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Reducing Poverty through Preschool Interventions

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Summary

Greg Duncan, Jens Ludwig, and Katherine Magnuson explain how providing high-quality care to disadvantaged preschool children can help reduce poverty. In early childhood, they note, children's cognitive and socioemotional skills develop rapidly and are sensitive to "inputs" from parents, home learning environments, child care settings, and the health care system.

The authors propose an intensive two-year, education-focused intervention for economically disadvantaged three- and four-year-olds. Classrooms would be staffed by college-trained teachers and have no more than six children per teacher. Instruction would be based on proven preschool academic and behavioral curricula and would be provided to children for three hours a day, with wraparound child care available to working parents.

The authors estimate that the annual cost of the instructional portion of the program would be about \$8,000, with child care adding up to another \$4,000. The program would fully subsidize low-income children's participation; high-income parents would pay the full cost. The total cost of the proposal, net of current spending, would be \$20 billion a year.

Researchers have estimated that a few very intensive early childhood programs have generated benefits of as much as \$8 to \$14 for every \$1 in cost. The authors think it unrealistic that a nationwide early education program could be equally socially profitable, but they estimate that their proposal would likely have benefits amounting to several times its cost. Some of the benefits would appear quickly in the form of less school retention and fewer special education classifications; others would show up later in the form of less crime and greater economic productivity. The authors estimate that their program would reduce the future poverty rates of participants by between 5 percent and 15 percent.

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Can public policy reduce poverty in the future by investing more in today's children, particularly young children? Research suggests that increased investments in prenatal and infant health and in high-quality preschool education programs will improve children's life chances and generate benefits to society that can easily cover the costs of these government programs. Based on this evidence, we propose a national program providing high-quality preschool education for three- and four-year-olds.

Increased policy attention to early childhood is warranted by new evidence regarding the lifelong implications of brain development during the early years, as well as the efficacy of early education programs.¹ Neuroscience research has documented how complex cognitive capacities are built on earlier foundational skills and that many cognitive skills are sensitive to early life experiences.² Preschool interventions may improve lifetime outcomes in part through the possibility that "learning begets learning"—that mastery by young children of a range of cognitive and social competencies may improve their ability to learn when they are older.³

Children's early learning environments differ profoundly across lines of both race and class. For example, compared with kindergarteners from families in the bottom fifth of the socioeconomic distribution, children from the most advantaged fifth are four times as likely to have a computer at home, have three times as many books, are read to more often, watch far less television, and are more likely to visit museums or libraries.⁴ One study found that three-year-olds in families of low socioeconomic status had half the vocabulary of their more affluent peers, which in turn could be ex-

plained by the lower quality and quantity of parental speech.⁵

Differences in children's learning environments contribute to large gaps in test scores, even among preschoolers. Numerous studies have compared the skills of preschool children from different socioeconomic backgrounds and racial or ethnic groups and found large differences in language and cognitive skills at school entry, age three, and perhaps even as early as age one.⁶

The early years also appear to be a sensitive period for the development of socioemotional skills, such as self-regulation.⁷ Such skills are connected, too, with brain development, as early emotional experiences literally become embedded in the architecture of infants' brains.⁸ Research has documented a number of differences in the socioemotional skills of poor and nonpoor children—as young as seventeen months in the case of physical aggression.⁹ Among behavioral skills, a child's ability to regulate his attention appears to contribute the most to success in elementary school.¹⁰ The attributes that make children eager learners in school may also influence the willingness of parents to engage them in learning activities at home.

Researchers have learned that rudimentary reading and, especially, mathematics skills at kindergarten entry are highly predictive of later school achievement, a finding that supports our emphasis on building these skills in our proposed preschool program.¹¹ Although the correspondence is far from perfect, children who score poorly on academic assessments before entering kindergarten are more likely to become teen parents, engage in crime, and be unemployed as adults.¹² Moreover, preschool problem behaviors like physi-

cal aggression are predictive of criminal behavior later in life.¹³

Preschool gaps in cognitive and socioemotional skills tend to persist through the school years and into later life. By the end of high school, the gap in achievement test scores between white and black children is at least as large as the preschool gap.¹⁴

The influence of the preschool years on children's later achievement and success is not well reflected in current federal government budget priorities, which allocate nearly seven times as much money per capita for K–12 schooling as for prekindergarten (pre-K) early education and child care subsidies for three- to five-year-olds.¹⁵ Given the opportunities for profitable preschool investments in children's cognitive and socioemotional development, current U.S. spending is not well targeted. Most social policies are devoted to playing catch-up against children's early disadvantages, but disparities are already apparent among young children, and many disadvantaged children never catch up. Efforts to improve young children's school readiness with proven, high-quality programs should play a much more prominent role in America's antipoverty strategy than they do today.

Our Proposal in Brief

We propose an intensive two-year, education-focused intervention for disadvantaged three- and four-year-olds. In a program modeled loosely after Perry Preschool and several state pre-K programs, college-trained teachers would staff the classrooms and administer the curriculum for three hours each day and spend some of their remaining work time engaging parents in outreach activities. Child-to-staff ratios would average 6:1. Wrap-around child care would also be available to

working parents. A national curriculum for the program would be developed from preschool reading, mathematics, and behavioral interventions with proven ability to foster children's academic and attention skills in engaging ways.

We estimate that the annual per child cost of the early education component of our program would amount to \$8,000, or \$16,000 over the entire two-year enrollment period. Child care costs would add \$4,000 annually to this total, for a total two-year cost of \$24,000. Children from families with incomes below 1.5 times the poverty line would be able to participate in the educational component free of charge, and partial subsidies would be available for children from families with incomes up to three times the poverty line. Higher-income families could also participate, but would not receive a subsidy. The total gross cost of our proposal to the government is on the order of \$30 billion a year. Because our proposed intervention overlaps with some existing services, we estimate that about \$20 billion of additional government spending is required.

Social benefits generated from our program are difficult to estimate, but we argue that the benefit-cost ratio is almost certainly going to exceed unity and is likely to be between 4:1 and 7:1, making it one of the nation's most profitable social investments. The intervention we propose, once fully scaled up, will reduce poverty in both the short and the long runs. Short-run effects are likely to follow from increased employment and work effort among families receiving subsidized education and care. Program effects on children's future earnings and behavior might plausibly reduce future poverty rates in the United States by around 5 to 15 percent of current levels (or 1 to 2 percentage points).

In what follows we first show why a proposal such as ours is needed, and then explain some of its details.

The Promise of Early Childhood Education

A rigorous body of research demonstrates that very intensive early childhood programs can produce lasting improvements in the life chances of poor children. Recent research also suggests that even less expensive Head Start and pre-K programs may boost early achievement significantly, and in the case of Head Start, improve children's long-term outcomes as well. By contrast, more typical day care or preschool settings have smaller effects on achievement and behavior. One important lesson is that not all early childhood education programs produce similar effects.

For policy purposes, the goal is not to find the program that produces the biggest benefits but rather to find programs that generate the largest benefits relative to their costs. Programs that generate large benefits but even larger costs are unwise public expenditures. Our proposed program is modeled after early childhood interventions that, according to the best available evidence, appear to generate the largest surplus of benefits relative to costs.

The ability of intensive model programs to improve the life chances of disadvantaged children is illustrated by the well-known Perry Preschool intervention. Perry provided one or two years of part-day educational services and home visits to a sample of low-income, low-IQ African American children aged three and four in Ypsilanti, Michigan, during the 1960s. Perry Preschool hired highly educated teachers (with at least a B.A.) and was implemented as a randomized experiment. Some mothers and their chil-

dren were randomly assigned to the Perry program while others were assigned to a control group that did not receive the Perry intervention. The great advantage of randomized assignment is that parents and children in the program of interest can be expected, on average, to be similar at baseline to those randomly assigned to the control group, so differences in outcomes for treatments and controls can be attributed to the effects of the program with a high degree of confidence.

When the children entered school, those who had participated in the Perry program scored higher on IQ tests than those who had not—an impressive nine-tenths of a standard deviation higher.¹⁶ These IQ effects, however, disappeared by third grade. Nevertheless, the program produced lasting effects through age forty on employment rates (76 percent compared with 62 percent) and earnings (median annual earnings of \$20,800 compared with \$15,300 in 2000 dollars) and substantially reduced the chances that participants had ever been arrested (29 percent of the participating children reached age 40 without an arrest as compared with 17 percent of the control group).¹⁷

The Abecedarian program, which began in 1972 and served a sample of low-income, mostly African American women from Chapel Hill, North Carolina, was even more intensive than Perry. Mothers and children assigned to the Abecedarian “treatment” received year-round, full-time care for five years, starting with the child's first year of life. The Abecedarian preschool program included transportation, individualized educational activities that changed as the children aged, and low child-teacher ratios (3:1 for the youngest children and up to 6:1 for older children). Abecedarian teachers followed a

curriculum that focused on language development and explained to them the importance of each task as well as how to teach it. High-quality health care, additional social services, and nutritional supplements were also provided to participating families.¹⁸ A full-time family nurse practitioner and a part-time pediatrician worked on staff and in the same building as the children. They provided immediate treatment for ear infections, which could have had an effect on the children's language development.

Abecedarian was a high-cost, high-quality program run by researchers rather than by a government agency. It cost about \$18,000 a year for each of a child's first five years and produced dramatic effects on the future life outcomes of its participants.¹⁹ At the start, Abecedarian and control group children had IQ scores that averaged about 1 standard deviation below the mean, as would be expected for children from economically disadvantaged backgrounds. By the time the Abecedarian children reached age five, however, their IQ scores were close to the national average and higher than the scores of children who did not participate. Similarly large effects were observed for achievement on verbal and quantitative tests.²⁰ Nearly fifteen years later, the program's effect on IQ scores at age twenty-one was smaller than at age five (around 0.38 standard deviation) but still impressive. This problem of partial "fade-out" of the effects of early education, which has been widely documented for a variety of different programs, suggests that sustaining the effects of early interventions on the child's ability to learn may require high-quality follow-up learning environments. We return to this point below.

Although IQ effects faded somewhat over time with Abecedarian, other long-term ef-

fects were dramatic and arguably just as important for reducing poverty. For example, children who received the Abecedarian program entered college at 2.5 times the rate of the control group. The Abecedarian intervention also reduced rates of teen parenthood and marijuana use by nearly half. Smoking rates of Abecedarian participants were about 30 percent lower than those of the control

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group.²¹ Although employment rates were not statistically different between the Abecedarian and control groups (64 percent compared with 50 percent), children who had participated in the program were about two-thirds more likely to be working in a skilled job (67 percent compared with 41 percent).²² Even with its \$18,000 cost and the need to discount benefits accrued in the distant future, the total economic value of Abecedarian's benefits far exceeded the costs of participating in the program.²³

Evidence on the existing publicly funded early education programs, which illustrate what can be achieved for large numbers of children in programs of more variable quality than the one we advocate, is also encouraging. A recent random-assignment experimental evaluation of Head Start found positive short-term effects of program participation on elementary prereading and prewriting for

three- and four-year olds equal to about 0.3 and 0.2 of a standard deviation, respectively, but not on advanced skills in these two outcome domains.²⁴ Head Start participation also increased parent-reported literacy skills of children by around 0.45 of a standard deviation. Statistically significant effects on other outcome domains were typically concentrated among three-year-olds, with effect sizes of 0.15 for vocabulary and 0.20 for problem behaviors. Effects on math skills were positive but not statistically significant.²⁵ If one calculates Head Start effects pooling together the three- and four-year-olds in the experiment, however, rather than showing results separately for each age group, the increased statistical power leads to statistically significant program effects on math and almost all of the other main cognitive skill outcomes in the report.²⁶

For policy purposes, the crucial question is whether Head Start effects persist over time; if so, program benefits may be likely to outweigh program costs. Nonexperimental studies of children who participated in Head Start several decades ago suggest lasting effects on school attainment and perhaps criminal activity, although test score effects appear to fade out over time.²⁷ As in the Abecedarian and Perry programs, these effects were large enough that the benefits to society likely outweighed the program costs.

Studies of previous cohorts of children, however, may not provide a good indication of how today's children will fare. Both center-based care and early education alternatives to Head Start have proliferated, and many provide enriching environments. In addition, better maternal education and parenting education programs have likely improved the developmental environments of poor children. For this reason we suspect that the

benefits of Head Start compared with the most likely alternative for poor children may have declined.

Numerous recent studies have examined the short-term effects of state-initiated pre-K programs on children's test scores. These studies typically find short-run effects on achievement test scores that are slightly larger than those estimated for Head Start and, importantly, find that participation in the programs improves both language and math skills.²⁸ A study by Steven Barnett, Cynthia Lamy, and Kwanghee Jung of pre-K in five states found effects on receptive vocabulary and math of just over one-quarter of a standard deviation and effects on print awareness of nearly two-thirds of a standard deviation.²⁹ Studies of the Tulsa pre-K program find effects on prereading skills (letterword identification) of around 0.8 of a standard deviation and on early math scores (applied problems) of around 0.38 of a standard deviation.³⁰

How can we explain why the effects estimated for recent state pre-K programs are slightly larger than those for Head Start? One possible explanation is that pre-K programs hire more qualified teachers, pay them more, and offer a more academically oriented curriculum than do Head Start programs. For example, only about one-third of Head Start teachers have completed a bachelor's degree, whereas all the pre-K programs evaluated by Barnett, Lamy, and Jung had college-educated teachers.³¹ Another explanation is that the Head Start comparison group received more center-based care than did children in the pre-K comparison group.³²

A third possible explanation is that the recent Head Start study relies on a rigorous randomized experimental design. Although the re-

cent state pre-K studies are big improvements over past efforts to examine such programs, all are nonetheless derived from a research design that may be susceptible to bias overstating the benefits of pre-K participation.³³

Our Proposed Early Childhood Intervention

Our proposed educational intervention builds on these encouraging research findings. It combines what we believe are likely to be the “active ingredients” behind the success of previous interventions, including college-educated teachers, small class sizes, academically oriented curricula, and parent outreach. Because resources are scarce, we propose the lowest-cost combination of these program features that is likely to improve the lifetime outcomes of poor children.

Specifically, we propose that all low-income children in the United States (from families with incomes below 1.5 times the poverty line) be eligible to participate at no cost in two years of intensive, high-quality early childhood education at three and four years of age. Classes would meet for one-half day for the duration of the regular academic year and be led by a college-educated teacher. Class sizes would be small, limited to six students per teacher, with no more than twelve students in a classroom. Teachers would devote the remaining half of their workday to parent outreach efforts, both to involve parents as partners in their children’s learning and to help them access available support and social services.³⁴ In addition, our proposed program would include the same health services as are now incorporated into Head Start.

Instruction would be organized around a new national curriculum that would be developed for the program from previous preschool

reading, mathematics, and behavioral interventions that have proven to foster children’s academic and attention skills in developmentally appropriate ways.³⁵ We recognize that the idea of a fairly prescriptive national curriculum will be controversial and not without drawbacks, such as imposing some constraints on the ability of local teachers and schools to tailor instruction to the particular needs of their children. But we are impressed by evidence from programs like Perry Preschool and Abecedarian that rely on prescriptive curricula. Moreover, evidence suggests that the Success for All program for slightly older, elementary school children achieved gains across a wide variety of program settings using the same reading-focused curriculum.³⁶

Participation in our program would not be limited to poor families, although the subsidy given to participating children would decline as family income increased. Families with incomes of 1.5 to two times the poverty threshold would be required to pay one-third of the program cost, while families with incomes two to three times the poverty threshold would pay two-thirds of the program’s costs. Families with incomes equal to more than three times the poverty threshold could participate in the program but would not receive a subsidy from the government. Mixing children from low- and higher-income families would help to mitigate program stigma and may even generate beneficial peer effects.

To support parents’ employment, our proposed program would also offer wraparound child care. The child care component would not require a college-educated teacher or the same very small class sizes as the education component, thereby helping to contain overall program costs. Participation in child care would be voluntary; parents would have the

Table 1. Subsidy and Expected Participation Rates for the Proposed Early Childhood Intervention

Percent

Ratio of family income to the poverty line	Early childhood education		Child care	
	Subsidy	Participation rate	Subsidy	Participation rate
Less than 1.25	100	80	100	60
1.25–1.5	100	80	75	50
1.5–1.75	67	80	50	40
1.75–2.0	67	80	25	30
2.0–2.5	33	50	0	20
2.5–3.0	33	50	0	10
More than 3.0	0	25	0	10

option of participating only in the education program.

Given that our child care component is likely much less important for promoting child development than our proposed early education classes, our subsidy for child care is considerably less generous to lower-income families. Families with incomes up to 1.25 times the poverty line would not be required to contribute anything toward the cost of care, while families with incomes between 1.25 and two times the poverty line would contribute a share of the half-day child care costs ranging from 25 percent to 75 percent, depending on their income (table 1). As with the education component, families with incomes too high to qualify them for a government subsidy would still be eligible to participate.

We remain agnostic about whether the program should be operated by local public schools and overseen by the states (subject to federal requirements for program quality and performance) or instead involve direct grant making between the federal government and local service providers, as with the current Head Start program. The former arrangement would have the advantage of helping public schools align their elementary school

curricula with the skills children learn in our proposed program. As with state prekindergartens, however, local public schools might choose to contract with existing providers to deliver the program rather than create new programs within the confines of the public school system. If the program followed the Head Start model of directly funding local service providers, it would be important that the federal government create incentives for local public schools to align their curricula with the new program we propose, perhaps by using existing Title I funding as leverage.

We estimate the annual cost per child for the early childhood education component of our program to be on the order of \$8,000 a year. That figure is somewhat higher than the estimated per child expenditures of Head Start (around \$7,000 a year), even though the Head Start figure is an average cost of both half-day and full-day programs and ours is half-day only. Our estimated costs are also roughly in line with existing pre-K programs. Michigan’s half-day pre-K program, at \$3,300 per child, costs considerably less than our program, but it has a higher teacher-child ratio than we propose (8:1 rather than 6:1) and does not include the health and parent outreach services. New Jersey’s Abbott inter-

vention has a per child cost of \$10,000, but it is a full-day program.

We estimate the cost of the half-day wrap-around child care component of our proposal to be on the order of \$4,000 per child per academic year. The figure is higher than most families now pay for center-based care. David Blau and Janet Currie report that the average family using center-based care pays about \$2,000 in 2005 dollars for forty weeks of half-time care.³⁷ The quality of the program we envision is probably higher than the average for center-based child care among families nationwide.

The expected gross cost to the government of our program would be on the order of \$30 billion a year. That figure comes from combining the subsidy rates by family income with our best estimates of the rates at which families will sign up to participate in the early childhood and child care components (both shown in table 1), and then multiplying by the total number of children aged three to four in each of these family income categories as estimated from the March 2005 Current Population Survey.

The net cost of the program would be less than \$30 billion, because some of the families who sign up for our program will have received other early childhood education or child care subsidies from existing programs, although the exact amount of these offsets is difficult to predict.³⁸ Taking these offsets together, the total amount of new spending by government at any level required to implement our program would be on the order of \$20 billion.

It is possible that our assumed participation rates are too high for low-income children who are already enrolled in either Head Start

or state pre-K programs. One could argue that our proposed pre-K program ought to replace Head Start, since its likely impacts are larger. But it might make sense to preserve the Head Start program at least for the medium term, so as to add to the choices available to low-income families. In this case, the total offsets would be lower than we project, but the total gross cost of our proposed program would be lower as well.

Expected Benefits of Our Proposal

Because our proposed early childhood education intervention is not an exact replica of existing programs, much less of an existing large-scale program, determining its long-term benefits necessarily requires some assumptions and guesswork. Our assumptions about take-up rates, as noted, imply that about 30 percent of children receiving subsidies under our program (that is, from families with incomes below three times the poverty line) would otherwise be in Head Start, about another 20 percent or so would be in state pre-K programs, just over 10 percent would be in other forms of center-based care, and the rest would be in some form of parental or other informal care arrangement.

The net impact of our proposed program will be based on the difference in effects between our early childhood education intervention and the effects of the other early childhood and child care programs that participants would have experienced in the absence of our program. Based on our reading of the evaluation literature, our program's effects on early childhood test scores would range from about one-third to one-half of a standard deviation.³⁹

Our proposed intervention may have other long-term benefits for society as well. One study of the Perry Preschool program esti-

mated that taxpayer benefits were four times as large as benefits to participants. For example, the study found that Perry Preschool reduced criminal activity: 83 percent of the control group had been arrested by age forty, as against 71 percent of the treatment group.⁴⁰

With the most recent estimates suggesting a benefit-cost ratio for Perry Preschool on the order of 13:1, if our assumption about program effects is even close to being correct, then the early childhood program that we propose would easily pass a benefit-cost test.⁴¹ If our program's net lifetime benefits are one-quarter to one-half as large as those for Perry, and our net program costs to the government (after expected offsets) are about the same as Perry's, then the expected ratio of benefits to costs would be between 4:1 and 7:1.⁴² The benefits of our proposal would likely rival or exceed any of the social investments now available.

How to go from effects on short-term test scores to effects on what is ultimately of interest for this volume of *The Future of Children*—adult poverty status? We assume that our program's long-term effects on adult poverty will be proportional to its effects on short-term test scores relative to those of Perry Preschool. In unpublished calculations that he generously shared with us, Clive Belfield found that Perry reduced adult poverty rates by about one-fifth at age twenty-seven and one-quarter at age forty. If our program's long-term effects are about one-third to two-thirds as great as those observed for Perry Preschool, then our intervention would reduce the chances of adult poverty for program participants by between 7 and 17 percent. If we assume that our program would reduce the risk of future poverty for children only from families with incomes below three times the poverty line, then

under our assumption that about 80 percent of children from these family backgrounds would participate in our program, our proposed intervention would reduce future poverty by roughly 5–15 percent. (Put differently, the net effects of our program might be around one-quarter to one-half as great as those from Perry Preschool.)

Finally, we note that our proposal will reduce both future and current poverty. The provision of subsidized care may result in increased parental employment and work effort, and thus, in turn, higher earnings for participating families. Moreover, poor families with three- and four-year-olds who participate in the early childhood education component of the program receive \$8,000 worth of services, while those in afternoon child care receive an additional \$4,000 of services a year. A good portion of this spending amounts to “near cash” income for the poor families and should figure into a poverty status calculation based on an expansive definition of family income.

Potential Criticisms of the Proposal

It is only natural that taxpayers who are being asked to contribute \$20 billion in new funding for our proposal would want to be sure that the program will accomplish its stated goals. We address here several of the more obvious doubts.

Is the program too expensive? Do we really need to require—and pay—college-educated teachers and insist on such small classes? The evidence on the effects of particular early childhood programs tells more about the net effect of these programs than about which program elements matter most for their success. Many—though clearly not all—successful programs involve highly educated teach-

ers and small classes. These findings are consistent both with social science research that finds, for example, better life outcomes for children of highly educated mothers than for those whose mothers have less schooling or lower cognitive test scores and with research from class-size experiments studying slightly older children, in kindergarten through third grade.⁴³ Even with the expense of highly educated teachers and small class sizes, this intensive intervention is still likely to pass a benefit-cost test quite easily.

Is program intensity too low? How do we know that half a day of educational instruction is enough? We have no direct evidence on whether a full-day early education program will yield larger or more lasting effects than a part-day program. Indirect evidence on the effects of full-day and part-day kindergarten may be informative, however. Studies have found that although students in full-day kindergarten programs learn more during the kindergarten year than students in part-day programs, the differential gains are relatively small and do not persist much beyond that year.⁴⁴ Researchers have pointed out that additional time in the classroom does not necessarily translate into greater exposure to enriching opportunities, and thus it is important to know how programs structure children's "extra" time.⁴⁵ With these considerations in mind, we propose a part-day preschool program.

Why wait until age three to provide educational services, given that disparities in cognitive and noncognitive skills are apparent in even younger children? We certainly agree that the period between conception and age three is vital for children's healthy development.⁴⁶ We choose to concentrate on ages three and four for several reasons. First, model programs such as Perry Preschool have

generated lasting effects for poor children by waiting until ages three and four to provide services. Second, although Abecedarian started even earlier than age three and achieved more pronounced and longer-lasting effects on outcomes such as IQ scores, it cost twice or three times as much as our proposed program (in part because class sizes for very young children in Abecedarian were about half of what we propose for our intervention). Yet we are far from certain that if the proposed program spent that extra money by starting earlier, effects would be commensurately greater. Third, many low-income families seem wary of sending very young children to center-based care, so starting our early childhood education services at age three is likely to enhance take-up rates and fit better with the preferences of our target population. For example data from the Department of Health and Human Services show that around 43 percent of eligible low-income children from birth to age two received federal child care subsidies, compared with 56 percent for poor children aged three to five.⁴⁷ Nevertheless, we agree that targeted health care and child maltreatment interventions are clearly warranted at an early age, although more work is needed to better understand what types of health and parent services are beneficial for particular populations.

Wouldn't spending \$20 billion more a year on income transfer programs do more to reduce poverty in the United States? The reason for devoting scarce resources to preschool education rather than to income transfer programs rests with cost-benefit analysis. It is true that income transfer programs will do more to reduce poverty than preschool interventions, in part because prevention programs such as those we propose here are imperfectly targeted. Although poor children are disproportionately likely to become poor

adults, many of tomorrow's poor adults come from families that are not poor today.⁴⁸

In contrast, income transfer programs are by definition directly targeted toward those people who wind up poor during adulthood, and provide cash assistance precisely during the periods when people need it. However, income transfer programs are usually a zero-sum game in a benefit-cost analysis, since they merely transfer resources from one group in society (taxpayers) to another (poor families). Consequently, the extent to which they are cost-effective depends on the benefits that accumulate to children from their parents' enhanced income. Although recent research has found that work-conditioned income transfers do improve children's achievement, the effects are relatively small.⁴⁹ In contrast, the sort of preschool education program that we propose here reduces poverty by making children more productive when they grow up, as well as more likely to engage in pro-social activities, such as work, and less likely to engage in antisocial behaviors, such as crime, that impose substantial costs on society. And in fact, as noted, we believe that the benefits to society generated by our proposed program are likely to be as much as four times the program costs.

Finally, is this a targeted or a universal program? Although our program is available to all three- and four-year-olds, we recommend publicly subsidizing its cost only for families with incomes less than three times the federal poverty threshold. Thus, access may be universal, but we are targeting public support to relatively economically disadvantaged children. Some researchers are concerned that targeted programs are both less efficient and less popular than universal programs.⁵⁰ But the "target" of our public funding is

much broader than that of most targeted programs. More than 60 percent of all three- and four-year-olds would be eligible to receive some public support to attend our proposed early education program. Moreover, all children would be able to attend, even if they do not receive subsidies. One other concern about targeted benefits is that they create a disincentive for parents who qualify to increase their earnings. For this reason, we have recommended a sliding scale for subsidies to avoid penalizing a family with the loss of a valuable benefit when its earnings exceed the benefit eligibility level by just a little. But we also note that because a child would be attending the program for at most two years, any labor disincentives would be short lived.

Concluding Thoughts

Basic science and social program evaluations often conflict. Not so with the emerging neuroscience of early childhood development and the growing evaluation literature examining existing early education programs. As neuroscience documents the process by which increasingly sophisticated skills are wired into the brain, evaluations of high-quality early education programs show that early skill building can generate a host of long-term benefits both for children in these programs and for society as a whole. Because there are good reasons to believe that program quality is a key ingredient for success, we propose a preschool education program with, among other features, small classes and well-qualified teachers. At \$20 billion in annual cost, our proposed program is not cheap. But even if early education programs generate only a fraction of the social benefits demonstrated by model programs, they are one of the most profitable social investments for fighting future poverty.

Notes

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2. Eric I. Knudsen and others, "Economic, Neurobiological and Behavioral Perspectives on Building America's Future Workforce," *Proceedings of the National Academy of Sciences of the United States of America* 103, no. 27 (July 2006): 10155–62.
3. Pedro Carneiro and James J. Heckman, "Human Capital Policy," in *Inequality in America: What Role for Human Capital Policies?* edited by Heckman and Alan B. Krueger (MIT Press, 2004), 77–240; Flavio Cunha and others, "Interpreting the Evidence on Life Cycle Skill Formation," Working Paper 11311 (Cambridge, Mass.: National Bureau of Economic Research, 2005).
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5. Betty Hart and Todd Risley, *Meaningful Differences in the Everyday Experiences of Young American Children* (Baltimore: Brookes, 1995).
6. Christopher Jencks and Meredith Phillips, eds., *The Black-White Test Score Gap* (Brookings, 1998); Roland Fryer and Steven D. Levitt, "Understanding the Black-White Test Score Gap in the First Two Years of School," *Review of Economics and Statistics* 86, no. 2 (2004): 447–64; Lee and Burkham, *Inequality at the Starting Gate* (see note 4); Cecilia Rouse, Jeanne Brooks-Gunn, and Sara McLanahan, "Introducing the Issue," *Future of Children* 15, no. 1 (2005): 5–14; Donald A. Rock and A. Jackson Stenner, "Assessment Issues in the Testing of Children at School Entry," *Future of Children* 15, no. 1 (2005): 15–34; J. Brooks-Gunn and L. B. Markman, "The Contribution of Parenting to Ethnic and Racial Gaps in School Readiness," *Future of Children* 15, no. 1 (2005).
7. Nelson, "Neural Plasticity and Human Development" (see note 1); National Scientific Council on the Developing Child, "Excessive Stress Disrupts the Architecture of the Developing Brain," Working Paper 3 (2005), www.developingchild.net/pubs/wp/excessive_stress.pdf (February 2007).
8. J. LeDoux, "Emotion Circuits in the Brain," *Annual Review of Neuroscience* 23 (2000): 155–84.
9. Richard Tremblay and others, "Physical Aggression during Early Childhood: Trajectories and Predictors," *Pediatrics* 114, no. 1 (2004): e43–50; Cunha and others, "Interpreting the Evidence on Life Cycle Skill Formation" (see note 3).
10. Greg Duncan and others, "School Readiness and Later Achievement," *Developmental Psychology* (forthcoming); Cybele C. Raver and others, "Self-Regulation across Differing Risk and Sociocultural Contexts: Preliminary Findings from the Chicago School Readiness Project," paper presented at the biennial meeting of the Society for Research in Child Development, Atlanta, April 2005.
11. Duncan and others, "School Readiness and Later Achievement" (see note 10).

12. Rouse and others, "Introducing the Issue" (see note 6).
13. Albert J. Reiss and Jeffrey A. Roth, *Understanding and Preventing Violence* (Washington: National Academies Press, 2003).
14. Meredith Phillips, James Crouse, and John Ralph, "Does the Black-White Test Score Gap Widen after Children Enter School?" in *The Black-White Test Score Gap*, edited by Jencks and Phillips (see note 6), pp. 229–72. For a discussion of measurement issues, see Jens Ludwig, "Educational Achievement and Black-White Inequality: The Great Unknown," *Education Next* 3, no. 3 (2003): 79–82.
15. According to U.S. Budget, Fiscal Year 2005, the United States now spends more than \$530 billion a year on elementary and secondary schooling for children aged five and older, including \$13 billion in extra federal funding through the Title I program for schools serving poor children. In contrast, the federal government spends only about \$18 billion on the Head Start program and child care subsidies, most of which go to preschoolers; see testimony of Douglas J. Besharov before the Subcommittee on 21st Century Competitiveness of the Committee on Education and the Workforce, February 27, 2002, www.welfareacademy.org/pubs/testimony-022702.pdf (February 2007).
16. Standard deviation units are a common way of expressing effect sizes. For comparison, the standard deviation for a typical IQ test is 15–16 points, and for the SAT, 100 points.
17. Lawrence Schweinhart and others, *Lifetime Effects: The High/Scope Perry Preschool Study through Age 40* (Ypsilanti, Mich.: High/Scope Press, 2005).
18. Frances A. Campbell and others, "Early Childhood Education: Young Adult Outcomes from the Abecedarian Project," *Applied Developmental Science* 6, no. 1 (2002): 42–57; Steven Barnett and Leonard Masse, "Comparative Benefit-Cost Analysis of the Abecedarian Program and Its Policy Implications," *Economics of Education Review* (2007, forthcoming); Craig Ramey and Frances Campbell, "Compensatory Education for Disadvantaged Children," *School Review* 87, no. 2 (1979): 171–89.
19. The cost estimate is in 2005 dollars. See Janet Currie, "Early Childhood Education Programs," *Journal of Economic Perspectives* 15, no. 2 (2001): 213–38.
20. Craig T. Ramey and Frances A. Campbell, "Preventive Education for High-Risk Children: Cognitive Consequences of the Carolina Abecedarian Project," *American Journal of Mental Deficiency* 88, no. 5 (1984): 515–23.
21. Campbell and others, "Early Childhood Education: Young Adult Outcomes from the Abecedarian Project" (see note 18).
22. In addition, criminal involvement was less common for treatments than controls (14 percent versus 18 percent for misdemeanor convictions, and 8 percent versus 12 percent for felony convictions), although the absolute numbers of those arrested in the two Abecedarian groups were small enough that it is impossible to prove statistically that this particular difference did not result from chance.
23. Barnett and Masse, "Comparative Benefit-Cost Analysis of the Abecedarian Program and Its Policy Implications" (see note 18).
24. Michael Puma and others, *Head Start Impact Study: First Year Findings* (U.S. Department of Health and Human Services, Administration for Children and Families, 2005). Note that the point estimates we report

- in the text are larger than those in this report. The Head Start report presents the difference between average outcomes for all children assigned to the treatment group and all children assigned to the control group, known in the program evaluation literature as the “intent to treat” (ITT) effect. But not all children assigned to the experimental group participated in Head Start (the figure is around 84 percent), while some children (18 percent) assigned to the control group enrolled in the program. If we divide the ITT effect by the difference between the treatment and control groups in Head Start participation (66 percent), the implied effect of Head Start participation on participants is around 1.5 times as large as the ITT effects presented in Puma and others’ report. For a discussion of this methodology, see H. S. Bloom, “Accounting for No-Shows in Experimental Evaluation Designs,” *Evaluation Review* 8 (1984): 225–46. If we define the “treatment” more broadly, as participation in any center-based care, the effects of Head Start participation may be up to 2.5 times as large as the ITT impacts reported by Puma and others, since more than 96 percent of the treatment group receives some sort of center-based care in the experiment but so does around 53–60 percent of the control group (see exhibits 3.2 and 3.3 in Puma and others’ report). For more on our calculations, see Jens Ludwig and Deborah Phillips, “The Benefits and Costs of Head Start,” Working Paper 12973 (Cambridge, Mass.: National Bureau of Economic Research, 2007).
25. The Early Head Start initiative serves children under age three in a mix of home and center-based programs. A rigorous evaluation of the Early Head Start program found some evidence that the program had positive effects on some aspects of children’s development and of parenting practices, but in general the effects were smaller than those produced by the Head Start program. See John M. Love and others, *Making a Difference in the Lives of Infants and Toddlers and Their Families: The Impacts of Early Head Start* (U.S. Department of Health and Human Services, Administration for Children and Families, 2002).
 26. Ludwig and Phillips, “The Benefits and Costs of Head Start” (see note 24).
 27. Janet Currie and Duncan Thomas, “Does Head Start Make a Difference?” *American Economic Review* 85, no. 3 (1995): 341–64; Eliana Garces, Duncan Thomas, and Janet Currie, “Longer-Term Effects of Head Start,” *American Economic Review* 92, no. 4 (2002): 999–1012; Jens Ludwig and Douglas L. Miller, “Does Head Start Improve Children’s Life Chances? Evidence from a Regression-Discontinuity Design,” *Quarterly Journal of Economics* 122, no. 1 (2007): 159–208.
 28. W. Steven Barnett, Cynthia Lamy, and Kwanghee Jung, “The Effects of State Prekindergarten Program on Young Children’s School Readiness in Five States” (Rutgers University, National Institute for Early Education Research, 2005); William T. Gormley and Ted Gayer, “Promoting School Readiness in Oklahoma: An Evaluation of Tulsa’s Pre-K Program,” *Journal of Human Resources* 40, no. 3 (2005): 533–58; William T. Gormley Jr. and others, “The Effects of Universal Pre-K on Cognitive Development,” *Developmental Psychology* 41, no. 6 (2005): 872–84.
 29. Barnett, Lamy, and Jung, “The Effects of State Prekindergarten Program on Young Children’s School Readiness in Five States” (see note 28).
 30. Gormley and others, “The Effects of Universal Pre-K” (see note 28).
 31. Barnett, Lamy, and Jung, “The Effects of State Prekindergarten Program on Young Children’s School Readiness in Five States” (see note 28); Katie Hamm and Danielle Ewen, “Still Going Strong: Head Start Children, Families, Staff, and Programs in 2004,” Head Start Series Policy Brief 6 (Center for Law and Policy, November 2005), www.clasp.org/publications/headstart_brief_6.pdf (February 2007); Gormley and others, “The Effects of Universal Pre-K” (see note 28).

32. Thomas Cook, Northwestern University, PowerPoint presentation, www.northwestern.edu/ipr/events/briefingdec06-cook/slide16.html.
33. Specifically, these recent studies all use a regression discontinuity design that compares fall semester tests for kindergarten children who participated in pre-K the previous year and have birthdates close to the previous year's enrollment cutoff with fall tests of children who are currently starting pre-K because their birthdates just barely excluded them from participating the previous year. The key assumption behind these studies is that the selection of children into pre-K does not change dramatically by child age around the birthday enrollment cutoff (that is, it changes "smoothly" with child age). But this need not be the case, because there is a discrete change at the birthday threshold in terms of the choice set that families face in making the decision to select pre-K. Suppose, for instance, that among the children whose birthdays just barely excluded them from enrolling in pre-K during the previous year, those with the most motivated parents were instead sent to private programs that are analogous to the public pre-K program that year and are then enrolled in private kindergarten programs in the fall semester when the pre-K study outcome measures are collected. This type of selection would reduce the share of more motivated parents among the control group in the pre-K studies and lead them to overstate the benefits of pre-K participation.
34. Evaluations do not produce definitive evidence on the importance of the parental outreach component of early childhood education programs. The outreach we propose is more modest than Perry's, which involved home visits, although it does build the connections between classroom teachers and parents.
35. A variety of developmental and academic curricula have been developed for preschool programs, but since few have been evaluated rigorously it is hard to compare the relative effectiveness of these programs. The Institute for Educational Sciences is currently sponsoring a number of evaluations, the findings of which should help guide the selection of the national curriculum for our proposed program.
36. Geoffrey D. Borman and others, "The National Randomized Field Trial of Success for All: Second-Year Outcomes," *American Educational Research Journal* 42, no. 4 (2005): 673–96.
37. David M. Blau and Janet Currie, "Preschool, Daycare and Afterschool Care: Who's Minding the Kids?" Working Paper W10670 (Cambridge, Mass.: National Bureau of Economic Research, August 2004).
38. State and federal governments spend about \$9 billion a year on child care subsidies through the Child Care and Development Fund (CCDF), and about 25 percent of these subsidies go to children of ages three and four, about 70 percent of whom attend center-based care; see www.acf.hhs.gov/programs/ccb/data/index.htm (February 8, 2007). Our take-up rates assume that every child whose family income is below three times the poverty line and who is currently in center-based child care will participate in our program. In this case, CCDBG expenditures would decline by $(0.25 \times 0.7 \times \$9 \text{ billion}) = \$1.6 \text{ billion}$. Similarly, TANF programs currently spend about \$2.5 billion in funding each year for child care subsidies, and under our assumed take-up rates for low-income children a portion of these expenditures would no longer be necessary; see www.clasp.org/publications/childcareassistance2004.pdf. Current Head Start program expenditures are on the order of \$7 billion a year; if our take-up rate assumptions are correct, then more than four-fifths of Head Start participants would switch over to the program we propose, either because their current Head Start providers would take over operation of the program or because these participants would move to another provider, who was providing our program. In either case, spending on Head Start in its current form would decline by around \$5.8 billion. Similarly, states are now spending more than \$2 billion on pre-K programs, and under our assumed take-up rates about three-quarters of these children would switch over to the new program we propose, saving \$1.5 billion in government spending.

39. Specifically, we assume that Head Start's impact on children's cognitive achievement test scores will be on the order of 0.2 of a standard deviation, effects of pre-K programs will be around 0.3 of a standard deviation, and effects of center-based care will be about 0.1 of a standard deviation. The "intent to treat" effects in the recent national randomized experimental impact of Head Start are on the order of 0.1 to 0.25, where the effects are statistically significant (Puma and others, *Head Start Impact Study*; see note 24); the implied effect of treatment on the treated will be more on the order of 0.15 to 0.35 standard deviation, and so averaging across relevant outcome domains (including those where standard errors did not allow for detectable impacts) suggests that 0.2 is a reasonable assumption for this program. Our assumption of 0.3 for state pre-K programs is the average across five states found by Barnett, Lamy, and Jung, "The Effects of State Prekindergarten Program on Young Children's School Readiness in Five States" (see note 28), for the PPVT vocabulary and Woodcock-Johnson early math tests. Because our program entails the same level of spending per child on early childhood intervention as Perry Preschool (about \$16,000 in current dollars for two years of half-day high-quality early education), if "scale-up" of our program does not reduce the intervention's effectiveness by more than half compared with the Perry model demonstration result, then our program's effect would be around 0.4 of a standard deviation. School-based research suggests that the benefits of two years of instruction are roughly twice those of a single year; D. Card, "The Causal Effect of Education on Earnings," in *Handbook of Labor Economics: Volume 3A*, edited by O. Ashenfelter and D. E. Card (New York: Elsevier, 1999), pp. 1801–63. Because our intervention is about equal to twice the early childhood instruction provided by current high-quality, one-year, state pre-K programs, our proposed program could generate impacts of about 0.6 of a standard deviation (twice the single-year pre-K impact). We also note that the average impact per participant of our program would be higher if more children than we have assumed stick with Head Start and pre-K. The reason is that both of these programs have larger impacts on children's cognitive skills compared with either "regular" center-based or other types of child care. If there is an increase in the fraction of children who switch into our program from center-based, parental, or informal care and a decline in the fraction who switch over from Head Start or pre-K, then the average effect of participating in our program rather than the alternative care arrangements they would have experienced will increase as well.
40. Schweinhart and others, *Lifetime Effects* (see note 17).
41. Clive R. Belfield and others, "The High/Scope Perry Preschool Program: Cost-Benefit Analysis Using Data from the Age 40 Follow-up," *Journal of Human Resources* 41, no.1 (2006): 162–90.
42. The standard cost estimate for two years of Perry Preschool is around \$16,000, less than the \$24,000 figure for our proposed program. The difference in costs is due in part to the wraparound child care that we propose. However, as discussed in the text, we think that offsets from reduced spending on other programs will reduce the costs of our proposal by up to one-third, which would make our per-child costs about the same as Perry Preschool.
43. Robert Haveman and Barbara Wolfe, "The Determinants of Children's Attainments: A Review of Methods and Findings," *Journal of Economic Literature* 23 (December 1995): 1829–78; Alan B. Krueger, "Economic Considerations and Class Size," *Economic Journal* 113 (2003): 34–63.
44. Jill S. Cannon, Allison Jacknowitz, and Gary Painter, "Is Full Better than Half? Examining the Longitudinal Effects of Full-Day Kindergarten Attendance," *Journal of Policy Analysis and Management* 25, no. 2. (2006): 299–321; John R. Cryan and others, "Success Outcomes of Full-Day Kindergarten: More Positive Behavior and Increased Achievement in the Years After," *Early Childhood Research Quarterly* 7, no. 2

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45. James Elicker and Sangeeta Mathur, "What Do They Do All Day? Comprehensive Evaluation of a Full-School-Day Kindergarten," *Early Childhood Research Quarterly* 12 (1997): 459–80; Nancy Karweit, "The Kindergarten Experience," *Educational Leadership* 49 (1992): 82–86.
46. "The Science of Early Childhood Development: Closing the Gap between What We Know and What We Do," National Scientific Council on the Developing Child, January 2007, www.developingchild.net/pubs/persp/pdf/science_of_development.pdf.
47. "Child Care Eligibility and Enrollment Estimates for Fiscal Year 2003," Policy Issue Brief (Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, April 2005), <http://aspe.hhs.gov/hsp/05/cc-elig-est03/index.htm> (February 2007).
48. Jens Ludwig and Susan E. Mayer, "'Culture' and the Intergenerational Transmission of Poverty: The Prevention Paradox," *Future of Children* 16, no. 2 (2006): 175–96.
49. Gordon Dahl and Lance Lochner, "The Effects of Family Income on Child Achievement," Working Paper 1305-05 (University of Wisconsin Institute for Research on Poverty, 2005); Pamela Morris, Greg Duncan, and Christopher Rodrigues, "Does Money Really Matter? Estimating Impacts of Family Income on Children's Achievement with Data from Random-Assignment Experiments," paper presented at the Chicago Workshop on Black-White Inequality, University of Chicago, 2006.
50. W. Steven Barnett, Kristy Brown, and Rima Shore, "The Universal versus Targeted Debate: Should the United States Have Preschool for All?" (Rutgers University, National Institute for Early Education Research, 2004).