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Inequality in America: What role for human capital policies?

Growth in the quality of the workforce has been a major source of U.S. productivity growth and economic mobility in the past century. But recently, growth in the quality of the workforce has slowed down.[1] The growth in educational attainment across cohorts of Americans born since 1950 has decelerated compared to the trend in the preceding 50 years. Measured correctly, the proportion of high school dropouts in entering cohorts of workers has increased in the past twenty years, even among the nonimmigrant population.[2] This has serious implications for growth in aggregate real wages.

The slowdown in the growth in the quality of the U.S. labor force came during a period of increasing wage differentials between skilled and unskilled workers. Around 1980, the measured wage premium for higher-skilled workers in the United States began to increase substantially. Adolescent white males from the top half of the family income distribution responded to the new economic incentives with higher college attendance rates, but the response of those from lower-income families was weaker (Figure 1). Across all demographic groups, the already substantial socioeconomic, racial, and ethnic gaps in college attendance widened. Because education is a primary determinant of earnings, these disparate responses to the new market for skills widened racial, ethnic, and family-related wage differentials, contributing to rising economic inequality among U.S. households.[3]

Our current understanding of the causes of the gaps and trends visible in Figure 1 is limited. The debate over

This article discusses issues addressed by James Heckman, Henry Schulz Distinguished Professor of Economics at the University of Chicago, in his seminar of the same title at the University of Wisconsin–Madison in November 2004. The seminar is one in a IRP seminar series devoted to the causes and consequences of inequality.

Figure 1. College participation among white males aged 18–24.

Source: Computed from the Current Population Survey P-20 School Reports and the October report.

Note: These are high school graduates and GED holders either living at home or financially dependent on their parents while attending college.

appropriate and cost-effective solutions for increasing the supply of skilled labor in an economically efficient way has been intense. There is no shortage of policy proposals. Disparities in educational attainment are seen as important contributors to rising income inequality. The uneven quality of U.S. schools has been held responsible. Much emphasis has been placed on reforms such as school choice, charter schools, and achievement testing, and on second-chance remediation programs—publicly provided job training or exam certification (through the General Educational Development or GED test)—as an alternative to high school graduation.[4]

The analyses of James Heckman and his colleagues[5] ground the policy analysis of these issues on clearly formulated and empirically justified economic models. It is possible through trial and error to stumble onto effective policies without understanding the causes of the problems being addressed. A far more promising approach is to undertake empirically grounded studies of the mechanisms and the institutions that produce skills, and this is what they do. A consideration of policies based on economic fundamentals is more likely to lead to innovative solutions that address problems with the supply of skills (what economists call "human capital problems") than is a synthesis of "treatment effects" from different programs with different features in different environments. In the research summarized here, Heckman and his colleagues consider the acquisition of human capital in the context of economic models of life-cycle learning and skill accumulation, rather than in the narrower framework of just looking at policies that worked in the past. From this broader perspective, they conclude that most commonly recommended remediation policies appear likely to have only modest effects on skill formation.[6]

The best evidence, Heckman contends, strongly suggests that longer-term factors such as the environment provided by the parents and family resources available to children over the life cycle are far more decisive in promoting readiness for postsecondary schooling and social attachment than is family income during the brief period of adolescence. Factors operating during early childhood cumulate in adolescence in the form of crystallized cognitive abilities, attitudes, and social skills that explain inequalities in later socioeconomic attainment. This insight, says Heckman, should shape our understanding of the processes involved in skill formation and the policies most likely to be effective in raising the skill levels of the workforce and remedying past neglect.

The remainder of this article summarizes some principal findings of research conducted by Heckman and colleagues on the relative effectiveness of widely advocated

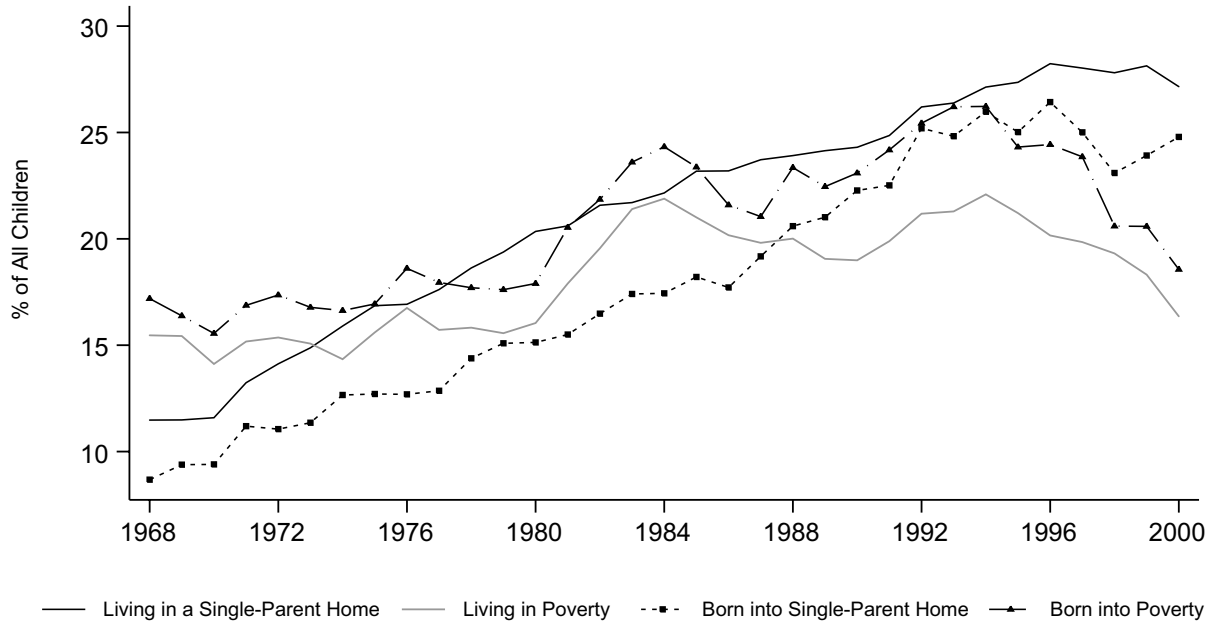

Figure 2. Children born or living in adverse environments, 1968–2000.

Source: Current Population Survey March Supplement, 1968–2000.

Note: Poverty is defined as living in a household with income below the federal poverty line, which is adjusted for age and number of family members. Single-parent homes include cohabiting partners.

human capital policies: early intervention programs for young children, interventions for adolescents, and, more briefly, job training for adults.[7]

Family environment and achievement

A greater proportion of American children are exposed to adverse family environments than in the past. Relatively more children are born into or are living in overwhelmingly poor, often single-parent homes, in which parents have low levels of educational attainment (Figure 2). These disadvantages are associated with poor child educational and economic outcomes. Children from disadvantaged families are less likely to complete high school or enroll in postsecondary education. Children from single-parent families are less likely as adults to complete high school, graduate from college, or be employed than are children from two-parent families.

Acquiring skills is a dynamic process. Much evidence concerning child development suggests that investments at different stages of the life cycle are vital to the formation of different types of abilities.[8] The skills acquired in one stage affect both initial capacities and the technology of learning at the next stage. Human capital is produced over the life cycle by families, schools, and firms, although most discussion has focused on schools as the major producers. Yet schools work with what parents bring them, operating more effectively if parents reinforce them by encouraging and motivating children. The child development literature tells us that younger mothers and mothers with less schooling provide less cognitive and emotional stimulation to their children. When the opportunities for forming particular skills or abilities are missed, remediation is costly, and full remediation is often prohibitively expensive.

The ability that drives college participation is shaped early in life. For all race and ethnic groups, important differences in child ability among income groups, as measured by cognitive test scores, appear as early as age 6 (see, for example, Figure 3A). These gaps in achievement are significantly reduced, but not eliminated, when the mother's education and ability, and family structure, are included as statistical controls (Figure 3B). The same is true when we examine gaps at other ages. Moreover, cognitive abilities appear to be fairly well determined by an early age (in the sense that IQ at later ages is highly correlated with IQ at age 10) and disparities cannot be completely eliminated at later ages. Test score differentials based on income also emerge quite early in children's behaviors and attitudes (their "noncognitive skills"—see Figure 4A). The gaps in behavioral skills are, however, significantly reduced once we account for the mother's ability, for family income and family structure, and for location (Figure 4B)—a finding of considerable policy significance. This correlational evidence is

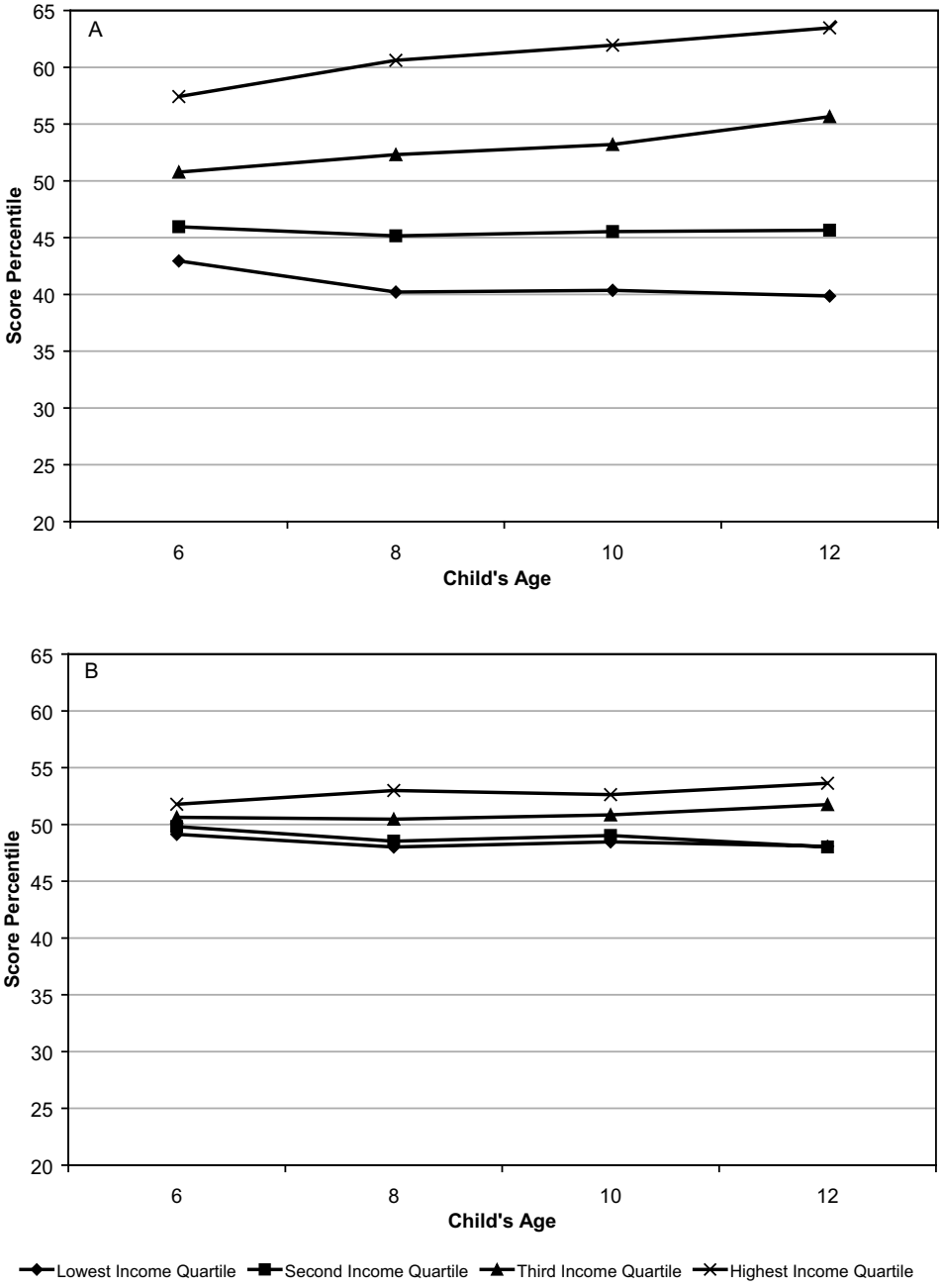

Figure 3. A. Average percentile rank on the PIAT-Math score, by income quartile. B. Residualized average PIAT-Math Score.

Source: P. Carneiro and J. Heckman, "Human Capital Policy," in *Inequality in America: What Role for Human Capital Policies?* ed. J. Heckman and A. Krueger (Cambridge, MA: MIT Press, 2003).

Note: The income measure we use is average family income between the ages of 6 and 10. Income quartiles are then computed from this measure of income. In Figure 3B, the score is residualized on maternal education, maternal AFQT, and living in a single-parent family at each age (we use AFQT corrected for the effect of schooling).

bolstered by experimental evidence, discussed below, that suggests that compensation for early family disadvantage can partially remediate the disadvantage.

The ability that is formed early largely accounts for the gaps in schooling by family income and by demographic groups. Steven Cameron and James Heckman show that, controlling for this ability, minorities are more likely to attend college than whites.[9] Tuition and family income during the child's adolescent years play only minor roles in accounting for schooling differentials once ability is controlled for.

The importance of noncognitive skills

The role of cognitive ability in shaping schooling and labor market outcomes is well established. Current edu-

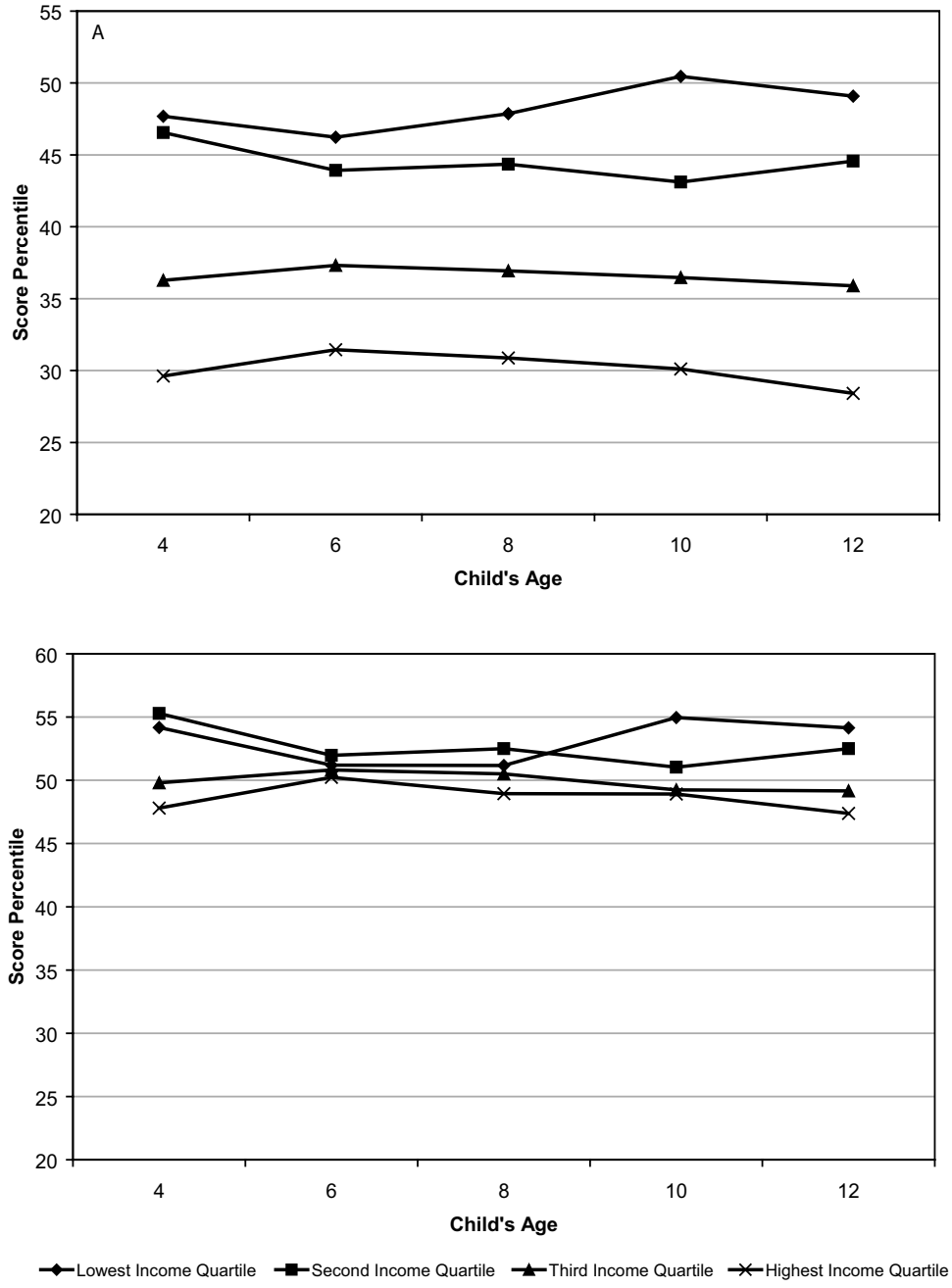

Figure 4. A. Average percentile rank on Antisocial Score, by income quartile. B. Residualized average Antisocial Score.

Source: P. Carneiro and J. Heckman, "Human Capital Policy," in *Inequality in America: What Role for Human Capital Policies?* ed. J. Heckman and A. Krueger (Cambridge, MA: MIT Press, 2003).

Note: The income measure we use is average family income between the ages of 6 and 10. Income quartiles are then computed from this measure of income. In Figure 3B, the score is residualized on maternal education, maternal AFQT, and living in a single-parent family at each age (we use AFQT corrected for the effect of schooling).

cational policy and much economic analysis focus on academic achievement tests as the major output of schools. Performance evaluations of the kind mandated under the No Child Left Behind Act of 2001[10] and other evaluations of educational reforms are based almost exclusively on changes in scores on achievement tests. Yet this focus on measured achievement misses the big picture of child development, because achievement tests measure only a few of the many skills required for a successful life.[11] It is common knowledge that motivation, trustworthiness, and other behavioral skills are crucial for success. Perseverance, dependability, and consistency are important predictors of grades in school, for example, and employers and supervisors rate job stability and dependability as highly valued traits.[12] More comprehensive evaluations of educational systems and proposed

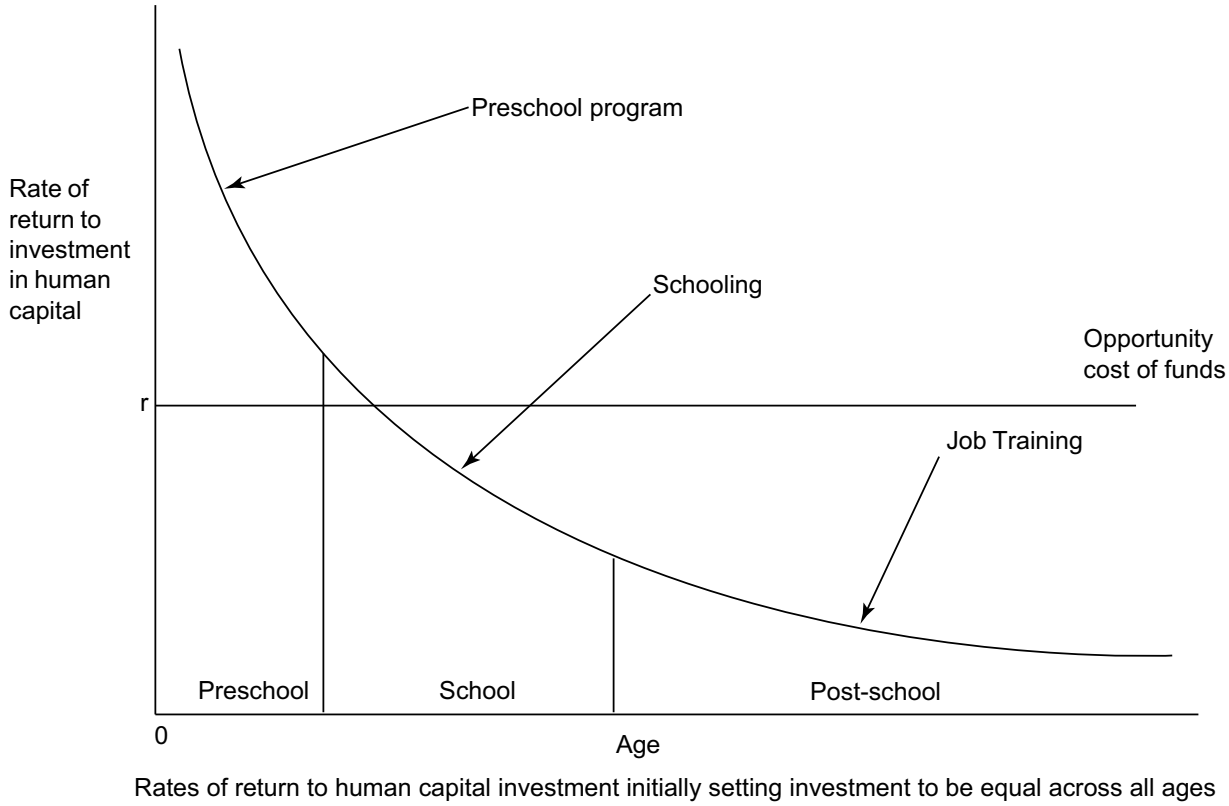

Figure 5. Rates of return to human capital investment.

Source: J. Heckman, "Policies to Foster Human Capital," *Research in Economics* 54, no. 1 (2000): 3–56.

Note: Investment is initially set to be equal across all ages.

reforms would take into account their effects in producing the noncognitive traits also valued in the market.

The neglect of noncognitive skills in analyses of earnings, schooling, and other life outcomes is in part due to the lack of any reliable means of measuring them. There is no single, identified, dominant factor for noncognitive skills that is equivalent to the psychometricians' "*g*," or general intelligence, which summarizes intelligence tests and their effects and often summarizes the scores of achievement tests. Indeed, it is unlikely that one will ever be found, given the diversity of character traits that fall into the category of noncognitive skills.[13] Much of the evidence is derived from self-reported assessments of persistence, self-esteem, optimism, and the like, and these may be as much a consequence as a cause of the measures being investigated.

In a series of studies of the GED, Heckman and his colleagues produce evidence about noncognitive skills that avoids some of the ambiguities in self-reported data.[14] In any consideration of the quality of the U.S. workforce, the GED, a high school equivalency diploma that administers cognitive tests to self-selected high school dropouts, is of considerable importance. The GED is stressed in many government training programs such as the Job Corps. Prisons encourage inmates to take the GED as part of a rehabilitation process. GED recipients now constitute around 15 percent of all persons certified with new high school credentials in the United States as a whole.

GED recipients are demonstrably as smart as ordinary high school graduates who do not go on to college, whether cognitive ability is measured by the Armed Forces Qualification Test (AFQT) or by *g*. They have better AFQT test results than high school dropouts who do not take the GED, they earn more, have higher hourly wages, and finish more years of high school before they drop out. But when their measured ability is taken into account, GED recipients obtain lower levels of schooling, earn no more and have higher turnover rates than other dropouts. The unmeasured factors that account for this relatively poor performance appear to lie in the area of noncognitive skills.[15] GED holders, Heckman and his colleagues contend, are the "wise guys," who lack the ability to think ahead, persist in tasks, or adapt to their environment. Among white male high school dropouts, for example, GED recipients have the highest levels of participation in illegal drug use and selling, fighting, vandalism, and petty theft. GED holders are the ones who drop out of the military and fail to complete college.[16] Their performance relative to that of high school graduates and high school dropouts demonstrates the importance of noncognitive skills in economic life.

The implications for policy

Early investment in children

From the evidence that the ability decisive in producing schooling differentials is shaped early in life, Heckman draws a first, straightforward conclusion. A society that seeks to eliminate ethnic and income differentials in schooling and skill attainment must start with young children, and cannot rely on later tuition policy or job training to compensate for neglect in the early years. An important corollary is that public dollars will be more efficiently spent if more human capital investment is directed toward the young.

Figure 5 diagrams Heckman's argument, plotting the rate of return to human capital at different stages in the life cycle. Age, the horizontal axis, is a surrogate for a person's position in the life cycle. The vertical axis represents the rate of return on investment at each age, under the benchmark that the same amount of investment is made at each age. All else equal, the return to a dollar of investment made when a person is young is higher than the return to the same dollar amount made at a later age. Early investments generate returns over a longer time horizon, and also raise the productivity of later investments: learning begets learning, and skills acquired early facilitate later learning. The optimal policy is to invest more in younger children relative to investment in older children, although the investments made at early ages have to be followed up by investment at later ages if the early investments are to bear fruit.[17] Heckman goes on to argue that Figure 5 also describes the return to investment given current expenditure in place.

Small-scale studies of early childhood investments in children have shown remarkable success; interventions in those years have lasting effects on learning and motivation. In school and out of it, participants in the High/Scope Perry Preschool Program, an intensive, two-year preschool program for highly disadvantaged children that ran from 1962 to 1967, have consistently been more successful than a comparable sample of nonparticipants obtained through randomization.[18] Participants performed better than nonparticipants in almost every area of schooling and of work and social life—from lower rates of special education placement and greater rates of high school graduation, through greater likelihood of employment, higher earnings, more stable marriages, and less delinquency and adult criminal activity. The effectiveness of the program has been matched by its cost-efficiency over the long term (Table 1).

It may be questioned whether programs such as the Perry Preschool Program can be replicated in a permanent, larger-scale fashion. There is encouraging evidence from a study of the Chicago Child-Parent Centers (CPC), an early intervention program for children attending Chicago public schools in very low income neighborhoods.[19]

Table 1
Economic Benefits and Costs of Two Early Childhood Interventions

	Perry	Chicago CPC
Child Care Benefit	986	1,916
Earnings Increase	40,537	32,099
K-12 Savings[a]	9,184	5,634
College/Adult Costs from Extra Education	-782	-644
Reduced Crime	94,065	15,329
Reduced Welfare Use	355	546
Future Generation Earnings Effect[b]	6,181	4,894
Reduced Abuse/Neglect	0	344
Total Benefits	150,525	60,117
Total Costs	16,514	7,738
Net Present Value	134,011	52,380
Benefits-to-Costs Ratio	9.11	7.77

Source: S. Barnett, "Cost-Benefit Analysis of Preschool Education," PowerPoint presentation, 2004, available on the Web site of the National Institute for Early Education Research, http://nieer.org/resources/files/BarnettBenefits.ppt.

Notes: All values are discounted at 3 percent and are in 2004 dollars. Numbers differ slightly from earlier estimates because FG Earnings for Perry and Chicago were estimated using the ratio of FG Earnings Effect to Earnings Effect (about 15 percent) that was found in Abecedarian data.

[a]The K-12 Savings arise from the improvement in student quality and represent a reduction in special education costs.

[b]Future Generation (FG) Earnings Effect represents the improvement in the earning of the descendants of the program participants.

Since 1967, CPC, one of the nation's oldest federally funded preschool programs, has served over 100,000 children at some 24 sites. Participants have consistently performed better in school, have been less likely to run afoul of the juvenile justice system, and have earned more than nonparticipants. The benefits of CPC substantially outweigh costs (see Table 1).

Research on successful early childhood interventions has found that the social skills and motivation of children are more easily altered than intelligence. Programs such as the Perry Preschool Program and the CPC have primarily improved social skills and motivation, and only affect measured achievement through their effects on motivation and not through their effects on IQ. Ten years after entering the Perry Program, participants had almost exactly the same IQ scores as nonparticipants although their achievement test scores were higher, suggesting that the good results of these programs are due in large part to improvements in the noncognitive area—children's motivations, attitudes, persistence in tasks, and social integration. Direct measures of postprogram social performance bolster this evidence. There is suggestive evidence from the Abecedarian program that enriched and sustained early interventions conducted at early ages (starting at 4 months of age) can boost IQ.[20]

Interventions in the adolescent years

A second policy conclusion derives from recognition of the importance of noncognitive skills. Motivation and self-discipline are more malleable at later ages than is IQ. There is evidence that mentoring and motivational programs oriented toward disadvantaged teenagers are effective and can *partially* remedy the consequences of early neglect. Programs for juveniles appear to have a relatively high payoff, although not as high as the payoff to enriched early interventions, because of the social skills and motivation they impart. Mentoring programs for young teenagers like Big Brothers/Big Sisters have shown broad, positive, social and academic impacts on participating school-aged children. Such programs recruit mentors who play a broad supportive role; they make no specific attempts to ameliorate particular difficulties or improve school achievement. One random-assignment study found, for example, that 18 months after being matched with a mentor, Little Brothers and Little Sisters were less likely to have initiated drug or alcohol abuse, hit someone, or skipped school; they had higher average grades and were more likely to express confidence in themselves and to report a better relationship with their parents.[21]

Programs aimed at increasing the skills and earnings of disadvantaged youth also suggest that some types of sustained intervention can positively affect their learning and their subsequent employment and earnings. The Quantum Opportunity Program offered disadvantaged minority students counseling and financial incentives for every hour spent in improving school and market skills, beginning in 9th grade. All participants were kept in the program for four years, whether or not they stayed in school. Two years after completing the program, about one-third more participating students had graduated from high school, and their arrest rates were one-half those of nonparticipants. A cost-benefit analysis of this program estimated positive net social returns.[22]

Other programs have demonstrated similar results for adolescents still in school. Ohio's Learning, Earning, and Parenting Program (LEAP) and the Teenage Parent Demonstration (TPD) projects provided financial incentives for teenage parents on welfare to stay in school or take GED classes, or imposed penalties for failure to enroll. LEAP improved graduation rates; TPD had mixed effects. Both show positive postprogram effects on earnings and employment among individuals who were still in school when they entered the program, but meager or even negative effects for dropouts. The reasons are unclear. Is there little advantage in intervening in the lives of young people who have already made the decision to drop out, or do those who choose to drop out have less ability and less motivation?[23] The available evidence does not say.

The evidence suggests that sustained interventions targeted at adolescents still enrolled in school can positively affect their learning and their subsequent employment and earnings. In either case, though, these programs hardly work miracles, says Heckman. Their success is more modest than that of early interventions; adolescent interventions can only alleviate and not reverse early damage caused by bad environments.

Job training for adults

Job training encompasses activities ranging from formal classroom instruction through make-work, subsidized employment, and job search. Heckman and his colleagues find that the rate of return to classroom training is sizable, but generally is lower for other components of training.[24] In evaluating any public program, they note, it is necessary to account for the welfare costs of raising the funds, as well as the direct costs of providing the services. Incorporating such factors as benefit duration, interest rates for discounting, and the welfare costs of taxes vitally affects estimates of the economic returns to training.[25]

The heterogeneity of activities subsumed under "job training" is matched by the heterogeneity of the estimated effects. Direct job creation typically provides few long-run benefits. Formal classroom training and on-the-job training appear to help women reentering the job market, but not prime-aged men. To be effective, these programs must be very strongly tailored to the local labor market.[26] Treatment appears to be most effective for those at the high end of the wage distribution, with little effect for those at the bottom, and the returns to job training for older workers and displaced workers are very low. A cost-benefit accounting similar to that made for early childhood programs finds meager net benefits per dollar of program expenditures even for the Job Corps, widely considered to be one of the more successful government training programs. Over the four-year course of the program, participants earned only about $3 more per week than they would have if they had not enrolled.[27] The best available evidence, Heckman concludes, indicates that job-training programs are an inefficient transfer mechanism and an inefficient investment policy for low-skilled adults.[28]

Conclusion

The studies summarized here offer a blueprint for the life cycle analysis of human capital accumulation that, Heckman states, requires much further elaboration. Many gaps in the evidence on skill formation over the life cycle must be filled, and a more explicit dynamic theory accounting for uncertainty is necessary for conducting and interpreting future empirical work. Research by Cunha and Heckman begins this task.[29] Heterogeneity and uncertainty are pervasive features of human capital investment. Much more work on efficient targeting is necessary. Targeting those groups that can best benefit from

interventions will clearly improve the efficiency of the interventions, but identifying such groups has proved elusive and politically precarious.

Moreover, it is too simplistic to explain the slowdown in the growth of schooling attendance rates solely in terms of trends in bad family environments. The trends for failed families show continuing deterioration, whereas the trends in schooling participation rates are flat. But the research examined here demonstrates the first-order importance of abilities and motivation in producing skills. Cognitive and noncognitive deficits emerge early, and if uncorrected create low-skilled adults. Studies of a limited set of small-scale, high-quality interventions suggest that these early deficiencies can be partially remedied, but perhaps only by intervening early and actively in failing families—a conclusion that in itself raises difficult ethical questions for a society that values the privacy and autonomy of the family. ■

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[1]See, for example, B. DeLong, C. Goldin, and L. Katz, "Sustaining U.S. Economic Growth," in *Agenda for the Nation*, ed. H. Aaron, J. Lindsay, and P. Nivola (Washington, D.C.: Brookings Institution Press, 2003); D. Ellwood, "The Sputtering Labor Force of the 21st Century: Can Social Policy Help?" in *The Roaring Nineties: Can Full Employment Be Sustained?* ed. A. Krueger and R. Solow (New York: Russell Sage Foundation, 2001); and P. Carneiro and J. Heckman, "Human Capital Policy," in *Inequality in America: What Role for Human Capital Policies?* ed. J. Heckman and A. Krueger (Cambridge, MA: MIT Press, 2003).

[2]See Carneiro and Heckman, "Human Capital Policy."

[3]A. Jones, Jr., and D. Weinberg, *The Changing Shape of the Nation's Income Distribution, 1947–1998*, Current Population Report P60-204, U.S. Census Bureau, Washington, D.C., June 2000.

[4]See, for example, E. Hanushek and D. Kim, "Schooling, Labor Force Quality, and Economic Growth," National Bureau of Economic Research Working Paper 5399, Cambridge, MA, 1995.

[5]J. Heckman, "Policies to Foster Human Capital," *Research in Economics* 54, no. 1 (2000): 3–56; Carneiro and Heckman, "Human Capital Policy;" F. Cunha and J. Heckman, "The Technology of Skill Formation," presented at Minneapolis Federal Reserve Conference, October 2003, and at the Society of Economic Dynamics and Control, Florence, July 2004.

[6]The research briefly summarized here is discussed in detail in Carneiro and Heckman, "Human Capital Policy." F. Cunha, J. Heckman, L. Lochner, and D. Masterov develop formal models of the skill formation process and interpret the empirical evidence in light of their implications in a chapter titled "Interpreting the Evidence on Life Cycle Skill Formation," forthcoming in *Handbook of Education Economics*, ed. E. Hanushek and F. Welch (Amsterdam: North Holland, 2005).

[7]Policies not considered in this summary, but fully examined in the articles on which it is based, are tax and subsidy policies to reduce tuition or supplement family resources of children during their college-going years. The evidence, says Heckman, suggests we should be skeptical that generous college scholarship policies and tax subsidies during the college-going years will provide a solution to the slowdown in the growth of skills in the U.S. labor force. Carneiro and Heckman, "Human Capital Policy," critically examine the claim that family credit constraints during the adolescent years play a fundamental role in the attainment gaps evidenced in Figure 1. They conclude that a small group in the United States, around 8 percent of youth, is credit-constrained in this short-run sense, and that policies remedying these constraints would be cost-effective, but, even if carefully targeted, would not substantially reduce gaps in schooling across family income levels or substantially increase the growth in labor force quality.

[8]J. Shonkoff and D. Phillips, *From Neurons to Neighborhoods: The Science of Early Childhood Development* (Washington, D.C.: National Academy Press, 2000). See the synthesis in Cunha, Heckman, Lochner, and Masterov, "Interpreting the Evidence on Life Cycle Skill Formation."

[9]S. Cameron and J. Heckman, "The Dynamics of Educational Attainment for Blacks, Whites and Hispanics," *Journal of Political Economy* 109, no. 3 (2001): 455–99.

[10]107 P.L. 110.

[11]Measured achievement reflects both cognitive ability ("IQ") and the motivation to acquire the specific knowledge tested by the exams.

[12]S. Bowles, H. Gintis, and M. Osborne, "The Determinants of Earnings: A Behavioral Approach," *Journal of Economic Literature* 39, no. 4 (2001):1137–76; R. Klein, R. Spady, and A. Weiss, "Factors Affecting the Output and Quit Propensities of Production Workers," *Review of Economic Studies* 58, no. 2 (1991): 929–54; J. Heckman, J. Stixrud, and S. Urzua, "The Effects of Cognitive and Non-Cognitive Skills on Labor and Behavioral Outcomes," unpublished manuscript, University of Chicago, Department of Economics, 2004.

[13]See Heckman, Stixrud, and Urzua, "The Effects of Cognitive and Non-Cognitive Skills on Labor and Behavioral Outcomes."

[14]J. Heckman, ed., *The GED,* unpublished book-length manuscript, University of Chicago, Department of Economics, 2004.

[15]J. Heckman and Y. Rubinstein, "The Importance of Noncognitive Skills: Lessons from the GED Testing Program," *American Economic Review* 91, no. 2 (2001): 145–49. The AFQT battery of tests is the primary measure of aptitude for determining eligibility for admission into the Armed Services and identifying aptitude for particular training. Heckman, Stixrud, and Urzua, "The Effects of Cognitive and Non-Cognitive Skills on Labor and Behavioral Outcomes," present additional evidence on this issue.

[16]S. Cameron and J. Heckman, "The Nonequivalence of High School Equivalents." *Journal of Labor Economics*, 11 no. 1 (1993): 1–47, and Heckman, ed., *The GED*.

[17]Cunha and Heckman, "The Technology of Skill Formation," and Cunha, Heckman, Lochner, and Masterov, "Interpreting the Evidence on Life Cycle Skill Formation," develop the technology of skill formation that underlies this figure, which first appeared in J. Heckman, "Policies to Foster Human Capital," *Research in Economics*, 54, no. 1 (2000): 3–56.

[18]The most recent report from this project is L. J. Schweinhart, J. Montie, Z. Xiang, W. S. Barnett, C. R. Belfield and M. Nores, *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40*, Monographs of the High/Scope Educational Research Foundation, 14 (Ypsilanti, MI: High/Scope Press, 2005). For a summary, see http://www.highscope.org/Research/PerryProject/PerryAge40SumWeb.pdf.

[19]The CPC has been the subject of an intensive matched-group comparison analysis for over two decades through the Chicago Longitudinal Study, directed by IRP affiliate Arthur Reynolds. A summary of the cost-benefit analysis of this program when participating children reached young adulthood is "A Cost-Benefit Analysis of the Chicago Child-Parent Centers," *Focus* 23, no. 1 (Winter 2004): 50–52. A full report of program findings is A. Reynolds, *Success in Early Intervention: The Chicago Child-Parent Centers* (Lincoln: University of Nebraska Press, 2000).

[20]C. Ramey, D. Bryant, F. Campbell, J. Sparling and B. Wasik, "Early Intervention for High-Risk Children: The Carolina Early Intervention Program," in *14 Ounces of Prevention: A Casebook for Practitioners*, ed. R. Price, E. Cowen, R. Lorion, and J. Ramos-McKay (Washington, D.C.: American Psychological Association, 1988). On the conse-

quences for IQ, see F. Campbell, E. Pungello, S. Miller-Johnson, M. Burchinal, and C. Ramey, "The Development of Cognitive and Academic Abilities: Growth Curves from an Early Childhood Educational Experiment," *Developmental Psychology*, 37 (2001): 231–42.

[21]J. Tierney and J. Grossman, *Making a Difference: An Impact Study of Big Brothers/Big Sisters* (Philadelphia: Public/Private Ventures, 1995).

[22]R. Taggart, *Quantum Opportunity Program Opportunities* (Philadelphia: Industrialization Center of America, 1995).

[23]J. Heckman, "Policies to Foster Human Capital."

[24]J. Heckman, R. LaLonde, and J. Smith, "The Economics and Econometrics of Active Labor Market Programs," in *Handbook of Labor Economics*, vol. 3A, ed. O. Ashenfelter and D. Card (New York: North-Holland, 1999): pp. 1865–2097.

[25]See, for example, Carneiro and Heckman, "Human Capital Policy," Table 2.13.

[26]Carneiro and Heckman, "Human Capital Policy," Table 2.14, and Heckman, LaLonde, and Smith, "The Economics and Econometrics of Active Labor Market Programs."

[27]J. Burghart and P. Schochet, *National Job Corps Study: Impacts by Center Characteristics* (Princeton: Mathematica Policy Research, 2001).

[28]The returns to private sector training are not so well studied as the returns to public sector training. In general, it is the more able, skilled, or motivated employee that undertakes such training, and the returns on investment are comparably high, ranging between 16 and 26 percent (see Carneiro and Heckman, "Human Capital Policy," Table 2.11) Private firms have in general shown little interest in training disadvantaged workers; the task is difficult and the returns are likely to be low.

[29]Cunha and Heckman, "The Technology of Skill Formation."

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