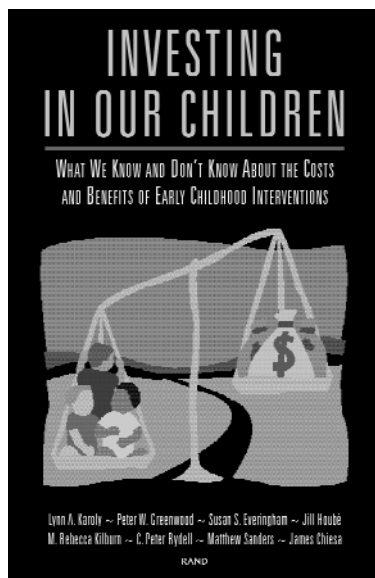


## Early Childhood Interventions: Benefits, Costs, and Savings

Over the last year or so, there has been a renewed interest in the influence of the first few years of life on child health and development, educational attainment, and economic well-being. Much of this interest has been given impetus by research findings that the great majority of physical brain development occurs by the age of three. These findings have been interpreted to suggest that early childhood furnishes a window of opportunity for enriching input and a window of vulnerability to poverty and dysfunctional home environments. The response has been an array of programs directing budgetary surpluses to promote healthy child development—particularly among disadvantaged children—with home visits by nurses, parent training, preschool, and other programs.

It is unclear what will happen to these programs once the media spotlight moves on and budgets tighten. Perhaps a public clamor over the next hot issue will draw funds away from early childhood programs; perhaps it should. The current period of relative largesse provides the opportunity not only to initiate programs but to undertake the kind of rational evaluation of those programs that will help clarify the choices that must eventually be made. In a new book, a RAND research team led by Lynn Karoly and Peter Greenwood assembles the evidence now available on early childhood interventions to try to answer two questions that will be of interest to



policyholders who must allocate resources and to the public who provides those resources:

- *Do early interventions targeted at disadvantaged children benefit participating children and their families?* After critically reviewing the literature and discounting claims that are not rigorously demonstrated, the researchers conclude that these programs can provide significant benefits.
- *Might government funds invested early in the lives of some children result in compensating decreases in government expenditures?* Again, after updating and refining earlier estimates, the researchers find that, at least for some disadvantaged children and their families, the answer to this question is yes.

We use words like “can” and “might” deliberately. These conclusions cannot be freely generalized to all kinds of targeted early interventions because of various limitations in the evidence collected to date. These limitations suggest that better evaluations of new and continuing intervention efforts would be of great value to future decisionmaking.

### WHAT ARE THE BENEFITS?

Targeted early interventions are those intended to overcome the cognitive, emotional, and resource limitations that may characterize the environments of disadvantaged children during the first several years of life. They include programs targeting children as well as those targeting their mothers; interventions aimed at improving educational achievement and those aimed at improving health; and services as diverse as parent skills training, child health screening, child-abuse recognition, and social-services referral.

Karoly and her colleagues examined a set of nine programs in which evaluations had assessed developmental indicators, educational achievement, economic well-being,

Program (age of child at final follow-up)	Cognitive/ Emotional Development		Education					Economic Well-Being			Health			
	IQ—Short Run	IQ—Long Run	Behavior	Achievement— Short Run	Achievement— Long Run	Special Education	Grade Repetition	High School Graduation	Crime/Delinquency	Employment	Income	Welfare Participation	ER Visits	Teen Pregnancy
Early Training Project (19)	6	17		7	17	18	18	18						18
Perry Preschool (27)	5	7		9	14	27	27	27	27	19	27	27		19
Chicago CPC (14)			9	9	14	14	14		14					
Houston PCDC (11)	2		4-7		8-11	8-11	8-11							
Syracuse FDRP (15)	3	6	3			15	15		15					
Carolina Abecedarian (15)	8	12		8	15	15	15							
Project CARE (5)	5													
IHDP—full sample (8)	3	8	3		8	8	8							
IHDP—heavier low-birthweight children (8)	3	8	5		8	8	8							
Elmira PEIP—full sample (15)		4							15				4	
Elmira PEIP—higher-risk children (15)		4							15				4	

Favorable and statistically significant results  
 Mixed results  
 No statistically significant results  
 Not measured

SOURCE: Tables 2.1 and 2.2 in Karoly et al. (See full citation at end of brief.)  
 NOTE: Number in box refers to age of child when measure was last taken. When results were mixed (gray squares), the age refers to the last age when the effect was significant. CPC = Child-Parent Center, PCDC = Parent-Child Development Center, FDRP = Family Development Research Program, CARE = Carolina Approach to Responsive Education, IHDP = Infant Health and Development Project, PEIP = Prenatal/Early Infancy Project.

Figure 1—Effects of Selected Early Intervention Programs on Participating Children

and health for program participants and compared them with the same measures for matched controls (usually selected through random assignment). The researchers sought programs with participant and control groups large enough at program implementation and follow-up to ensure unbiased results, although resource limitations on these programs did not always permit that.

Figure 1 schematically summarizes the results of the RAND review of the effects of these programs on participating children. The filled squares show which indicators were measured for each program reviewed. Blue indicates a favorable (and statistically significant) result, and black indicates no statistically significant result; gray denotes mixed findings. As the figure shows, each program made participating children better off in one or more ways than those who did not participate. Overall, favorable effects outnumber instances where the differences were not significant. A companion analysis of program effects on mothers also showed that measured results tended to be favorable, although the ratio of favorable to null results across all programs was not as high.

The programs thus led variously to the following advantages for program participants relative to those in the control group:

- Gains in emotional or cognitive development for the child, typically in the short run, or improved parent-child relationships.

- Improvements in educational process and outcomes for the child.
- Increased economic self-sufficiency, initially for the parent and later for the child, through greater labor force participation, higher income, and lower welfare usage.
- Reduced levels of criminal activity.
- Improvements in health-related indicators, such as child abuse, maternal reproductive health, and maternal substance abuse.

Many of these statistically significant differences turn out to be of substantial magnitude. For example, three programs resulted in IQ differences between treatment participants and controls at the end of program implementation that approached or exceeded 10 points, a large effect by most standards. The difference in rates of special education and grade repetition at age 15 in the Abecedarian project participants exceeded 20 percentage points. In the Elmira, New York, Prenatal/Early Infancy Project (PEIP), participating children experienced 33 percent fewer emergency room visits through age 4 than the controls, and their mothers were on welfare 33 percent less of the time. In the Perry Preschool program, children’s earnings when they reached age 27 were 60 percent higher among program participants.

It is also apparent from Figure 1, however, that for most programs, most indicators are not measured. This is even

truer of the maternal analysis. These analyses thus represent only a partial accounting of program benefits. Furthermore, most evaluations did not involve long-term follow-ups, and some benefits could take a number of years to accrue (some could also erode with the passage of time).

### WHAT ARE THE SAVINGS?

Some people may think that the benefits of targeted early intervention programs for participating families are enough to justify public expenditures on them. Others may appreciate the benefits to disadvantaged children but may be reluctant to raise tax burdens to accomplish such goals or may wish, at least, for broader favorable ramifications from an investment of public funds. One source of broader benefit is the potential savings the government (and thus taxpayers) realizes when families participating in early interventions require lower public expenditures later in life. Participating children may spend less time in special-education programs. Parents and, as they become adults, children may spend less time on welfare or under the jurisdiction of the criminal justice system. They may also earn more income and thus pay more taxes.

Figure 2 compares program costs with eventual government savings for two of the nine programs—Perry Preschool and the Elmira PEIP. The Perry Preschool program enrolled 123 disadvantaged African American children in Ypsilanti, Michigan, in the mid-1960s. The program was a part-time preschool that included weekly home visits by the teacher and lasted for one or two school years. For the Elmira PEIP, 400 disadvantaged, primarily nonminority families received home visits by nurses trained in parent education and in linkage of the family to support networks and other services. These two interventions were chosen for three reasons:

- They were random trials that satisfied sample size and attrition criteria.
- They measured progress on various indicators that could be expressed in monetary terms.
- They followed the children long enough for benefits to accrue. The latest Elmira PEIP follow-up was at age 15 and Perry Preschool at age 27.

For the Elmira PEIP estimates, the results were split into two groups. One contained the higher-risk families (those with single mothers and low socioeconomic status) and the other the lower-risk families. Figure 2 shows costs and savings to the government for the two Elmira PEIP groups and for the Perry Preschool participants.<sup>1</sup> Costs are known with a fair degree of certainty. The precision of

<sup>1</sup>Dollars shown have been converted to present value—i.e., future costs and savings have been discounted (at 4 percent per year) to recognize the standard assumption in economics that, even apart from inflation, people attach less value to future dollars than to current ones. “Present” here is the year of the child’s birth. All amounts are in 1996 dollars.

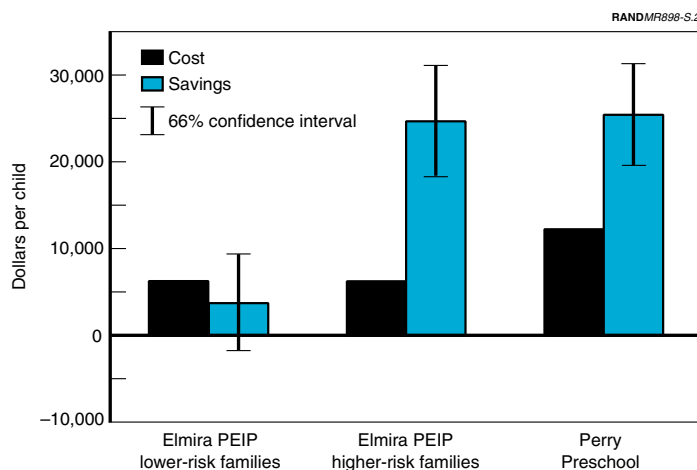


Figure 2—Program Cost Versus Savings to Government (Taxpayers)

the savings estimates, however, depends on the sample sizes, and the vertical lines indicate the 66 percent confidence band (that is, there is a 66 percent probability that the true benefit level falls along the vertical line). A vertical line of twice the length shown would indicate a 95 percent confidence band.

For the Perry Preschool and the higher-risk families of the Elmira PEIP, the research team’s best estimates of the savings to government are much higher than the costs (about \$25,000 versus \$12,000 for each participating Perry child; \$24,000 versus \$6,000 for Elmira). Although there is considerable uncertainty with respect to the benefit estimates, from a statistical point of view one can be quite confident that the benefits exceed the costs.<sup>2</sup> It is worth pointing out, however, that although benefits exceed costs, the costs accrue immediately, while the benefits are realized only as the years pass and children mature through adolescence to adulthood.

In the case of the lower-risk participants of the Elmira PEIP, the savings to government are unlikely to exceed the costs. Thus, the researchers’ best estimate of the net savings is that they are negative. This result illustrates the importance of targeting programs to those who will benefit most if the hope is to realize government savings that exceed costs.

It should be emphasized, however, that while the full costs of the programs are included, the full benefits are not. The Elmira PEIP, which has followed participating children only to age 15 so far, provides no basis for calculating the amount these children may save the government in welfare costs or the extra taxes they may pay as adults. The Perry savings may also be underestimated because benefits to mothers were not measured.

<sup>2</sup>There are, however, other uncertainties that are not related to sample size and that cannot be measured with statistical methods.

Furthermore, the programs generate additional benefits to society beyond the government. These include the tangible costs of the crimes that would eventually have been committed by participating children, had they not participated in the program. The benefits also include the extra income earned by participating families, which can be reckoned as a benefit to the overall economy. RAND estimated these two benefit sources combined as roughly \$3,000 per family in the case of the lower-risk Elmira participants, about \$6,000 for the higher-risk Elmira participants, and over \$24,000 in the Perry case.

While the net savings and other benefits from these programs appear promising, caution must be exercised for various reasons in drawing generalizations for public policy. Most of these reasons are explained below, but two relate specifically to the cost-savings approach. First, costs and savings have been estimated for only two programs, and it is risky to generalize from such a small sample. Second, because there was some variation between the two programs in the indicators of success measured, it cannot be concluded from the different net savings numbers that one program is better than the other.

One final caveat: Cost-savings analysis is a useful tool because, when the results are positive, it provides strong support for program worth. That is, it shows that only a portion of the benefits—those easily monetizable—outweigh the program's entire cost.<sup>3</sup> However, because only some of the benefits are taken into account, a negative result does not indicate that a program shouldn't be funded.

## WHAT REMAINS UNKNOWN AND WHAT DOES IT MEAN FOR POLICY?

There is still much that we do not know about these programs, and this limits the degree to which these conclusions can be generalized to other early intervention programs. For example, we do not know the following:

- *How early interventions can best be targeted to those who would benefit most.* It is not yet known which eligibility criteria would generate the most positive benefit/cost ratios.
- *Whether the model programs evaluated to date will generate the same benefits and savings when implemented on a large scale.* The demonstrations have been undertaken in a more resource-intensive context than is likely to be achievable in full-scale programs.
- *What the implications of the changing social safety net are.* Previous demonstrations were carried out under the now-superseded welfare system. Costs and savings may be different under the new system.

These unknowns will have to be resolved if wise decisions are to be made among early intervention alternatives and if the programs chosen are to be designed to fully realize their potential for promoting child development—and saving money. In particular, research is needed into why programs work. Otherwise, inferences cannot be drawn about new program designs, and every such design would be unproven until tested and evaluated.

The scope of further research should depend on the specific information sought or the scale of the program. *New demonstrations are needed* to answer questions about program design or the changing safety net, and broader testing of previous designs is required to answer questions of scale-up. However, on questions of targeting and other issues, much could also be gained—and less expensively—by *making the most of evaluations already under way*, for example, by undertaking more follow-ups and expanding the set of benefits measured. Finally, where governments see fit to initiate large-scale public programs on the basis of current knowledge, *careful evaluation should be a component*. Then, when budgets tighten again and choices need to be made, the value of these programs will be more clearly understood.

<sup>3</sup>A decision as to whether to fund a program must, of course, also take into account budgetary constraints and other uses for the money.

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*RAND research briefs summarize research that has been more fully documented elsewhere. This research brief describes work done for The California Wellness Foundation; it is documented in Investing in Our Children: What We Know and Don't Know About the Costs and Benefits of Early Childhood Interventions, by Lynn A. Karoly, Peter W. Greenwood, Susan S. Everingham, Jill Houbé, M. Rebecca Kilburn, C. Peter Rydell, Matthew Sanders, James Chiesa, MR-898-TCWF, 1998, 182 pp., \$15.00, ISBN 0-8330-2530-9, available from RAND Distribution Services (Telephone: 310-451-7002; FAX: 310-451-6915; or Internet: order@rand.org). Abstracts of all RAND documents may be viewed on the World Wide Web (http://www.rand.org). Publications are distributed to the trade by National Book Network. RAND is a nonprofit institution that helps improve policy and decisionmaking through research and analysis; its publications do not necessarily reflect the opinions or policies of its research sponsors.*

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