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# EARLY CHILDHOOD EDUCATION AND CARE

## THE CASE FOR INVESTING IN DISADVANTAGED YOUNG CHILDREN\*

JAMES J. HECKMAN\*\*

### Introduction

In a series of papers with distinguished co-authors, I have developed the case for intervening in the lives of disadvantaged children. This paper reviews the arguments developed in Cunha, Heckman, Lochner and Masterov (2006), Heckman and Masterov (2007) and Heckman (2000, 2008).

This body of research examines the origins of inequality and analyzes policies to alleviate it. Families play a powerful role in shaping adult outcomes. The accident of birth is a major source of inequality. Recent research by Cunha and Heckman (2007a) shows that in American society, about half of the inequality in the present value of lifetime earnings is due to factors determined by age 18. It is possible that the figure is as high or even higher in Western Europe because labor market inequality is lower there. Compared to 50 years ago, a greater fraction of American children is being born into disadvantaged families where investments in children are smaller than in advantaged families. Growing unassimilated immigrant populations in Western Europe create similar adverse trends there. Policies that supplement the child rearing resources available to disadvantaged families reduce inequality and raise productivity.

The argument made in the cited papers can be summarized by the following 15 points:

1. Many major economic and social problems such as crime, teenage pregnancy, dropping out of

- high school and adverse health conditions are linked to low levels of skill and ability in society.
2. In analyzing policies that foster skills and abilities, society should recognize the multiplicity of human abilities.
3. Currently, public policy in the U.S. and many other countries focuses on promoting and measuring cognitive ability through IQ and achievement tests. A focus on achievement test scores ignores important noncognitive factors that promote success in school and life.
4. Cognitive abilities are important determinants of socioeconomic success.
5. So are socioemotional skills, physical and mental health, perseverance, attention, motivation, and self confidence. They contribute to performance in society at large and even help determine scores on the very tests that are commonly used to measure cognitive achievement.
6. Ability gaps between the advantaged and disadvantaged open up early in the lives of children.
7. Family environments of young children are major predictors of cognitive and socioemotional abilities, as well as a variety of outcomes, such as crime and health.
8. Family environments in the U.S. and many other countries around the world have deteriorated over the past 40 years. A greater proportion of children is being born into disadvantaged families including minorities and immigrant groups. Disadvantage should be measured by the quality of parenting and not necessarily by the resources available to families.
9. Experimental evidence on the positive effects of early interventions on children in disadvantaged families is consistent with a large body of non-experimental evidence showing that the absence of supportive family environments harms child outcomes.
10. If society intervenes early enough, it can improve cognitive and socioemotional abilities and the health of disadvantaged children.
11. Early interventions promote schooling, reduce crime, foster workforce productivity and reduce teenage pregnancy.
12. These interventions are estimated to have high benefit-cost ratios and rates of return.



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13. As programs are currently configured, interventions early in the life cycle of disadvantaged children have much higher economic returns than later interventions, such as reduced pupil-teacher ratios, public job training, convict rehabilitation programs, adult literacy programs, tuition subsidies or expenditure on police. The returns are much higher than those found in most active labor market programs in Europe (See Heckman, LaLonde and Smith (1999) and Martin and Grubb (2001)).
14. Life cycle skill formation is dynamic in nature. Skill begets skill; motivation begets motivation. Motivation cross-fosters skill and skill cross-fosters motivation. If a child is not motivated to learn and engage early on in life, the more likely it is that when the child becomes an adult, he or she will fail in social and economic life. The longer society waits to intervene in the life cycle of a disadvantaged child, the more costly disadvantage is to remediate.
15. A major refocus of policy is required to capitalize on knowledge about the importance of the early years in creating inequality and in producing skills for the workforce.

The evidence assembled in this body of work substantially amends the analysis of *The Bell Curve* by Herrnstein and Murray (1994). Those authors made an important contribution to academic and policy analysis by showing that cognitive ability as captured by achievement test scores measured in a child's adolescent years predicts adult socioeconomic success on a variety of dimensions. Heckman, Stixrud and Urzua (2006) and Borghans, Duckworth, Heckman, and ter Weel (2008) demonstrate that personality factors are also powerfully predictive of socioeconomic success and are as powerful as cognitive abilities in producing many adult outcomes. Achievement tests of the sort used by Herrnstein and Murray reflect both cognitive and noncognitive factors.

*The Bell Curve* assigned a primary role to genetics in explaining the origins of differences in human cognitive ability and a primary role to cognitive ability in shaping adult outcomes. If cognitive ability is genetically determined and is primary in shaping adult outcomes, public policy towards disadvantaged populations is limited to transfer payments to the less able. Recent research, summarized in the cited papers, establishes the power of socioemotional abilities and an important role for environment and intervention in creating abilities. The field of epigenetics demonstrates how genetic expression is strongly influenced by envi-

ronmental influences and that environmental effects on gene expression can be inherited. The cited papers show that high quality early childhood interventions foster abilities and that inequality can be attacked at its source. Early interventions also boost the productivity of the economy.

### **Enriching early environments can partially compensate for early adversity**

Experiments that enrich the early environments of disadvantaged children demonstrate causal effects of early environments on adolescent and adult outcomes, and provide powerful evidence against the genetic determinism of Herrnstein and Murray (1994). Enhancements of family environments improve child outcomes and affect both cognitive and noncognitive skills. Noncognitive skills – personality factors, motivation and the like – are an important channel of improvement (Heckman, Malofeeva, Pinto, and Savelyev (2008)).

The most reliable data come from experiments that substantially enrich the early environments of children living in low-income families. Two of these investigations, the Perry Preschool Program and the Abecedarian Program, are very informative for the purposes of this discussion because they use a random assignment design and collect long-term follow-up data. These longitudinal studies demonstrate substantial positive effects of early environmental enrichment on a range of cognitive and noncognitive skills, schooling achievement, job performance, and social behaviors, long after the interventions ended. Data from David Olds' Nurse Family Partnership Program (2002) and from non-controlled assessments of Head Start and the Chicago Child-Parent Centers programs confirm these findings.<sup>1</sup>

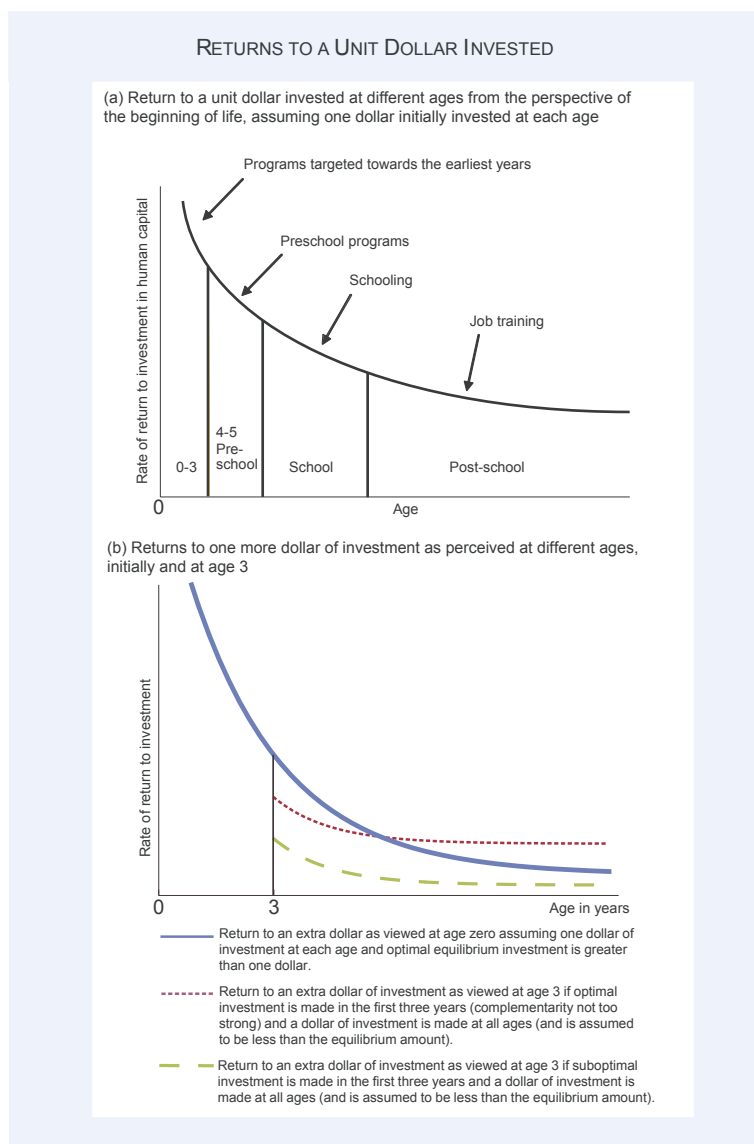
An estimated rate of return (the return per dollar of cost) to the Perry Program is in excess of 14 percent.<sup>2</sup> This high rate of return is higher than standard returns on stock market equity (7.2 percent) and suggests that society at large can benefit substantially from such interventions. These are underestimates of the rate of return because they ignore the economic returns to health and mental health.

Several observations about the evidence from the intervention studies and non-experimental longitudi-

<sup>1</sup> See Cunha, Heckman, Lochner, and Masterov (2006) and Heckman (2008) for a detailed discussion of these programs.

<sup>2</sup> See Heckman, Moon, Pinto, and Yavitz (2008).

Figure 1



nal studies are relevant. Skills beget skills and capabilities foster future capabilities. All capabilities are built on a foundation of capacities that are developed earlier. Early mastery of a range of cognitive, social, and emotional competencies makes learning at later ages more efficient and therefore easier and more likely to continue.

As currently configured, public job training programs, adult literacy services, prisoner rehabilitation programs, and education programs for disadvantaged

adults produce low economic returns.<sup>3</sup> Moreover, for studies in which later intervention shows some benefits, the performance of disadvantaged children is still behind the performance of children who experienced earlier interventions in the preschool years. If the base is weak, the return to later investment is low.

The advantages gained from effective early interventions are best sustained when they are followed by continued high quality learning experiences. The technology of skill formation developed in Cunha and Heckman (2007b) and Heckman (2007) shows that the returns on school investment are higher for persons with higher ability, where ability is formed in the early years. Figure 1 (a) shows the return to a marginal increase in investment at different stages of the life cycle starting from a position of low but equal initial investment at all ages.<sup>4</sup>

Due to dynamic complementarity, or synergy, early investments must be followed by later investments if maximum value is to be realized. One unusual feature of early interventions that

is stressed in Cunha and Heckman (2007b) and Heckman and Masterov (2007) is that the traditional equity-efficiency trade-off that plagues most policies is absent. Early interventions promote economic efficiency and reduce lifetime inequality. Remedial interventions for disadvantaged adolescents who do not receive a strong initial foundation of skills face an equity-efficiency trade-off. They are difficult to justify on the grounds of economic efficiency and generally have low rates of return.

Cunha and Heckman (2008) and Cunha, Heckman, and Schennach (2007) estimate technologies of skill formation to understand how the skills of children evolve in response to (1) the stock of skills children have already accumulated; (2) the investments made by their parents; and (3) the stock of skills accumulated by the parents themselves.

<sup>3</sup> See Cunha, Heckman, Lochner, and Masterov (2006) and Heckman and Lochner (2000) for evidence on the returns to adolescent interventions for disadvantaged youth.

<sup>4</sup> The curve is not an equilibrium schedule. It is a return to a unit of investment at each age assuming an initial low and equal investment at all ages that is below the final equilibrium level at each age. The equilibrium investment policy would allocate more resources to the early years and less to later years.

Table 1

Comparison of different investment strategies with regard to disadvantaged children<sup>a)</sup>

Outcome	Baseline	Changing early conditions: changing investment from the 1 <sup>st</sup> to 7 <sup>th</sup> decile of the overall distribution of early investment	Adolescent intervention: moving investments at last transition from 1 <sup>st</sup> to 9 <sup>th</sup> decile of overall investment <sup>b)</sup>	Changing initial conditions and performing a balanced intervention using the resources spent on the adolescent intervention
High school graduation	0.4109	0.6579	0.6391	0.9135
Enrollment in college	0.0448	0.1264	0.1165	0.3755
Conviction	0.2276	0.1710	0.1773	0.1083
Probation	0.2152	0.1487	0.1562	0.0815
Welfare	0.1767	0.0905	0.0968	0.0259

<sup>a)</sup> Disadvantaged children: First decile in the distribution of cognitive and noncognitive skills at age 6. Mothers are in first decile in the distribution of cognitive and noncognitive skills at ages 14–21. <sup>b)</sup> 35–50%; more costly. This is the range produced from a two standard deviation confidence interval.

Source: Cunha and Heckman (2006).

Figure 1(b) repeats the curve of Figure 1(a) on a different scale and also shows the return to an extra dollar of investment at *age three* under two different scenarios. In the first scenario (depicted by the tightly-spaced dashed line), optimal investment up to age three is assumed to have been made. An additional dollar is invested at each age after age three and the return to the next dollar after that is computed. At age three, the curve starts below the curve (a) that is determined at age zero because substantial investment is assumed to have been made at age three. This is a manifestation of diminishing re-turns. After age three, the return eventually is greater than the initial curve for Figure 1(a) because of dynamic complementarity. The higher skill base at three enhances the productivity of later investment.<sup>5</sup>

The third curve (the curve with wider dashes) depicts a case with suboptimal investment in the years zero to three. Assuming that a dollar is initially invested in each year after age three, the return to the next dollar is less than the return viewed prospectively. When the initial base is substantially compromised, so are the returns to later investment.<sup>6</sup>

Table 1 presents a simulation of the model of Cunha et al. (2007). It considers a population of disadvantaged children with low levels of skills as

measured at ages four to six. The investments they receive place them at the bottom decile of the overall population ability distribution. Their mothers are also at the bottom decile of the distribution of maternal endowments. For the outcomes listed in the first column, the baseline (no treatment) performance is presented in the second column “Baseline.” These outcomes are those of the Perry control group.

Using an empirically determined technology, Cunha and Heckman (2006) simulate an intervention that moves children from the bottom decile of family resources to the seventh decile (from the bottom) in terms of their family environments. This produces the outcomes displayed in the third column of Table 1. This intervention essentially produces the outcomes for the Perry treatment group (see Schweinhart, Montie, Xiang, Barnett, Belfield, and Nores (2005)). The fourth column of Table 1 is a later adolescent intervention that also causes children to achieve Perry outcomes. To achieve Perry results in this fashion requires 35–50 percent *more* investment costs in present value terms discounted back to ages four to six (the age of the initial intervention). Family resources must be moved from the bottom decile to the ninth decile to achieve with later interventions what can be achieved with earlier interventions.

It is possible to remediate rather than to intervene early, but it is also much more costly. The outcomes displayed in the final column of Table 1 result from allocating the resources spent in the adolescent intervention more smoothly over the life cycle of the child. Such interventions front load investment in

<sup>5</sup> The curve is drawn assuming moderate dynamic complementarity. In principle, the interval between age three and the crossing age could be made arbitrarily small.

<sup>6</sup> Many different configurations of the age three investment curve are possible depending on the extent of diminishing returns within a period and the strength of dynamic complementarity of investments over time.



the early years, following the logic of Figure 1(a) and the model developed in Cunha and Heckman (2007b) and Heckman (2007, 2008). Relatively more investment is spent in the early years, but early investments are supported by later investments.

Suppose that the resources required to produce Perry outcomes solely from adolescent interventions are spread more smoothly over the life cycle using an optimal investment strategy. This causes Perry-like children to attain middle class outcomes as is shown in the final column of numbers.

The evidence in the recent research literature supports the economic efficiency of early initial investment that is sustained. The optimal policy is to invest relatively more in the early years. But early investment must be followed up to be effective. This is a consequence of dynamic complementarity. Later remediation for early disadvantage is possible but to attain what is accomplished by early investment is much more costly. If society intervenes too late and individuals are at too low a level of skill, later investment can be economically inefficient. Middle-class children receive massive doses of early enriched environments. Children from disadvantaged environments do not.

### Practical issues in implementing early childhood programs

A variety of practical issues arise in implementing early childhood programs.

- *Who should be targeted?* The returns to early childhood programs are the highest for disadvantaged children who do not receive substantial amounts of parental investment in the early years. The proper measure of disadvantage is not necessarily family poverty or parental education. The available evidence suggests that the quality of *parenting* is the important scarce resource. The quality of parenting is not always closely linked to family income or parental education. Measures of risky family environments should be developed that facilitate efficient targeting.
- *With what programs?* Programs that target the early years seem to have the greatest promise. The Nurse-Family Partnership Program (Olds (2002)), the Abecedarian Program and the Perry Program have been evaluated and show high

returns. Programs with home visits affect the lives of the parents and create a permanent change in the home environment that supports the child after center-based interventions end. Programs that build character and motivation that do not focus exclusively on cognition appear to be the most effective.

- *Who should provide the programs?* In designing any early childhood program that aims to improve the cognitive and socioemotional skills of disadvantaged children, it is important to respect the sanctity of early family life and to respect cultural diversity. The goal of early childhood programs is to create a base of productive skills and traits for disadvantaged children living in culturally diverse settings. By engaging private industry and other social groups that draw in private resources, create community support, and represent diverse points of view, effective and culturally sensitive programs can be created.
- *Who should pay for them?* One could make the programs universal to avoid stigmatization. Universal programs would be much more expensive and create the possibility of deadweight losses, whereby public programs displace private investments by families. One solution to these problems is to make the programs universal but to offer a sliding fee schedule by family income to avoid deadweight losses.
- *Will the programs achieve high levels of compliance?* It is important to recognize potential problems with program compliance. Many successful programs change the values and motivations of the child. Some of these changes may run counter to the values of parents. There may be serious tension between the needs of the child and the acceptance of interventions by the parent. Developing culturally diverse programs will help avoid such tensions. One cannot assume that there will be no conflict between the values of society as it seeks to develop the potential of the child and the values of the family, although the extent of such conflicts is not yet known.

### Summary

About 50 percent of the variance in inequality in lifetime earnings is determined by age 18. The family plays a powerful role in shaping adult outcomes that is not fully appreciated in current policies around the world.

Current social policy directed toward children focuses on improving cognition. Yet more than intelligence is required for success in life. Gaps in both cognitive and noncognitive skills between the advantaged and the disadvantaged emerge early and can be traced in part to adverse early environments. A greater percentage of children in the U.S. and many other countries is being born into adverse environments.

The problems of rising inequality and diminished productivity growth are not due mainly to defects in public schools or to high college tuition rates. Late remediation strategies designed to compensate for early disadvantage such as job training programs, high school classroom size reductions, convict rehabilitation programs, adult literacy programs and other active labor market programs are not effective, at least as currently constituted. Remediation in the adolescent years can repair the damage of adverse early environments, but it is costly. There is no equity-efficiency trade-off for programs targeted toward the early years of the lives of disadvantaged children. There is a substantial equity-efficiency trade-off for programs targeted toward the adolescent years of disadvantaged youth. Social policy should be directed toward the malleable early years.

Any proposed program should respect the primacy of the family. Policy proposals should be culturally sensitive and recognize the diversity of values in society. Effective strategies would engage the private sector to mobilize resources and produce a menu of programs from which parents can choose.

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