

# **Early Childhood Investments**

## **Paving the Way for the Future Workforce**

Rob Grunewald

Successful investments in the workforce development pipeline, such as K–12 schools, technical schools, colleges and universities, and other training programs, depend in large part on the experiences students had years earlier. This is because the first few months and years of a child’s life establish the building blocks for skill development during school and at the workplace. With a strong foundation, the workforce development pipeline can build on early gains.

Research also shows that investments in early childhood development (ECD) can reduce downstream costs and support workforce productivity decades later. Early health and education programs targeted to disadvantaged children have been shown to improve school readiness, reduce grade retention and special education, and increase high school graduation rates and college enrollment. Studies also link early investments to higher earnings, a signal of stronger productivity in the workforce.

Not only can ECD programs support early development, but the presence of high-quality child care provides important workforce infrastructure that allows parents to enter the workforce and be productive at their jobs. In contrast, a lack of affordable, high-quality child care can keep parents out of the labor force, constraining employers’ ability to fill open positions. Research also indicates that disruptions in child care arrangements can reduce workforce productivity and increase employee turnover, which result in costs for businesses and families.

This chapter first discusses the science of ECD and the positive impact early investments can have on children and their families. Next, it considers how ECD programs support downstream workforce development initiatives and boost labor productivity. The chapter concludes

with an analysis of how child care serves as critical two-generation workforce development infrastructure and describes opportunities to address barriers to accessing high-quality child care.

## **THE SCIENCE OF EARLY CHILDHOOD DEVELOPMENT**

The science of ECD shows that investments during early childhood can have a positive effect on downstream workforce development. The first few years of life set the foundation for developing the attributes and skills needed to succeed in school and work, including math and language proficiency, collaboration, critical thinking, self-motivation, and persistence. As stated by James Heckman, Nobel laureate economist at the University of Chicago, skills learned later in life build on those learned as a young child; thus, “skills beget skills” (Heckman 2008).

Research into neuroscience and developmental psychology describes the type of early experiences that help children thrive, including stable and nurturing relationships with caregivers, language-rich environments, and encouragement to explore through movement and senses. With supportive early experiences, children are more likely to start kindergarten prepared to succeed.

Research also describes experiences that hinder healthy development. Adverse experiences and chronic exposure to “toxic stress” can lead to a brain wired for negligence or threat, impairing learning, memory, or the ability to self-regulate. Economically struggling families living in low-income areas are more likely to endure exposure to such negative experiences.

These disadvantageous circumstances can interfere with children’s early skill development, leading them to underperform relative to their peers even before kindergarten. One research study documented that, by the age of three years, children in families with college-educated parents have twice the vocabulary of children in low-income families, on average (Hart and Risley 1995). According to a report by Garcia and Weiss (2015), U.S. kindergarten children in the highest quintile by socioeconomic status have reading scores that are significantly higher than scores of their peers in the bottom quintile.

The achievement gap between children from more advantaged environments and those from disadvantaged situations is established before children enter kindergarten and widens somewhat during their time in school (Bradbury et al. 2015). That is, the experiences children have before they enter school likely have a stronger impact on the achievement gap than their experiences during their school-age years.

Early adversity not only affects school success but is also associated with mental and physical health issues later in life. According to the Adverse Childhood Experiences study, adults who suffered multiple types of adverse experiences in childhood were more likely to suffer from health problems, including heart disease, diabetes, substance abuse, and depression, compared with adults who did not have an adverse experience (Dong et al. 2004). For better or worse, early experiences have lifelong implications for education, health, and success in the workforce.

## **IMPACT OF EARLY INVESTMENTS ON YOUNG CHILDREN**

In response to the science of ECD, public investments in young children are designed to provide resources to children and families that promote development. They are often targeted to children and families who face risks for starting school behind their peers. Such investments include maternal and child home visits for families with pregnant women and young children, family health and nutrition programs, early learning programs, and early childhood mental health services. Child care programs provide early learning experiences for young children and also enable parents to participate in the workforce.

Four key longitudinal evaluations demonstrate that early interventions can have a positive impact on young children from disadvantaged environments that lasts well into adulthood (García et al. 2016; Heckman et al. 2010; Karoly et al. 1998; Reynolds et al. 2011). The Perry Preschool Program in Michigan and the Chicago Child-Parent Centers provided preschool at ages three and four, the Abecedarian project in North Carolina provided full-day care and education for children from a few months old through age four, and the Elmira Prenatal/Early Infancy

Project in New York provided home visits by a nurse to high-risk mothers during pregnancy until the child turned age two. The studies used well-matched comparison groups and cost-benefit analysis, and have demonstrated inflation-adjusted average annual rates of return from 7 percent to about 20 percent, depending on the size and timing of benefits relative to the cost of the program. While children and families benefit from these investments, the majority of benefits accrue to the rest of society and are still felt years later, as discussed in the next section.

Researchers continue to investigate the conditions necessary to carry forward positive impacts from early investments. At a 2015 research conference at the Federal Reserve Bank of Minneapolis on sustaining early childhood education gains, presenters identified the following conditions that are consistent with sustaining early gains: program quality, such as having trained and skilled teachers and a research-based curriculum; facilitating and aligning expectations and approaches between early learning programs, kindergarten classrooms, and early elementary classrooms; and engaging and supporting parents and guardians as children's primary teachers (Grunewald 2016).

## **IMPACT OF EARLY CHILDHOOD INVESTMENTS ON THE WORKFORCE DEVELOPMENT PIPELINE**

Early childhood investments can have a positive effect on the workforce development pipeline, whether for a child entering kindergarten or an adult enrolling in a workforce training program. Investments in disadvantaged children produce the largest benefits on a per-child basis and have the potential to close achievement gaps between children from disadvantaged and advantaged backgrounds. In addition, the skills children learn in ECD programs span the cognitive and noncognitive skills they need to thrive in school and in the workplace. Evaluations of several early childhood programs show gains in language, problem solving, and social-emotional skills.

## **School Readiness**

Early childhood investments can help children arrive at kindergarten prepared to succeed. School readiness effects have been found for early learning centers and a home-visiting program. One study indicates that children who attend an early learning program have stronger math and preliteracy scores compared with children in a home setting. Stronger effects are observed for children in classrooms who spend more time with activities that emphasize language, preliteracy, and math (Fuller et al. 2017). According to a randomized trial in Memphis, Tennessee, children whose mothers received counseling by visiting nurses during pregnancy and up to the child's second birthday had stronger cognitive skills for both genders at age six and stronger social-emotional skills for females at age six (Heckman et al. 2017).

## **Better K–12 Performance**

Evidence from long-term evaluations of the Perry Preschool, Abecedarian, and Chicago Child-Parent programs shows that children who attended these programs had higher achievement levels and were less likely to require special education. The Abecedarian and Chicago Child-Parent studies also show reductions in grade retention (Barnett and Masse 2007; Reynolds et al. 2011).

In addition to these long-term studies, more recent research also finds benefits to schools from investments in young children. In North Carolina, an evaluation of two resources—a statewide preschool program for disadvantaged four-year-olds and a county-level partnership network called Smart Start that funds a variety of services for young children—found positive effects on third-grade reading and math test scores, and reductions in the likelihood of special education placement (Ladd, Muschkin, and Dodge 2014; Muschkin, Ladd, and Dodge 2015).

Meanwhile, results from a study of the Tulsa, Oklahoma, Public Schools pre-K program for four-year-old children show enduring effects into middle school, including higher math achievement test scores and enrollment in honors courses, and reductions in grade retention (Gormley, Phillips, and Anderson 2018). An analysis of the Abbott Preschool Program offered in New Jersey's most disadvantaged school districts found evidence of gains in language arts and literacy, math,

and science by fifth grade (Barnett et al. 2013). Test score gains were larger for children who attended two years of preschool compared with one year of attendance. The Barnett study also indicated reductions in grade retention and special education.

In Salt Lake City, Utah, a study showed that providing preschool to vulnerable children is associated with reductions in expected special education placements. Based on results of this study, the school district, the state of Utah, private investors, and other partners developed a Pay for Success contract to expand preschool services. Private investors are paid back with a return if the expansion results in fewer than initially predicted special education placements (Pay for Success 2017).

### **High School Graduation Rates and Postsecondary Enrollment**

ECD programs also demonstrate greater high school graduation rates, such as those found in the Perry Preschool and Chicago Child-Parent Center studies. In addition, students who attended one year of Michigan's state-funded School Readiness Program in preschool had higher high school graduation rates compared with eligible children who did not attend. The finding was particularly strong for children of color (Schweinhart et al. 2012).

After high school, evidence from the Abecedarian study shows that participating children were three times more likely to go on to higher education (Barnett and Masse 2007). For context, it is important to note that while increased attendance at postsecondary institutions is consistent with the goal of investments in workforce development, it also represents a net cost to public budgets, as more low-income students use public subsidies to defray tuition expenses.

A recent meta-analysis of 22 early childhood education studies conducted between 1960 and 2016 shows substantial reductions in special education and grade retention, and increases in high school graduation rates (McCoy et al. 2017). The programs (including some of those previously cited) provided classroom-based early childhood education to children under age five.

## **Reductions in Crime and Health Problems**

Education is a key component of an employee's success in the workforce; however, non-education-related issues, such as crime and health problems, can also inhibit success. Involvement in crime and incarceration can reduce labor force participation and prospects for landing higher-wage jobs. Meanwhile, health problems have been identified as a significant barrier to participation and success in the workplace. Evidence from long-term early childhood studies shows that investments in vulnerable young children can reduce juvenile and adult crime (Heckman et al. 2010; Reynolds et al. 2011) as well as reduce risks for chronic conditions such as heart disease and diabetes (García et al. 2016).

## **CHILD CARE AS IMPORTANT WORKFORCE DEVELOPMENT INFRASTRUCTURE**

Child care not only serves as an important part of the ECD system to help children prepare for success in school and life, but child care programs also provide key workforce development infrastructure that enables parents to enter the workforce. The quality and consistency of child care offerings can also affect the productivity of parent employees and, in turn, impact local employment and business development.

### **Demand for Child Care**

In the United States, almost two-thirds of children under age six (about 15 million) have parents in the workforce (U.S. Census Bureau 2016).<sup>1</sup> According to the 2016 National Survey of Children's Health (the Child and Adolescent Health Measurement Initiative), 54 percent of respondents with a child under age six in the household noted that the child received care for at least 10 hours per week from someone other than the child's parent or guardian. Working parents may place their children in one or more types of child care arrangements, including informal care with a relative or neighbor, licensed family-based programs operated out of a home, or licensed child care centers.

When parents have reliable, high-quality child care, they can go to work confident that their children are in a stable and stimulating environment. But when child care arrangements fall apart during the day, parents may be distracted at work or need to leave to attend to the situation. Unstable child care can also put parent employees at risk of losing their jobs. As evidence, about 8 percent of respondents to the 2016 National Survey of Children's Health with a child under age six reported that during the past 12 months, they or someone in their family had to quit a job, not take one, or greatly change the conditions of a job because of problems with child care (Data Resource Center for Child and Adolescent Health 2016). A recent survey of parents with children under the age of five in Louisiana showed that over 40 percent of respondents had missed work during the previous three months because of child care issues (Davis et al. 2017).

While instability of child care affects parental employment and household finances, these issues also affect the bottom line of businesses. A report released by Cornell University suggests that parent absenteeism, productivity reductions, and turnover due to child care breakdowns cost U.S. businesses more than \$3 billion annually (Shellenback 2004).

Issues with child care can also keep parents from entering the workforce, particularly for low-income families with young children. A recent paper published by the U.S. Chamber of Commerce Foundation's Center for Education and Workforce notes that over 70 percent of nonworking, low-income adults with children under age five cite "taking care of home/family" as the reason they are not in the workforce (Stevens 2017).

In contrast, the availability of high-quality child care can lead to employment and higher earnings. The Abecedarian study shows that low-income mothers whose children participated in the full-day ECD program had higher levels of educational attainment and held higher-paying jobs (Barnett and Masse 2007). The average net present value of increased maternal labor income is estimated at \$117,000 (García et al. 2016). Another study found that availability of child care subsidies increased labor force participation rates for mothers of children aged three or younger. A threefold increase in funding for child care subsidies would lead to an estimated 376,000 more mothers being able to find work (Enchautegui et al. 2016).

## Barriers to Child Care

Despite the value of high-quality child care to families and businesses, there are a number of interrelated barriers to parents accessing child care services, including a lack of supply, issues regarding program quality, unpredictable job schedules for low-wage workers, overly restrictive public subsidies, and relatively high costs—a burden particularly for low- to moderate-income families.

**Child care availability.** This presents a challenge in several parts of the country. Part of the reason has to do with the child care business model, which typically produces thin profit margins at best for operators. A unique set of constraints on both the consumers and providers of child care creates a market laden with obstacles.

The vast majority of revenue in the market comes from parents' tuition payments. Parents with young children are typically in the early earning years of their careers. Many bring home less income than they will in their later years while facing costs associated with family formation, such as housing and transportation. That means child care costs are often unsustainable in family budgets, and it also means child care providers have little room to raise rates further.

The cost side of a child care provider's ledger is driven by hired labor, an expense that is essential to providing child care. As will be detailed later, wages in the child care sector are already low. With providers unable to lower wages further or reduce staff levels, there are few opportunities for finding efficiencies or cutting costs.

Bringing the child care business model to rural areas can be particularly challenging. The economies of scale to open a child care center are often not available in rural areas; therefore, the market tends to rely more on family child-care providers, which often cannot meet the full demand for child care. For example, an analysis of child care availability in Wisconsin demonstrates that children living in rural areas have fewer child care slots per young child than in more populated areas (Grunewald and Jahr 2017). In neighboring Minnesota, the number of child care slots available outside the Minneapolis–St. Paul metropolitan area decreased by about 15,000 during the period from 2006 to 2015 because of reductions in family child-care providers (Werner 2016).

Child care availability can also be affected by household income levels in communities. The Wisconsin analysis shows that child care availability per young child is greater in low-poverty areas as compared to higher-poverty areas (Grunewald and Jahr 2017).

**Child care quality.** This can affect how well a child care setting meets children’s developmental needs and provides stable care. For example, informal caregivers are less likely to have training in child development and pedagogy than teachers in licensed child-care centers and family child-care homes.

Many states use a “quality rating and improvement system” (QRIS) to establish standards of quality for licensed child-care providers and rate providers along a quality spectrum. QRIS also provides pathways and resources for providers to improve quality and gives accessible information to parents about the quality of providers. QRISs usually have four or five quality tiers with standards that go beyond the “health and safety” requirements of a child care license, such as staff education and qualifications, learning environments, family and community partnerships, and staff-to-child ratios (Grunewald and Horowitz 2018). In most states, participation is voluntary, and provider participation rates vary based on requirements and incentives. According to QRIS state data collected by the Quality Compendium, a catalog that compares quality initiatives including QRIS, the median participation rate among child care centers is 60 percent, and for family child-care programs it is 25 percent (Quality Compendium 2018).<sup>2</sup>

To date, QRIS validation studies have generally demonstrated positive associations between the stated rating and the observed level of quality; however, higher-rated providers have not consistently shown stronger child outcomes compared with lower-rated providers. This has led some states to make changes in rating criteria based on recent research and other feedback (Grunewald and Horowitz 2018).

**The cost of child care.** This is often a barrier to families accessing good-quality child care. In 2016, the national average annual tuition for an infant in a child care center was estimated at about \$11,000, and for a family child-care provider it was estimated at about \$8,700 (Fraga et al. 2017). The same study finds that for a four-year-old, average annual tuitions in 2016 were \$8,600 at a child care center and \$7,900 at a fam-

ily child-care provider. However, there is a wide variation in child care prices across states, the authors find. For example, Fraga et al. show that average annual tuitions for an infant at a child care center ranged from \$5,178 in Mississippi to \$20,125 in Massachusetts.

Government-funded child care subsidies can help defray the cost of child care for low-income families who receive them. The federal Child Care Development Fund (CCDF), a program of the U.S. Department of Health and Human Services' Administration for Children and Families, partially funds state-run child care subsidies that lower the cost of child care for low-income families while parents work, go to school, or attend job training. However, federal and state funding for child care subsidies reach only a fraction of eligible recipients. In 2013, about 13 million children would have been eligible, based on federal rules, to receive a child care subsidy through CCDF and related government funding streams; only 16 percent of them actually did (Chien 2017).

Furthermore, child care subsidy reimbursement rates are often set lower than prevailing market tuition rates. Providers often need to choose between three options: 1) charging parents the difference between the tuition price and the child care subsidy reimbursement amount, 2) absorbing the difference, or 3) only serving relatively higher-income families.

**All three barriers—1) availability, 2) quality, and 3) cost—are interrelated.** These issues often intersect in regard to the child care workforce. There are about two million people working in child care centers, family child-care homes, private and public preschools, and Head Start programs (NSECE Project Team 2013). As discussed earlier, labor costs make up a large share of expenses for providers. Since the quality of interactions between teachers and children are an important determinant of child development outcomes, the training and abilities of this workforce are crucial to the success of early childhood interventions.

Despite the influence teachers and caregivers have on the development of young children, they receive relatively small pay. Excluding family child-care home providers, the median hourly wage for teachers and caregivers responsible for children who are infants to aged five is about \$11 per hour (NSECE Project Team 2013).<sup>3</sup> Occupational employment data show that in 2015, median hourly wages for child

care-related occupations were well below \$15 per hour, including child care workers (\$9.77), self-employed home care providers (\$12.44), and preschool teachers (\$13.74) (Whitebook, McLean, and Austin 2016). Relatively low wage rates make it challenging to attract and retain talent in the sector.

### **Addressing Child Care Barriers**

The issues facing child care availability, quality, and cost are challenging, but there are a number of strategies available to address them at the federal, state, and local levels. Government funding and policy have an important role to play, while private-public partnerships and businesses are also well positioned to help address these issues.

State and federal governments could increase the amount of funding for child care subsidies and scale up the amount paid per subsidy relative to program quality. For example, a number of states use QRIS to implement tiered reimbursement subsidy payments based on a provider's rating. This incentivizes providers to increase their rating and helps cover costs associated with quality improvements. In addition, the child and dependent care tax credit contributes to child care tuition, providing a benefit of up to \$3,000 for one individual and \$6,000 for two or more individuals (Internal Revenue Service 2018).

Another strategy is to realign child care resources with developmental outcomes for children. Child care subsidies are often tied to work or education requirements for parents that fail to reflect the needs of the entire family. For example, a subsidy may be restricted to specific hours even when a parent faces volatile work scheduling, and families may paradoxically face the loss of subsidies if a parent pursues better job opportunities.

In Minnesota, policymakers have begun to address this issue. The state's Early Learning Scholarships are available for low-income or high-risk parents with three- and four-year-old children, and for high-risk families with children from birth through age two. They allow children to attend a quality-rated early learning program of the parents' choice. Local governments and philanthropists have funded similar initiatives in other parts of the country.<sup>4</sup>

The state also recently adopted a set of federally recommended practices that support parents' flexibility and earnings growth in their

broader child care subsidy program. And in 2014, Minnesota made it easier for parents enrolled in the Temporary Assistance for Needy Families (TANF) program to engage in workforce development activities without losing access to child care subsidies and other resources (Minnesota House of Representatives 2014).

These policy designs encourage continuity of services for children, support parental choice and success in the workforce, and, in the case of the scholarships, leverage other public early-learning funding streams.

Channeling more funding to early learning markets can increase access to child care among low- to moderate-income families and give providers the resources to hire more qualified staff and offer more competitive wages. There are also strategies to support the education and retention of child care teachers, such as the Teacher Education and Compensation Helps (TEACH) Early Childhood Program, which is available in 23 states and Washington, DC.<sup>5</sup>

While encouraging access to child care centers and family child-care providers has a number of benefits, many families likely will continue to choose to make informal care arrangements with family, friends, and neighbors for at least part of their child care. For these settings, government agencies and nonprofits could provide ECD training and materials to informal providers through group-based sessions or home visits to improve caregiver-and-child interaction and activities.

Public-private partnerships can also play a key role in supporting child care. In Minnesota, a nonprofit organization, Parent Aware for School Readiness (PASR), supported the state's child care QRIS by providing in-kind marketing and web design expertise and by funding an evaluation. The PASR board primarily consisted of business leaders.<sup>6</sup> As most child care providers are independent small businesses, private-sector business leaders have an opportunity to provide guidance on marketing, business planning, finance, and governance. For example, First Children's Finance has created opportunities for business leaders in a number of states to volunteer as mentors or serve on advisory boards to support the business side of child care.<sup>7</sup> Finally, employers can implement strategies to help parent employees access child care, including subsidizing slots at a provider or even offering on-site child care. In a rural Minnesota town, companies are helping address the problem of local child care access by paying for slots at a new child care center (Aamot 2017).

## GOING UPSTREAM

Every part of the workforce development pipeline has much to gain by making sure children are off to a strong start. Child care infrastructure also ensures that parents have stable care options so they can choose to enter the workforce and be productive at their jobs. While segments of the workforce pipeline face their own challenges, whether in K–12 schools, postsecondary education, or workforce training, supporting children and families during the early years can make workforce development much easier down the road.

### Notes

1. “Have parents in the workforce” can refer to children either with two parents in the workforce or with one parent in the workforce.
2. Medians calculated by author based on center-based program data available from 37 states and family child-care program data available from 36 states.
3. Adjusted 2012 median wage to 2016 dollars using the Personal Consumption Expenditures Price Index.
4. For example, the Denver Preschool Program uses a voter-approved 0.15 percent sales tax to provide tuition support to families to help pay for four-year-old preschool. Erie’s Future Fund in Erie, Pennsylvania, provides scholarships to low-income families to enroll their three- or four-year-old children in a good-quality early learning program of their choice; scholarships are funded by local donors.
5. For more information, visit [www.teachechnationalcenter.org](http://www.teachechnationalcenter.org).
6. For more information, visit [www.closegapsby5.org](http://www.closegapsby5.org).
7. For more information, visit [www.firstchildrensfinance.org](http://www.firstchildrensfinance.org).

### References

- Aamot, Gregg. 2017. “How One Small Town Is Trying to Solve Greater Minnesota’s Day Care Crisis.” *MinnPost*, December 11. <https://www.minnpost.com/economy-0/2017/12/how-one-small-town-trying-solve-greater-minnesotas-day-care-crisis> (accessed June 26, 2018).
- Barnett, W. Steven, Kwanghee Jung, Min-Jong Youn, and Ellen C. Frede. 2013. *Abbott Preschool Program Longitudinal Effects Study: Fifth Grade Follow-Up*. Brunswick, NJ: Rutgers University, National Institute for Early Education Research.

- Barnett, W. Steven, and Leonard N. Masse. 2007. "Comparative Benefit-Cost Analysis of the Abecedarian Program and Its Policy Implications." *Economics of Education Review* 26(1): 113–125.
- Bradbury, Bruce, Miles Corak, Jane Waldfogel, and Elizabeth Washbrook. 2015. *Too Many Children Left Behind: The U.S. Achievement Gap in Comparative Perspective*. New York: Russell Sage Foundation.
- Chien, Nina. 2017. *Factsheet: Estimates of Child Care Eligibility and Receipt for Fiscal Year 2013*. Washington, DC: U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation.
- Data Resource Center for Child and Adolescent Health. 2016. *The National Survey of Children's Health*. Baltimore, MD: Child and Adolescent Health Measurement Initiative. <http://www.childhealthdata.org/learn/NSCH> (accessed June 26, 2018).
- Davis, Belinda, Ali Bustamante, Melanie Bronfin, and Monica Candal Rahim. 2017. *Losing Ground: How Child Care Impacts Louisiana's Workforce Productivity and the State Economy*. Baton Rouge: Louisiana State University Public Policy Research Lab; New Orleans: Louisiana Policy Institute for Children.
- Dong, Maxia, Wayne H. Giles, Vincent J. Felitti, Shanta R. Dube, Janice E. Williams, Daniel P. Chapman, and Robert F. Anda. 2004. "Insights into Causal Pathways for Ischemic Heart Disease: Adverse Childhood Experiences Study." *Circulation* 110(13): 1761–1766.
- Enchautegui, María E., Nina Chien, Kimberly Burgess, and Robin Ghertner. 2016. *Effects of the CCDF Subsidy Program on the Employment Outcomes of Low Income Mothers*. Washington, DC: U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation.
- Fraga, Lynette M., Dionne R. Dobbins, Fitzgerald Draper, and Michelle McCready. 2017. *Parents and the High Cost of Child Care: 2017 Report*. Arlington, VA: Child Care Aware of America.
- Fuller, Bruce, Edward Bein, Margaret Bridges, Yoonjeon Kim, and Sophia Rabe-Hesketh. 2017. "Do Academic Preschools Yield Stronger Benefits? Cognitive Emphasis, Dosage, and Early Learning." *Journal of Applied Developmental Psychology* 52(September-October): 1–11.
- García, Emma, and Elaine Weiss. 2015. *Early Education Gaps by Social Class and Race Start U.S. Children Out on Unequal Footing: A Summary of the Major Findings in Inequalities at the Starting Gate*. Washington, DC: Economic Policy Institute.
- García, Jorge Luis, James J. Heckman, Duncan Ermini Leaf, and María José Prados. 2016. "The Life-Cycle Benefits of an Influential Early Childhood

- Program.” Human Capital and Economic Opportunity Working Paper No. 22993. Chicago: University of Chicago.
- Gormley, William T. Jr., Deborah Phillips, and Sara Anderson. 2018. “The Effects of Tulsa’s Pre-K Program on Middle School Student Performance.” *Journal of Policy Analysis and Management* 37(1): 63–87.
- Grunewald, Rob. 2016. “Sustaining Early Childhood Education Gains.” *Community Dividend* (February). Minneapolis, MN: Federal Reserve Bank of Minneapolis. <https://www.minneapolisfed.org/publications/community-dividend/sustaining-early-childhood-education-gains> (accessed April 23, 2018).
- Grunewald, Rob, and Ben Horowitz. 2018. “Child Care Rating Systems Promote Quality and Parental Awareness.” *Community Dividend* (January). Minneapolis, MN: Federal Reserve Bank of Minneapolis. <https://www.minneapolisfed.org/publications/community-dividend/child-care-rating-systems-promote-quality-and-parental-awareness> (accessed April 23, 2018).
- Grunewald, Rob, and Michael Jahr. 2017. “Rating YoungStar.” *WPRI Report* 30(2): 1–24. Milwaukee: Wisconsin Policy Research Institute. [http://www.wpri.org/BI-Files/Special-Reports/Reports-Documents/2WPRIwhitepaper\\_YoungStarFinalforWeb.pdf](http://www.wpri.org/BI-Files/Special-Reports/Reports-Documents/2WPRIwhitepaper_YoungStarFinalforWeb.pdf) (accessed April 23, 2018).
- Hart, Betty, and Todd R. Risley. 1995. *Meaningful Differences in the Everyday Experience of Young American Children*. Baltimore, MD: Brookes Publishing.
- Heckman, James J. 2008. “Schools, Skills, and Synapses.” *Economic Inquiry* 46(3): 289–324.
- Heckman, James J., Margaret L. Holland, Kevin K. Makino, Rodrigo Pinto, and Maria Rosales-Rueda. 2017. “An Analysis of the Memphis Nurse-Family Partnership Program.” NBER Working Paper No. 23610. Cambridge, MA: National Bureau of Economic Research.
- Heckman, James J., Seong Hyeok Moon, Rodrigo Pinto, Peter A. Savelyev, and Adam Yavitz. 2010. “The Rate of Return to the HighScope Perry Preschool Program.” *Journal of Public Economics* 94(1–2): 114–128.
- Internal Revenue Service. 2018. *Topic Number 602—Child and Dependent Care Credit*. Washington, DC: Internal Revenue Service. <https://www.irs.gov/taxtopics/tc602> (accessed April 23, 2018).
- Karoly, Lynn A., Peter W. Greenwood, Susan S. Everingham, Jill Houbé, M. Rebecca Kilburn, C. Peter Rydell, Matthew Sanders, and James Chiesa. 1998. *Investing in Our Children: What We Know and Don’t Know about the Costs and Benefits of Early Childhood Interventions*. Santa Monica, CA: RAND Corporation.

- Ladd, Helen F., Clara G. Muschkin, and Kenneth A. Dodge. 2014. "From Birth to School: Early Childhood Initiatives and Third-Grade Outcomes in North Carolina." *Journal of Policy Analysis and Management* 33(1): 162–187.
- McCoy, Dana Charles, Hirokazu Yoshikawa, Kathleen M. Ziol-Guest, Greg J. Duncan, Holly S. Schindler, Katherine Magnuson, Rui Yang, Andrew Koepp, and Jack P. Shonkoff. 2017. "Impacts of Early Childhood Education on Medium- and Long-Term Educational Outcomes." *Educational Researcher* 46(8): 474–487.
- Minnesota House of Representatives. 2014. *House Research Bill Summary*. File Number: H.F. 2458. MFIP Education Opportunities. Saint Paul: Minnesota House of Representatives, Research Department. <http://www.house.leg.state.mn.us/hrd/bs/86/HF2458.pdf> (accessed April 23, 2018).
- Muschkin, Clara G., Helen F. Ladd, and Kenneth A. Dodge. 2015. "Impact of North Carolina's Early Childhood Initiatives on Special Education Placements in Third Grade." *Educational Evaluation and Policy Analysis* 37(4): 478–500.
- National Survey of Early Care and Education (NSECE) Project Team. 2013. *Number and Characteristics of Early Care and Education (ECE) Teachers and Caregivers: Initial Findings from the National Survey of Early Care and Education (NSECE)*. OPRE Report No. 2013-38. Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research, and Evaluation.
- Pay for Success. 2017. *Utah High Quality Preschool Program*. New York: Nonprofit Finance Fund. <http://www.payforsuccess.org/project/utah-high-quality-preschool-program> (accessed April 23, 2018).
- Quality Compendium. 2018. *A Catalog and Comparison of Quality Initiatives Like Quality Rating and Improvement Systems (QRIS): To Promote Thoughtful Design, Analysis, and Ongoing Improvement in Early Care and Education Systems Building*. Boston, MA: Build Initiative: Strong Foundations for Our Youngest Children. [www.qualitycompendium.org](http://www.qualitycompendium.org) (accessed April 23, 2018).
- Reynolds, Arthur J., Judy A. Temple, Barry A. White, Suh-Ruu Ou, and Dylan L. Robertson. 2011. "Age 26 Cost-Benefit Analysis of the Child-Parent Center Early Education Program." *Child Development* 82(1): 379–404.
- Schweinhart, Lawrence J., Zongping Xiang, Marijata Daniel-Echols, Kimberly Browning, and Tomoko Wakabayashi. 2012. *Michigan Great Start Readiness Program Evaluation 2012: High School Graduation and Grade Retention Findings*. Ypsilanti, MI: HighScope Educational Research Foundation.
- Shellenback, Karen. 2004. *Child Care and Parent Productivity: Making the Business Case*. Linking Economic Development and Child Care Research Project. Ithaca, NY: Cornell University.

- Stevens, Katharine B. 2017. *Workforce of Today, Workforce of Tomorrow: The Business Case for High-Quality Childcare*. Washington, DC: U.S. Chamber of Commerce Foundation, Center for Education and Workforce.
- U.S. Census Bureau. 2016. *2016 American Community Survey 1-Year Estimates*. Washington, DC: U.S. Census Bureau. [https://www.census.gov/programs-surveys/acs/news/data-releases/2016/release.html#par\\_textimage\\_11](https://www.census.gov/programs-surveys/acs/news/data-releases/2016/release.html#par_textimage_11) (accessed June 26, 2018).
- Werner, Marnie. 2016. *A Quiet Crisis: Minnesota's Child Care Shortage*. Mankato, MN: Center for Rural Policy and Development.
- Whitebook, Marcy, Caitlin McLean, and Lea J. E. Austin. 2016. *Early Childhood Workforce Index—2016*. Berkeley: University of California, Berkeley, Center for the Study of Child Care Employment.