledge. See McCaffrey et al., 2003. Despite these concerns, many researchers believe value-added measures are the best available measure of teacher effectiveness, and considerably preferred to measures based on absolute student achievement (which makes teachers and schools look more effective if they teach students who enter with higher achievement levels), as well as to existing teacher evaluation procedures, which tend to rate all teachers as uniformly satisfactory. However, even proponents of greater use of statistical measures of teacher effectiveness advocate that such measures be just one part of an overall teacher evaluation system; for example, Robert Gordon, Thomas Kane, and Douglas Staiger advocate that measures of teacher effects be "perhaps one-third to two-thirds of the total score" in new systems of teacher evaluation. See Gordon, Kane, and Staiger, 2006.
12. Schacter et al., 2002.
13. Gordon, Kane, and Staiger, 2006.

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