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Article

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Why Governments Should Invest in Early Education

W. Steve Barnett*

Over a century ago, the English economist Alfred Marshall elucidated the rationale for public investment in education in his *Principles of Economics:* "Education must be made more thorough. The schoolmaster must learn that his main duty is not to impart knowledge, for a few shillings will buy more printed knowledge than a man's brain can hold. It is to educate character, faculties, and activities; so that the children of even those parents who are not thoughtful themselves may have a better chance of being trained up to become thoughtful parents of the next generation. To this end public money must follow freely. And it must flow freely to provide fresh air and space for wholesome play for the children in all working class quarters."

Today, his conclusion applies to education from the very earliest years and in every nation around the globe. Indeed, the public interest in early education has become universal and transnational. As I hope to make clear, the citizens of the wealthiest countries have reason to be concerned about the education of all young children in their own countries and in less developed countries.

Scientists have learned much about the effects of education outside the home in the first five years of life. It is well-established that intensive early education can dramatically improve the learning and development of children from economically disadvantaged families. These early gains have long-term consequences for school success, employment and earnings, delinquency and crime, family formation and fertility, and health. The evidence includes randomized trials (the gold standard for establishing causal connections) in nations that differ by orders of magnitude in their economic development, from the United States to Mauritius.

Three key studies

The fact that we can improve the learning, development, and life course of children through early educational investments does not mean that there is an economic rationale for such investments. An economic case for such investments requires estimates of their costs and benefits. Fortunately, three rigorous cost-benefit analyses have been conducted based on longitudinal studies through adulthood. These studies constitute a kind of Rosetta stone for interpreting the broader evidence on investments in early education. Their findings are summarized in Table 1, and each is briefly described.

All three studies were conducted in the United States to assess the effects of classroom-based education before age five on children from low-income families. I have worked on two of these, beginning with a cost-benefit analysis of the Perry Preschool program in 1981 using data through age 19. More recently, I helped update that analysis with data through age 40. In between, Len Masse and I conducted a cost-benefit analysis of the Abecedarian program, and other researchers conducted a similar cost-benefit analysis on the Chicago Child-Parent Centers.

Each of these cost-benefit analyses is independently important. However, they are even more important when considered together and in the context of the larger research literature. By considering them together we learn from the ways in which they are similar and gain confidence in the findings that are replicated. We also learn from their differences, which help to us to generalize beyond a specific time, location, population, program design and pedagogical approach, and to understand how variations in persons, process, and context affect the return on investment.

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Program descriptions

The High/Scope Perry Preschool was a two-and-a-half hours per day education program offered to small numbers of children in the public schools during the school year. Economically disadvantaged children were randomly assigned to the Perry Preschool at age three (for a small number age four) or to attend kindergarten at the normal starting age of five. The Perry Preschool classes had one teacher for every 6 or 7 children, whereas the typical primary school might have one teacher in a classroom of 25 to 30 children. The preschool teachers had at least baccalaureate degrees in education and were licensed public school teachers. The curriculum emphasized the broad development of the child, much along the lines advocated by Marshall, though influenced more by Piaget and other psychologists.

The Abecedarian program was developed a decade later than the Perry Preschool, at a time when full-day child care was more acceptable. In this randomized trial, the program delivered education in classrooms for up to ten hours per day over 50 weeks, and served children from before age one to age five. With this schedule and age range, it is the only one of these three programs that met the child care needs of parents working full-time or even long part-time hours. Thus, it is also the only one that might increase maternal employment. Abecedarian had broad educational goals and emphasized play, but it may have been more educationally narrow than the other programs. Staffing patterns were similar to the Perry Preschool in having high ratios of well-qualified and adequately paid teachers to children, though of course there were even fewer children per teacher for children under three (e.g., three children per adult for infants).

Yet another decade later, the Child-Parent Center (CPC) study was launched. In contrast to the other two studies, it was not a randomized trial, but compared children in matched neighborhoods. Some consider this study to provide a better "real life" test of early education because it was implemented on a large scale by the Chicago Public Schools with teacher-child ratios that are more typical of preschool programs in the United States. The CPCs can be viewed as a replication of the Perry Preschool approach (in overall design) at a lower dosage. Both were two-and-a-half hour per day programs during the school year (about 180 days) with well-educated, adequately paid teachers. However, the CPCs employed one teacher and an assistant (who may have no post-secondary education) for every classroom of 18 children. Thus, it is a less intensive, lower dosage program from which one would expect the same kinds of effects as produced by Perry, but smaller in size.

Program effects

All three of these preschool education programs were found to produce gains in long-term academic achievement and educational attainment (e.g., completing of secondary school). In addition, there were other indications of positive effects on school progress: all three decreased special education and two decreased grade repetition (when children fail and must repeat a grade). These results have been replicated by many other studies in Europe and Latin America as well as the United States, with the most common long-term findings being reductions in grade repetition and special education placement.

The two studies (Perry and Abecedarian) that measured effects on cognitive abilities prior to age five both found large gains from program participation. These early cognitive gains give rise to the later achievement and school progress gains. These early cognitive gains are quite large, roughly an order of magnitude larger than the cognitive gains found for typical child care or parenting education programs. However, there is an interesting difference in cognitive outcomes between the Perry and Abecedarian studies.

The Abecedarian program produced a permanent increase in IQ (general cognitive ability) as well as in achievement (subject matter specific knowledge and skills). Perry produced a permanent increase in only achievement. This pattern is seen across the larger research literature – only classroom programs over most of the first five years of life have produced permanent gains in IQ. Thus, educational investments that start prior to age three may have an advantage in building more foundational cognitive abilities, though the practical consequences of this are unknown. It is tempting to attribute the persistence of achievement effects in the absence of permanent IQ gains to motivation, persistence, and other "non-cognitive" traits. This leap is not warranted. Perhaps IQ represents potential abilities, and achievement attained abilities. Perhaps children who attended preschool education learned more and developed

stronger cognitive abilities in reading and math, but these do not generalize to IQ at older ages.

The entire literature indicates that some decline in the initial cognitive advantages of early education occurs after children leave the preschool program and begin school. In the Abecedarian study, for example, the permanent IQ advantage was only about half the initial gain. However, "fade out" is neither so rapid nor so great as to preclude permanent educational advantages. Indeed, to some extent it is not a fade out at all, but the result of cognitive gains after school entry for children who did not have preschool education. The grade repetition and special education results themselves are evidence that school systems spend greater resources compensating children who are further behind.

Two other interesting effects evident in these studies are decreased crime and decreased smoking. Both are predicted by the well-known association between educational attainment and these activities. Although the CPC study did not ask participants about cigarette smoking, the other two studies did. Although there is no statistically significant effect when the studies are considered individually, I noticed the similarity in results between the two studies and pooled their data to provide a more powerful statistical test. When the studies are pooled, the result is statistically significant. There may well be other long-term health behaviors that are improved by preschool education, but which could be detected only in large studies because they affect relatively small parts of the population.

All three studies investigated effects on crime, but only two found such effects. Both half-day programs found effects on arrests. The full-day program did not. There are at least two plausible explanations for this result. One is differences in the curriculum. Several randomized trials have found that curricula vary in their influence on executive function, self-regulation, and social skills and behavior, thereby producing different impacts on behavior while having the same impacts on achievement. As Marshall might have said, it is possible to improve intellect without improving character. The other explanation concerns differences in context. The Abecedarian study took place in a community with a very low rate of crime. It may not be possible to further reduce crime if it is already quite low. The Perry and CPC studies had nearly identical impacts on juvenile arrests (the CPC study has not yet published adult crime results). Remarkably, a randomized trial of enriched half-day preschool education in Mauritius replicated this finding of crime reduction in young adults.

Costs and benefits

Economic analysis of these preschool education studies begins by estimating their costs and benefits. To make all costs and benefits comparable, adjustments are made for inflation and timing (a benefit next year is worth more than the same benefit 20 years later). Thus, the costs and benefits in the Table are the present value of the estimated streams of costs and benefits over time calculated using a real discount rate of three percent. All three programs yield benefits that far exceed costs, that is, net present value is strongly positive. Net present value remains positive at very high discount rates for the two half-day programs and somewhat higher rates for the Abecedarian program. Thus, the results withstand reasonable variations in the choice of discount rate, and are particularly robust for the part-day programs. In fact, the part-day programs yield double digit real rates of return, far exceeding the historical average for private equities.

The consistency across the three cost-benefit analyses is notable, especially since not all benefits were included in every study. All three include the benefits of reduced costs of special education and grade repetition in primary and secondary schools (to some extent offset by increased costs of more post-secondary education). All three include the value of increased compensation in the labor market for program participants and their mothers (zero for half-day programs). All three include the value of any decreases in criminal justice system and victim costs (zero for the full-day program).

The Abecedarian benefit-cost analysis was the most comprehensive. The half-day program analyses omitted from consideration two key benefits: health benefits (from decreased smoking) and second generation earnings benefits (projected based on the intergenerational transmission of labor market productivity). All three underestimate health benefits as even the Abecedarian study includes only the value of decreased mortality and omits health care cost savings and the benefits of better health *per se*.

One of the most striking differences illuminated by a cross-study comparison concerns child care and

maternal earnings. Every preschool education classroom provides child care and education. They are as much "joint products" as wool and mutton. However, just as sheep may be raised primarily for meat or wool, so it is with child care and education. The part-day programs produced little child care, a few hours per day 180 days per year, requiring a midday pick-up that would conflict with many regular work schedules. Abecedarian provided up to 10 hours per day virtually every work day for nearly five years. Accordingly, Abecedarian was much more expensive. The short-term value of its child care was considerable, but would not offset the added cost of an intensive educational program like Abecedarian. However, mothers in the Abecedarian study were asked to report their earnings in years after the children entered school, and we found a substantial increase in their long-term compensation. Apparently, mothers who took more time out of the labor force to care for their children over those five years paid a high price in terms of lower long-term earnings.

Two other striking differences in benefit estimates are found. First, estimated earnings gains are larger in the Perry study, but this is not likely a true difference in effects. The other two studies have only collected data to the end of secondary education or just beyond. Thus, their estimated effects on earnings are conservative projections based on census data relating educational attainment to earnings. The Perry study has actual earnings data through age 40, and was much less reliant on projections. Second, the Abecedarian program did not reduce crime. In the other two studies benefits from crime reduction are quite large.

Public policies

These and other studies indicate that there are high rates of return to investments in preschool education, at least for economically disadvantaged children. However, it may be asked whether public investments are necessary to secure these benefits. I would say yes for several reasons. The highest economic returns are for children from lower income families who have limited ability to pay for such programs. Also, individual families face substantial risks that their child might not receive average or even near average benefits. Even if they could borrow at reasonable rates to finance early education, parents cannot be assured of having the means to repay the loans. Of at least equal importance, many benefits accrue to others in society – those who pay for the schools and the criminal justice and welfare systems, those who are victims of crime and those who benefit from tax payments on increased earnings. This is a classic externality problem. For the part-day programs most of the benefits do not accrue to the participants.

There are more reasons it is unwise to depend on parents and the private sector to obtain the benefits of preschool education. First, from a purely selfish perspective, parents can obtain substantial benefits by investing in inexpensive, custodial care while avoiding paying for the more intensive education that would generate public benefits (i.e., the positive externalities). If the Abecedarian parents had purchased care privately (costing about the $27,000 over five years) they would have had higher earnings immediately (not estimated in the Table) and over the long run (as increased continuity in employment resulted in greater on-the-job skill building, seniority, etc.). Their private return would be more than double their cost.

Even the most altruistic parents face a daunting problem in identifying preschool education of sufficiently high quality. The nature of the service is that it is provided in the parent's absence, and young children cannot adequately report on the quality. Surveys find that parental reporting on program quality does not correspond well with expert measurements of program quality. Thus, even if parents had the means and inclination to purchase intensive preschool education, they are unlikely to be able to do so in the private market.

Thus, there is a strong economic case that government should finance preschool education and ensure that programs are of the quality needed to produce the desired benefits. However, to whom should these programs be provided? Most research to date has focused on children from lower income families. However, newer studies have expanded our knowledge, and I believe that support should be broader in two ways.

An economic argument can be made that government-financed high quality preschool education should be made available to all children regardless of family background. Recent studies find no clear dividing line between lower and higher income at which either the problems addressed (e.g., school

failure or crime) or the gains produced by preschool education (e.g., improved cognitive abilities and character) sharply decline. Rather there is a very smooth decline as income rises so that expected returns at the median income might easily be half that for children in poverty. Even at one-tenth the return, public investment in a part-day program would pay-off. Also, it is costly and difficult to identify and serve only economically disadvantaged children, and some parents will avoid programs that serve only disadvantaged families. Finally, as a political matter it may be easier to secure public support for the quality needed to produce the desired results in a program that serves all children.

An economic case also can be made that governments in high-income nations should support early education investments in low-income nations. This case is more speculative, but once again depends on the expected externalities. The world is so inter-related today culturally, politically and economically that the benefits to wealthy nations could well exceed costs. The costs would be relatively low, given the lower cost of preschool education in low-income nations, and it might suffice to offer matching funds as an incentive for local financing. Stimulating the full talents of one additional Goethe, Gates, or Gandhi might warrant financing early education for an entire small nation. Greater educational attainment and productivity in many countries would contribute to prosperity and stability beyond their borders, as well as within. Of course, the benefits of early education depend on the broader infrastructure that provides a context, including publicly supported primary and secondary education, and returns to early investments would vary accordingly.

I have not addressed the question of the precise level and form of public support warranted by the economic benefits. For the first year of life, the most productive investments may be paid parental leave and education for parents on how best to enhance their child's learning and development. Paid leave should be the responsibility of government, not business,

Table

Three benefit-cost analyses

	Carolina Abecedarian	Chicago Child-Parent Centers	High/Scope Perry Preschool
Year began	1972	1983	1962
Location	Chapel Hill, NC	Chicago, IL	Ypsilanti, MI
Sample size	111	1,539	123
Research design	Random assignment	Matched neighborhood	Random assignment
Ages	6 weeks to age 5	Ages 3–4	Ages 3–4
Program schedule	Full-day, year round	Half-day, school year	Half-day, school year
	Findings		
Increased IQ short-term	Yes	Not collected	Yes
Increased IQ long-term	Yes	Not collected	No
Increased achievement long-term	Yes	Yes	Yes
Special education	25% v. 48%	14% v. 25%	37% v. 50%
Retained in grade	31% v. 55%	23% v. 38%	35% v. 40%
High school graduation	67% v. 51%	62% v. 51%	65% v. 45%
Ever arrested as juvenile	45% v. 41%	17% v. 25%	16% v. 25%
Mean number of adult arrests	1.7 v. 1.5 (age 21)	Not yet available	2.3 v. 4.6 (age 27)
Adult smoker	39% v. 55% (age 21)	Not yet available	42% v. 55% (age 40)
	Cost-benefit results (2002 dollars, discounted at 3%) in $		
Cost	– 63,476	– 7,417	– 15,386
Child care	27,621	1,829	919
Maternal earnings	68,728	0	0
K-12 cost savings	8,836	5,377	8,556
Post-secondary ed. cost	– 8,128	– 615	– 1,309
Abuse & neglect cost savings	Not estimated	329	Not estimated
Crime cost savings	0	36,902	173,959
Welfare cost savings	196	Not estimated	774
Health cost savings	17,781	Not estimated	Not estimated
Earnings	37,531	30,638	65,455
Second generation earnings	5,722	Not estimated	Not estimated
Total benefits	158,278	74,981	248,354
B-C ratio	2.5	10.1	16.1

though government might finance leave for many by letting parents save tax free to support time out of the labor force later. I am less clear about the best course after that and until age three when public education for all children clearly is warranted. As time out of the labor force imposes a heavy cost, it may be best to offer parents choices among remaining at home, part-day programs and full-day programs. Research on the consequences of these options would be well-advised if we are to have a better idea of their costs and benefits.

In conclusion, I return to Marshall's *Principles* where he noted that "The wisdom of expending public and private funds on education is not to be measured by its direct fruits alone". The truth of that statement is highly evident in what we have learned about preschool education. Yet, today public and private investments continue to evince little awareness of the indirect benefits of early education. This article and the others in this issue offer a modest corrective. As this information becomes more broadly available, public and private investments should be strengthened. To some extent, governments are already responding, and public and private investments have expanded early education. However, many preschool programs fail to produce even short-term meaningful gains in learning and development much less what is required for the benefits detailed in Table 1. The same difficulties that parents face in judging the quality of private programs put the public at risk of poor-quality government financed programs. Thus, there is a clear role for the philanthropic sector and others to provide information about such programs, and this is already taking place in the United States and Europe. Without such efforts, *quis custodiet ipsos custodes?*