



CHAPTER 4

INEQUALITY IN EARLY CHILDHOOD AND EFFECTIVE PUBLIC POLICY INTERVENTIONS

INTRODUCTION

Economic research has established that investments in children’s health, education, nutrition, and income support have large benefits both for individuals and for society as a whole. For example, public provision of K-12 education has long been viewed as essential for promoting equality of opportunity and for fostering a productive workforce. More recently, however, research has shown the critical importance of investments made in the years before children enter school.

Many measures of abilities and skills that contribute to future productivity—referred to by economists as “human capital”—were once considered by many to be hereditary. Yet a growing body of research at the intersection of economics, neuroscience, and developmental psychology has shown that early indicators of a child’s potential are often highly responsive to changes in environment and to the actions of parents and caregivers. In turn, improvements or deficits in early investments can perpetuate themselves, in part by enhancing or reducing the efficacy of later childhood investments. Indeed, at the time of school entry, the characteristics of a child and his or her family explain much of the variation in later educational achievement, and even in subsequent earnings and employment. Further, gaps that exist at school entry tend to remain stable or even widen as children progress through school.

The persistence of these early childhood disparities has profound consequences for the life chances of those born into poverty and disadvantage. Comparisons of early health and human capital measures across different groups in society reveal large gaps by household income and by race/ethnicity, geography, and family structure. These gaps are mirrored by gaps in a variety of parental characteristics and inputs, as well as by differences in the

child’s environment. Despite the high potential returns, many families lack the resources, time, and opportunities to make essential early investments in their children.

Opportunity gaps among young children have important implications for public policy. Researchers have studied a broad set of policies that provide investment in early childhood and found significant and wide-ranging benefits for parents and children.¹ Public investment that improves the inputs in a child’s early years can help to close critical achievement, health, and development gaps, and can lead to benefits such as higher earnings that accumulate over a lifetime. In fact, some researchers argue that closing the gaps in early childhood is the easiest and most cost-effective way to reduce inequality in later-life outcomes.² Closing these gaps is not just about education, but also about more broadly alleviating the budget constraints facing families of younger children.

Importantly, the benefits of early investment accrue not only to individual children and their families, but also to society. The public benefits include: higher tax revenue from a more productive workforce; lower rates of criminal activity; reduced inequality; and reductions in public spending on medical care, remedial education,³ incarceration, and transfer programs.

This chapter surveys the research on the benefits of early childhood investment, with an emphasis on the role of public policy. The first part of the chapter begins with an overview of the main theories explaining why early investments may have especially high returns. It then presents evidence on the early appearance of large gaps by socioeconomic status (SES)—including gaps in measures of early health and human capital, in a variety of parental characteristics and inputs, and in other environmental factors. The first part concludes by presenting the main economic arguments on why government policy is crucial to ensuring an optimal level of investment in early childhood, especially for children from disadvantaged households.

In the second part, the chapter surveys existing Federal policies and programs that invest in early childhood health, development, and education and reviews the most rigorous research on the impacts of these policies on children’s short- and long-run outcomes. The broad range of policies and programs considered here operate through multiple mechanisms. These include: direct investments in early education such as high-quality child care

¹ Chapter Four of the 2015 *Economic Report of the President*, “The Economics of Family-Friendly Workplace Policies,” and CEA’s January 2015 report “The Economics of Early Childhood Investment” discuss the benefits that early childhood education can have for parents. This chapter focuses on the benefits for children.

² See, for example, Cunha et al. (2006).

³ Encompasses both special education and additional education required by students that are held back.

and preschool; direct investments in health such as children’s health insurance and home visitation to help new parents keep infants healthy; nutrition programs that supplement families’ food budgets; and income transfers and other near-cash transfer programs that offer more flexible assistance to low-income families. This overview analyzes the benefits to the individual and to the public and assesses the role of policy in promoting economic opportunity for all children.

THE ECONOMICS OF INVESTING EARLY AND THE CONSEQUENCES OF EARLY LIFE DISADVANTAGE

Pathways for Returns to Early Investments

Researchers have outlined several theories that help explain why early childhood is a particularly important time to invest in children. First, investments made when children are very young will generate returns that accrue over a child’s entire life. Since the benefits are realized over a longer time horizon, the earlier in life they are made, the more likely early childhood interventions are to generate substantial benefits—both to the child and to his or her community.⁴

A second reason that early childhood investments benefit children’s development may be that the flexibility and capacity for change in cognitive functioning and brain development is the greatest for young children, and these changes can have lasting effects on behavior throughout life (Knudsen et al. 2006). Research shows that characteristics that are often assumed to be innate, like cognitive skills, can be influenced by environmental factors in early childhood (Jensen 1980; National Scientific Council on the Developing Child 2007). Under this model, not only do earlier investments generate benefits over a longer time period, but also each dollar invested produces greater impacts since children’s brains are developing most rapidly when they are young.

Related developmental theories imply that a child’s environment *in utero* has a large impact on the health of the child and indicate that even investments made before birth can have long-lasting consequences. The “fetal origins hypothesis” posits that adverse conditions in the womb can strongly influence whether a child develops metabolic issues such as diabetes and heart disease throughout their lives (Currie and Rossin-Slater 2015) and can even translate beyond physical health to mental health (Persson

⁴ This is a central tenet of the human capital model in economics; see Becker (1962) and Ben-Porath (1967).

and Rossin-Slater 2015).⁵ These adverse conditions can also affect cognitive and economic outcomes, including test scores, educational attainment, and income (Almond and Currie 2011; Lavy, Schlosser, and Shany 2016). The academic literature on the long-term health impacts of stress and nutrition *in utero* provides support for this theory, and support for intervening even before birth.

Third, early investments can have large impacts if early skills serve as a multiplier, or prerequisite, for later skills (Cunha et al. 2006; Cunha and Heckman 2007). For example, it may be that the extent of skill acquisition in early elementary school depends on the degree of skills attained before entering kindergarten, and skills learned in adolescence depend on mastery of these elementary skills. Under this “skill-begets-skill” model, early investments in child development can enhance the productivity of future investments in human capital. Since early education may serve as a complement for later skills gained in high-quality elementary and later education, it is important to reinforce children’s learning throughout their schooling years to maximize the benefits of early education. A continuum of high-quality education ensures that early investments can be strengthened and built upon in later years (Currie and Thomas 2000).

These mechanisms are not mutually exclusive, as there is evidence to support each, and they may work together to produce the large benefits of early investments.

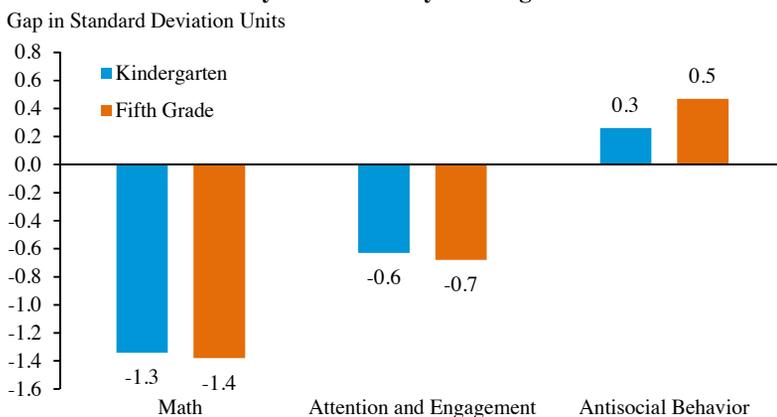
Inequality in Early Health and Human Capital Investments

Comparisons of early health and human capital measures across different groups in American society reveal large gaps by household income and by race/ethnicity and family structure. On nearly every measure of school readiness, children born into low-income households enter school at a substantial disadvantage relative to their higher-income peers. For example, Figure 4-1 shows that income-based gaps in math skills, attention, and social skills are well-established by kindergarten and that these achievement gaps persist (and, if anything, tend to widen) through fifth grade.

The barriers faced by young people who grow up in disadvantaged settings are compounded over time and may be exacerbated by unequal treatment in the educational and disciplinary systems later in childhood. By the time youth who have experienced these challenges reach adulthood,

⁵ See also the large epidemiological literature connecting *in utero* exposure to famine and the onset of mental illness (Susserr and Lin 1992; Susser et al. 1996; Neugebauer et al. 1999; McClellan et al. 2006), and evidence that mental illness can be traced to brain abnormalities that may be related to fetal environment (Berquin et al. 1998; Stoner et al. 2014; Liu et al. 2012).

Figure 4-1
**Cognitive and Non-Cognitive Skills SES Gaps are
 Mostly Established by Kindergarten**



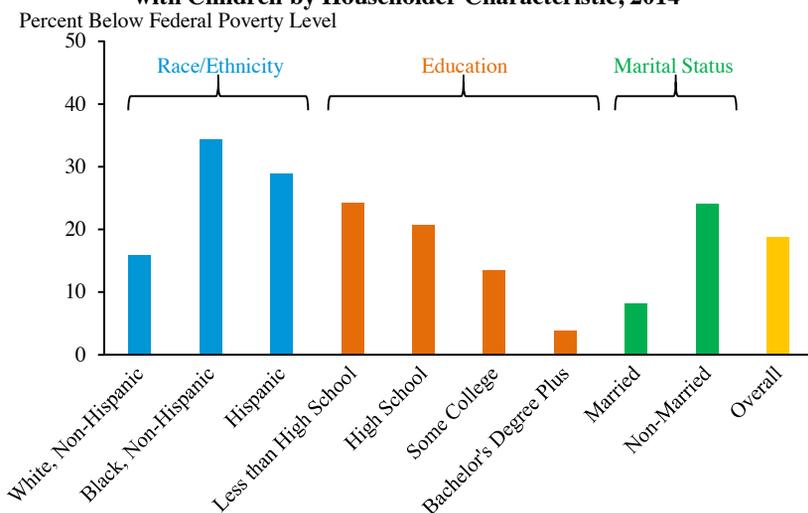
Note: SES refers to socioeconomic status. Calculations by Duncan and Magnuson (2011) based on data from the Early Childhood Longitudinal Study - Kindergarten Cohort. Kindergarten test scores were measured in 1998–1999; fifth grade test scores for the same students were measured in 2004. Source: Duncan and Magnuson (2011).

they are less likely to have the educational attainment and labor market skills critical to success in today’s economy. As a result, they tend to participate less often in the labor force, experience higher rates of unemployment when they do participate, and earn less when they find work.

Recent research on the intergenerational transmission of wealth suggests that the close connection between family resources and children’s adult outcomes is in large part due to differences in environment rather than genetics (Black et al. 2015). Research also points to specific pathways through which poverty can be detrimental for young children’s immediate and long-run outcomes, including inequality in resources directed toward building human capital. Growing up with a lack of familial resources means there are simply fewer resources available to support health and education. In addition to restricted monetary investment due simply to a lack of resources, several other factors associated with poverty—such as low parental health and human capital, food insecurity, stress, and neighborhood factors like school quality—can have negative impacts on children’s physical and mental health, cognition, and socio-emotional and behavioral skills.

This section examines the evidence on gaps in early childhood health, as measured by birth weight and other physical health indicators, and in early human capital measures, including both “cognitive skills,” as measured by school achievement, and “non-cognitive skills,” as measured by socio-emotional and behavioral skills. Research has demonstrated that these

Figure 4-2
**Official Poverty Rate for Households
 with Children by Householder Characteristic, 2014**



Source: CPS ASEC (2015); CEA calculations.

measures are both mutable and strong predictors of long-run outcomes. Evidence is also presented on the parallel gaps in a variety of parental characteristics and inputs as well as other characteristics of children's environments that likely contribute to the gaps in early outcomes.

Here and throughout this chapter, the focus is on income-based gaps and disadvantages associated with poverty. While poverty is strictly defined in terms of income, it is important to note that poverty can also serve as a proxy for many other forms of disadvantage that may also stifle investment in early childhood. Poverty is unevenly distributed by race/ethnicity and family structure. In 2014, 15.5 million children lived in poverty in the United States—an overall child poverty rate of 21 percent. But youth of color were disproportionately impoverished, including 37 percent of African-American youth and 32 percent of Hispanic youth. Young children of single mothers were also disproportionately impoverished, with over one-half of all related children under age 6 in households headed by a female in poverty (Census Bureau 2015).

Finally, as Figure 4-2 shows, children whose households are headed by individuals who are non-White, less-educated, and/or single are especially likely to experience poverty; as a result, they are more likely to experience deficits in early health and human capital inputs and in later-life outcomes.

Disparities in Early Health

Prenatal, neonatal, and post-neonatal health (through the first year of life) are crucial early determinants of later-in-life health and academic success. Good health and nutritional baselines are directly linked to better health in childhood. Early health outcomes carry over into adult health outcomes and even connect to non-health outcomes such as cognition, which can continue into adulthood. Even before birth, children born into lower socioeconomic status households face disadvantages in the area of health.

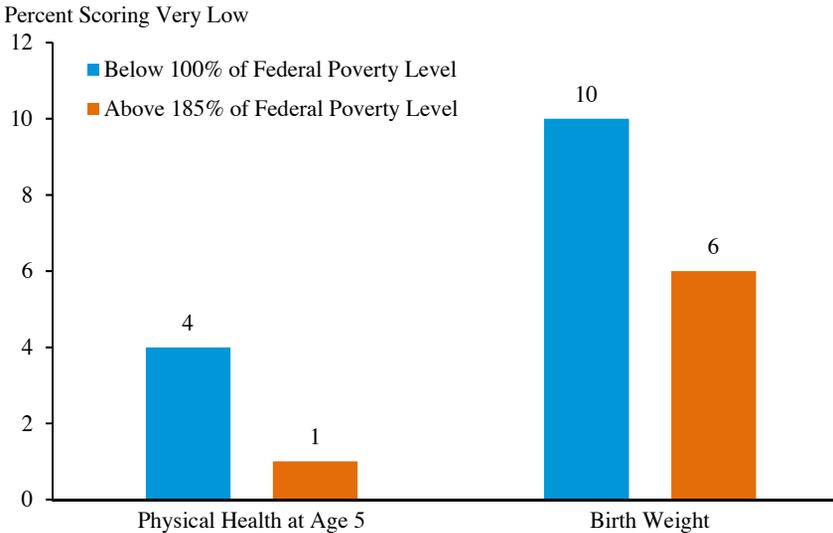
Individuals of lower socioeconomic status experience higher levels of stress than more advantaged individuals. As such, the link between maternal stress and child physical and mental health outcomes puts children born into poorer households at higher risk of adverse health outcomes (Persson and Rossin-Slater 2015; Thompson 2014; Kunz-Ebrecht et al. 2004; Cohen et al. 2006; Aizer, Stroud, and Buka 2012). Health disadvantages continue throughout children's earliest years in the form of food insecurity, stress, and cognitive overload (an accumulation of concerns to the point that the stress becomes overwhelming and impairs cognitive functioning). The stress and concerns associated with living in poverty can affect cognition and health into adulthood. Children born to lower-income mothers are also less likely to receive early and adequate prenatal care. Rates of first trimester prenatal care increase with educational attainment, from only 58 percent of mothers with less than a high school diploma to 86 percent of mothers with a bachelor's degree or higher (Health Resources and Services Administration 2013).

As a result of exposure to these adverse early childhood health conditions, children growing up in poverty may experience more physical and mental health problems throughout their lives. Researchers have shown that maternal stress during pregnancy depresses birth weight (Persson and Rossin-Slater 2015; Black, Devereux, and Salvanes 2016) and can increase the risk of hospitalizations in the first five years of life (Persson and Rossin-Slater 2015). The impacts of maternal stress during pregnancy can even be traced to educational attainment (Aizer, Stroud, and Buka 2012) and adult mental health (Persson and Rossin-Slater 2015).

Children growing up in poverty tend to do worse across a spectrum of important early health outcomes. They are nearly twice as likely to be born at a low or very low birth weight and are four times more likely to have poor overall physical health (Figure 4-3). Birth weight is one early indicator of health that can be highly predictive of later-life success. Studies of birth weight find that it is not only a good predictor of short-term health and mortality, but also of longer-term health and human capital variables,

Figure 4-3

Likelihood of Scoring Very Low on Early Health Measures



Note: Data are from the Early Childhood Longitudinal Study - Birth Cohort and for children born in 2001. Very low physical health defined as at least one standard deviation below the average. Very low birth weight defined as below 5.5 pounds.

Source: Isaacs (2012).

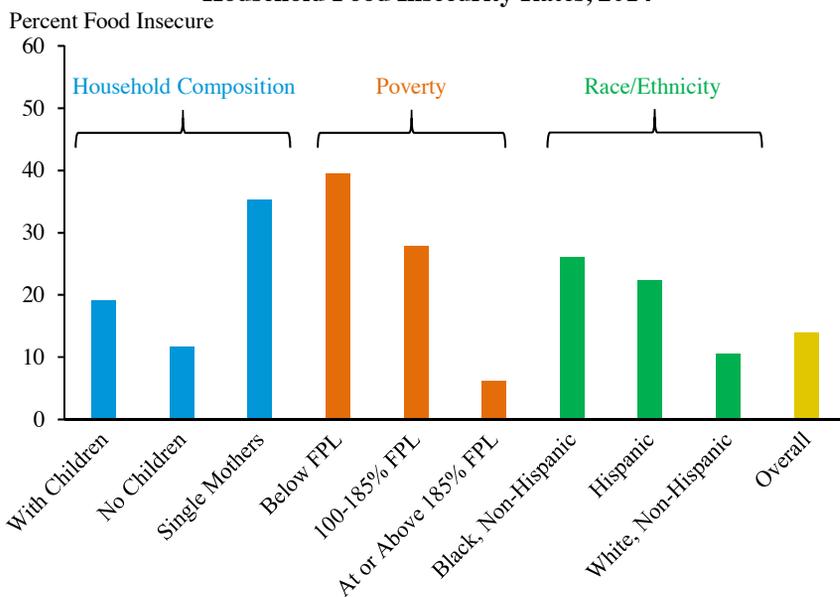
including school achievement and earnings (Black, Devereux, and Salvanes 2007; Figlio et al. 2014).

Poor children are also much more likely to experience food insecurity, or the lack of resources necessary for consistent and dependable access to food, which can compromise early nutrition and lead to worse short- and long-term outcomes. Overall, about 19 percent of households with children, including 15 million children, experienced food insecurity in 2014 (Coleman-Jensen et al. 2015). Rates of food insecurity are much higher among certain vulnerable populations, including poor households and households headed by single women and minorities (Figure 4-4). Food security and access to good nutrition are critical *in utero* and in the early years of life, setting up a child for physical and mental health throughout their lives. For example, the type of nutrition young children receive can shape the architecture of the brain and central nervous system in a variety of ways (Georgieff 2007; Rosales, Reznick, and Ziesel 2009). Maternal malnutrition can impair fetal development, with effects that carry into childhood and adulthood physical and mental health (Almond and Mazumder 2011; Adhvaryu et al. 2014).⁶

Parental and child stress can also be contributors to inferior mental and physical health outcomes for poor children. Parents living in poverty are more likely to experience cognitive overload, meaning that the stress

⁶ See also Persson and Rossin-Slater (2015) for a review of this literature.

Figure 4-4
Household Food Insecurity Rates, 2014



Note: FPL refers to the federal poverty level.
Source: Coleman-Jensen et al. (2015).

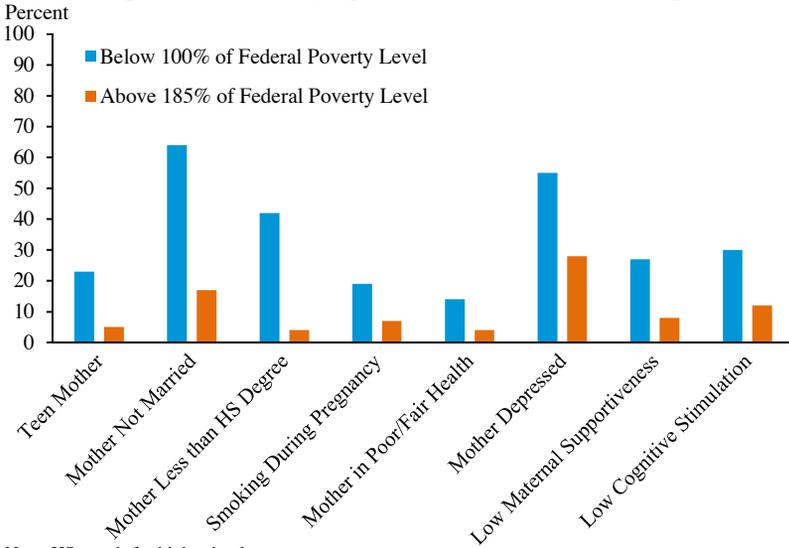
and concerns associated with living in poverty can become overwhelming to the point that it affects cognitive functioning, which can further perpetuate poverty (Mani et al 2013). Mothers living in poverty are also more likely to be depressed and in poor health, and to smoke during pregnancy (Figure 4-5). When children live in poverty, they may also experience chronic stress and cognitive overload, which can harm cognition in adulthood (Evans and Schamberg 2009). Children in poor households are disproportionately likely to be exposed to adverse childhood experiences, including neglect and abuse, which can lead to poorer health and human capital outcomes later in life (Hillis et al. 2004; Felitti et al. 1998; Campbell, Walker, and Egede 2015; Flaherty et al. 2013). All of these differential inputs and experiences contribute to gaps in early physical and mental health.

Disparities in Early Human Capital

Insufficient family financial and non-financial resources mean that children from low-income families are less likely to have access to activities and materials that promote learning and wellness, such as high-quality early education and enriching home environments. These factors, and others associated with poverty (such as higher health risks, food insecurity, and increased stress) contribute to the disparities between these children and their higher-income peers in school readiness. In turn, the disadvantage

Figure 4-5

Disparities in Underlying Factors Behind Outcome Gaps



Note: HS stands for high school.
 Source: Isaacs (2012).

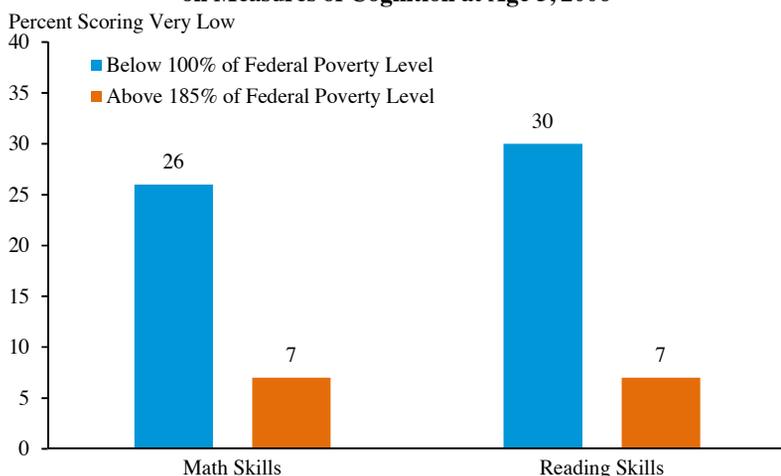
these children face upon school entry has long-lasting consequences for academic achievement and behavior throughout their schooling years (Duncan, Magnuson, and Votruba-Drzal 2014; Duncan, Ziol-Guest, and Kalil 2010).

A child’s early years, beginning in infancy, are a period of profound advances in reasoning, language acquisition, and problem solving. Importantly, a child’s environment can dramatically influence the degree and pace of these advances. By supporting development when children are very young, early childhood development and education programs can complement parental investments. Children who enter school at higher levels of readiness have higher earnings throughout their lives. They are also healthier and less likely to become involved with the criminal justice system.

Early Gaps in Cognitive and Non-Cognitive Outcomes

Socioeconomic disparities in cognitive, social, behavioral, and health outcomes are evident in children as young as 9 months of age and these gaps tend to widen as children grow older. At just 9 months, infants and toddlers from low-income families score lower on cognitive assessments, are less likely to be in excellent or good health, and are less likely to receive positive behavior ratings than their counterparts from higher-income families; by 24 months, the cognitive and behavioral gaps have at least doubled (Halle et al. 2009). By the time children enter school around age 5, children in poor households are nearly 4 times more likely to score “very low” on assessments

Figure 4-6
**Likelihood of Scoring Very Low
 on Measures of Cognition at Age 5, 2006**



Note: Very low is defined as more than one standard deviation below average on academic measures. Data are from the Early Childhood Longitudinal Study - Birth Cohort. Test scores were measured in fall of 2006 or 2007. Source: Isaacs (2012).

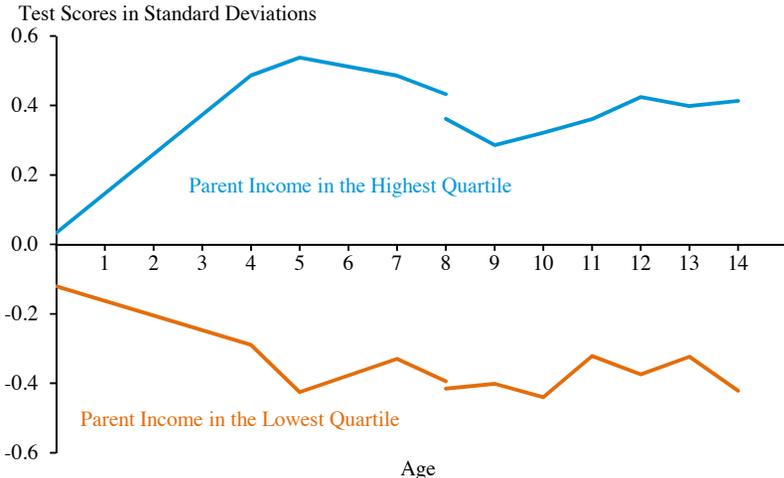
of math skills and over 4 times more likely to score “very low” on reading skills than children in more well-off households (Figure 4-6).

These gaps tend to follow children throughout their school careers, putting impoverished children at a substantial academic disadvantage that can be hard to overcome. As shown in Figure 4-7, most of the income achievement gap emerges before age 5, and it remains relatively constant through the beginning of high school—suggesting that achievement gaps in later years are established in the earliest years of childhood. Some researchers argue that these gaps have grown over the past 50 years as overall income inequality has grown, and as the relationship between income and achievement has become stronger (Reardon 2011).⁷ Family income is an increasingly important determinant of children’s future earnings, suggesting that parental income inequality can have a long-run impact on educational and labor market inequality as their children age (Duncan, Kalil, and Ziolk-Guest 2015).

Children experiencing poverty are also more likely to exhibit behavioral problems and to perform worse on non-cognitive skills tests. As shown in Figure 4-8, at age 5, children in poor households are nearly 80 percent

⁷ There is some disagreement on the comparability of achievement gaps across studies over time. While some studies suggest gaps in test scores across socioeconomic groups stabilize from primary school (Reardon 2011; Heckman 2006), others argue that differences in academic achievement based on standardized test scores are not comparable over time (Nielsen 2015).

Figure 4-7
Achievement Gap is Largely Set by Age 5

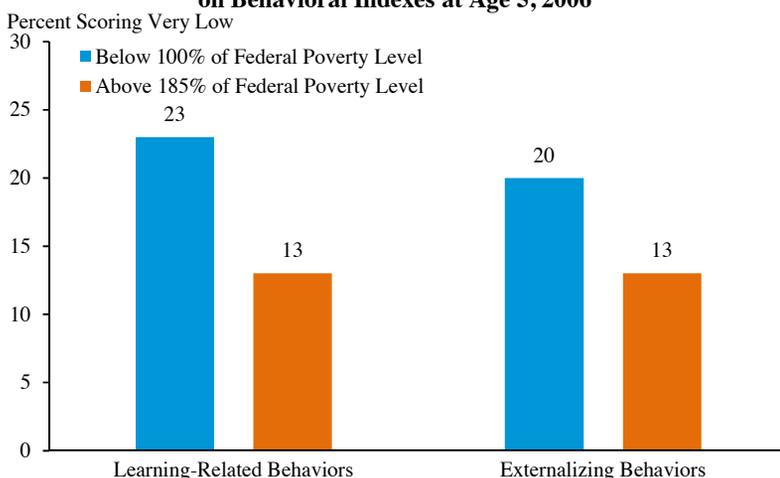


Note: IQ scores are available through age 8. After age 8, math test scores are shown. A three year moving average is used for math scores.
 Source: U.S. Collaborative Perinatal Project from Fryer and Levitt (2013) (through age 8); NLSY79 Child and Young Adult Supplement from Cunha et al. (2006) (after age 8); CEA calculations.

more likely to exhibit learning-related behavioral issues, such as not paying attention in class, and more than 50 percent more likely to exhibit externalizing behavioral problems. These findings are likely attributable to a host of stressors that these children face, including less-safe neighborhoods, increased exposure to trauma, insufficient resources to address their physical and mental health needs, and having parents with unmet physical or mental health needs.

In addition to cognitive skills, non-cognitive skills, or socio-emotional and behavioral skills, are also strong predictors of educational attainment, and therefore of longer-term human capital accumulation, employment, and wages. For example, teacher-rated social adjustment is a strong predictor of educational attainment and employment (Carneiro, Crawford, and Goodman 2007). Social and behavioral skills in childhood have also been shown to be strong predictors of physical health and engagement in risky behaviors later in life. Indeed, non-cognitive factors can be even stronger predictors than cognitive factors of risky behaviors and their consequences—including smoking, participation in illegal activity, and incarceration (Heckman, Stixrud, and Urzua 2006). This means that children from disadvantaged backgrounds who have had less support in their socio-emotional and behavioral development from their earliest years are at a higher risk of engaging in unhealthy and harmful behavior.

Figure 4-8
**Likelihood of Scoring Very Low
 on Behavioral Indexes at Age 5, 2006**



Note: Very low is defined as more than one standard deviation below average on behavioral measures. Data are from the Early Childhood Longitudinal Program Birth Cohort. Test scores were measured in the fall of 2006.

Source: Isaacs (2012).

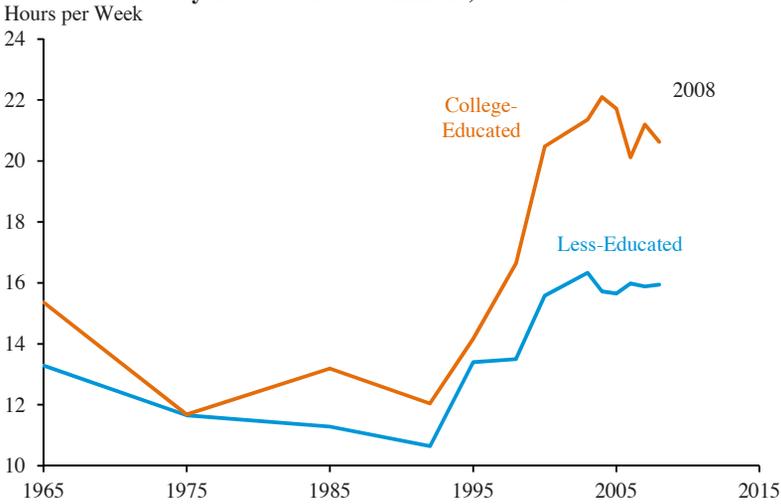
Gaps in Resource and Time Investment

As discussed above, these large gaps in cognitive and non-cognitive skills may be due in part to large differences in inputs, including both parental inputs and formal, high-quality early learning opportunities. Today, inequalities in parental inputs such as time, resources, earnings, and education are higher than in the past. Parents in the top fifth of income earners now spend seven times more on enrichment activities and materials for their children—such as books, computers, summer camps, and music lessons—than families in the bottom fifth (Duncan and Murnane 2011). Moreover, as income inequality has grown, so has inequality in child-related expenditures.

Higher-income parents generally have more time to spend with their children, and the amount of time they spend has been increasing at a faster rate than among lower-income parents (Figure 4-9).⁸ This may reflect, in part, that higher-income workers are much more likely to have access to paid time off and workplace flexibility, which they can use to spend quality time with young children (CEA 2015b). This additional time, particularly time spent playing and engaging in a child’s development, is important for early cognitive and socio-emotional development. For example, research demonstrates that reading to children is crucial for early language acquisi-

⁸ See Ramey and Ramey (2010) and Bianchi (2010) for further details.

Figure 4-9
**Mother's Time Spent on Child Care
 by Educational Attainment, 1965–2008**



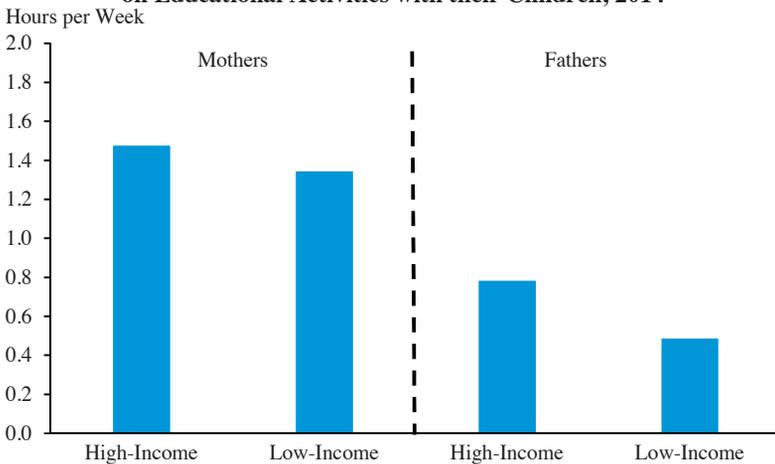
Note: Estimates are for mothers aged 25-34.
 Source: Ramey and Ramey (2010).

tion and communication skills (National Research Council and Institute of Medicine 2000; Tamis-LeMonda et al. 2004). This inequality during early childhood creates an income-based advantage in educational outcomes early in life and leads to inequality in adult outcomes, one reason suggested for the persistence of income levels across generations (Solon 1992). For instance, when mothers obtain more education, it improves birth outcomes for their children (Currie and Moretti 2003). This may be due to the increases in marriage, use of prenatal care, lower fertility, reduction in smoking, or other factors that are correlated with higher levels of maternal education.

The gap is also reflected in the total time spent with children and in activities that engage children. In particular, high-income parents spend more time on educational activities with their children (Figure 4-10), creating an income-based advantage in educational outcomes in the first few years of life.

Highly educated parents are also spending more time on child-care activities, such as playing with young children and helping with children’s activities (Ramey and Ramey 2010). For example, highly educated parents spend more time on developing their children’s reading and problem-solving skills in preschool, and on extra-curricular activities for older children (Kalil 2014). In contrast, less-educated parents are less likely to adapt their time-use patterns with children to developmental stages (Kalil, Ryan, and Corey 2012). Gaps in children’s vocabulary can reflect these differences in

Figure 4-10
**High-Income Parents Spend More Time
 on Educational Activities with their Children, 2014**



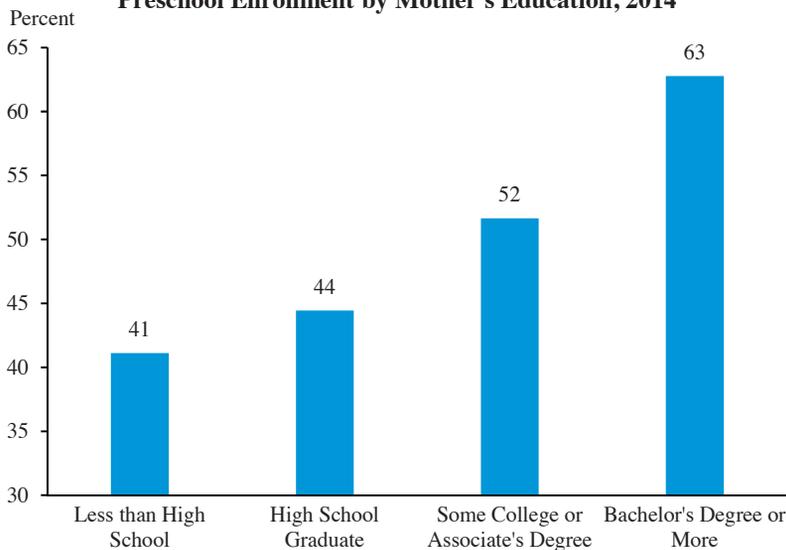
Note: High-income refers to top quartile while low-income refers to bottom quartile. Includes time spent helping with homework, attending school meetings, reading to or with children, and other activities associated with children's education.
 Source: American Time Use Survey (2014).

time use by parents' educational attainment: highly educated mothers tend to engage in more complex talk with their children and spend more time reading and, at 3 years old, their children have more expansive vocabularies than children with less exposure to books and language (Vernon-Feagans et al. 2015).

These disparities in early childhood development can be exacerbated by later gaps in formal early schooling opportunities, as demonstrated by an extensive literature on the positive impacts of preschool on cognitive and non-cognitive outcomes. Children's enrollment in formal learning environments is especially affected by socioeconomic status. About 60 percent of 3- and 4-year olds whose mothers have a college degree are enrolled in preschool, compared to about 40 percent of children whose mothers did not complete high school (Figure 4-11). Although preschool attendance has increased for all maternal education groups since the 1970s, children of less-educated mothers are still less likely to attend preschool, in part due to the significant cost burden of high-quality early childhood care. Lower-income families are less likely to be able to afford care: among families with child-care expenses and working mothers, families below the Federal Poverty Level pay an average of 30 percent of their income in child-care costs, compared with 8 percent among non-poor families (Laughlin 2013).

Since formal early childhood education is less affordable for children who grow up in disadvantaged settings, inequalities in achievement

Figure 4-11
Preschool Enrollment by Mother's Education, 2014



Note: Excludes children in kindergarten.

Source: Current Population Survey October Supplement (2014); Census Bureau calculations; CEA calculations.

that appear within the first few years of life continue to grow as children from disadvantaged families fall behind. Federal, State, and local programs help fill the socioeconomic status gap in the availability of early childhood education. For example, Head Start and Early Head Start provide formal high-quality learning environments for children from low-income families.

Gaps in Quality of Environmental & Neighborhood Factors

Around 4 million poor children grow up in high-poverty neighborhoods (Rawlings 2015). The health and human capital inputs that are available to poor children because of where they live are considerably worse than those available to children in more advantaged neighborhoods. A large body of literature confirms that neighborhood characteristics, such as accessibility and quality of learning, social and recreational activities, support networks, and the presence of physical risk (such as violence, victimization, and harmful substances), affect later-life outcomes (Leventhal and Brooks-Gunn 2000).

For example, school quality varies enormously with the level of poverty in a neighborhood. Access to high-quality schools with good teachers has been proven to improve later-life outcomes, such as earnings potential (Chetty, Rockoff, and Friedman 2014). However, because most public schools serve students within attendance district boundaries, children from low-income neighborhoods often lack access to high-quality schooling.

Black (1999) shows that school quality is capitalized in housing prices, meaning that houses in neighborhoods assigned to high-quality schools may be too expensive for low-income families to afford. Moreover, students in high-poverty school districts too often receive less investment than their peers in low-poverty districts, since local revenues account for a large fraction of school revenue (45 percent in 2011-2012) (National Center for Education Statistics 2015). In 23 States, districts serving the highest percentage of students from low-income families are spending fewer State and local dollars per pupil than districts that have fewer students in poverty (U.S. Department of Education 2015).

In addition to inadequate resources and support and the voluntary nature of the early childhood system, differential expulsion and suspension can also reduce disadvantaged students' access to early learning. Children from disadvantaged backgrounds may face biases that create barriers to their education, especially since children of color are overrepresented in low-income populations. For example, children of color, particularly boys are much more likely to be suspended or expelled from early learning settings (see Box 4-1 for further discussion of differential outcomes by gender in early childhood). In 2011-12, African-American students represented 18 percent of preschool enrollment but 48 percent of preschoolers suspended more than once (Office for Civil Rights 2014). This type of discipline can detract from learning, especially when children are removed from school and temporarily denied a formal learning environment.

Although traditional neighborhood school quality can be lacking in disadvantaged areas, there may be opportunities for government intervention to address barriers to quality schooling in these neighborhoods. Research shows that policies to expand disadvantaged students' access to quality schooling, like busing or charter schools, can improve educational attainment and close achievement gaps (Billings, Deming, and Rockoff 2014; Dobbie and Fryer 2011). Additionally, traditional public schools see marked improvement when they adopt best practices identified in alternative schooling policies. A study by Fryer (2014) shows that public schools in Houston experienced sizeable increases in student math achievement of 0.15 to 0.18 standard deviations per year when they adopted five best practices from charter schools.

Other characteristics of low-income neighborhoods can also inhibit healthy child development. The Centers for Disease Control and Prevention (CDC) reports that children living at or below the poverty line who inhabit older housing are at greatest risk for lead poisoning, which impairs brain development. Although much progress has been made in reducing rates of poisoning (CDC 2015), the effects of lead persist through a child's life.

Box 4-1: Gender Differences in Early Outcomes and Responses to Investment

Early investments are critical for both boys and girls, but parental and environmental inputs can differ for children of different genders, leading to disparate outcomes. Boys in low-income households tend to do worse on a myriad of health and human capital outcomes than similarly situated girls, ranging from educational attainment to test scores to crime involvement (Autor et al. 2015). A new working paper by Chetty et al. (2016) shows that these gender gaps in the impact of childhood disadvantage may be sustained through adulthood. Men who grew up in high-poverty, high-minority areas work significantly less than women from similar backgrounds, with the worst outcomes concentrated among men who grew up in low-income, single-parent households.

Researchers have found that environmental, rather than biological, factors drive this relationship. Autor et al. (2015) show that, though children born into families of low socioeconomic status (SES) have worse health than higher-SES newborns, birth outcomes are similar between low-SES siblings of different genders. The authors suggest that the gaps that emerge between low-SES male and female siblings later in childhood are due to differences in their environment after birth, or differential response to that environment.

Influences from both inside and outside of the home environment may lead both genders to be more sensitive to certain aspects of disadvantaged upbringing. Autor et al. (2015) suggest that gender gaps in outcomes between low-SES siblings, where boys tend to do worse, are related to home environment, partially through a lack of same-sex role models (fathers are more likely to be absent than mothers) and relatively smaller parental time investments as a result. They also posit that factors outside of the home but that are associated with low-SES status, including worse schools and neighborhoods, can have disproportionately negative impacts on boys. For example, a new working paper by the same authors shows that males on average benefit more from cumulative exposure to high-quality schools than their female siblings (Autor et al. 2016). Additionally, the stress associated with poverty appears to have more serious effects on males than on females (Bertrand and Pan 2013). This may be in part because boys' coping strategies tend to involve more aggressive behavior and less interaction with prosocial adults (Coleman and Hendry 1999). These differences in coping strategy may lead to different outcomes for the genders in different types of early intervention.

As a consequence, the effects of policies that support investment in children may vary for girls and boys. The policy section of this chapter examines how and why program impacts may differ by gender.

Differences in early life investments and adaptation behaviors between genders can affect the efficacy of childhood policy interventions. These disparities not only highlight the complexities in childhood development, but also the need to invest early. The earlier an intervention occurs, the fewer baseline gaps and maladaptive behaviors there are to overcome.

Besides diminished cognitive function, lead poisoning can manifest in behavioral problems as a child, pregnancy and aggression as a teen, and criminal behavior as a young adult (Reyes 2015a,b). Children from low-socioeconomic-status families are also more likely to be exposed to higher levels of pollution in their neighborhoods, making them more likely to be hospitalized with asthma complications (Neidell 2004). Exposure to pollution in a child's first year of life can also have negative long-term impacts on labor market outcomes, such as hours worked and earnings (Isen, Rossin-Slater, and Walker forthcoming).

Recent studies document large differences across counties in inter-generational economic mobility (Chetty et al. 2014) and find that these differences directly affect children's future outcomes (Chetty and Hendren 2015). About 60 percent of U.S. counties are positive contributors to inter-generational economic mobility, meaning that living in those counties during youth positively impacts the future income of children in low-income households.⁹ Importantly, the duration of exposure to a better environment also matters—suggesting that the future benefits are greater when a child moves at an earlier age. For a child with parents at the 25th percentile of the income distribution, each year a child spends in DuPage, Illinois (which has the highest mobility of the 100 largest counties in the United States) raises that child's future earnings by 0.8 percent (Chetty and Hendren 2015). In contrast, every year of childhood spent in Baltimore City, Maryland (the worst of the 100 largest counties) reduces their future earnings by 0.7 percent.

Place also matters because segregation—both by race and by income—has negative implications for those who grow up in these neighborhoods. Living in a high-poverty neighborhood reduces access to jobs and career networks (Spaulding et al. 2015). Racial segregation has also been shown to have adverse effects on educational achievement and attainment, employment, earnings, single parenthood, and health (Cutler and Glaeser 1997;

⁹ Causal effects on mobility based on Chetty and Hendren (2015) Online Data Table 2: Preferred Estimates of Causal Place Effects by County. <http://www.equality-of-opportunity.org/index.php/data>.

Card and Rothstein 2007; Dickerson 2007; Subramanian et al. 2005; Acevedo-Garcia and Lochner 2003).

The Role of Public Investment in Early Childhood

Early childhood investments can result in significant benefits for children, parents, and society. However, children from disadvantaged households often do not receive the investment they need to ensure their healthy development and success in school because optimal investments are resource-intensive and must happen early, while the benefits are realized over a long time horizon. Indeed, the challenges inherent in investing in children may be experienced by all parents; however, these obstacles can be especially daunting for parents with limited resources.

First, the need to invest early presents a challenge. Because many of the benefits—which include future earnings, health, and life satisfaction—are delayed and accrue to children in adulthood, children rely on parents and others to recognize these future returns on investment and to invest on their behalf.

Second, the gains these investments produce require significant up-front costs. This can be difficult for families to afford on their own, particularly for low-income households, since they lack sufficient time and financial resources or access to affordable credit to make these early investments.

Third, among factors that determine the quality of investment in young children, neighborhood quality and other environmental factors can be as important as family income. Many aspects of a child's environment can be difficult for parents to change on their own. Children from disadvantaged households face additional risks as a result of their environment, and public investments can improve these environmental inputs and supplement existing investments made by the family and community.

Finally, because many of the benefits accrue to society over a long time period, individuals lack the incentive to invest at the level that would achieve the highest social return. Indeed, the research surveyed later in this chapter suggests that the societal benefits are potentially large and wide ranging, and that these societal benefits often exceed the benefits received by the children themselves. These benefits include: reductions in crime; lower expenditures on health care, remedial education, and incarceration; and increased tax revenue and lowered public assistance expenditure due to higher earnings.

In light of these challenges, well-designed public investments can play a crucial role in closing income- and opportunity-related gaps that affect short- and long-run outcomes of children (see Box 4-2 for a discussion of the design of public investment). Public policy can also be key to ensuring that

Box 4-2: Types of Public Investment

Policies to improve investment in early health and human capital can take several forms. Income and in-kind transfers to families, direct investments in the health and human capital of young children, and investments that improve parental inputs can all help to compensate for underinvestment in their learning and development that stems from poverty. These various policies operate through different mechanisms but all support children's well-being in their formative years when it is easier to close gaps and influence children's lives.

1. Direct investments in early childhood health and human capital services: These investments provide direct access to early learning and care to promote healthy child development and prepare children for school. These programs include Head Start, child-care services, and State-funded preschool, among others. Access to these services can improve children's short- and long-term health and human capital outcomes and can have huge positive spillover effects for society as a whole.

2. Indirect investments through improved parental and home inputs: Many of the programs reviewed later in this chapter, such as the Nurse-Family Partnership Home Visiting Program and Head Start, involve parental engagement. Some programs, such as the READY4K! texting literacy intervention, are aimed entirely at improving children's home environments through parental behavior modifications. The goal of these investments, whether standalone or embedded in other initiatives, is to improve the quantity and quality of parental time with children.

3. In-kind transfers: Transfers in the form of health insurance or food help families to meet basic medical and nutritional needs while at the same time freeing up money for other types of consumption or investment. Examples include Medicaid, which helps parents afford health care for themselves and their children, and nutrition programs like the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the Supplemental Nutrition Assistance Program (SNAP), which provide food and nutritional guidance.

4. Income transfers: Transfers in the form of cash provide flexible support to low-income families and can help parents invest in their children by alleviating resource and credit constraints. Examples include Temporary Assistance to Needy Families (TANF), which provides a temporary cash benefit to the poorest families, and two others only available to those with earned income—the Earned Income Tax Credit (EITC) and the low-income portion of the Child Tax Credit (CTC). With regard to children's outcomes, the impact of these programs (as well as other programs that effectively increase disposable income) may

depend on how parents choose to invest the extra income. Further, these programs may have additional impacts on children through the work incentives (or disincentives) that they create for parents.

investments made now are large enough to pay off in the future and realize the gains shown by research—including numerous public benefits.

Underinvestment in children's health and human capital in their earliest years can become more costly for society later in children's lives. Societal efforts that attempt to intervene later in life, for example through remedial education or the juvenile justice system, tend to be less cost-effective than interventions that help children get, and stay, on the right track in the first place. For example, the cost of incarceration is substantially higher than investing in education or other programs to increase opportunity, even before one takes the returns to the investments into account. The annual cost of incarceration for a single juvenile is over \$100,000— more than three times the average tuition and fees at a four-year, non-profit private university, and more than 10 times as expensive as an average year of Head Start (Figure 4-12).

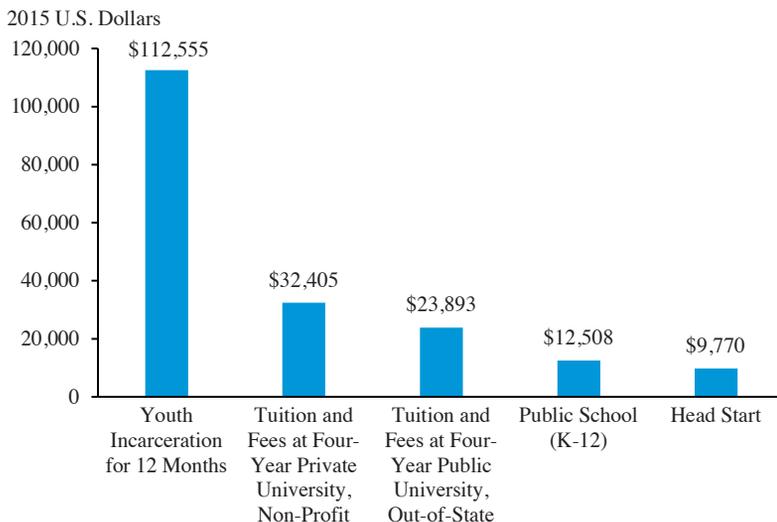
Evidence suggests that investments in early childhood education may reduce involvement with the criminal justice system. Lower crime translates into benefits to society in the form of lowered costs of the criminal justice system and incarceration, as well as reductions in the costs of crime to victims (Heckman et al. 2010; Currie 2001; Reynolds et al. 2001). Likewise, these improvements in children's development may also reduce the need for special education placements and remedial education.¹⁰ For example, studies of preschool programs for low-income children have found benefit-cost ratios of \$7 to \$12 for every \$1 spent in the form of higher participant earnings, lower remedial education costs, reduced transfer payments, and reduced crime (Heckman et al. 2010).

Some early childhood investments, such as Early Head Start, Head Start, and home visitation programs, which offer access to immunizations, health services, and/or parenting education, have improved not only social-emotional and cognitive outcomes but also the health of program participants (Dodgson et al. 2013; Kilburn 2014). These health improvements result in lower societal expenditures on emergency care and health care.

Finally, public investments in young children, such as preschool, public health care, and income transfers, have been shown to improve children's

¹⁰ Anderson (2008); Reynolds et al. (2001, 2002); Belfield et al. (2006); Heckman et al. (2010); Carneiro and Ginja (2014).

Figure 4-12
Annual Cost of Juvenile Incarceration vs. Other Youth Investments



Source: American Correctional Association; College Board; National Center for Education Statistics; CEA calculations.

long-term earnings potential (Brown, Kowalski, and Lurie 2015; Chetty, Friedman, and Rockoff 2011; Barnett and Masse 2007). When the children who receive these investments grow up, they pay more in taxes and are less likely to receive public assistance. As a result, making these early investments would actually increase government revenue and reduce government expenditure over time.

POLICY INTERVENTIONS THAT IMPROVE CHILDREN’S OUTCOMES

The evidence surveyed thus far overwhelmingly shows that, compared with their higher-income peers, children born into lower-income households receive fewer investments in their early health and education. They enter school at a substantial disadvantage on multiple measures of health, cognition, and non-cognitive skills. Mounting theoretical and empirical research also suggests that early investments in children can have especially large economic returns. Yet despite these returns, parents with few resources face several challenges to investing in their children.

Public policy has an important role to play in ensuring that high-return investments in early childhood are realized, and in preventing and closing opportunity gaps. Nevertheless, the relationships between early childhood experiences and long-run outcomes are complex and mediated

by many factors, which makes it difficult to isolate the impact of any given policy. Research that demonstrates and measures the causal links between interventions and outcomes is crucial for guiding effective policy.

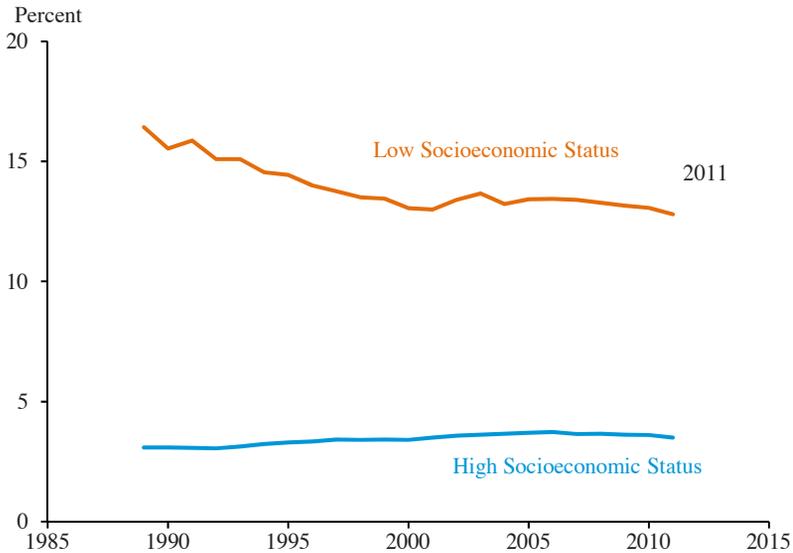
This section reviews the most rigorous research on the impacts of specific policy interventions that improve investments in early childhood (see Box 4-3 for a list of major Federal early childhood policy interventions). Attention is limited to studies that plausibly identify and measure the causal impacts of these policies on outcomes rather than documenting correlations. The section first presents the evidence on policies that provide direct investments in early childhood health and education, programs that aim to improve parental inputs, and in-kind transfers such as health insurance and food assistance programs. It then turns to the research on programs that provide more flexible assistance to low-income families, such as income transfers and housing assistance. A wide range of outcomes is considered—including measures of short-run health and human capital (such as infant and child mortality, birth weight, nutrition, test scores, and behavior and emotional skills) as well as long-run outcomes such as adult health, employment, earnings, and involvement in the criminal justice system.

On the whole, the research evidence confirms that policy interventions ranging from preschool provision to income transfers have large and sustained impacts on children's health and human capital accumulation. The evidence shows that these policies not only help children from disadvantaged families stay on pace with children from better-off families; they also lead to large benefits for society as a whole.

Direct, Indirect and In-Kind Investments in Early Health and Human Capital

The evidence discussed earlier in this chapter documented the existence of large gaps in health outcomes between children based on their mother's socioeconomic status. However, even as many measures of inequality have been rising in the United States, key measures of infant health, such as low birth weight, show a steady decline in the socioeconomic gap in health over the past 20 years (Figure 4-13). Recent research suggests that a range of successful public policy interventions targeted at improving maternal and infant health have played a key role in this trend. This section discusses some of the most successful policies aimed at improving early health.

Figure 4-13
Low Birth Weight by Maternal Socioeconomic Status, 1989–2011



Note: Low socioeconomic status (SES) is defined as African-American, less than a high school degree, and unmarried. High SES is defined as White, college-educated, and married.

Source: Aizer and Currie (2014).

Policy Interventions in Early Health

Home Visitation

Several types of public investments target child development from before children are born and throughout early childhood. Home visitation programs, including those that are Federally funded by the Maternal, Infant, and Early Childhood Home Visiting program, rely on trained professionals, including nurses, teachers, or social workers, to visit families during pregnancy and shortly after a baby is born to provide a range of health, development, and parenting information. Depending on the model, this may include parental observations and instruction, nutrition and wellness education, and psychological consultations. The goal of home visitation programs is to ensure a healthy, safe, and supportive environment in the first years of a child's life. The programs tend to be targeted toward children who are most at risk of receiving insufficient prenatal and antenatal health care, including children of first-time, low-income, less-educated and/or unemployed mothers.

These programs—which were expanded through new grants to States under the Affordable Care Act of 2010 (ACA)—have shown promise in reducing mortality among infants between 4 weeks and 1 year of age born to mothers of low socioeconomic status. Poverty has been a major contributor

Box 4-3: Federal Early Childhood Programs: An Overview¹

Various Federal programs help to close gaps in early investments in health and education, as well as family resources, and improve later-life outcomes. Millions of children benefit from this funding, often in the form of grants to States, each year. In many cases, Federal policies and investments complement, enhance, and expand State and local investments and policies.

Child Care and Development Fund: Assists low-income families in obtaining child care so they can work or attend training/education. The program, which is administered through block grants to States, also improves the quality of child care and promotes coordination among early childhood development and afterschool programs. In FY 2014, this \$5 billion fund served about 1.4 million children each month.

Head Start: Promotes school readiness of 3- and 4-year-old children from low-income families through education, health, social and other services. Teachers facilitate individualized learning experiences to promote children's readiness for school and beyond. Children also receive health and development screenings, nutritious meals, oral health and mental health support. Additionally, parents and families are supported in achieving their own goals, such as housing stability, continued education, and financial security. Together with Early Head Start, this \$9 billion program served approximately 1 million children and pregnant women in FY 2014 through grants to local entities.

Early Head Start: Provides early, continuous, intensive, and comprehensive child development and family support services to low-income infants and toddlers and their families, and pregnant women and their families. This program also includes the Early Head Start-Child Care Partnerships, which provide funding to States and local communities to increase the number of high-quality early learning opportunities for infants and toddlers across the country.

Preschool Development Grants: Supports States in building or enhancing a preschool program infrastructure that would enable the delivery of high-quality preschool services to children, and expanding high-quality preschool programs in targeted communities that would serve as models for expanding preschool to all 4-year-olds from low- and moderate-income families. This \$250 million grant supported 18 States in FY 2015 and is funded at \$250 million for FY 2016.

Individuals with Disabilities Education Act (IDEA): Serves infants and toddlers through age 2 and children ages 3-5 with developmental delays or high probabilities of developmental delays. These \$791 million

¹ Figures for funding and number of beneficiaries are for the most recent year for which comprehensive data were available on February 1, 2016.

Federally funded programs, administered by States, provided approximately 1.1 million children with special education and related services in FY 2015.² Many of the children are able to enter kindergarten no longer needing special education services.

Maternal, Infant, and Early Childhood Home Visiting (MIECHV): Reaches pregnant women, expectant fathers, and parents and caregivers of children under the age of 5. In these voluntary, evidence-based programs, trained health care or social services professionals meet regularly with expectant parents or families with young children to: improve health and development; prevent child injuries, abuse, neglect, or maltreatment; improve school readiness and achievement; improve family economic self-sufficiency; and improve coordination with other community resources. Through State and Tribal grants, this \$400 million program served approximately 115,500 parents and children in FY 2014.

Medicaid and Children's Health Insurance Program (CHIP): Provides health coverage to millions of Americans, including eligible low-income adults, children, pregnant women, elderly adults and people with disabilities. CHIP provides health coverage to eligible children through both Medicaid and separate CHIP programs. These programs receive both Federal and State dollars and are managed by States. Together, Medicaid and CHIP provided health coverage to nearly 44 million children in FY 2014, including one-half of all low-income children in the United States.

Special Supplemental Nutrition Program for Women, Infants, and Children (WIC): Serves to safeguard the health of low-income pregnant, postpartum, and breastfeeding women, infants, and children up to age 5 who are at nutritional risk by providing nutritious foods to supplement diets, information on healthy eating and breastfeeding, and referrals to health care services. In FY 2015, nearly \$7 billion was provided to States through Federal grants, and, in FY 2014, approximately 8 million people received WIC services, including roughly 4 million children between 6 months and age 5, 2 million infants under 6 months, and 2 million mothers.

Supplemental Nutrition Assistance Program (SNAP): Provides nutrition assistance to millions of eligible, low-income individuals and families and provides economic benefits to communities. Formerly known as Food Stamps, recipients receive State-administered monthly benefits in the form of an Electronic Benefit Transfer (EBT) card, which can be used to purchase foods at authorized stores. This \$76 billion

² U.S. Department of Education, ED Facts Data Warehouse (EDW): "IDEA Part B Child Count and Educational Environments Collection," 2014-15. Data extracted as of July 2, 2015 from file specifications 002 and 089; Department of Education calculations.

program served over 45 million Americans, including almost 7 million children under the age of 5, in FY 2014.

Earned Income Tax Credit (EITC): Reduces the amount of taxes qualified working people with low to moderate income owe and provides refunds to many of these individuals. According to the Internal Revenue Service (IRS), there were \$68 billion in EITC claims from 28.8 million tax filers for tax year 2013.

Child Tax Credit (CTC): Allows taxpayers to claim a credit of up to \$1000 per child under age 17, depending on the taxpayers' income, and is partially refundable, making it one of the largest tax-code provisions benefitting families with children. According to the IRS, there were \$55 billion in CTC claims for tax year 2013. The Urban-Brookings Tax Policy Center (2013) estimates that roughly 40 million families claimed credits in that year.

Temporary Assistance to Needy Families (TANF): Provides temporary monthly cash assistance to needy families with dependent children, while also preparing program participants for independence through work. Replacing Aid to Families with Dependent Children (AFDC), TANF now provides block grants to States and Tribes, which States match with their own "maintenance of effort" funds to implement the program. In 2015, this \$17 billion program supported roughly 3 million children—though this number is approximately one-third of the 1994 peak in AFDC (Falk 2015). As of FY 2013, over 40 percent of children receiving TANF were age 5 and under.

Housing and Neighborhood Programs: Increases affordable housing options for low-income families through a variety of Federal programs, including public housing, project-based rental assistance, and the Housing Choice Voucher Program. The Section 8 Housing Choice Vouchers Program—the largest Federal housing assistance program—allows very low-income families to lease or (in a small number of cases, purchase) safe, decent, and affordable privately owned rental housing, including housing in higher opportunity neighborhoods. The Promise Zone Initiative, announced in the 2013 State of the Union Address, is an innovative partnership with local communities and businesses, one of the major goals of which is to increase access to affordable housing and improve public safety.

to the United States' overall high infant mortality rate (Chen, Oster, and Williams 2015). Home visitation programs have also been shown to improve parenting behavior and children's cognitive outcomes, especially among families with low-birth-weight children (Sweet and Appelbaum 2004). By

improving parental behavior and children's outcomes, these programs can benefit children and parents in the long run.

One well-established program, the Nurse Family Partnership, provides first-time, low-income mothers with home visits during pregnancy through their child's second birthday. A longitudinal evaluation of the program found that participants who were randomly assigned to receive home visitation services, compared with women who only received prenatal and well-child clinic care, waited longer after the birth of their first child before having a second child; had lower receipt of cash transfers; and exhibited lower rates of arrest, drugs and alcohol abuse, and child abuse (Olds et al. 1997). The children of mothers who received home visitation services were also less likely to be arrested, consumed less alcohol, had fewer behavioral problems, had fewer sexual partners, smoked fewer cigarettes, and were less likely to run away compared to children of mothers in the control group (Olds et al. 1998). These studies measured outcomes at age 15, indicating that the program impacts were sustained in the medium term.

A more recent analysis of the Nurse Family Partnership program examined its impacts on children's cognitive abilities and found improvement by age 6 among children whose mothers participated in the program. These early cognitive gains were attributable to improvements in the home environment and in parenting behavior, as well as to greater self-esteem and lower anxiety among mothers, and they translated into improved language and math abilities and fewer school absences at age 12 (Heckman et al. 2014).

Some home visitation programs are provided as part of the Federal Head Start preschool program (described further below). A recent study finds that Head Start programs that incorporated frequent home visitation were particularly effective at improving non-cognitive outcomes compared with other Head Start programs (Walters 2015). Other models of home visitation programs are also showing promising results, with 19 models meeting the Department of Health and Human Services' (HHS) criteria for evidence-based home visiting programs (Administration for Children and Families 2015). Ongoing data collection will allow for further rigorous evaluation and help expand the knowledge base of the most effective home visitation programs.

Based on the mounting evidence that home visiting programs have significant positive impacts on children's cognitive outcomes, Federal support for home visitation programs was introduced in 2008 and was further expanded under the Affordable Care Act two years later. This ACA expansion was extended with bipartisan support through March 2015, and the President proposed expanding and extending funding for another 10 years in his 2013 State of the Union address. The Medicare Access and CHIP

Reauthorization Act of 2015, signed into law by the President in April 2015, extends an annual \$400 million in funding for the Maternal, Infant, and Early Childhood Home Visiting programs through September 30, 2017.

Health Insurance

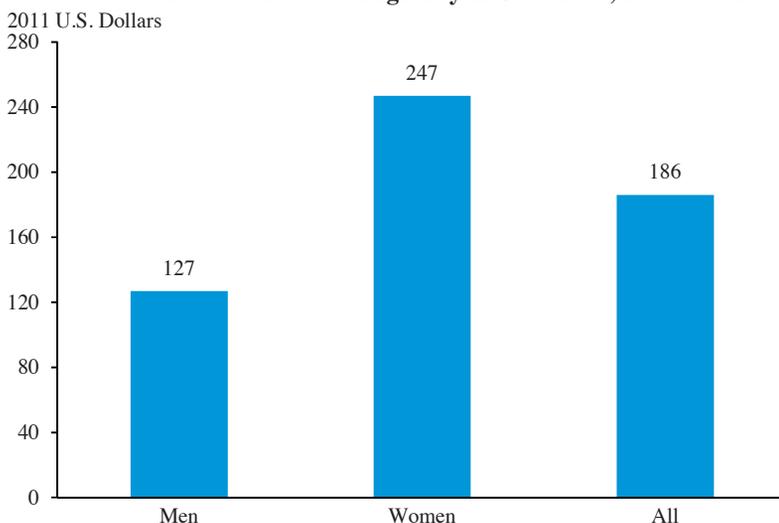
Research has established that access to insurance coverage during childhood can have important benefits for educational and labor market outcomes much later in life—benefits that appear to be mediated, at least in part, through sustained improvements in health.

Medicaid and the Children’s Health Insurance Program (CHIP) provide low-cost health coverage to millions of Americans, including nearly 44 million children and covering one-half of all low-income children (Centers for Medicare and Medicaid Services). The programs are funded jointly by States and the Federal Government and are administered by States. All children enrolled in Medicaid are entitled to the comprehensive set of health care services known as Early and Periodic Screening, Diagnosis, and Treatment (EPSDT). CHIP also ensures a comprehensive set of benefits for children. Most States have elected to provide Medicaid to children with family incomes above the minimum of 100 percent of the Federal Poverty Level, and all States have expanded coverage to children with higher incomes through CHIP.

A pair of recent studies have used the fact that States expanded access to health insurance for children through Medicaid and CHIP at different times and to different extents in recent decades to study how access to health insurance in childhood affects long-term educational and labor market outcomes. Using data that connect individuals’ adult earnings and tax information to their residence and family income in childhood (ages 0-18), Brown, Kowalski, and Lurie (2015) find that female children with more years of Medicaid/CHIP eligibility in childhood (due to their State of residence and year of birth) had higher educational attainment and higher earnings in early adulthood. They also find evidence that both men and women with greater access to childhood coverage pay more in income and payroll taxes in their young adult years, potentially offsetting a substantial fraction of the cost of providing Medicaid/CHIP coverage to children. The authors estimate that a single additional year of Medicaid/CHIP eligibility in childhood increased cumulative tax payments through age 28 by \$186 (Figure 4-14; Brown, Kowalski, and Lurie 2015). The more years a child is eligible, the larger the cumulative impact.

Related work by Cohodes et al. (2014) examines the impact of changes in Medicaid/CHIP eligibility rules affecting children (ages 0-18) on educational attainment. The authors also find improvements in educational attainment at age 22 to 29, with individuals who were eligible for Medicaid/

Figure 4-14
Increase in Income and Payroll Taxes Paid Through Age 28 from an
Additional Year of Medicaid Eligibility in Childhood, 1996–2012



Note: Cumulative tax payments based on earnings through age 28.
Source: Brown, Kowalski, and Lurie (2015).

CHIP in childhood being more likely to complete high school and graduate from college. These attainment impacts were similar regardless of the age at which the child had Medicaid coverage.

New evidence from Miller and Wherry (2015) suggests that prenatal Medicaid receipt can also have large long-term effects on health and economic outcomes. Like some of the other studies discussed above, Miller and Wherry also examine variation in Medicaid and CHIP eligibility rules across States and over time, but focus on eligibility for pregnant women rather than children. Children whose mothers gained Medicaid coverage while pregnant had lower rates of obesity and fewer hospitalizations related to endocrine, nutritional, metabolic diseases, and immunity disorders between the ages of 19 and 32. The effects for children whose mothers gained Medicaid between birth and age 18 (as opposed to *in utero*) were generally insignificant, suggesting that receipt *in utero* is particularly important for these health outcomes. Health gains for children whose mothers received Medicaid while pregnant were also accompanied by improvements in educational and economic outcomes, including higher high school graduation rates, higher income, and lower SNAP receipt.

The literature on desegregation of health care facilities also demonstrates that access to health care during childhood can have large impacts on children's long-term outcomes. Almond, Chay, and Greenstone (2006)

document that desegregation of hospitals during the 1960s resulted in increased hospital access for African-American families, dramatic improvements in infant health for these families, and large declines in the racial gap in infant mortality in the 1960s. Chay, Guryan, and Mazumder (2009) show that these improvements in access to health care at birth and health soon after birth led to large student achievement gains for African-American teenagers in the 1980s, contributing to a reduction in the racial test score gap. The researchers estimate that each additional early-life hospital admission made possible by desegregation raised test scores by between 0.7 and 1 standard deviation—an effect that implies a very large impact on lifetime earnings.

Nutrition Programs

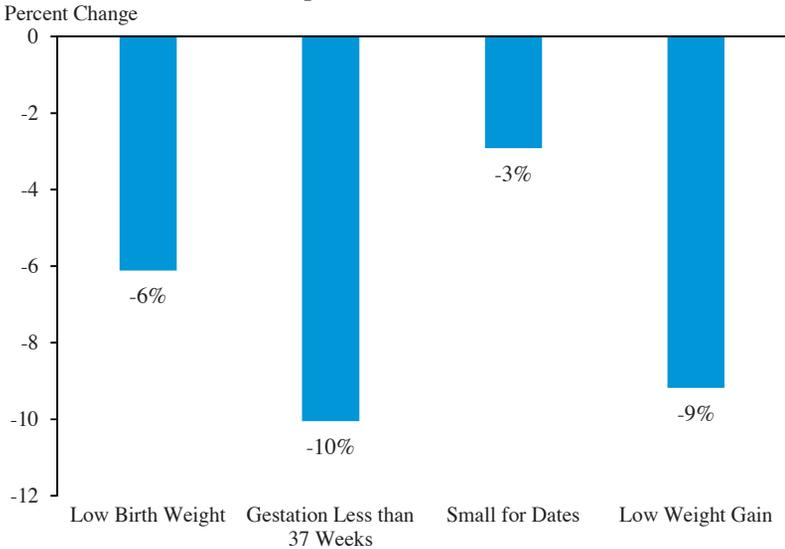
WIC

The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) is an assistance program that supports the health and nutrition of low-income pregnant and postpartum women, infants, and children under the age of 5. More than 8 million people received WIC services in FY 2014, including roughly 4 million children between 6 months and age 5, 2 million infants under 6 months, and 2 million mothers. WIC services include health care referrals, nutrition education, and the provision of nutritious foods to supplement the diets of both mothers and their children.

There is a robust literature on the impact that this comprehensive set of WIC services has on participants. Earlier studies comparing birth outcomes of women who participate in WIC to those of other low-income women with similar characteristics document that participants give birth to healthier babies as measured along several dimensions (Bitler and Currie 2005; Joyce, Gibson, and Colman 2005). More recent studies using rigorous methods confirm that WIC participation leads to improved birth outcomes. One such study focuses on the program's initial roll out, which was implemented in stages at the county level between 1972 and 1979. Hoynes, Page, and Stevens (2011) compare birth information from the Vital Statistics Natality Data among children who were born at similar times, but in different counties, and therefore had different *in utero* exposure to WIC. These results suggest that access to WIC increased birth weight among children born to mothers who participated in WIC from the third trimester by around 10 percent, and effects were largest among mothers with low levels of education.

Other work uses more recent data on local access to WIC. In some States, like Texas, clients must apply for WIC in person, and distance to a clinic can present a barrier to access. Rossin-Slater (2013) examines data from the Texas Department of State Health Services on WIC clinic openings,

Figure 4-15
Effects of WIC Participation on Birth Outcomes, 1994—2004



Source: Currie and Rajani (2015).

which include operating dates and ZIP codes for all clinics in the States, and birth records that include information on birth outcomes and maternal characteristics. The author compares birth outcomes between siblings, where one child was born when a clinic was open nearby, but one sibling was born without a clinic, to separate the effect of WIC access from genes and upbringing. This work shows that proximity to a WIC clinic increased weight gain during pregnancy, birth weights, and the likelihood of breastfeeding upon hospital discharge.

Another recent paper by Currie and Rajani (2015) uses birth records from New York City to look at birth outcomes, controlling for fixed and time-varying characteristics of mothers that might affect selection into the WIC program. The authors find that WIC reduced the probability that the mother gained too little weight during pregnancy, improved receipt of intensive medical services, and reduced the incidence of low birth weight, even among full-term infants (Figure 4-15). Overall, the literature shows that WIC has led to substantial gains in many of the most important indicators of early health, helping to close the gap in early health outcomes by socioeconomic status.

SNAP

The Supplemental Nutrition Assistance Program, or SNAP, is the cornerstone of the U.S. policy to address food insecurity—it is the largest and most universal of a set of Federal food and nutrition programs designed

to alleviate hunger by supplementing the food budgets of low-income households. SNAP is broadly available to most low-income households, with eligibility based primarily on income and assets. Over 45 million Americans, including almost 7 million children under the age of 5, received SNAP in FY 2014, as well as the elderly, working families, and individuals with disabilities.

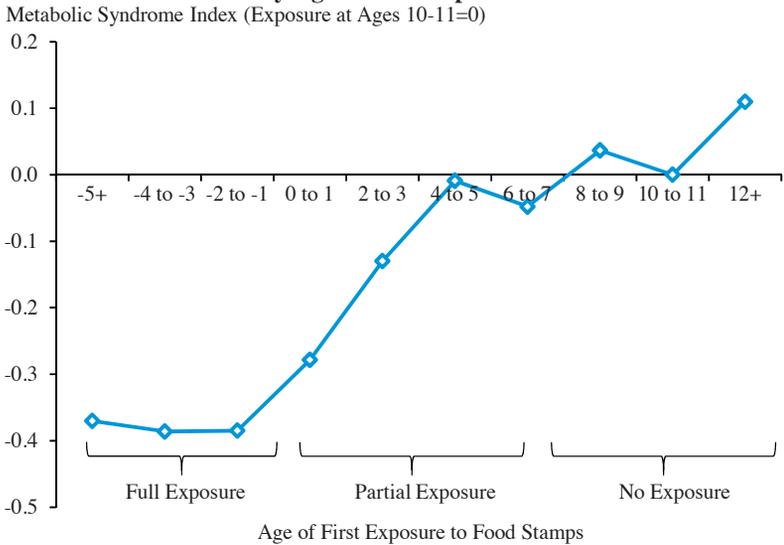
Eligible households generally must have a gross monthly income below 130 percent of the official poverty guideline for their family size and a net income that falls below the poverty line (USDA 2015). SNAP benefits are distributed to eligible households on a monthly basis in the form of an electronic benefit transfer (EBT) card, which can be used to purchase eligible foods at authorized retail stores. The level of SNAP benefits is intended to fill the gap between a household's cash resources that are available to spend on food and the amount needed to purchase a nutritious diet at minimal cost. The latter amount is calculated using a model-based market basket of foods known as the Thrifty Food Plan (TFP), which is adjusted for household size but not for other factors such as local prices. The benefit formula assumes that households can contribute 30 percent of their net income to purchase food. A household's SNAP allotment is thus equal to the TFP-based measure of need, which gives the maximum allotment for that household's size, less 30 percent of the household's net income.

SNAP plays an important role in reducing poverty in the United States and has been shown to be highly effective at reducing food insecurity. In 2014, SNAP benefits directly lifted at least 4.7 million Americans, including 2.1 million children, over the poverty line. Research has also shown that, among households who receive SNAP, food insecurity rates are up to 30 percent lower than they otherwise would be, with impacts for children that are at least this large (Council of Economic Advisers 2015c).

A growing body of high-quality research shows that SNAP and its functionally similar predecessor, the Food Stamp Program, have led to significant improvements in the health and wellbeing for those who receive food assistance as young children. Almond, Hoynes, and Schanzenbach (2011) study the impact of the early Food Stamp Program on birth outcomes by studying the initial rollout of the program across US counties between 1961 and 1975. Using county level variation in the timing of implementation, they find that a mother's access to Food Stamps during pregnancy led to increased birth weight, with the greatest gains at the lower end of the birth-weight distribution.

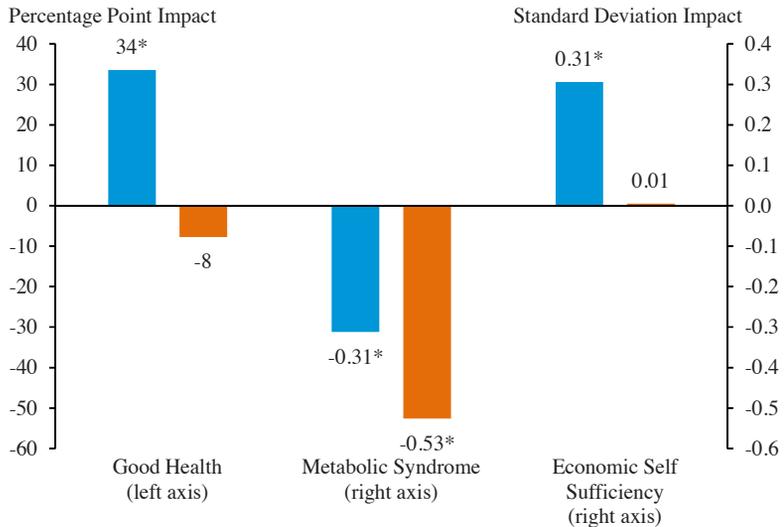
Related recent work uses similar cross-State variation and longitudinal data on children who received food stamps before birth and in the first few years of life, following them throughout their adolescence and into

Figure 4-16
Impact of Food Stamp Exposure on Metabolic Syndrome
by Age of First Exposure



Source: Hoynes, Schanzenbach, and Almond (forthcoming).

Figure 4-17
Long-Term Impacts of Exposure to Food Stamps as a Child



Note: * denotes statistically significant result. Estimates are for a high-impact sample where the head of household had less than a high school education.

Source: Hoynes, Schanzenbach, and Almond (forthcoming).

adulthood (Hoynes, Schanzenbach, and Almond forthcoming). They find that increased exposure to food stamps *in utero* and in early childhood led to a significant reduction in the incidence of “metabolic syndrome,” including a 16 percentage-point drop in the likelihood of being obese as adults for the children of less-educated parents (Figure 4-16).¹¹

Turning to the program’s impact on economic success and self-sufficiency, the authors find that early access to food stamps led to an 18 percentage-point increase in the likelihood of completing high school among disadvantaged adults. Finally, their results show even broader impacts for women, who benefitted through significant improvements in overall health and economic self-sufficiency—including increased educational attainment, increased earnings, and reduced participation in public assistance programs (Figure 4-17).

Policy Interventions in Early Education

Investments in early childhood education can take a number of forms and can benefit children through multiple channels. Policy interventions include preschool programs for children in the year before entering kindergarten; child-care programs that provide a stimulating environment for infants and toddlers; and programs that provide information and support services to parents and caregivers. Formal preschool and child-care programs typically aim to improve early human capital—including both cognitive and non-cognitive skills—through services provided directly to children. Yet these programs may also benefit children indirectly; for example, by helping parents to increase their labor force participation and raising household income. Other interventions affect children’s outcomes indirectly by providing services to the parent or caregiver that improve the quality of their interactions with the children. Such caregiver interventions may be standalone or may be coupled with formal child-care and preschool programs (see Box 4-4 for examples of how technology can be used to supplement formal early learning settings).

The United States has, over the past half-century, made tremendous strides in expanding investment in formal early childhood education. Head Start, established as part of the War on Poverty in 1964, and Early Head Start, established in 1994, collectively provide comprehensive educational and health services—including formal schooling, health and development screenings, meals, and family support services—for approximately 1 million low-income children annually. States and localities are also making

¹¹ The study measures metabolic syndrome as an index that puts equal weight on five related components: high blood pressure, heart disease, heart attack, obesity, and diabetes. The results show that among these components, Food Stamp exposure had the largest impact on obesity, but all five components showed improvement.

Box 4-4: Technological Innovation that Stimulates Learning during Out-of-School Time

Sesame Street & Early Childhood Education

Massive open online courses (MOOCs) have the potential to enhance children's experiences in early education, by extending low-cost early education materials to large numbers of young children. One of the earliest examples of such innovation is the educational program Sesame Street.

A recent study on Sesame Street in its earliest years showed that preschool-aged children who lived in areas where Sesame Street was available were more likely to advance age-appropriately through school. The results were particularly pronounced for boys, for children in economically disadvantaged areas, and for students from disadvantaged backgrounds, including non-Hispanic African-American children. Although the long-term outcome results were inconclusive, the authors of the study suggest that the potential impacts of the program on advancing through school as appropriate, coupled with the very low cost for each student (\$5 a child annually), and the enhanced impact for students from disadvantaged backgrounds, show promise for MOOCs to supplement early childhood education for low-income children (Kearney and Levine 2015). It is important to note that the National Research Council and the Institute of Medicine (2000) agree that children learn best through enriching, social interactions with adults and peers in their lives, including teachers and families. Sesame Street and other educational programs are not intended to replace formal high-quality early education, or high-quality adult-child interactions in the earliest years; rather they can serve as a supplement to the learning that happens in early learning settings and with families at home by providing an opportunity to spend out-of-school time learning.

This low-cost delivery of an effective curriculum continues to be important for disadvantaged children today, since the costs of early childhood care and educational activities have risen so rapidly in recent years, putting high-quality education out of reach of many low-income families. Low-cost supplements to early education, like Sesame Street, can help low-income children gain some of the out-of-school educational experience received by higher-income children.

Texting to Improve Parental Inputs

Text messaging is another promising delivery method that can improve parental behavior at low cost. Most American adults (88 percent) have cell phones and can receive texts (Zickuhr and Smith 2012), which have a 95-percent open rate (Mogreet 2013). READY4K!, an eight-month-long text messaging program designed to help parents

of preschoolers support their child's literacy development outside of the classroom, significantly improved literacy during a pilot program in San Francisco. The text messages sent to parents suggested simple, concrete actions that could be taken at home to build on children's classroom learning, like suggesting specific ways to work on children's literacy skills during bath time. The intervention significantly increased positive parental behaviors and school involvement, and improved children's literacy scores by up to 0.34 standard deviation. There is some evidence that these impacts were larger for the children of African-American and Hispanic parents (York and Loeb 2014). More READY4K! pilots are underway across the country.

significant investments in early childhood education. Today, 40 States and the District of Columbia have in place State-funded preschool programs, serving more than one-quarter of all 4-year-olds in the 2012-13 school year.

To further increase opportunities for all children to begin kindergarten school-ready, the Obama Administration has proposed expanding high-quality preschool for all low- and middle-income 4-year-olds, expanding access to affordable high-quality child care for low- and moderate-income families, and making effective home visitation programs for new parents more widely available. Since President Obama put forth his Preschool for All proposal in the 2013 State of the Union Address, the Federal Government has invested \$750 million in high-quality early childhood programs, through the Early Head Start-Child Care Partnerships for infants and toddlers, and Preschool Development Grants. In addition, the Every Student Succeeds Act, which President Obama signed into law in December 2015, includes a new version of the Preschool Development Grant program, building on the Administration's commitment to expanding and establishing State-supported high-quality preschool.

Child Care and Early Education Leading Up to Preschool

High-quality care for young children before they are eligible to attend preschool can provide direct and indirect benefits for both children and parents. Specifically, high-quality child care may benefit children by ensuring that they are in safe, stimulating, and nurturing learning environments while away from parents (Havnes and Mogstad 2011). By increasing the probability that parents are working, child-care access may also benefit children by supplementing family resources, thereby reducing financial hardship and possibly related stressors.

Parents are best able to work when they have access to stable, high-quality, affordable child-care arrangements, allowing them to better support

their children through wages. Studies generally find that improving the affordability of child care increases employment for parents, particularly mothers. For instance, a universal subsidy that lowered the cost of child care to \$5 a day in Quebec increased maternal labor force participation by about 8 percentage points (Baker et al. 2008; Lefebvre and Merrigan 2008). Similarly, an evaluation of a near-universal U.S. child-care program during the 1940s found that it substantially increased maternal employment (Herbst 2014). More recently, research showed that U.S. child-care subsidies that reduced the cost of child care by 10 percent increased employment among single women by 0.5 percent (Herbst 2010).

Evidence on the lifetime benefits of programs targeted to very young children comes from studies that have tracked participants in such programs into adulthood. One well-known program, the Abecedarian Project, provided poor children born in North Carolina between 1972 and 1977 with a full-time, high-quality educational intervention from infancy through age 5. The project, which was funded through both Federal and State grants, used a randomized design to allocate spots in the program and collected detailed longitudinal data on child and family outcomes. Although the program served a relatively small number of children (57), it is a landmark study for its rigorous design and for establishing credible, causal evidence that educational interventions at a very early age can affect participants over their lifetimes.

Children's gains from the Abecedarian Project persisted through adolescence and adulthood. Beginning at 18 months, program participants had higher scores on tests of various cognitive skills and scored higher on math and reading achievement tests, and these achievement gains persisted through ages 15 and 21 (Ramey and Campbell 1984; Campbell and Ramey 1995; Campbell et al. 2001). In addition, participants had higher high school graduation and college attendance rates, as well as more years of schooling. These achievement gains translated to large earnings gains as participants entered the labor force. At age 30, participants had income gains of over 60 percent relative to the control group (Campbell et al. 2012). The benefits of Abecedarian also accrued to parents, as the program increased maternal earnings by about \$90,000 over the mother's career, approximately double the estimated earnings gains for participant children based on their higher levels of educational attainment (about \$50,000) (Barnett and Masse 2007).¹²

Between 1985 and 1988, the Infant Health and Development Program (IHDP) expanded the Abecedarian model to eight U.S. cities, targeting a sample of low-birth-weight, premature infants. IHDP significantly improved cognitive outcomes among a diverse group of students during the

¹² Each of these figures is in 2015 dollars, with a 3 percent discount rate.

program and up to 15 years after completing the program (Brooks-Gunn et al. 1994; Gross et al. 1997; McCarton et al. 1997; McCormick et al. 2006). Low-income children benefited the most from the program, and projections suggest that either a universal or income-based program similar to IHDP would essentially eliminate income-based gaps in IQ at age 3 and would substantially reduce IQ gaps at ages 5 and 8 (Duncan and Sojourner 2014).

In 1994, the Head Start program, which was established in 1964 for preschool-aged children (mainly 3 or 4 years of age), expanded access to younger children through Early Head Start. Early Head Start provides services for at-risk pregnant women, new mothers, children ages zero to 3, and their families and focuses on positive parenting and home environments and children's developmental outcomes. Over 100,000 children ages 2 and younger were enrolled in Early Head Start in FY 2012 (Office of Head Start 2015).

The impacts of Early Head Start have been studied through the Early Head Start Research and Evaluation Project, which randomly assigned children to receive Early Head Start services and tracked children's performance through elementary school. Children who participated in Early Head Start showed less aggressive behavior, greater vocabulary and language development, and higher cognitive skills upon the program's completion. These gains were especially pronounced among African-American children. Parents who received Early Head Start services showed greater engagement during play and greater support for language and learning development at home (Love et al. 2005). Other studies of Early Head Start have found similar results for cognitive development and language acquisition (Vogel et al. 2013; Vallotton et al. 2012), as well as for home environments (Green et al. 2014; Love et al. 2002).

While most research on child care has focused on specific, targeted interventions like Abecedarian and Early Head Start, some studies have shown that government provision of child-care subsidies can also improve children's outcomes. Two studies from Norway demonstrate that child-care subsidies can improve children's academic performance (Black et al. 2012) and, later in life, increase educational attainment, decrease receipt of cash transfers, and increase labor-market participation (Havnes and Mogstad 2011). In the United States, evidence on the impact of child-care subsidies comes from a study of the Lanham Act of 1940, which funded the provision inexpensive and universal public child care through wartime stimulus grants between 1943 and 1946. A recent study examining outcomes of adults who were children during these years finds that growing up in a State that spent heavily on child care under the Lanham Act led to increased educational attainment and earnings capacity, making children more likely to graduate

from high school, earn a college degree, and work full-time. For each \$100 increase in spending on the program, participants' average annual earnings in adulthood rose by 1.8 percent. These benefits proved largest for the poorest children served (Herbst 2014).

To be sure, the quality of child care is important for children's outcomes, and higher-quality child care is associated with better social skills, cooperation, and language development. Important aspects of high-quality care may include the use of evidence-based curricula, longer program duration, high teacher effectiveness, and parental involvement, and productive and complementary use of out-of-school time (Council of Economic Advisers 2015a). Low-quality care may explain why some studies have found that universal \$5 a day child care in Quebec adversely affected children's behaviors, and why some studies of U.S. child-care subsidies also find negative effects on child achievement and behavioral outcomes (Baker et al. 2008; Baker et al. 2015; Bernal and Keane 2011; Herbst and Tekin 2010, 2014). These disparate results underscore the importance of efforts to enhance not only the quantity, but also the quality of child-care programs.

Preschool

A large body of literature demonstrates that preschool can benefit children's school readiness and increase earnings and educational attainment later in life by improving both cognitive and non-cognitive skills. Preschool is one of the most studied early childhood human capital interventions, with an unusually deep research base beginning with randomized evaluations of well-known, but small, Federally supported programs like Abecedarian (described above) and Perry Preschool (described below) that began in the 1960s and whose participants' outcomes have been tracked well into adulthood. Much of what we know about the effects of larger-scale preschool programs comes from Head Start, the most widely available public preschool program for lower-income children. However, there is growing evidence from a number of new preschool programs, including State preschool programs in Georgia and Oklahoma and local initiatives in Chicago and Boston. Researchers have also collected results from numerous studies of smaller programs and used meta-analysis to discern general tendencies in impacts, thereby drawing more general conclusions from a large number of analyses.

The High/Scope Perry Preschool Program, which operated in Ypsilanti, Michigan during the 1960s, provided preschool education for low-income African-American children who were at high risk of failing in school. Perry is one of the most well-known preschool interventions in part because it was evaluated using a randomized trial yielding highly credible results and also because data on its participants were collected more routinely and over

a longer period than is true of most other program evaluations of any kind (Schweinhart et al. 2005). Participants in Perry Preschool were randomly assigned to either a treatment group, who attended preschool at ages 3 and 4, or to a control group that received no preschool program. Researchers have examined how these two groups fared on a wide range of outcomes through the ages of 39 to 41.

Perry increased IQ scores at school entry, and other gains persisted through school and into adulthood (Schweinhart et al. 2005). Participants demonstrated higher motivation, placed a higher value on schooling, did more homework, and demonstrated higher achievement through age 15 (Schweinhart and Weikart 1981). The program group scored better on several cognitive and academic tests through age 27 (Barnett 1996; Schweinhart 2003). In addition to performing better on cognitive tests, educational attainment and labor market outcomes also improved among program participants. High-school graduation rates rose by about 19 percentage points, and when participants entered the workforce, they had earnings about 25 percent higher than their control group counterparts through age 40 (Heckman et al. 2010). Other observations of Perry participants later in life found similarly large increases in earnings ranging from 19 percent to nearly 60 percent (Bartik 2014; Karoly et al. 1998).¹³

While evidence from narrowly targeted programs like Perry provide valuable evidence that early interventions can have large and sustained benefits, an important policy question is whether larger-scale programs can provide similar benefits. One larger-scale early childhood education intervention for which research has found positive impacts in both the short term and long term is the Chicago Child-Parent Centers (CPC). Since 1967, the CPC have provided comprehensive early childhood education and family supports to low-income children and parents. At kindergarten entry, studies show that CPC preschoolers' cognitive readiness improved by about three months of learning and math and reading achievement gains persisted through sixth grade (Reynolds 1995). Later evaluations found that participation in the CPC preschool program led to higher high-school graduation and college attendance rates (Temple and Reynolds 2007), and that participants, in turn, saw increases in annual earnings in their late 20s of about 7 percent (Reynolds et al. 2011).¹⁴

Additional evidence on the effectiveness of large-scale and long-running preschool programs comes from modern evaluations of the Head Start

¹³ CEA calculations based on the percent increase in earnings of students in the program relative to similar students who were not in the program.

¹⁴ CEA calculations based on the percent increase in earnings of students in the program relative to similar students who were not in the program.

program. The Head Start Impact Study (HSIS) followed a nationally representative sample of nearly 5,000 children who were 3 or 4 years old in 2002 (Puma et al. 2012). One-half of these children were randomly assigned to a group that was allowed to enroll in a Head Start program, and the rest were assigned to a control group who did not receive access to Head Start but could enroll in another early childhood program. The study, which examined children’s cognitive and non-cognitive outcomes through third grade, found positive impacts on children’s language and literacy development during the first year of the program—especially for students whose scores were initially at the bottom of the distribution. These gains were generally attenuated over time, as measured by tests in elementary school, though the gains persisted through at least first grade for some Spanish speakers (Bitler, Hoynes, and Domina 2014).

Studies of Head Start have generally found positive, but somewhat smaller, impacts on test scores than the impacts found by studies of earlier programs like Perry. However, several factors are important for understanding these differences. One is that the early, narrowly targeted programs like Perry and Abecedarian were more intensive and more costly than Head Start and might therefore be expected to yield a higher return. A second issue, highlighted by a growing number of researchers, is that early education programs may have long-run benefits even when the program effect on test scores appears to “fade out” in elementary or middle school—and a study by Deming (2009) suggests that this is true for Head Start.¹⁵ This study compares long-run outcomes of siblings who differed in their program participation and finds that, despite a fadeout of test score gains, children who participated in Head Start are more likely to graduate from high school. Looking at a summary index of young-adult outcomes, the study finds that Head Start participation closes one-third of the gap between children with median family income and those in bottom quarter of family income and is about 80 percent as large as model programs such as Perry. The finding of long-run benefits despite elementary school test score fadeout may also apply to other public preschool programs, such as Tennessee’s Voluntary Pre-K program, where researchers found evidence of test-score fadeout, but where long-term outcomes cannot yet be measured (Lipsey, Farran, and Hofer 2015).

Yet another reason why modern program evaluations such as HSIS are likely to produce smaller measured effects than earlier studies of programs like Perry is simply that the outcomes of children in the “control group” of these studies, which provide a baseline for comparison, are likely

¹⁵ Other studies, such as Heckman et al. (2010), also find evidence of long-term benefits despite short-term fadeout.

to be higher today than in the past. As highlighted in a new study by Kline and Walters (2015), children in earlier control groups typically received no formal education if they were not assigned to the program being studied, while children today—including those in the HSIS—are much more likely to attend an alternative preschool program. Kline and Walters (2015) also show that benefits of Head Start are larger for children who would not otherwise attend preschool, suggesting that further expansion of program access would yield significant gains.

In addition to the large positive impacts on cognitive skills and labor market outcomes, recent research also shows that the benefits of high-quality preschool programs like Perry, Abecedarian, and Head Start can extend to improvements in health and non-cognitive outcomes. Ludwig and Miller (2007), examining the effects of technical assistance provided to some counties to develop Head Start funding proposals that led to increased Head Start funding in the late 1960s and 1970s, find that access to Head Start at the age of 3 or 4 had significant implications for child mortality between the ages of 5 and 9. Their results indicate that, for children living in the 300 poorest U.S. counties, a 50 to 100 percent increase in Head Start funding reduced mortality rates from relevant causes enough to essentially close the gap between these counties and the national average. A new study examining the Perry Preschool and Abecedarian programs shows that these programs affected health and risky behavior over the long run, in part by reducing the likelihood of smoking as an adult for some participants (Conti, Heckman, and Pinto 2015). Similarly, Campbell et al. (2014) find that participation in the Abecedarian Project led to better adult health outcomes such as lower blood pressure.

Interestingly, the impacts of some early education initiatives appear to differ by gender, though the gender differences are not always consistent across studies and their underlying causes are not always well understood. Anderson (2008) finds larger impacts of three preschool programs on long-term outcomes for girls, possibly because girls respond differently to schooling interventions. Compared to boys, girls participating in the programs saw sharper increases in high-school graduation and college attendance rates, along with positive effects for economic outcomes, criminal behavior, drug use, and marriage. These results are consistent with Oden et al. (2000), who find that Head Start participation in Florida significantly raises high-school graduation rates and lowers arrest rates for girls but not boys. On the other hand, Conti, Heckman, and Pinto (2015) find that the long-run health benefits of Perry and Abecedarian are larger for boys.

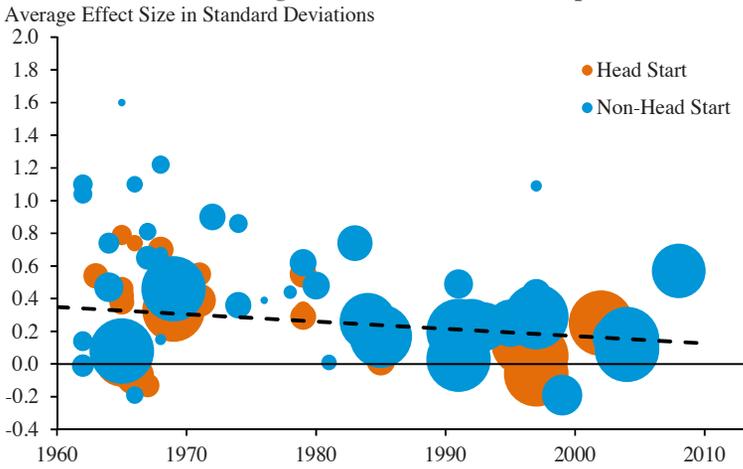
In addition to the studies highlighted above, numerous other studies have rigorously evaluated the impact of preschool programs since the 1960s.

A meta-analysis by Duncan and Magnuson (2013) examines the distribution of impacts for more than 80 programs, including Head Start, Abecedarian, and Perry as well as dozens of other preschool programs. Overall, across all studies and time periods, early childhood education increases cognitive and achievement scores by 0.35 standard deviations on average, or more than one-quarter of the kindergarten math test score gap between the highest and lowest income quintiles (Duncan and Magnuson 2011). The estimated impacts in the studies considered in Duncan and Magnuson (2013) are illustrated in Figure 4-18, with bigger circles generally corresponding to studies that enrolled more children. Figure 4-18 shows that the vast majority of programs benefit children’s cognitive development and achievement at the end of the program.

The downward slope of the line in Figure 4-18 suggests that the effect sizes of early childhood education programs have fallen somewhat over time. However, as discussed above, a new study by Kline and Walters (2015) suggests that this pattern does not reflect declining program quality, but may be driven in part by an improving counterfactual for students not enrolled in the program being studied.

One likely source of the improving academic outcomes for children who are not enrolled in Head Start or other more narrowly targeted programs is the recent expansion of large, State-run public preschool programs. Wong et al. (2008) examine five State-run preschool programs and find positive impacts on achievement test scores. Gormley et al. (2005) evaluate Oklahoma’s preschool program in Tulsa and find that children’s kindergarten achievement significantly improved. While it is too soon to directly estimate these programs’ long-term effects since the oldest participants have not yet entered the labor force, Hill, Gormley and Adelstein (2015) find evidence of a persistent improvement in the Tulsa program’s impacts through third grade for some students. Recent evaluations find positive cognitive outcomes at fourth grade of Georgia’s State-run preschool program (Fitzpatrick 2008) and some persistent, though smaller, effects of Georgia and Tulsa’s programs through eighth grade (Cascio and Schanzenbach 2013). These studies also show that, even when some participating children switch from private programs (a phenomenon often referred to as “crowd-out”), there can still be gains in achievement for these children who would have otherwise been in private programs, perhaps because families can use the savings from switching to a public program to make other positive investments in their children. A new working paper has also found evidence of the non-academic impacts of universal preschool on criminal activity. Oklahoma’s universal preschool program lowered the likelihood that African-American

Figure 4-18
**Most Early Childhood Programs Have
 Positive Cognitive and Achievement Impacts**



Note: Circle sizes reflect the inverse of the squared study-level standard error. 74 of 83 studies showed positive effects and CEA estimates that roughly 60 percent of estimates were statistically significant at the 10 percent level. The dashed line is a weighted trendline.

Source: Duncan and Magnuson (2013); Weiland and Yoshikawa (2013); CEA calculations.

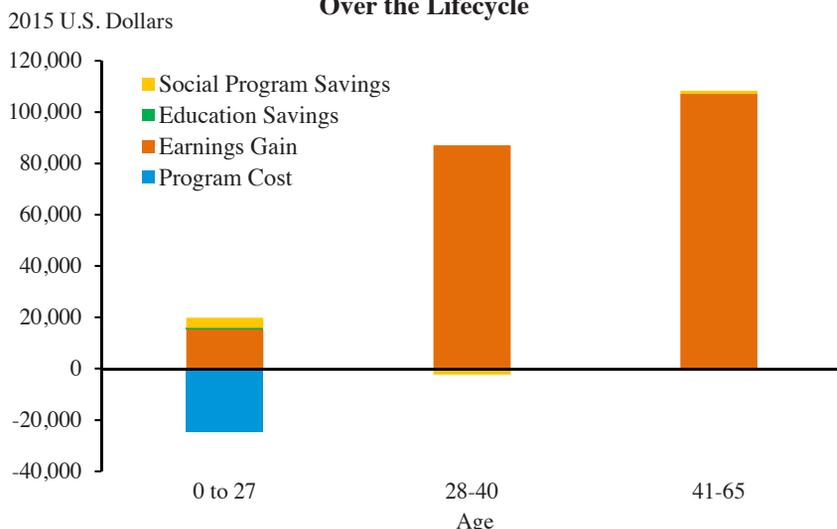
participants were charged with a misdemeanor or felony in their late teen years (Smith 2015).

Students who attended State-run preschool, such as those in Georgia and Oklahoma, are not yet old enough to directly measure earnings; however, researchers have used achievement gains to estimate that adult earnings for these children will likely increase by 1.3 to 3.5 percent (Cascio and Schanzenbach 2013).¹⁶ Other studies also project large positive effects on lifetime earnings (Bartik, Gormley, and Adelstein 2012; Duncan, Ludwig, and Magnuson 2010).

Although studies find that early childhood education yields a large return, the payoff may take time to materialize as benefits are realized through behavior or earnings changes over an individual's lifecycle. When a child attends an early education program, an upfront cost is incurred. Some benefits are realized immediately—for example, parents who choose to re-enter the labor force or increase their work hours are able to increase their earnings right away. However, the majority of benefits, from reduced crime to higher earnings for participants, accrue later in life. In the case of Perry Preschool, evidence on long-run outcomes, including increases in earnings and savings from education and social program utilization, suggests

¹⁶ Studies generally use increases in test scores to predict the future increase in earnings using estimates from Chetty, Friedman, and Rockoff (2014) or Krueger (2003).

Figure 4-19
**Net Benefit Per Child of Perry Preschool Rises
 Over the Lifecycle**



Note: Estimates based on Heckman et al. (2010) using undiscounted 2006 dollars converted to 2015 dollars using CPI-U-RS. Additional costs and benefits, such as education beyond age 27, vocational training, savings from crime reduction, health benefits, and maternal earnings, have not been quantified in this chart.

Source: Heckman et al. (2010); CEA calculations.

that benefits continue to rise throughout participants' lives (Figure 4-19; Heckman et al. 2010).

Although it took time for the benefits of Perry Preschool to appear, Heckman et al. (2010) estimate that the benefits quickly outweighed the initial cost and that the net benefit increased over the course of participants' lifetimes. The timing of benefits for modern universal programs will likely follow a similar lifecycle pattern. When the savings from crime reduction are also included, the estimated total discounted benefits of Perry are almost 80 percent higher.¹⁷

Estimates based on the substantial earnings gains alone indicate that investing in early childhood education would boost GDP in the long run. If all families enrolled their children in preschool at the same rate as high-income families, enrollment would increase by about 13 percentage points.¹⁸ If the earnings gains per student were similar to the estimated gains from

¹⁷ CEA calculation based on Heckman et al. (2010) discounted lifetime benefits from earnings, crime reduction, K-12 and other education up to age 27, and social program use, with a discount rate of 3 percent.

¹⁸ In 2013, about 71.7 percent of four-year-olds from families with income of \$100,000 or more were in preschool, but only 59.0 percent of the overall population was enrolled (Current Population Survey, October Supplement; CEA calculations). Thus about 12.7 percent of each cohort would be affected.

the preschool programs in Georgia and Oklahoma, the total gains resulting from the increase in enrollment would raise the level of GDP by 0.17 to 0.44 percent a year after 60 years, when higher levels of enrollment would be fully reflected in the labor force. This is equivalent to adding between approximately \$30 and \$80 billion a year based on 2015 GDP.¹⁹ This estimate does not include the gains to GDP that would result from earnings gains for parents and the many non-earnings benefits of quality preschool education, including expanded economic activity due to reduced crime and possible spillovers to other workers who did not directly benefit from the program as children.

Income and Other Near-Cash Transfer Programs

In addition to providing direct investments or in-kind transfers to disadvantaged children and their families, public policy can also provide more flexible support to low-income families in the form of income transfers. Programs like the Earned Income Tax Credit, the Child Tax Credit, and Temporary Assistance for Needy Families are targeted mainly at families with children, and can benefit children by helping their families to invest more resources in their early development. Similarly, housing programs also provide flexible and multi-faceted support to low-income families and can produce especially large benefits for poor families with young children. Programs like the Housing Choice Voucher program not only free up a family's income so that more of it can be invested in their children, but can also improve children's living conditions in ways that can be highly beneficial to their development.

A large body of literature shows that a boost to income can vastly improve young children's health and human capital attainment. An influx of income in children's earliest years may provide a particularly large boost to short-term and long-term health and human capital outcomes (Duncan, Magnuson, and Vortuba-Drzal 2014). For programs that are not targeted solely at young children, the academic literature does not always distinguish between impacts in the first few years of life from impacts throughout childhood as a whole; where the evidence exists, this chapter presents evidence showing the impacts of income in children's earliest years (see Box 4-5 for discussion of sustaining these impacts in later childhood years).

¹⁹ Cascio and Schanzenbach (2013) estimate that these programs increase earnings by 1.3 to 3.5 percent per year. After 60 years, the labor force would fully reflect the higher levels of enrollment; hence 12.7 percent of each cohort's earnings would increase by 1.3 to 3.5 percent per year, yielding an increase in aggregate earnings of 0.17 percent to 0.44 percent. Using 2015 GDP as of February 1, 2016 (\$17.94 trillion), this yields an increase of \$29.6 to \$79.7 billion per year.

Box 4-5: Nutrition and Income Programs Help Sustain Human Capital Development throughout Childhood

While policies that address inequities in nutrition and family resources are critical for preventing and closing gaps in human capital before children enter school, these policies also help to sustain the gains from early childhood investments and to close gaps in children’s cognitive and non-cognitive development once they enter school.

Two recent studies demonstrate a link between Supplemental Nutrition Assistance Program (SNAP) benefits and children’s performance in school by showing how student outcomes vary with the timing of benefit receipt. SNAP benefits are distributed on a monthly basis and many low-income families see their food intake reduced over the course of each month as their budgets are depleted (Shapiro 2005; Hastings and Washington 2010; Todd 2014). Gassman-Pines and Bellows (2015) analyze test scores of students in grades 3 through 8 in North Carolina and find that for children in households receiving SNAP—but not for students from higher-income households—test scores fall at the end of the month when food budgets tend to be depleted. They find also that scores recover gradually after the next month’s benefits are received—suggesting that a steady diet is a prerequisite for optimal learning and test performance. A related study of fifth through eighth graders in the City of Chicago School District suggests that disruptions in food budgets also lead to disciplinary problems in school. Gennetian et al. (2015) find that disciplinary incidents rise toward the end of the month, especially for students in SNAP households. This pair of findings suggests that food assistance programs like SNAP are important complements to educational investments. They also suggest that, for many families, additional support to help sustain food budgets throughout the month would lead to further improvements in children’s academic performance and would help close achievement gaps.

Other studies have shown that children’s performance in school responds to increases in their family’s income due to policies such as the Earned Income Tax Credit (EITC) or the Child Tax Credit (CTC). Under both the EITC and the CTC, the transfer a family is eligible to receive depends on household income; both policies offer a flat subsidy in a certain range that is phased out at higher incomes, and the EITC also has a phase-in range at very low incomes. Chetty, Friedman, and Rockoff (2011) use these changes in the tax rates to identify the extent to which benefit receipt improves academic performance. Linking data from a large school district on children’s test scores, teachers, and schools from grades 3 through 8 with administrative tax records on parental earnings, they find that a credit of \$1,000 increases elementary- and middle-school

test scores by 6 to 9 percent of a standard deviation. Similar effects are found in related work by Dahl and Lochner (2012), who examine the impact of EITC expansions in the late-1980s and mid-1990s on math and reading test scores using the National Longitudinal Survey of Youth. Their study finds that an additional \$1,000 in family income raises children's test scores by about 6 percent of a standard deviation, with larger effects for children under 12 years of age.

Income Transfers: EITC, CTC, and AFDC/TANF

The Earned Income Tax Credit provides a refundable tax credit to lower-income working families. As of 2012, 97 percent of EITC dollars went to families with children (Falk and Crandall-Hollick 2014) and an earlier estimate suggests that approximately one-quarter of children receiving EITC benefits are under the age of 5 (Gothro and Trippe 2010). A family's credit amount is based on the number of dependent children and its earnings. A large and robust literature shows that the EITC increases labor force participation among single mothers (Eissa and Hoynes 2011; Eissa and Liebman 1996; Meyer and Rosenbaum 2001). The low-income portion of the Child Tax Credit, which is partially refundable, has a similar structure to the EITC and could therefore be expected to have proportionally similar positive impacts on low-income families. Together, the EITC and the refundable portion of the CTC directly lifted 5.2 million children over the poverty line in 2014 (Short 2015), and the additional work incentives and associated earnings may have amplified this effect. Empirical work on the EITC's impacts tends to compare families that became eligible for a larger credit with families with similar observable characteristics that were ineligible for a change in their credit.

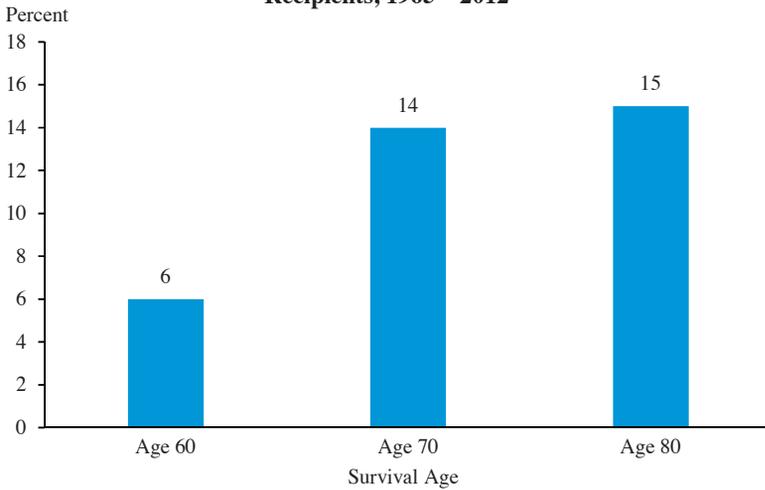
The EITC has been expanded in every Administration since 1975 (Council of Economic Advisers 2014). Most recently, under the American Recovery and Reinvestment Act of 2009, the EITC was expanded for families with three or more children, the marriage penalty was reduced, and the refundable portion of the Child Tax Credit was expanded, all on a temporary basis. These changes were made permanent by Congress last December. Examining the 1986, 1990, and 1993 reforms, which expanded the amount for which some families were eligible, particularly families with multiple children, Hoynes, Miller, and Simon (2015) use Vital Statistics data covering all births from 1984 to 1998. These data provide information on birth weight and birth order, as well as some maternal demographic information. Since families with a first, second, or third and higher-order birth experience a different EITC schedule, the authors compare birth outcomes

for single mothers across these groups and find that an additional \$1,000 in EITC receipt lowers the prevalence of low birth weight by 2 to 3 percent (Hoynes, Miller, and Simon 2015). Using information on doctor visits during pregnancy and from birth certificate records on smoking and drinking during pregnancy, they speculate that one channel for health improvements is through better prenatal care and health.

Researchers also find impacts of Federal and State EITC receipt as a young child on educational attainment later in their school years. In these studies, the impacts are concentrated among students who received the EITC as young children, suggesting a particularly important role for income in early years. Micheltore (2013) finds that a \$1,000 increase in the maximum EITC for which a child is eligible based on the State they live in is associated with a one percentage-point increase in the likelihood of college enrollment and a 0.3 percentage-point increase in the likelihood of receiving a bachelor's degree among 18-23 year olds. The attainment benefits of EITC receipt were almost entirely driven by children who were 12 or younger when their State implemented the EITC, with a 3 percentage-point impact on college enrollment. Using a similar method, Maxfield (2013) finds that an increase in the maximum EITC of \$1,000 increases the probability of high school completion at age 19 by 2 percentage points and the probability of completing at least one year of college by age 19 by 1.4 percentage points. Like in the Micheltore (2013) paper, Maxfield (2013) finds that the magnitudes of these impacts decrease as the age at which children became eligible for the EITC increases. A \$1,000 increase in the maximum EITC available to a preschooler increases high school completion by 3.6 percentage points, versus a 1.9 percentage-point increase for a middle schooler. Altogether, the studies show that EITC receipt as a young child can have profound impacts on educational and labor market outcomes later in life.

In a study of a similar kind of income transfer, but without a work requirement, Aizer et al. (forthcoming) examine the Mothers' Pension, a cash assistance program in effect from 1911 to 1935, and a precursor to AFDC and TANF. The authors use data from World War II enlistment records, the Social Security Death Master File through 2012, and 1940 Census records on 16,000 men to compare mortality of children of any age (0-18) who benefited from the program to similar children of the same age living in the same county whose mothers applied, but were denied benefits. They find that the program reduced mortality through age 87 among recipient children (Figure 4-20) and that the lowest-income children experienced the largest benefits. Census and enlistment records suggest that these improvements may be at least partly due to the improvements in nutritional status (measured by underweight status in adulthood), educational attainment, and income in

Figure 4-20
Increase in Probability of Survival Past Age 60-80 Among Mothers' Pension Recipients, 1965–2012



Note: Based on specification that includes individual controls and county and cohort fixed effects. Increase in survival calculated as a percent of the average survival rate of rejected applicants.
 Source: Aizer et al. (2014).

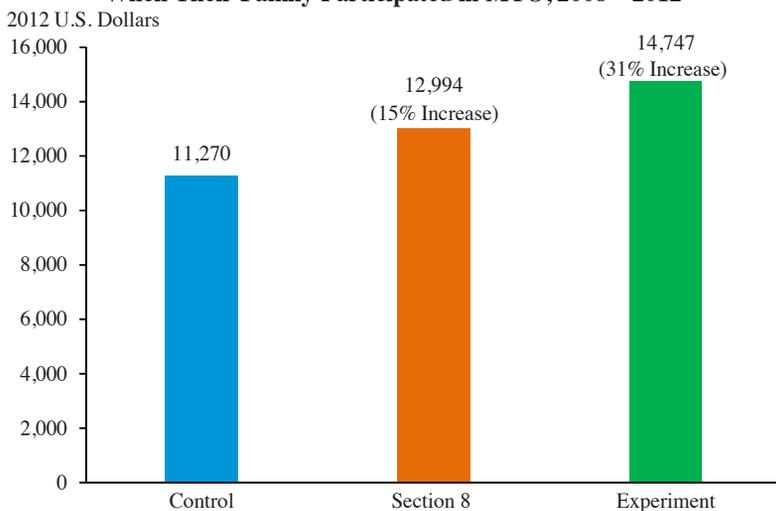
early- to mid-adulthood. Documenting that the most common reason for rejection was “insufficient need,” the authors argue their results provide a lower-bound estimate of the program’s effects.

The positive impacts associated with the EITC may operate through multiple channels. Most obvious is the increase in income that families experience. A less obvious channel for the positive impacts could be through increases in maternal labor supply that resulted from EITC expansions or via other policy changes that occurred at the same time as those expansions (Nichols and Rothstein 2015). It may be that at least some of the effects captured in the studies operate through the less obvious channels. Studies that use variation based on EITC expansions over time may be especially likely to capture some effects associated with other policy changes. For example, the 1991 EITC expansions coincide with an increase in the minimum wage, and the 1996 expansions coincide with welfare reform.

Some studies suggest that EITC impacts may differ somewhat by gender, since a lower baseline level of health and human capital among young boys may make income targeted toward these investments in them particularly impactful. For example, a study of Canadian child benefits finds that increases in benefits lead to larger improvements in education and physical health variables for boys (Milligan and Stabile 2011).

Figure 4-21

Average Annual Earnings in Adulthood Among Children Younger than 13 When Their Family Participated in MTO, 2008–2012



Note: MTO stands for the Moving to Opportunity experiment.

Source: Chetty, Hendren, and Katz (2015).

Housing and Neighborhoods

Moving to a lower-poverty neighborhood as a child can have a profound impact on multiple health and human capital outcomes, both in the short term and long term. These impacts are driven in part by changes in the availability of health and human capital inputs reviewed earlier in this chapter, and in part due to related changes in peer effects, crime, safety, and other environmental factors.

Compelling evidence that the opportunity to move to a better neighborhood can dramatically impact children’s lives comes from a randomized controlled trial conducted in the mid-1990s known as the Moving to Opportunity program (MTO). MTO allowed researchers to evaluate the impact of both conventional Section 8 housing vouchers, which do not place any geographic restrictions on where recipients can live, and experimental vouchers that required families to move to lower-poverty neighborhoods for at least one year.

A new study by Chetty, Hendren, and Katz (forthcoming), which is the first to look at adult outcomes for children whose parents received housing vouchers, finds remarkably large benefits—especially when voucher receipt was contingent on moving to a low-poverty neighborhood. Among children who were younger than 13 when their families moved, Section 8 vouchers increased adult earnings by 15 percent and experimental vouchers

increased earnings by 31 percent (Figure 4-21). Moreover, the earnings gains were largest when children’s parents moved in their earlier years and fell with the age when children moved—suggesting that the cumulative impact of exposure to a better environment is highest when children move in early childhood.

The authors also find that children whose families received vouchers when they were young were ultimately 32 percent more likely to attend college and, among those who attended college, the voucher recipients went to higher-quality schools. While the program did not have a significant effect on birth rates, girls whose families received vouchers were more likely to be married between the ages of 24 and 30 and those whose families received experimental vouchers were more likely to have the father present when they did have children. Importantly, these positive outcomes were limited to individuals who moved at younger ages and did not accrue to those who moved past the age of 13—again suggesting that neighborhood quality is especially influential in a child’s most formative years.

CONCLUSION

When we invest in young children, it is not just children and their families who benefit. The research highlighted here suggests that the investments we make in children today could benefit our economy in the long run by expanding our skilled workforce and increasing their earnings, as well as by improving health and wellness. This means society reaps the benefits of a better-educated, higher-earning, and healthier population in the future—including lower transfer payments, reduced involvement with the criminal justice system, lower health care costs, and a larger tax revenue base. Expanding access to high-quality programs that support children in their earliest years is a win-win opportunity for participating children, their parents, and society as a whole. It is time to build on demonstrated successes of programs that invest in young children and broaden their scope to boost opportunity for more American children.