Title
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Journal
Future of Children, 24(1)

ISSN
1054-8289

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Publication Date
2014

DOI
10.1353/foc.2014.0008

Peer reviewed

Boosting Family Income to Promote Child Development

Greg J. Duncan, Katherine Magnuson, and Elizabeth Votruba-Drzal

Summary

Families who live in poverty face disadvantages that can hinder their children's development in many ways, write Greg Duncan, Katherine Magnuson, and Elizabeth Votruba-Drzal. As they struggle to get by economically, and as they cope with substandard housing, unsafe neighborhoods, and inadequate schools, poor families experience more stress in their daily lives than more affluent families do, with a host of psychological and developmental consequences. Poor families also lack the resources to invest in things like high-quality child care and enriched learning experiences that give more affluent children a leg up. Often, poor parents also lack the time that wealthier parents have to invest in their children, because poor parents are more likely to be raising children alone or to work nonstandard hours and have inflexible work schedules.

Can increasing poor parents' incomes, independent of any other sort of assistance, help their children succeed in school and in life? The theoretical case is strong, and Duncan, Magnuson, and Votruba-Drzal find solid evidence that the answer is yes—children from poor families that see a boost in income do better in school and complete more years of schooling, for example. But if boosting poor parents' incomes can help their children, a crucial question remains: Does it matter when in a child's life the additional income appears? Developmental neurobiology strongly suggests that increased income should have the greatest effect during children's early years, when their brains and other systems are developing rapidly, though we need more evidence to prove this conclusively.

The authors offer examples of how policy makers could incorporate the findings they present to create more effective programs for families living in poverty. And they conclude with a warning: if a boost in income can help poor children, then a drop in income—for example, through cuts to social safety net programs like food stamps—can surely harm them.

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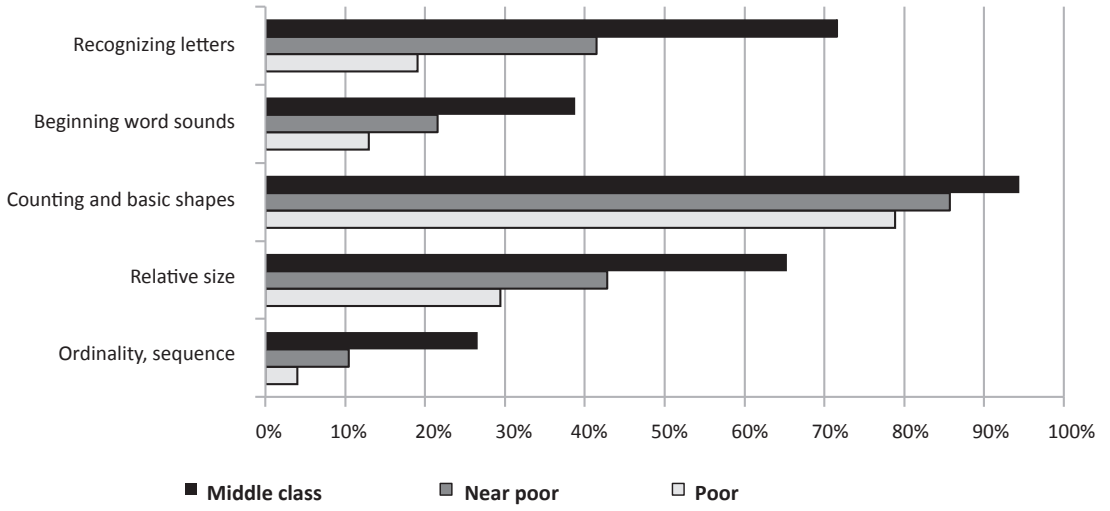
Using a poverty line of about $23,000 for a family of four, the U.S. Census Bureau counted more than 16 million U.S. children—more than one in five—living in poor families in 2012.[1] Poor children begin school well behind their more affluent peers and may lose even more ground during the school years. On average, poor U.S. children have lower levels of kindergarten reading and math skills than their more fortunate peers (figure 1). Moreover, when compared with people whose families had incomes of at least twice the poverty line during their early childhood, adults who were poor as children completed two fewer years of schooling and, by the time they reached their 30s, earned less than half as much, worked far fewer hours per year, received more in food stamps, and were nearly three times as likely to report poor overall health (table 1).[2] Poor boys were more than twice as likely to be arrested later in life, and poor girls were five times as likely to bear a child out of wedlock before age 21.

Poverty is associated with a cluster of disadvantages that may be harmful to children, including low levels of parental education and living with a single parent. To determine whether children would be helped by a policy that is designed to increase family incomes and nothing else, we focus on distinguishing the effects of family income from those of other sources of disadvantage. In policy terms, this approach lets us answer the following question: To what extent would children's development be affected by policies that give low-income parents more income, but do not directly target other characteristics of parents or family environments? In other words, would increasing family income through policies such as the Earned Income Tax Credit, food stamps, or the Child Tax Credit lead to better child outcomes? If the benefits are larger than the costs, income-support programs for parents might constitute a wise two-generation investment.

If income is beneficial for children, we also need to know at what point in children's lives an income-support program for parents would be most effective. But few studies of poverty's effects have been able to focus on the timing of economic hardship in children's lives, partly because such studies rarely include children at a variety of childhood stages. Recent research in neuroscience and developmental psychology suggests that poverty early in a child's life may be particularly harmful. Not only does the astonishingly rapid development of their brains leave young children sensitive and vulnerable to environmental conditions, but the family (as opposed to school or peers) dominates their everyday lives. Where we can, as we summarize the evidence for income's effects on children, we pay attention to the timing of economic deprivation. After reviewing both experimental and other evidence of the ways poverty may affect children, we highlight emerging research based on newly available data that include measures of poverty recorded as early as the prenatal year alongside adult outcomes measured in the fourth decade of life.

The strongest evidence, drawn from social experiments, has linked increases in family income to increased school achievement in middle childhood and greater school attainment (for example, high school completion) in adolescence and early adulthood. Although we have virtually no experimental evidence of how economic deprivation affects children in the first several years of life, other kinds of evidence suggest that poverty early in childhood may reduce adult earnings and work hours.

Figure 1. Rates of Kindergarten Proficiencies for Poor, Near Poor, and Middle-Class Children



Source: Authors' calculations from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99.

Note: "Poor" is defined as income below the official U.S. poverty threshold. "Near poor" is defined as income between one and two times that poverty line. "Middle class" is defined as income above twice the poverty line.

We conclude with our thoughts about how social policy makers might focus attention on poverty occurring across childhood. The weight of the evidence indicates that increased income does indeed give children a better chance to develop successfully, although the likely impact of changes to the family incomes of low-income children appears to vary depending on the children's age and the form (cash versus in-kind) of the income change.

People who advocate for income-support policies often emphasize the potential benefits of increasing the incomes of low-income families, and they point to studies of policy changes that increased income support. But evidence from these studies can suggest what to expect not only from policies that increase the generosity of programs such as the Earned Income Tax Credit and food stamps, but also from those that reduce income or in-kind supports.

Why Poverty May Hinder Healthy Development

We use the terms "poverty" and "low income" synonymously. The official U.S. poverty thresholds designate a set of income levels below which families are considered "poor" and above which they are not. These thresholds let us consistently track poverty rates over time and serve to determine who is eligible for various programs. But there is no evidence that these particular dollar thresholds meaningfully differentiate families' economic needs. Indeed, evidence indicates that improving the incomes of families both just below and just above the poverty line will have similarly positive effects. But from studies that consider links between income and children's development across a larger spectrum of the income distribution, it is also clear that income changes have larger effects for low-income children than for children from wealthier families.[3] Accordingly, we focus on evidence of how variations in income

Table 1. Adult Outcomes (Age 30–37) by Income between the Prenatal Year and Age Five

	Income below the official U.S. poverty line	Income between one and two times the poverty line	Income more than twice the poverty line
Completed schooling (mean)	11.8 years	12.7 years	14.0 years
Annual earnings (mean)	$17,900	$26,800	$39,700
Annual work hours (mean)	1,512	1,839	1,963
Annual food stamps (mean)	$896	$337	$70
Poor health	13%	13%	5%
Arrested (men only)	26%	21%	13%
Nonmarital birth (women only)	50%	28%	9%

Source: Greg J. Duncan, Kathleen M. Ziol-Guest, and Ariel Kalil, "Early Childhood Poverty and Adult Attainment, Behavior, and Health," *Child Development* 81 (2010): 306–25.

Note: Earnings and food stamp values are in 2005 dollars.

affect children in poor families, rather than on how such variations affect middle-class or wealthy families.

What are the consequences of growing up in a poor household? Economists, sociologists, developmental psychologists, and neuroscientists emphasize different ways that poverty may influence children's development. Three main theoretical frameworks describe these processes: family and environmental stress, resources and investment, and culture. Each framework is grounded in a different scholarly discipline, and they differ in the extent to which they focus on socioeconomic status (SES) in general rather than on income, poverty, or any other particular component of SES (for example, parents' education or occupational prestige). Nevertheless, these frameworks overlap and are complementary.

Family and Environmental Stress

As Ross Thompson explains in this issue of *Future of Children*, economically disadvantaged families experience more stress in their everyday lives than more affluent families do, and this stress may affect children's development. Glen Elder Jr. first developed the family stress model to document how economic loss affected people during the Great Depression.[4] According to this perspective, poor families face significant economic pressure as they struggle to pay bills and buy important goods and services, and are forced to cut back on daily expenditures. This economic pressure, coupled with other stressful events that are more prevalent in the lives of poor families, creates high levels of psychological distress in poor parents, including depressive and hostile feelings.[5]

Recent work in behavioral economics has broadened the family stress model by showing that poverty and scarcity not only create psychological distress but also deplete important cognitive resources.[6] Studies conducted mostly in developing countries have found that making economic decisions under conditions of scarcity reduces adults' ability to control their own behavior and renders them less able to pursue longer-term goals.

Psychological distress spills over into marriages and parenting. As couples struggle to make ends meet, their interactions tend to become more hostile and conflicted, and they withdraw from each other.[7] Parents' psychological distress and conflict, in turn,

are linked with parenting practices that are, on average, more punitive, harsh, inconsistent, and detached, as well as less nurturing, stimulating, and responsive to children's needs. Such lower-quality parenting is likely to elevate children's physiological stress responses, and ultimately to harm children's development.[8]

To fully understand environmental stress as a pathway through which poverty may affect individuals, we need to go beyond the family to consider other sources of stress that poor children encounter every day. Compared with their more affluent peers, poor children are more likely to live in housing that is crowded, noisy, and characterized by defects such as leaky roofs, rodent infestations, or inadequate heating.[9] Poor families are more likely to live in neighborhoods characterized by high crime rates, boarded-up houses, abandoned lots, and inadequate municipal services.[10]

The schools that low-income children attend are more likely to be overcrowded and have structural problems (affecting, for example, noise, lighting, and ventilation).[11] Economically disadvantaged children also tend to be exposed to higher levels of air pollution from parents' smoking, traffic, and industrial emissions.[12] These environmental conditions create physiological and emotional stress in the lives of low-income children that may impair their socioemotional, physical, cognitive, and academic development. For example, poverty heightens a child's risk for lead poisoning, which has been linked to health, behavior, and neurological problems that may persist into adolescence and beyond.

Cognitive neuroscience has produced evidence that chronically elevated physiological stress may interfere with the development of poor children's stress response system and health, as well as the regions of their brains responsible for self-regulation (the ability to regulate attention and emotions). Researchers have documented that such stress harms brain development in animals. Exposure to stress, and increased levels of stress hormones such as cortisol, diminish animals' cognitive functioning, leading to impairments in brain structures such as the hippocampus, which plays an important role in memory.[13]

What empirical evidence supports family stress theory? Nonexperimental studies have found that low-income children have significantly higher levels of stress hormones than their wealthier counterparts and that early childhood poverty is associated with increased allostatic load, a measure of the physiological consequences of stress.[14] Higher levels of physiological stress have been linked not only to poorer cognitive functioning, but to poorer immunological functioning as well, putting children at risk for a host of inflammatory diseases later in life.[15] For example, recent work connects the body's stress system to brain regions that support cognitive skills, such as self-regulation and executive functioning (the ability to plan and carry out complicated tasks). Researchers have also found that heightened salivary cortisol, an indicator of an elevated stress response, partially accounts for the fact that poverty is associated with problems in both parenting and children's executive functioning.[16] Thus disparities in stress exposure and related stress hormones may explain to some extent why poor children have lower levels of cognitive ability and achievement as well as poorer health later in life.[17]

The biological links between low income and stress are compelling, but no methodologically strong studies have linked poverty to

elevated and prolonged stress reactions in children. However, suggestive evidence has linked receiving food stamps in childhood to stress-related adult diseases.[18] Moreover, some rigorous studies have found poverty-stress connections in mothers. One of these tied expansions of the Earned Income Tax Credit (EITC) to data from the National Health Examination and Nutrition Survey.[19] Between 1993 and 1996, the generosity of the EITC increased sharply, particularly for mothers with two or more children. If higher income can reduce mothers' stress, the change in the EITC should have produced a bigger improvement for children and mothers in two-child low-income families than in single-child low-income families. And, indeed, the study found that when compared with mothers with just one child, low-income mothers with two or more children experienced larger reductions in biological indicators of health risks, and they reported better mental health. A study of increases in the Canadian Child Benefit also found that mothers' mental health improved. Evaluations of welfare and anti-poverty programs that increased both income and mothers' employment did not show similar improvements in mental health.[20]

Overall, the family stress perspective has advanced conceptually and empirically in recent years. On the conceptual side, a narrow focus on parents' mental health and parenting has been broadened by neurobiological evidence that too much stress can harm both parents and children, and by research in cognitive psychology that links stress, information processing, and decision making. Increasingly sophisticated studies suggest that income support can reduce mothers' stress. This research should continue to benefit from an explosion in neuroscience-based findings that shed light on the connections among poverty, stress, behavior, and development.

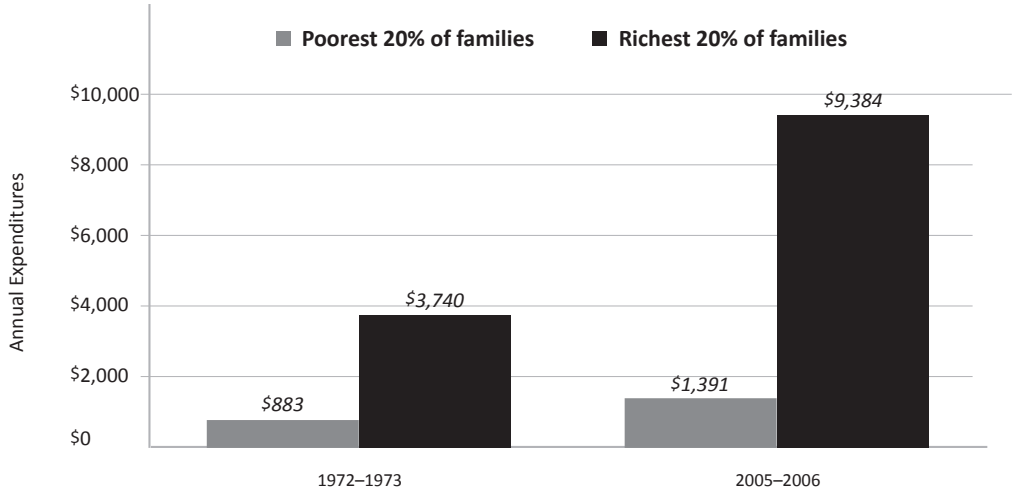
Resources and Investment

When economists think about how the family influences children's development, household production theory plays a central role. Gary Becker, in 1991's *A Treatise on the Family*, suggested that children's development is "produced" from a combination of endowments and parental investments. Endowments include genetic predispositions and the values and preferences that parents instill in their children. Parents' preferences, such as how much they value education and their orientation toward the future, combine with their resources to shape their investments.

Economists argue that time and money are the two basic resources that parents invest in their children. For example, investments in high-quality child care and education, housing in good neighborhoods, and rich learning experiences enhance children's development, as do investments of parents' time. Endowments and investments appear to affect development differently in different domains of children's development (for example, achievement, behavior, and health). Children's own characteristics also affect the level and type of investments that parents make in their offspring.[21] For example, if a young child is talkative and enthusiastic about learning, parents are more likely to purchase children's books or take the child to the library.[22]

Household production theory suggests that children from poor families lag behind their wealthier counterparts in part because their parents have fewer resources to invest in them.[23] Compared with more affluent parents, poor parents are less able to purchase inputs for their children, including books and educational materials for the home, high-quality child care and schools, and safe neighborhoods. Poor parents may also have less

Figure 2. Family Enrichment Expenditures on Children



Source: Greg J. Duncan and Richard J. Murnane, "Introduction: The American Dream, Then and Now," in *Whither Opportunity? Rising Inequality, Schools, and Children's Life Chances*, ed. Greg J. Duncan and Richard J. Murnane (New York: Russell Sage, 2011), 3–23. Calculations are based on data from the U.S. Bureau of Labor Statistics' Consumer Expenditure Survey, http://www.bls.gov/cex.

Note: Amounts are in 2012 dollars.

time to invest in their children, because they are more likely to be single parents, to work nonstandard hours, and to have less flexible work schedules.[24] This too may have negative consequences for children. Evidence suggests that the amount of cognitive stimulation in the home environment varies with changes in family income.[25]

Compared with wealthier children, poor children have fewer child enrichment resources—for example, books, computers, high-quality child care, summer camps, and private schools—and the gap is growing wider. Forty years ago, low-income families spent about $880 (in 2012 dollars) per child annually on such resources, while higher-income families spent more than $3,700, already a substantial difference (figure 2).[26] By 2005–06, low-income families had increased their expenditures to about $1,400, but high-income families had increased theirs much more, to about $9,400 per child. The difference in spending between the two groups had almost tripled in the intervening years. The largest spending differences were for activities such as music lessons, travel, and summer camps.[27]

Nonexperimental studies suggest that differences between poor children and wealthier children in the quality of their home environments account for a substantial portion of the association between poverty and children's educational achievement.[28] This is not surprising, because we know that environmental enrichment influences the structure and functioning of a wide range of brain areas in animals.[29] Disparities in the cognitive development of low- and middle-SES children are most pronounced in brain regions that are important for language, memory, and cognitive control.[30] These differences may stem in part from differences in exposure to enriching environments.[31]

All in all, the resource and investment perspective provides a conceptual framework for the interactions among family income, what parents spend to enrich their children's home learning environments, and the development of brain structures and functioning associated with learning. In light of sharp increases in both income inequality and the gap between what poor and higher-income parents spend on children's enrichment, the resource and investment perspective suggests that we should expect that, in the future, poor children will fall further behind higher-income children in terms of their school readiness.

Culture

In the 1960s, in his "culture of poverty" model, Oscar Lewis developed a sociological theory about how the norms and behavior of poor families and communities affect children.[32] Drawing from fieldwork with poor families in Latin America, he argued that the poor were economically marginalized and had no opportunity for upward mobility, and that people responded to their marginalized position with maladaptive behavior and values. The resulting culture of poverty was characterized by weak impulse control and an inability to delay gratification, as well as feelings of helplessness and inferiority. These adaptations manifested in high levels of female-headed households, sexual promiscuity, crime, and gangs. Although Lewis acknowledged that these behaviors emerged in response to structural factors, he thought that such values and behaviors were transmitted to future generations, and therefore became a cause of poverty: "By the time slum children are age six or seven they have usually absorbed the basic values and attitudes of their subculture and are not psychologically geared to take full advantage of changing conditions or increased opportunities."[33]

Evidence suggests that poor people hold many middle-class values and beliefs, but that circumstances make it hard for them to behave accordingly.

Cultural explanations for the effects of poverty on children suggested that high levels of nonmarital childbearing, joblessness, female-headed households, criminal activity, and welfare dependency among the poor were likely to be transmitted from parents to children. In the mid-1980s and 1990s, scholars expanded the scope of this argument by paying closer attention to the origins of cultural and behavioral differences. For example, some emphasized the role of individual choice in the face of the liberal welfare state's perverse incentives, which rewarded single-mother households and joblessness among men.[34] Others stressed structural and economic factors: the concentration of neighborhood poverty, the social isolation of poor inner-city neighborhoods, and the deindustrialization of urban economies.[35] They contended that these structural factors undermine community norms and influence the behavior of inner-city adults and their children.

A common criticism of "culture of poverty" explanations is that they fail to differentiate people's behavior from their values and beliefs.[36] Evidence suggests that poor people

hold many middle-class values and beliefs, but that circumstances make it hard for them to behave accordingly. For example, one study showed that poor women value marriage and recognize the benefits of raising children in a two-parent household.[37] However, their low wages, as well as black men's high rates of unemployment and incarceration, lead poor women to conclude that marriage is out of their reach. Notions of a unified culture of poverty do not account for this sort of disconnect between values and behaviors.

Annette Lareau's qualitative study of social class and family life identifies other differences in the cultural childrearing repertoires of high- and low-income families, including the degree to which middle-class parents "manage" their children's lives, while working-class and poor parents leave children alone to play and otherwise organize their activities on their own:

> "In the middle class, life was hectic. Parents were racing around from one activity to another … Because there were so many activities, and because they were accorded such importance, child's activities determined the schedule for the entire family … [In contrast, in working-class and poor families,] parents tend to direct their efforts toward keeping children safe, enforcing discipline, and, when they deem it necessary, regulating their behavior in certain areas. … Thus, whereas middle-class children are often treated as a project to be developed, working-class and poor children are given boundaries for their behavior and then allowed to grow.[38]"

Lareau called the middle-class pattern "concerted cultivation"—providing stimulating learning activities and social interactions that parents believe will promote their children's social and cognitive development. In contrast, the "natural growth" perspective of working-class and poor parents often stops at providing basic supports (for example, food, shelter, and comfort). Such differences in cultural repertoires give a distinct advantage to middle-class children and contribute to the intergenerational transmission of social class.

These cultural theories extend the resource and investment perspective. Class-related differences in the parenting practices of Lareau's families arise, in part, from income differences that let some parents support a much broader range of activities for their children. But some of the differences arise from fundamentally divergent beliefs about how children succeed and the best kinds of parenting practices. Such beliefs are unlikely to change in response to changes in family income that might be brought about by changes in policy.

Why Early Poverty May Matter the Most

The timing of poverty during childhood and adolescence may make a difference for how it shapes children's development. Emerging evidence from human and animal studies shows that during early childhood, the brain develops critically important neural functions and structures that will shape future cognitive, social, emotional, and health outcomes.[39] Two recent neuroscience studies show strong correlations between socioeconomic status and important aspects of young children's brain function.[40]

Flavio Cunha and James Heckman propose a model of the production of human capital that allows for distinct childhood stages during which investment may take place, as

well as roles for the past effects and future development of both cognitive and socioemotional skills.[41] In this model, children are born with cognitive potential and temperament that reflect a combination of heredity and the prenatal environment. Cunha and Heckman emphasize that skill building interacts with investments from families, preschools and schools, and other agents. Their model suggests that we accumulate human capital in two ways. One is "self-productivity," in which skills developed in earlier stages bolster the development of skills in later stages. The other is "dynamic complementarity," in which skills acquired before a given investment increase that investment's productivity. These two principles combine to form the hypothesis that "skill begets skill." Cunha and Heckman's model predicts that economic deprivation in early childhood creates disparities in school readiness and early academic success that widen over the course of childhood.

Intensive programs that provide early care and educational experiences for high-risk infants and toddlers offer evidence to support the idea that the early years are a fruitful time to intervene. The best known are the Abecedarian program, a full-day, center-based educational program for children who were at high risk for school failure, starting in early infancy and continuing until school entry, and the Perry Preschool program, which provided one or two years of intensive, center-based education for preschoolers.[42] Both programs generated long-term improvements in subsequent education, criminal behavior, and employment, although other early-childhood education programs have shown more modest effects.

Income may matter the most for brain development in the early years, but increased income may also be beneficial for low-income adolescents, particularly when they use it to help pay for postsecondary schooling. The sticker price of college has more than doubled in the past 20 years.[43] Although Pell Grants and other sources of financial aid drive down the net cost of college for low-income students, the cost of enrollment in public four-year colleges has risen faster than the amount available from grants. In contrast, the cost of attending a public community college has not increased over the past two decades for students from very low-income families because the amount of aid has expanded to cover the higher price. Of course, many low-income students and their parents either don't know how much aid is available or are discouraged by the extremely complex federal financial aid application form.[44]

Assessing Causal Effects of Poverty: Methods and Results

Studies that aim to estimate how income influences children's development differ in their methodological rigor. At one end are correlational studies that analyze associations between family income and children's outcomes, with few adjustments for confounding factors (that is, other important family conditions that might be correlated with income and child outcomes). These studies are common, particularly in neuroscience, but they are likely to be plagued by biases that lead researchers to overestimate income's causal effects. On the other end are experiments in which families are randomly assigned to receive additional income or not. If implemented correctly, experiments provide unbiased estimates of income's effects. But experimental studies are exceedingly rare, and sometimes they condition income support on behavior such as full-time work, which may exert its own influence on children's development. Almost as trustworthy

as experiments are "quasi-experiments" in which income changes are beyond the control of the families involved. Examples are policy changes that increase the generosity of programs like the EITC.

Our review of the evidence on how increases in family income influence children and youth distinguishes among effects on achievement, attainment, behavior, and health. Readers should bear in mind that the policy implications of income support programs rest on collective impacts across all of these domains. Small impacts in several different domains of child functioning could add up to a total benefit that exceeds costs, even if no single component shows such a level of benefit.

School achievement, attainment, and behavior

The strongest evidence relates income increases to children's test scores (achievement) and the number of years of schooling they complete (attainment). The only large-scale randomized interventions to alter family income directly were the U.S. Negative Income Tax experiments, which were conducted between 1968 and 1982 with the primary goal of identifying how guaranteed income influenced parents' participation in the labor force. Three of the six experimental sites (Gary, Indiana, and rural areas in North Carolina and Iowa) measured achievement gains for children in elementary school, and two of the three found significant impacts.[45] In contrast, adolescents showed no differences in achievement. Impacts on school enrollment and attainment for youth were more uniformly positive. Both Gary and New Jersey—the only two sites that measured these outcomes—reported increases in school enrollment, high school graduation rates, or years of completed schooling. Second- through eighth-grade teachers rated student "comportment" in the two rural sites; results showed income-induced improvements in one site but not the other.

Taken together, the Negative Income Tax studies appear to suggest that income is more important for the school achievement of pre-adolescents and for the school attainment of adolescents. None of the results offers evidence to support the "early is better" hypothesis, because no site tracked the achievement of children who had not yet entered school when the income "treatment" was being administered.

Welfare reform programs undertaken during the 1990s encouraged parents to work by providing income support to working-poor parents through wage supplements. Moreover, evaluations of some of these programs measured the test scores of at least some children who had not yet entered school when the programs began. One study analyzed data from seven random-assignment welfare and antipoverty policies, all of which increased parental employment, though only some increased family income.[46]

The combined impacts on children's school achievement of higher income and more work hours for mothers varied markedly by the children's age. Treatment-group children who were between the ages of four and seven when the programs took effect, many of whom made the transition to elementary school during the programs, scored significantly higher on achievement tests than their control-group counterparts. A sophisticated statistical analysis of the data on these younger children suggests that a $3,000 boost in annual income was associated with a gain in achievement scores of about one-fifth of a standard deviation—a modest but still

statistically significant increase.[47] In contrast, a boost in income had no effect on children's rate of behavior problems, whether reported by parents or teachers.[48]

Elevated income did not appear to affect the achievement of children from eight to 11, and the achievement of children who were 12 and 13 seemed to be hurt by the programs' efforts to increase family income and parental employment. Another study using the same data examined very young children and found positive impacts for some ages but not others.[49]

Like the maternal stress study discussed above, another recent study took advantage of the increasing generosity of the EITC between 1993 and 1996 to compare children's test scores before and after it was expanded.[50] Most of the children in this study were between the ages of eight and 14, and none was younger than five. The researchers found improvements in low-income children's achievement in middle childhood that coincided with the EITC expansion.

A study conducted in Canada took advantage of variations in the generosity of the National Child Benefit program across Canadian provinces to estimate income's effects on children's achievement.[51] Among six- to 10-year-old children in low-income families, policy-related income increases had a positive and significant association with math scores and a negative association with the likelihood that a child would be diagnosed with a learning disability. Among four- to six-year-olds, the income increases were associated with higher scores on a test of receptive vocabulary for boys, but not for girls. Turning to behavior, higher income led to less aggression among four- to 10-year-olds, but it did not appear to affect other behaviors.

A third quasi-experimental study examined what happened after a tribal government in North Carolina opened a casino and began distributing about $6,000 annually to each adult member of the tribe.[52] A comparison of Native American youth with non-Native American youth, before and after the casino opened, found that receiving casino payments for about six years increased school attendance and high school graduation rates and decreased criminal behavior among poor Native American adolescents. The data did not include achievement test scores, nor any information on children under age nine.

These experimental and quasi-experiment studies offer three lessons. First, achievement gains depend at least in part on how old the children were when their families received additional income. Children making the transition to school and elementary school students generally enjoyed the most consistent achievement increases. For adolescents, the school achievement picture was muddier, with various studies finding positive, null, and even negative effects. Second, among adolescents, increased income appears to boost educational attainments such as high school graduation and completed years of schooling rather than test scores. Given the high cost of postsecondary education, it's not surprising that higher family income leads to more completed years of schooling. Third, we know far more about how boosting income affects achievement and schooling than we do about its effects on behavior problems, including childbearing and criminal activity.

Virtually none of the experimental literature on income effects has been able to estimate the impacts of changes in family income during the earliest years of life, when children are developing rapidly and may be especially sensitive to family and home conditions. Nor

have these studies been able to examine how income changes during childhood affect outcomes measured in adulthood. This is particularly unfortunate, because policies directed at children often couch their goals in terms of lifetime effects, such as a middle-class standard of living or higher labor market earnings.

Achievement gains depend at least in part on how old the children were when their families received additional income.

Two recent nonexperimental studies, however, have linked early childhood income to adult outcomes.[53] Both use data from the Panel Study of Income Dynamics (PSID), focusing on children who were born in the early years of the study. Adult outcomes were collected when these children were in their 30s. The PSID measures income in every year of a child's life from before birth through age 15, making it possible to measure poverty and family income early in life (prenatal through the fifth year in one study, prenatal through the first year in the other) as well as later in childhood and in adolescence. Among families whose average income was below $25,000, one study found, an annual boost to family income early in the children's lives (birth to age 5) was associated with an increase in adult work hours, a rise in earnings, and a reduced likelihood of receiving food stamps (women, however, were no less likely to receive welfare). A boost in family income at other stages in children's lives, however, was not significantly related to the adults' earnings and work hours. For the most part, increased income at any stage of childhood did not affect whether the children would exhibit behavior problems (arrests and incarcerations for males; nonmarital births for females).

Health

As Sherry Glied and Don Oellerich write in this issue of *Future of Children*, growing up in poverty is associated with poor health. In one study, only 70 percent of poor children were reported by their mothers to be in excellent or very good health, compared with 87 percent of wealthier children. Some evidence suggests that, in Western industrialized countries, economic disparities in health tend to increase from early childhood through adolescence.[54] It may be that income serves as a buffer, preventing early chronic health conditions from producing pervasive negative effects.[55] But not all researchers have found that the association between income and health becomes stronger as children grow older.[56]

In the United States, children from poor households have higher rates of chronic health conditions, such as asthma, diabetes, and problems with hearing, vision, and speech. According to reports from their parents, about 32 percent of poor children have at least one such condition, compared with 27 percent of wealthier children. Asthma is the most common chronic problem among poor children, followed by mental health and behavioral problems; attention deficit hyperactivity disorder is the most common mental health diagnosis. Finally, poor children are more likely than their more affluent peers to suffer from acute illness or to have health problems that require them to limit their activities.[57]

Table 2. Statistically Significant Associations between Income Increases during Childhood and Adult (Age 30–41) Outcomes, by Childhood Stage

Adult outcome (age 30–41)	Age when income is measured		
	Prenatal to age 2	*Age 3–5*	*Age 6–15*
Earnings	+Positive	Not significant	Not significant
Work hours	+Positive	Not significant	Not significant
Work limitations	–Negative	Not significant	Not significant
Arthritis	–Negative	Not significant	+Positive
Hypertension	–Negative	Not significant	Not significant
Depression	Not significant	Not significant	Not significant
General health	Not significant	Not significant	Not significant

Source: Kathleen M. Ziol-Guest et al., "Early Childhood Poverty, Immune-Mediated Disease Processes, and Adult Productivity," *Proceedings of the National Academy of Sciences* 109 (2012): 17289–93.

Correlations between childhood poverty and health are also found later in life. By age 50, compared with people whose incomes were twice the poverty line or greater, people who experienced poverty in childhood are 46 percent more likely to have asthma, 75 percent more likely to have high blood pressure, 83 percent more likely to have been diagnosed with diabetes, 125 percent more likely to have experienced a stroke or heart attack, and 40 percent more likely to have been diagnosed with heart disease. Economic disadvantage in adolescence has been linked to worse overall health and higher death rates in adulthood.[58] Adolescent poverty, measured from age 13 to 16, is associated with heightened risk for several chronic diseases in adulthood.[59]

Some studies have employed stronger statistical methods to reduce the influence of possible confounding factors and produce more trustworthy estimates of how income is associated with child health.[60] Specifically, two studies uncovered large and significant links between adolescent poverty and a variety of health problems in adulthood.[61] However, when the researchers compared the health of siblings who shared the same general family background but experienced different economic conditions during childhood, they found much smaller associations. However, none of these health studies measured income in early childhood, when, as we've seen, the link between income and health may be strongest.

Another group of researchers investigated the associations between mean family income in early, middle, and later childhood, on the one hand, and adult Body Mass Index (BMI), on the other. They found that, among poor people, higher income during their mother's pregnancy and their first year of life was associated with lower adult BMI, whereas higher income later in childhood was not.[62] A companion study considered whether chronic diseases in which the immune system plays a role, such as arthritis, affect the associations between poverty very early in life and adult economic outcomes.[63] Concentrating on families with incomes below $25,000, the researchers distinguished among three childhood stages—pregnancy through age two, ages three to five, and ages six to 15—and compared family income during each of

these stages with the children's own earnings later in life. They found that increased family income from pregnancy to age two was significantly associated with higher earnings and longer work hours when the children reached ages 30 to 41, but family income at other stages of childhood was not (table 2). Similarly, when children's family income increased from pregnancy through age two (but not at the other stages of childhood), they were less likely as adults to experience high blood pressure, arthritis, or conditions that limited their daily living activities. Moreover, their reduced susceptibility to these three health problems partially explained their higher earnings and longer work hours as adults.

Despite the recent research that links income to both children's and adults' health, it is hard to show that these links are causal. Studies that link income with health have been far less rigorous than those that link income with achievement and behavior. Moreover, most studies that compare childhood family income with adult health have measured income during children's adolescent years. Although a few studies have suggested that early-life income can strongly affect adult health, the pattern of conflicting results produces more questions than answers.

Implications for Policy

Several recent rigorous studies suggest that childhood income does indeed improve at least some key child, adolescent, and adult outcomes. But we need a better understanding of how the timing of income boosts affects children's development, across a wide range of outcomes. If the effects differ, then policies that target specific stages of childhood or adolescence are likely to be more efficient than those that do not.

If the evidence ultimately shows that poverty early in childhood is most detrimental to development during childhood and adolescence, then it may make sense to consider income-transfer policies that provide more income to families with young children. In the case of work support programs like the EITC, this might mean extending more generous credits (or reallocating existing credits) to families with young children. In the case of refundable child tax credits, this could mean providing larger credits to families with young children.

Another step might be to ensure that sanctions and other regulations embedded in welfare policies do not deny benefits to families with very young children. Not only do young children appear to be most vulnerable to the consequences of poverty, but mothers with very young children are also least able to support themselves by working.

Assistance programs in several European countries offer time-limited income supports that depend on children's age. In Germany, a mother who works fewer than 20 hours per week can receive a modest parental allowance until her child is 18 months old. France guarantees a modest minimum income to most of its citizens, including families with children of all ages. Between 1976 and 2009, the Allocation de Parent Isolé (API) program supplemented this income for single parents with children under age three. In effect, the API acknowledges that families have a special need for income support during this period, especially if a parent wishes to forgo income from employment in order to care for very young children. Once children turn three, France's state-funded child care system alleviates some of the problems associated with a parent's transition to the labor force.

One way to deliver additional cash assistance is through payments that depend on the behaviors of parents and children. These strategies receive support because they encourage desirable behavior. The EITC is such a program, because it goes only to parents who work; unemployed parents do not receive a refundable tax credit. Conditional cash transfer (CCT) programs, used in a number of developing countries, constitute a more elaborate example. Mexico pioneered the CCT movement with a program originally called Progresa and now known as Oportunidades. This program gives parents direct cash payments that are linked to several positive behaviors, including whether their children attend school and preventive health care appointments, and whether they adopt specific child nutrition practices.[64] Although poor households in the program make more use of health and education services, evidence is mixed on whether the program improves children's health and education.[65] For example, school enrollment has improved, but achievement test scores have not. CCT programs have since been widely adopted in other developing countries. Evaluations show that some have improved children's health and nutrition, while others have not.

Oportunidades inspired New York City's Family Rewards program, which operated from 2007 to 2009 in the city's highest-poverty communities. Begun in the fall of 2007, the program tied cash rewards to children's education, families' preventive health care, and parents' employment.[66] As its creators hoped, the program reduced poverty and hardship and increased families' savings. However, children's results depended on their age. Elementary and middle school students whose families received the payments did not improve their school attendance or overall achievement. But better-prepared high school students attended school more frequently, earned more course credits, were less likely to repeat a grade, and scored higher on standardized tests.

Increased income support can also take the form of in-kind benefits such as food stamps or housing vouchers. One study took advantage of geographic variation in the timing of the rollout of the Food Stamp Program (now called the Supplemental Nutrition Assistance Program) in the 1960s and 1970s. The researchers examined adult outcomes of people whose families received food stamps around the time they were born.[67] They found that access to food stamps in early childhood led to a significant reduction in the incidence of "metabolic syndrome" (obesity, high blood pressure, and diabetes) and, for women, an increase in economic self-sufficiency.

Though we emphasize that policies to boost income in early childhood may be important, we are not suggesting that this is the only policy path worth pursuing. Obviously, investments later in life and those that provide direct services to children and families may also be well advised. Regardless of the timing of the investment, economic logic requires that we compare the costs and benefits of the various programs that seek to promote the development of disadvantaged children throughout the life course. In this context, expenditures on income-transfer and service-delivery programs should be placed side by side and judged by their benefits, and by society's willingness to pay for the outcomes they produce, relative to their costs.

We conclude by noting again that the research we have reviewed focuses on the possible consequences for children and youth

of income *changes*, and not just income increases. The wider discussion of policy has been cast in the optimistic light of benefits that might result from increasing the incomes of low-income families, particularly families with young children. It is important to remember, however, that reductions in the generosity of programs such the EITC can be expected to reduce children's success at school and increase their mothers' stress levels and mental health problems. With achievement and attainment gaps between low- and high-income children larger than any time in the past 40 years, we should think twice about policy changes that would further increase these gaps.

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