

The Dynamics of Investments in Young Children

by Philip A. Trostel



Philip Trostel presents compelling evidence of the importance of early investment in young children, citing research demonstrating the economic and social benefits of such investments. He suggests that the lack of understanding of the cause-and-effect relationship between early childhood experiences and later-life consequences and a failure to conceptualize how things might be done in new ways are both obstacles. Trostel argues that investing in early childhood development benefits children for the rest of their lives, benefits government with reduced spending in other areas, and moreover is the “right thing to do.” 🐼

INTRODUCTION

In the mid 1960s, 123 three- and four-year-old African-American children living in poverty were selected for a pioneering study on the long-term effects of high-quality preschooling. Almost half of those children (58 of the 123) were randomly chosen to participate in the High/Scope Perry Preschool program in Ypsilanti, Michigan. The other half served as a control group. Most (three-fourths) of those randomly selected into the program attended the Perry Preschool for two academic years, with the rest only attending one year at age four. This preschool program consisted of weekday 2.5-hour sessions taught in small groups (there was an average of fewer than six children per teacher) by a certified teacher with at least a bachelor's degree, and 1.5-hour weekly home visits and curriculum interaction with mothers. The annual cost per child was about \$11,300 in 2007 dollars. For further information on the program and its consequences, see Schweinhart et al. (2005).

Of the 123 children originally in the study, data from all 116 still alive were collected when they reached age 40 several years ago. The results are nothing short of remarkable. Of the Perry Preschool attendees (the treatment group), 65 percent had graduated from regular high school, compared to only 45 percent of those in the control group. Only 62 percent of the control group was employed at age 40, compared to 76 percent of the treatment group. Median annual earnings at age 40 were about 36 percent higher for the group participating in the enriched preschool program. Moreover, 17 percent of the group not participating in the program was incarcerated at age 40, compared to six percent of those with the good fortune of being selected into the high-quality preschool program. Even survival to age 40 was evidently positively affected by preschool participation (97 percent for the treatment group compared to 92 percent for the control group). Similarly, fewer of the treatment group had received some form of social services by age 40, and fewer had used illegal drugs and legal medications. Even after taking the "time value of money" into account (i.e., discounting the benefits that occur after the up-front cost), the value of some of the various benefits to the participants and to society from participation in the

Perry Preschool program was estimated to be more than nine times greater than the cost of the program.

Rather than emphasize the astounding payoff from the Perry Preschool experiment, one could just as easily emphasize the tragic unfairness for those with the random misfortune of being in the control group. The children excluded from the opportunity of a quality preschool experience generally suffered the consequences for the rest of their lives. And, as if that were not bad enough, the rest of society experienced the higher costs of crime, incarceration, and welfare spending, and lower tax revenues. Denying people opportunities to create successful lives in the name of research is an inexplicable injustice.

If only this inexplicable injustice were an isolated incident. The real tragedy is that denying children opportunities for success occurs on a much wider scale right now here in Maine. Of course, the exclusion is not in the name of research. It occurs because early childhood educational opportunities are perceived as being too costly—especially now in these tight budgetary times. What is truly costly, however, is status quo. We simply cannot afford not to make much greater investments in laying the groundwork for successful lives for our young children.

THE PAYOFF: A BRIEF SURVEY OF THE RESEARCH

Although the Perry Preschool study is the most widely celebrated research on the benefits of early childhood programs, it is not alone in demonstrating astounding returns to early childhood programs. For more in-depth reviews of the research briefly summarized below, see Currie (2001), Karoly Kilburn and Cannon (2005), Cunha et al. (2006), and Blau and Currie (2006).

The Abecedarian study is the other well-known small-scale randomized trial involving young children

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and the collection of long-term longitudinal data. This program provided full-day, year-round child care with educational emphasis for 53 of 104 at-risk children born in Chapel Hill, North Carolina, in the mid-1970s (the remaining 51 served as a control group). High-quality child care was provided for the treatment group from infancy until kindergarten at age five. The cumulative five-year cost was approximately \$77,000 per child in 2007 dollars (for further information on the cost and benefits of this program, see Barnett and Masse 2007). Followed through to age 21, the treated group had significantly lower costs in K-12 education (from less participation in special education and less grade repetition), less smoking and illegal drug use, higher rates of high school completion and college attendance, and greater earnings potential. After discounting the benefits occurring after participation in the program, the value of some of the benefits was estimated to be 2.5 times greater than the cost. The benefit-cost ratio for the Abecedarian program is much less than for the Perry Preschool program, primarily because it did not measure any benefits from reduced crime, which accounted for the majority of the measured benefits from the earlier experiment.

Like all other investments, the costs of early childhood programs are borne up front, and the benefits accrue later.

The Chicago Child-Parent Center program begun in 1967 is a high-quality half-day preschool program for at-risk three- and four-year-olds. The annual cost was about \$7,500 per preschooler in 2007 dollars. Instead of a small-scale randomized trial, it is a large-scale project that has been evaluated by comparing the outcomes of the participants to the outcomes of children with comparable socioeconomic backgrounds. After discounting the post-preschool consequences, the estimated value of the increase in earnings and the decreases in the costs of crime, K-12 education, and social insurance was almost eight times greater than the cost of the program.

The benefits of early childhood interventions were also shown in the Prenatal/Early Infancy project, a small-scale randomized trial of home visitation for low-income, first-time, young and unmarried mothers in Elmira, New York. In the late 1970s and early 1980s, numerous and lengthy pre- and postnatal visits were made by specially trained nurses in a mostly white, rural area. The benefits have been estimated to be four times the cost. However, the discounted benefit-cost ratios of other home-visitations programs are generally somewhat smaller than this, although they are still greater than one.

Because of their scientific designs, the results of these programs represent the most highly regarded evidence on the effects of early childhood interventions. Ironically, the academic jury is still out on Head Start, by far the nation's largest and best-known program for early childhood education. This federally funded and locally administered program currently serves almost a million children (mostly four-year-olds) per year at an annual cost of about \$7 billion. Because of the lack of a control group and the difficulties in constructing a comparison group that is truly comparable, the evidence on the effectiveness of Head Start is mixed.

Overall, the literature generally indicates tremendous returns from targeted efforts to lay early groundwork for socially and economically successful lives. Although more research on the topic narrowing the precision of the estimates of the returns of early childhood interventions would be useful, it is quite clear that the returns can be substantial. Moreover, much of the return accrues to the general public (i.e., greater tax revenues and lower costs of crime, incarceration, public health, and welfare). Indeed, given the estimated returns, if targeted investments in early childhood development were private investment opportunities capitalists would have scooped up those windfall-profit opportunities long ago.

\$100 BILLS LYING ON THE GROUND

Investments in early childhood education are analogous to proverbial \$100 bills lying on the ground waiting to be picked up. To illustrate the principle that investors seize clearly profitable private investment opportunities, economists often joke that we do not

see \$100 bills just lying around because people would obviously quickly scoop them up. For public investment opportunities, however, this principle often fails, and public investment in our most precious asset is a glaring example.

What makes this figurative \$100-bills-left-on-the-ground instance particularly tragic is that not only is investment in early childhood development the financially sensible thing to do, it is also the moral imperative. No reasonable argument can be made against improving and equalizing opportunities for successful lives, all else the same. In most instances there is a severe tradeoff between equity and economic efficiency. That is, attempting to equalize incomes through various social-insurance and public-welfare programs is typically extremely costly in terms of aggregate prosperity. Arthur Okun famously described this harsh tradeoff as a “leaky bucket” (Okun 1975). A lot of income is spilled in passing income from the rich to the poor. In the case of early childhood interventions, though, the bucket is not only watertight, it actually fills as greater opportunities are created for disadvantaged young children. Unlike perhaps any other egalitarian policy, there is no tradeoff between strict fiscal stewardship and promoting greater equality.

The leading proponent of the idea above is James Heckman, a Nobel laureate in economics. He recently summarized the argument (Heckman 2008):

A large body of research establishes that investing in disadvantaged young children improves the productivity of the economy and, at the same time, reduces social and economic inequality. In the world of politics where “tradeoffs” are the rule, a policy of investing in disadvantaged young children is rare. For this policy, there is no tradeoff between equity and efficiency, between fairness and economic productivity. Sixty years ago, Harry Truman said he would like to have a one-handed economist. Asked why, he said that every economist he met gave him a menu of choices and not a preferred choice. They would tell him, “on the one hand, if you adopt this policy you will get these benefits and costs; on the other hand, if you adopt another policy then there are these benefits and costs.” If there

were only one hand, the choice would be clear. Investing in disadvantaged young children is one policy where the choice is clear and the two hands clap together.... The good news for policymakers is that there is strong evidence that early environments can be enriched and that we can offset, in part, the powerful consequences of the accident of birth.

It is thus particularly ironic that the typical argument against devoting more resources to early childhood development is its cost, particularly now in such harsh budgetary times. But budgets are always tight. If we cannot afford it now, then when? Not now often means never. Moreover, if the debate comes down to just cost, then not making these investments is what is really costly. The failure to pick up the figurative \$100 bills means greater costs in K-12 education, crime and crime prevention, incarceration, and welfare spending, as well as reduced opportunities for the success of our young people.

FAILURE TO CONCEPTUALIZE

Like all other investments, the costs of early childhood programs are borne up front, and the benefits accrue later. It is this initial cost that appears to be the obstacle to ensuring quality early starts for the children of Maine. In my opinion, though, the initial cost is not really the primary obstacle to picking up the figurative \$100 bills lying around. No matter how tight budgets get, we manage to fund other investments, such as K-12 and higher education, and road maintenance, to name a few. I believe the problem is that we have a difficult time imagining the counterfactual, that is, what would occur if we did things differently, or how things are different now as a consequence of our previous decisions.

If we do not maintain our roads, we can still use them for a long time, but we get visible reminders—big potholes—that something needs to be done. The lack of investment in early childhood education also creates big potholes—more spending on special and remedial education, greater spending on police and corrections, more drug and crime problems, smaller tax base—but we are unaware that an important cause of these problems is our insufficient investment in our youngest

children. To paraphrase a famous line from the movie *Cool Hand Luke* (read this with a theatrical drawl), what we have here is a failure to conceptualize. It is this failure to conceptualize future counterfactual cost savings that leads us to believe that the budget is too tight right now, and investment in our young children is not an urgent priority.

A fairly well known academic economist, Lee Hansen at the University of Wisconsin, joked to his graduate students that “if you can’t measure it, it might as well not exist.” Unfortunately, there is too large a grain of truth in this. We do not readily see the benefits of early childhood education, so in policy discussions they might as well not exist. Consequently, too much of our spending goes to costly band-aids—remedial and special education, corrections, and welfare—rather than to relatively inexpensive prevention. Given the magnitudes of the costs of these band-aid programs (see Table 1 for examples) prevention only needs to have small effects to lead to big savings.

TABLE 1: Selected Maine State and Local Government Spending in FY 2005–06

	Total	Per Capita
Public Welfare	\$2,496,584,000	\$1,903
Special Education	\$282,763,474	\$215
Police Protection	\$221,288,000	\$169
Corrections	\$182,639,000	\$139

Source: Special education expenditure is from the Maine Department of Education. All other data are from the U.S. Census Bureau.

The net benefits of early education are not readily seen for two reasons. First, the hazards of inadequate development in early childhood are latent, that is, not observed until much later. If the same hazards (probabilities of incarceration, drug abuse) were immediate, such as providing alcohol to minors, they almost certainly would be illegal. Second, there is no explicit exchange of dollars when the latent effects occur. Thus, the subsequent costs savings in K-12 education

and incarceration, for example, would not show up in an accounting line labeled “returns to investment in early education.” But this does not make the returns any more hypothetical or any less real than if actual dollars were exchanged every time a child is prevented from repeating a grade or spending time in detention. Of course, more research quantifying these difficult-to-measure benefits would help us to better visualize the counterfactual consequences, but the primary obstacle is the preoccupation with explicit monetary transactions. It is the preoccupation with what is easily measurable that has led to all sorts of economically inefficient policies, such as allowing too much environmental degradation. We must hope that this improves over time with improved ability to estimate values of things that do not involve market transactions.

Also contributing to doubts about the payoff from early childhood interventions is the rather large range of estimated benefit-cost ratios. The ratios in the case studies noted above ranged from greater than nine to less than three. This suggests uncertainty about the value of the benefits of early education programs. Actually, the benefit-cost ratios vary not because of uncertainty about the values of the benefits, but rather because of which benefits can be measured in each case. For example, some studies do not measure the value of the reduction in crime, other studies do not include the value of better health, some do not include the benefits that accrue over entire lifetimes, and so on. The lower range of cost-benefit ratios are mostly due to including the value of fewer benefits in the calculations. Hence, the most complete estimates are generally in the upper range of cost-benefit numbers.

WHY THE PAYOFF IS SO HIGH

Perhaps another obstacle to making significantly greater investment in early childhood development is that the purported return is almost too high to believe. It is like the joke about the two economists who walk past a \$100 bill lying on the ground. Neither will pick it up because a real \$100 bill lying on the ground is just too good to be true. In the case of investment in the human capital of preschool children, though, there is a straightforward reason for

the extraordinarily high returns. It has to do with the nature of human capital accumulation.

The more skills one learns, the easier it becomes to learn additional skills. As Nobel Prize laureate James Heckman (2000: 4) has written, “early learning begets later learning and early success breeds later success.” Human capital accumulation has a self-productive aspect. In other words, the production of human capital is characterized by dynamic complementarity: the impact of investment in human capital at a particular time in the life cycle affects, and is affected by, investments in human capital at other times in the life cycle. This is analogous to the “miracle of compound interest” with financial investments, but is considerably stronger in the case of human capital accumulation, which is why investing early and often is so important and why the payoff can be so high. It is also why later investments in children’s human capital are also important. For far too many disadvantaged young children, our expensive investments in their educations are largely ineffective because of insufficient development in early childhood. Conversely, greater investments in early childhood investments would be largely ineffective if they come from substantial cuts in investments in primary, secondary, and tertiary education (although greater early childhood investments will lead to later reductions in the costs of remedial education).

Indeed, the first several years of education, and presumably preschool, have little direct economic payoff (for evidence on this, see Trostel 2004; Heckman, Lochner and Todd 2008). As common sense would suggest, the payoff from the first years of schooling is in preparing the student for later years of schooling, and those years have a direct economic return (for further discussion on this point, see Cunha et al. 2006; Cunha and Heckman 2007). Also, for those falling behind initially it is difficult, even impossible, to catch up. Adverse early childhood experiences can create a permanent barrier to success in life.

The empirical evidence on the nature of human capital accumulation suggests that achieving economic success through education is analogous to climbing a hill. Imagine biking and being at the bottom of a big hill. The crucial part of the effort up the hill is where it starts to get steep. The key to getting through this tough part where the road turns upward is having and

keeping momentum from the start. If you start from a standing stop on the steepest part, you are unlikely to make it up the hill. Thus, it is the beginning that generates the momentum for the hardest part that is crucial. Having enough early momentum to get through the inflection point (where the slope starts to diminish) makes the rest of the hill relatively easy. Reaching academic, social, and economic summits is like this biking example. The production profile of human capital is shaped like a hill.

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There is also empirical evidence on the other side of the dynamic-complementarity issue. That is, the returns to early investments in human capital depend on the extent of later investments. The high returns to early interventions are contingent on continued investment. To go back to the biking-up-a-hill analogy, although effort before the steepest part of the hill may be the most crucial, continued effort all the way up is needed to reach the summit. Even past the inflection point where the slope starts becoming less steep, coasting and losing momentum can still lead to failure. For example, some research has found that the initial gains in academic achievement tests from participation in Head Start “faded out” in elementary school because the former Head Start participants generally attended poorer schools (see Currie and Thomas 2000). Thus, early and sustained investment creates the compounding effect.

CAVEATS

Two important points should be stressed about estimates of the returns to investment in early childhood development.

First, because of the dynamic complementarity, the return to early childhood investments is contingent on later human capital investments. Consequently, the rate of return at various stages of investment in human capital is not well defined. The rate of return to investment at a specific stage of human capital accumulation depends on one's perspective, that is, on the particular thought experiment being considered. The return estimated from a preschool intervention, for example, implicitly holds all else constant, including the quantity and quality of later schooling. Similarly, the estimated return for high school or college graduation, for instance, implicitly holds the quantity and quality of preschool and primary education constant. But these stages of education are unlikely to be independent of each other. So, there is no clear cut way to unambiguously isolate the benefits of a specific stage of educational development. In other words, research studies examining different stages of preschool or school could attribute the same benefits (higher earnings and tax revenues, lower costs of incarceration and welfare) to different levels of human capital development.

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This has important policy implications, but this point has been overlooked in the mushrooming literature on the returns to early childhood programs (as well as in the literature on the returns to high school and college graduation). The failure to account for the dynamic complementarity between human capital investments can misguide policy. The estimated returns from a specific preschool intervention, which implicitly hold all else constant, do not generalize for a reallocation of preschool and school funding. The apparent "fade out" of the benefits of Head Start serves as a good lesson in this regard. It is important to keep in mind the specific experiment from which the estimated returns were derived.

The second, more well-known, caveat about estimated benefits of investment in early childhood development is that almost all the estimates are from targeted interventions. That is, the estimates are for children the most at risk for low educational, social, and economic outcomes. The benefit-cost ratios for such targeted interventions are surely higher than for early childhood programs for the broader population. A far higher proportion of non-at-risk children are on their way to successful lives without new programs. It is unclear, however, to what extent the benefit-cost ratio would be lower for a wide-reaching early childhood program. Karoly and Bigelow (2005), however, calculated that the returns to a universal preschool program would not be dramatically less than the returns to targeted programs. The benefit-cost ratio in their baseline case, after discounting the future benefits, was 2.6. Thus, as programs for early childhood development reach a wider population, evidently the larger the net benefits for society. The policy goal should not be to achieve the higher benefit-cost ratio, but rather to undertake all policies with benefit-cost ratios greater than one.

CONCLUSION

The evidence is steadily mounting that investing in early childhood development pays in a big way. It benefits the children for the rest of their lives. It also benefits society with reduced crime and reduced government spending in other areas. Moreover, it benefits society in terms of being the right thing to do (which clearly has value too). It is rare that a public policy choice does not present difficult tradeoffs, but greater investment in young children is such a case.

As I see it, the real obstacle preventing us from taking advantage of the windfall-profit opportunities of investing in our young children is the lack of awareness. The cause-and-effect relationships between early childhood learning and later-life consequences are underappreciated, and our spending priorities lean too far toward treating the symptoms rather than on low-cost prevention. In a 2009 press release from the Highscope Educational Research Foundation, Sanford Newman, founder of Fight Crime: Invest in Kids, put a

particularly eloquent point on this: "...we need to be as willing to guarantee our kids space in a pre-kindergarten program as we are to guarantee a criminal a prison cell" (www.highscope.org/Content.asp?ContentId=282). Indeed, we should be more willing to guarantee our kids quality early childhood education than later-life band-aids.

Whenever I think about the issue of early childhood investments, I recall the old long-running ad campaign of a well-known muffler business—where the mechanic chuckles at the end "well, you can pay me now, or you can pay me (a lot more) later." Basic maintenance on a car is an obvious way to prevent expensive problems later. If only we could see early childhood development as an obvious way to prevent expensive, and inequitable, problems later. 🐞

REFERENCES

- Barnett, W.S. and Leonard N. Masse. 2007. "Comparative Benefit-Cost Analysis of the Abecedarian Program and its Policy Implications." *Economics of Education Review* 26(1): 113–25.
- Blau, David and Janet Currie. 2006. "Pre-School, Day Care, and After-School Care: Who's Minding the Kids?" *Handbook of the Economics of Education*, Vol. 2, ed. Eric A. Hanushek and Finis Welch. Elsevier, Amsterdam.
- Cunha, Flavio and James Heckman. 2007. "The Technology of Skill Formation." *American Economic Review* 97(2): 31–47.
- Cunha, Flavio, James J. Heckman, Lance Lochner and Dimitriy V. Masterov. 2006. "Interpreting the Evidence on Life Cycle Skill Formation." *Handbook of the Economics of Education*, Vol. 2, ed. Eric A. Hanushek and Finis Welch. Elsevier, Amsterdam.
- Currie, Janet. 2001. "Early Childhood Education Programs." *Journal of Economic Perspectives* 15(2): 213–238.
- Currie, Janet and Duncan Thomas. 2000. "School Quality and the Longer-Term Effects of Head Start." *Journal of Human Resources* 35(4): 755–774.
- Heckman, James J. 2000. "Policies to Foster Human Capital." *Research in Economics* 54(1): 3–56.

Heckman, James J. 2008. "Investing in Disadvantaged Young Children Is Good Economics and Good Policy." Presented at the American Education Finance Association Annual Conference, Denver, CO.

Heckman, James J., Lance J. Lochner and Petra E. Todd. "Earnings Functions and Rates of Return." *Journal of Human Capital* 2(1): 113–125.

Karoly, Lynn A. and James H. Bigelow. 2005. *The Economics of Investing in Universal Preschool Education in California*. RAND, Santa Monica, CA.

Karoly, Lynn A., M. Rebecca Kilburn and Jill S. Cannon. 2005. *Early Childhood Interventions: Proven Results, Future Promise*. RAND, Santa Monica, CA.

Okun, Arthur M. 1975. *Equality and Efficiency: The Big Tradeoff*. Brookings Institution, Washington, DC.

Schweinhart, Lawrence J., Jeanne Montie, Zongping Xiang, William S. Barnett, Clive R. Belfield and Milagros Nores. 2005. *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40*. High/Scope Press, Ypsilanti, MI.

Trostel, Philip A. 2004. "Returns to Scale in Producing Human Capital from Schooling." *Oxford Economic Papers* 56(3): 461–484.



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