The Economic Case for Investing in Young Children

Rob Grunewald
Federal Reserve Bank of Minneapolis
October 2014

This article reviews the arguments that comprise the economic case for investing in young children.

1. Investments in early childhood development (ECD) improve the long-run productivity of the workforce, a key to economic growth.
2. Investments in ECD have a high public return on investment by reducing costs to government and society.
3. A strong child care industry allows parents to enter the workforce and be more productive while at work.
4. The child care industry is a relatively large industry and employer. Furthermore, child care businesses tend to purchase goods and services from other local businesses and employees tend to spend their earnings locally, which stimulate economic activity.

The evidence for each of these arguments is supported by research conducted in the United States and a growing body of evidence from other countries.

Investments in ECD improve the long-run productivity of the workforce

Investments in the education and skills of young children can have a substantial impact on their success as students, workers and citizens. That is, one of the most efficient means to boost the productivity of the workforce in 15 to 20 years is to invest in today's youngest children.

Early investments increase labor productivity as adults; that is, the amount produced per hour worked. Strong labor productivity in turn supports economic growth. Countries that have highly skilled workforces have stronger economic growth relative to countries with lower-skilled workforces. Within the United States, those states with a higher percentage of population with a college degree tend to have higher levels of per capita personal income.[1]

However, demographic trends in many countries show that the growth in the working-age population is slowing and is expected to slow even more during the next few decades. In the United States, growth in the working-age population is expected to slow as the baby boom generation retires.[2] The same trend is expected for most developed countries, and even in China the growth of the working-age population is expected to slow in the near term and eventually shrink somewhat.

Meanwhile, the number of jobs that require higher levels of education and training are expected to grow faster than jobs that require lower levels of education and training. With a slower-growing labor force, it's becoming more difficult and will continue to be more difficult for employers to find qualified workers to fill open positions.

According to the Manpower Group's 2012 annual survey of global talent, respondents from 41 countries indicate growing difficulty finding applicants with the appropriate set of skills to fill open positions at their companies.[3] The good news for educated workers now and in the future is jobs that require more skills pay higher annual wages. For example, in the United States a job that requires at least a bachelor's degree on average pays three times more than a job that only requires on-the-job training.[4]

The combination of a slower-growing workforce combined with anticipated increased demand for higher-skilled workers means schools and universities are under pressure to prepare more children to succeed in the workforce as adults.

However, the foundation for labor productivity begins well before children arrive at the elementary school door. A child's quality of life and the contributions that child makes to society as an adult can be traced to his or her first years of life. During these first few years of life, 700 new neural connections are formed every second.[5] When this sensitive period includes support for growth in language, motor skills, adaptive abilities and social-emotional functioning, the child is more likely to succeed in school and to later contribute to society.[6]

The skills employers look for—including ability in math and language, working well on teams, critical thinking, self-motivation and persistence—are shaped during the first few years of life. According to 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."[7] When a child is off to a good start, future investments pay larger benefits than if a child is not prepared early.

Investments in ECD have a high public return on investment

Because early childhood is a sensitive period for development, costs to government and society are high when a child is not prepared to succeed in school. Without support during the early years, a child is more likely to drop out of school, depend on government assistance and commit crime—thereby imposing significant costs on society.[8]

The achievement gap observed in U.S. elementary and secondary schools between children from advantaged and disadvantaged backgrounds is detected before children arrive at school. In *Meaningful Differences in the Everyday Experience of Young American Children*, researchers

document that by the age of 3, children observed in families with college-educated parents had twice the vocabulary as children in families with very low income.[9] Furthermore, early gaps associated with family income persist into school age. For example, gaps in U.S. math test scores by income quartile observed at age 12 are already present at age 6.[10]

A study of early childhood cognitive development using data from Columbia, Chile, Ecuador, Nicaragua and Peru shows that children from about the ages of 3 to 6 from the wealthiest quartile of households had scores 0.57 to 1.23 standard deviations higher than children in the poorest quartile of households, a relatively large difference. Furthermore, in three of the countries where researchers followed children over time, the gaps in achievement did not appear to change substantively once children entered school through ages 8 to 13.[11]

Not only do the early years have an impact on the degree to which children are ready to succeed in school, but a substantial body of research demonstrates that early environments have a lifelong impact on health. As articulated by the National Scientific Council on the Developing Child at Harvard University, early experiences are built into the body (for better or worse), and significant adversity early in life can produce physiological disruptions that persist far into adulthood and lead to lifelong impairments in both physical and mental health.[12] For example, according to analysis of data collected in the Adverse Childhood Experiences study, adults who suffered multiple adverse experiences in childhood were three times more likely to suffer from heart disease.[13] Adverse experiences include excessive stressful environments, such as growing up in poverty; exposure to violence, abuse or neglect; a household member incarcerated or mentally ill; and parental separation or divorce.

Many children growing up in developing countries face adverse conditions for child development, such as poverty, malnutrition, poor health and unstimulating home environments.[14] A 2007 study estimates that over 200 million children under age 5 living in developing countries are not fulfilling their developmental potential based on the prevalence of early childhood stunting and the number of people living in poverty.[15] The study authors estimate that the loss of human potential among these children is associated with more than a 20 percent deficit in adult income later in life.

Researchers associated with the University of Oxford recently documented a relationship between early childhood nutrition and cognition in Peru. Child-specific shocks in the form of food price changes during the critical period of development are used to show that a one standard deviation increase in a height-for-age score is associated with about a 20 percent standard deviation gain in a vocabulary test score.[16]

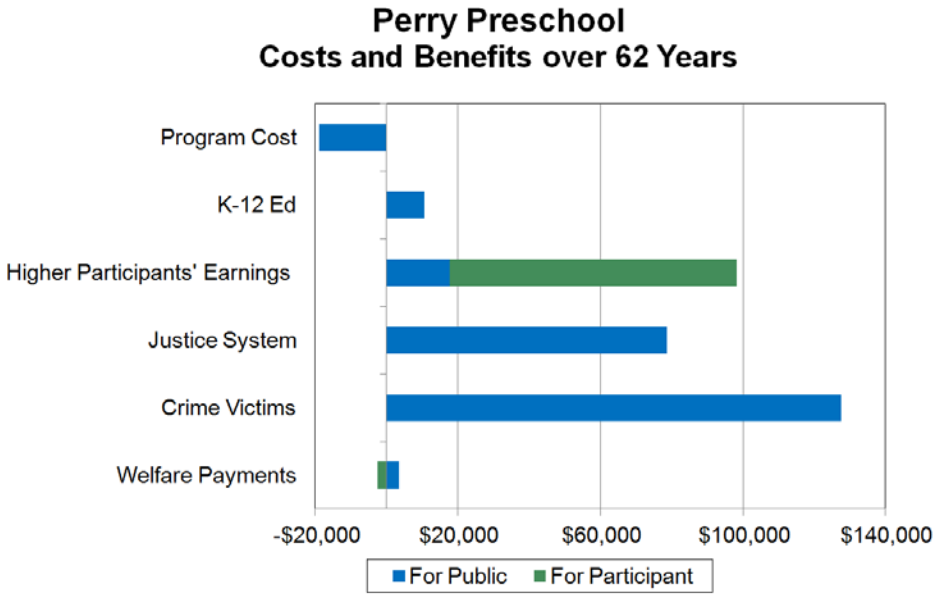
In response to the science of early childhood, ECD programs seek to nurture healthy development from the earliest years. Programs that provide enriched experiences for children

and involve parents provide benefits for all children, but they have the strongest impact on children from disadvantaged environments.

Four key longitudinal evaluations in the United States demonstrate that early interventions can have a positive impact on young children from disadvantaged environments that lasts well into adulthood. The studies used well-matched comparison groups and cost-benefit analysis to compare the estimated dollar value of benefits to the cost of the programs. Analyses of the Perry Preschool Program,[17] the Abecedarian Project,[18] the Chicago Child-Parent Centers[19] and the Elmira Prenatal/Early Infancy Project[20] showed annual rates of return, adjusted for inflation, ranging from 7 percent to just over 20 percent.[21] The Perry Preschool Program and Chicago Child-Parent Centers provided preschool at ages 3 and 4, Abecedarian provided full-day care and education for children a few months old through age 4 and the Elmira Prenatal/Early Infancy Project provided home visits by a nurse to high-risk mothers during pregnancy until the child turned age 2.

The benefits attributed to these ECD programs include reductions in special education and crime, and increases in tax revenue. According to a study by Wilder Research, investment in early childhood education can save K-12 public schools money by reducing special education costs and grade retention and improving classroom productivity. A cost-benefit analysis in Minnesota suggests that the monetary benefits accrued to the school system come close to covering the cost of providing preschool.[22]

Reductions in the cost of crime play a large role in boosting overall rates of return, particularly for the Perry Preschool Program which has a benefit-cost ratio of $16 returned for every $1 invested (see chart). Only the Abecedarian Project did not include cost reductions due to decreases in crime because differences in crime rates between the treatment and control groups were not statistically significant.[23] In each study, the drop in crime led to reduced costs for incarceration, police protection and courts. Furthermore, the costs to the victims of crime decreased, including loss of property and suffering. Added together across all four longitudinal studies, the savings in crime alone could justify increased investment in high-quality ECD.



Source: Schweinhart, et al. (2005)

In addition to the longitudinal studies, a meta-analysis by Washington State Institute for Public Policy creates an average composite of 53 ECD programs to compare the return on investment with other intervention programs for youth. The results for early childhood education for 3- and 4-year-old children, the Nurse Family Partnership and home visiting programs for at-risk mothers and children compared favorably with other intervention program types reviewed by the authors, including several parole supervision programs for juvenile offenders.[24]

In addition to reductions in remedial education and crime costs, the longitudinal evaluations show that children who take part in ECD programs have higher earnings and pay more taxes once they reach working age. According to a cost-benefit analysis of the Perry Preschool study, a child who attended preschool will pay $38,000 to $75,000 more in taxes over his or her lifespan than a child who did not attend.[25]

However, the return to investment calculations have not captured a number of potential benefits from improving child and adult health. For example, a review of the Abecedarian study and recently collected biomedical data show that adults in their mid-30s who attended the ECD program as children have lower prevalence of risk factors for heart disease and diabetes compared with adults in the control group. The study notes the outcomes were particularly strong for males who had lower blood pressure and no incidences of metabolic syndrome whereas 25 percent of males in the control group were affected by metabolic syndrome.[26]

Finally, rates of return for the longitudinal early childhood education studies compare favorably with the U.S. stock market, which on average earned between 5 percent and 7 percent, adjusted

for inflation, over the past few decades. This suggests that vulnerable children are a better social investment than stock market equity.[27] Finally, while children and their families benefit in the studies, the majority of financial benefits accrue to society.[28] That is, everyday citizens (in many countries, taxpayers) receive proportionally more benefits than the individual children and families participating in ECD programs.

More recent studies show children benefit from preschool

While the return on investment calculations are based on studies that started 20 to 40 years ago, recent evidence from preschool assessments and child care studies provides additional corroboration that ECD programs help children prepare for school.

In the United States a five-state study shows that children who attended a state preschool program at age 4 showed overall gains in vocabulary, math and print awareness.[29] Meanwhile, an analysis of New Mexico's fourth year of offering preschool shows that vocabulary and math scores posted solid growth relative to the control group, while early literacy scores grew substantially.[30] Similar gains are found in a study of Oklahoma's universal preschool program in Tulsa, with low-income children posting larger test score gains than higher-income children.[31]

Two U.S. studies, one that examines child care in poor communities[32] and a second that includes a more diverse sample,[33] both found that enrollment in center-based care was associated with positive cognitive outcomes for young children, particularly when child care providers had high levels of skill and education and child-teacher ratios were low. These positive effects were significant in both poor communities and more diverse communities even after other relevant factors such as family background and maternal education were controlled. However, an additional finding from these studies is an increase in children's physically aggressive behavior after participating in center-based care, particularly for children who spend large amounts of time in these care arrangements.[34]

In the Philippines researchers evaluated an ECD initiative that enabled local governments to deliver a broad set of ECD-related services to pregnant women and children under age 7. Comparing children in regions that provided the ECD program with a region not funded to provide the program, the study shows that the ECD program is associated with positive impacts on children's cognitive, motor, language and social development and short-run nutrition status, with some suggestion that duration of exposure increases the program impacts.[35]

A recent study of child care center quality in Rio de Janeiro, Brazil, finds that the developmental age of children attending high-quality programs is greater than the developmental age of children attending low-quality programs. The authors note that improving the activities and program structure of child care centers is associated with an increase in child developmental age of 3 months at a 6 percent increase in cost.[36]

A longitudinal study in Jamaica found that one-hour weekly visits from community health workers over a two year period who taught parenting skills and encouraged mothers to interact and play with their children in ways to develop cognitive and personality skills increased the average earnings of participants by 42 percent 20 years later. Children in the study were toddler age, stunted and living in poverty. Not only did participant wages exceed a randomly assigned control group, they also caught up to the earnings of a matched nonstunted group of children.[37]

Achievement gaps can be reduced when high-quality ECD programs reach disadvantaged children. For example, an analysis of the Infant Health and Development Program in the United States, which provided a high-quality center-based early childhood education program between the ages of one and three showed much larger impacts among low-income children than high-income children. Trajectories suggest that such a program offered to low-income children would eliminate the income-based achievement gap at age 3 and between a third and three quarters of gaps at ages 5 and 8.[38]

Finally, while many benefits to ECD programs accrue years later, several are realized in the short-term and some are immediate. Home visiting programs, such as the Nurse Family Partnership, have reduced child and social welfare costs.[39] The Chicago Child-Parent Center program is associated with reductions in child maltreatment.[40] As discussed, ECD programs can reduce remedial education costs during the first few years of primary school. For example, Utah's Granite School District is using special education cost reductions to fund preschool through a results-based financing model.[41]

The studies listed here are only an overview of ECD program research from the United States and throughout the world. The results from these studies and many others are consistent with the science of child development – early investments can have a strong positive impact on children and children from disadvantaged backgrounds have the most to gain.

A strong child care industry allows parents to enter the workforce and be more productive at their jobs.

While much of the labor productivity gains and several government cost reductions from ECD investments occur years down the road, there are substantial economic development benefits that accrue in the near term.

Child care is a key component of economic development infrastructure alongside other important infrastructure, such as transportation and communication systems. In the United States, 65 percent of children under age 6 have all their parents in the workforce. A high-quality child care system helps parents enter the workforce, and once they find a job, makes it less likely that they

will be absent or less productive due to unreliable child care arrangements. Research shows that parent absenteeism and productivity reductions due to child care breakdowns cost U.S. businesses more than $3 billion annually.[42] This is consistent with studies in other parts of the world. In the United Arab Emirates, Dubai Customs reported that after opening its own child care program, absenteeism and tardiness decreased 70 percent and productivity increased 71 percent among parent employees whose children enrolled.[43] A high-quality child care system can help mitigate these employee-related costs, while increasing profitability.

The child care industry is a relatively large employer and tends to be more interconnected with the local economy than many other industries

The child care industry is a large employer with almost 2 million workers in the United States.[44] Furthermore, relative to many other industries, U.S. child care providers tend to buy a greater share of services and materials from local businesses, and child care workers tend to spend more of their earnings locally.[45] A similar result was found in a Canadian study.[46] While other industries have been targets for economic development policy in the United States, such as receiving tax credits or subsidies, child care traditionally has not been. However, Mildred Warner notes that statewide surveys of economic developers in Wisconsin and New York found that more than 80 percent believe child care should be part of economic development policy, while 58 percent note that their communities face an inadequate supply of quality child care.[47]

The economic case for investing in ECD, therefore, is found not only through benefits that accrue several years down the road, but through increased jobs and income in the near term. Tim Bartik concludes in his book, *Investing in Kids: Early Childhood Programs and Local Economic Development*, that ECD investments provide local economic development benefits that significantly increase the near-term and long-run employment rates and wage rates of a state or local economy.[48]

Notes

[1] There is a strong correlation between the percentage of population with a college degree and per-capita income at the state level. Data from U.S. Census Bureau and Bureau of Economic Analysis.
[2] US Census Population Division. Population Projections. http://www.census.gov/population/www/projections/.
[3] Manpower Group. 2012 Talent Shortage Survey Research Results. May 2012.
[4] US Bureau of Labor Statistics. Employment Projections Program. http://www.bls.gov/emp/.
[5] Center on the Developing Child at Harvard University. I*n Brief:The Science of Early Childhood Development.*
[6] Martha F. Erickson and Karen Kurz-Riemer. *Infants Toddlers, and Families: A Framework for Support and Intervention.* New York: Guilford Press, 1999.
[7] James J. Heckman. "Schools, Skills, and Synapses." *Economic Inquiry*, Vol. 46, No. 3, 289-324.
[8] Center on the Developing Child at Harvard University. "Excessive Stress Disrupts the Architecture of the Developing Brain." Working Paper No. 3, Summer 2005.
[9] Betty Hart and Todd R. Risley. *Meaningful Differences in the Everyday Experience of Young American Children*. Baltimore, MD: Paul H Brookes Publishing, 1995.
[10] James J. Heckman. "Schools, Skills and Synapses." IZA Discussion Paper No. 3515, May 2008.
[11] Norbert Schady, Jere R. Behrman, Maria Caridad Araujo, Rodrigo Azuero, Raquel Bernal, David Bravo, Florencia Lopez-Boo, Karen Macours, Daniela Marshall, Christina Paxson, and Renos Vakis. "Wealth Gradients in Early Childhood Cognitive Development in Five Latin American Countries." GCC Working Paper Series, GCC 14-02, January 2014.
[12] Center on the Developing Child at Harvard University. *The Foundations of Lifelong Health Are Built in Early Childhood*. July 2010.
[13] Maxia Dong, Wayne H. Giles, Vincent J. Felitti, Sharon R. Dube, Janice E. Williams, Daniel P. Chapman, Robert F. Anda. "Insights into causal pathways for ischemic heart disease: Adverse Childhood Experiences Study." Circulation 2004; 110:1761–1766.
[14] Sally Grantham-McGregor, Yin Bun Cheung, Santiago Cueto, Paul Glewwe, Linda Richter, Barbara Strupp, the International Child Development Steering Group, "Developmental potential in the first 5 years for children in developing countries," *The Lancet*, January 2007, Vol. 369, No. 9555, 60-70.
[15] Ibid.
[16] Ingo Outes-Leon, Catherine Porter, and Allen Sánchez. "Early Nutrition and Cognition in Peru: A Within-Sibling Investigation." Inter-American Development Bank Working Paper Series No. IDB-WP-241, August 2011.
[17] Lawrence J. Schweinhart, Jeanne Montie, Zongping Xiang, W. Steven Barnett, Clive R. Belfield, and Milagros Nores. *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40*. Ypsilanti, Mich.: High-Scope Press, 2005.
[18] Leonard N. Masse and W. Steven Barnett. *A Benefit-Cost Analysis of the Abecedarian Early Childhood Intervention.* New Brunswick, NJ: National Institute for Early Education Research, 2002.
[19] Arthur J. Reynolds, Judy A. Temple, Dylan L. Robertson, and Emily A. Mann. "Age 21 Cost-Benefit Analysis of the Title I Chicago Child-Parent Centers." *Educational Evaluation and Policy* Analysis, 2002, Vol. 24, No. 4, 267–303.
[20] Lynn A. Karoly, Peter W. Greenwood, Susan S. Everingham, Jill Houbé, M. Rebecca Kilburn, C. Peter Rydell, Matthew Sanders, and James Chiesa. *Investing in Our Children: What We Know and Don't Know About the Costs and Benefits of Early Childhood Interventions.* Santa Monica, Calif.: RAND Corporation, 1998.
[21] James J. Heckman, Rob Grunewald and Arthur J. Reynolds. "The Dollars and Cents of Investing Early: Cost-Benefit Analysis in Early Care and Education." *Zero to Three*, July 2006, Vol. 26, No. 6, 10–17.
[22] Richard Chase, Brandon Coffee-Borden, Paul Anton, Christopher Moore, and Jennifer Valorose. *The cost burden to Minnesota K-12 when children are unprepared for kindergarten.* Wilder Research. December 2008.
[23] The lack of a crime effect is likely due to relatively low crime rates in the study area compared with other parts of the country. See Jean Burr and Rob Grunewald. "Lessons Learned: A Review of Early Childhood Development Studies," Federal Reserve Bank of Minneapolis, April 2006.
[24] Washington State Public Policy Institute. "Meta-Analysis Benefits and Costs of Prevention and Early Intervention Programs for Youth." September 2004.
[25] Clive R. Belfield, Milagros Nores, and W. Steven Barnett. *The High/Scope Perry Pre-School Program: Cost–Benefit Analysis Using Data from the Age-40 Followup*. HighScope Educational Research Foundation, 2004. Values in 2010 dollars.

[26] Frances Campbell, Gabriella Conti, James J. Heckman, Seong Hyeok Moon, Rodrigo Pinto, Elizabeth Pungello, and Yi Pan. "Early Childhood Investments Substantially Boost Adult Health." *Science*, 2014, Vol 343, No. 6178, 1478-1485.
[27] Heckman, Grunewald, and Reynolds.
[28] Ibid.
[29] Vivian C. Wong, Thomas D. Cook, W. Steven Barnett, and Kwanghee Jung. "An effectiveness-based evaluation of five state pre-kindergarten programs." *Journal of Policy Analysis and Management*, 2008, Vol. 27, No. 1, 122-154.
[30] Jason T. Hustedt , W. Steven Barnett, Kwanghee Jung, and Allison H. Friedman. *The New Mexico PreK Evaluation: Impacts From the Fourth Year (2008-2009) of New Mexico's State-Funded PreK Program*. National Institute for Early Education Research. November 2010.
[31] William T. Gromley. *Small miracles in Tulsa: The effects of universal pre-K on cognitive development.* 2007. http://www.humancapitalrc.org/events/2007/hcconf_ecd/gormley-slides.pdf. Accessed January 3, 2011.
[32] Susanna Loeb, Bruce Fuller, Sharon Lynn Kagan, and Bedemi Carrol. "Child Care in Poor Communities: Early Learning Effects of Type, Quality, and Stability." *Child Development*, 2004, Vol. 75, No. 1, 47-65.
[33] National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network. "Child Outcomes When Child Care Center Classes Meet Recommended Standards for Quality." *American Journal of Public Health*, 1999, Vol. 89, No. 7, 1072-1077.
[34] Burr and Grunewald.
[35] Graeme Armecin, Jere R. Behrman, Paulita Duazo, Sharon Ghuman, Socorro Gultiano, Elizabeth M. King, and Nanette Lee. "Early Childhood Development through an Integrated Program: Evidence from the Philippines." World Bank Policy Research Working Paper No. 3922, May 2006.
[36] Ricardo Barros, Mirela de Carvalho, Samuel Franco, Rosane Mendonça, and Andrezza Rosalém. "A Short-Term Cost-Effectiveness Evaluation of Better-Quality Daycare Centers." Inter-American Development Bank Working Paper Series No. IDB-WP-239, December 2011.
[37] Paul Gertler, James Heckman, Rodrigo Pinto, Arianna Zanolini, Christel Vermeersch, Susan Walker, Susan M. Chang, and Sally Grantham-McGregor. "Labor Market Returns to Early Childhood Stimulation: A 20-year Follow-up to an Experimental Intervention in Jamaica." NBER Working Paper No. 19185, June 2013.
[38] Greg J. Duncan and Aaron J. Sojourner. "Can Intensive Early Childhood Intervention Programs Eliminate Income-Based Cognitive and Achievement Gaps?" *The Journal of Human Resources*, 2014, Vol. 48, No. 4, 945-968.
[39] David L. Olds, John Eckenrode, Charles R. Henderson Jr., Harriet Kitzman, Jane Powers, Robert Cole, Kimberly Sidora, Pamela Morris, Lisa M. Pettitt, and Dennis Luckey. "Long-term Effects of Home Visitation on Maternal Life Course and Child Abuse and Neglect: Fifteen-year Follow-up of a Randomized Trial." *JAMA*, 1997, Vol. 278, No. 8, 637-643.
[40] Arthur J. Reynolds, Judy A. Temple, Dylan L. Robertson, and Emily A. Mann.
[41] Adrienne Lu. "Results-Based Financing for Preschool Catching on." *Stateline: The Daily News Service of The Pew Charitable Trusts*. March 21, 2014.
[42] Karen Shellenback. *Child Care & Parent Productivity: Making the Business Case*. Linking Economic Development & Child Care Research Project. Cornell University, December 2004.
[43] Carol Simpson. "Workplace nursery cuts staff absenteeism," *The National*, June 2012. http://www.thenational.ae/news/uae-news/workplace-nursery-cuts-staff-absenteeism
[44] United States Government Accountability Office. *Early Child Care and Education. HHS and Education are Taking Steps to Improve Workforce Data and Enhance Worker Quality*. Report to the Chairman, Committee on Finance, U.S. Senate. February 2012.
[45] Mildred Warner. "Child Care Multipliers: Stimulus for the States." Linking Economic Development and Child Care Research Project. Cornell University, 2009.
[46] Child Care Human Resources Sector Council. "Literature Review of Socioeconomic Effects and Net Benefits." Understanding and Addressing Workforce Shortages in Early Childhood Education and Care (ECEC) Project Ottowa, Ontario (Canada), 2009.
[47] Ibid.
[48] Tim Bartik. *Investing in Kids: Early Childhood Programs and Local Economic Development*. W.E. Upjohn Institute for Employment Research. Kalamazoo, Mich., 2011.