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Early Life Impacts on Later Life Health and Economic Outcomes

Diane Whitmore Schanzenbach*

INTRODUCTION

What are the lasting impacts of childhood events? Scientists across a variety of fields have found that acute negative life events result in important later life harms. For example, childhood exposure to famine or food deprivation permanently scars those who survive, resulting in increased obesity, schizophrenia and disability rates in adulthood.¹ Similarly, survivors of the 1918 pandemic flu grew up to earn lower wages, and are more likely to become disabled in later life.² Experiencing extreme malnutrition in early life has been shown to impact brain development, with brain growth diminished among children who were malnourished in infancy.³

Building on these findings, an important next question is whether more commonplace deprivation during childhood—such as growing up in poverty—also impairs adult outcomes? If so, how large are the impacts? Can they be ameliorated by policies aimed at reducing poverty? Are there particular ages when deprivation is particularly harmful? The answers to these questions are vitally important to understand the level and timing of investments in reducing poverty in early life. A growing body of literature seeks to address these questions, and suggests that investments in children are more important to our nation’s long-term economic well-being than is typically understood.⁴

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1. Douglas Almond & Janet Currie, *Killing Me Softly: The Fetal Origins Hypothesis*, J. 25 (3) ECON. PERSP. 153, 154-55, 157, 166 (2011); Douglas Almond & Bhashktar Mazumder, *Health Capital and the Prenatal Environment: The Effect of Ramadan Observance During Pregnancy*, 3(4) Am. Econ. J.: Applied Econ. 56 (2011).

2. Douglas Almond, *Is the 1918 Influenza Pandemic Over? Long-Term Effects of In Utero Influenza Exposure in the Post-1940 U.S. Population*, 114 J. POL. ECON. 672, 672 (2006).

3. Elizabeth L. Prado & Kathryn G. Dewey, *Nutrition and Brain Development in Early Life*, 72 NUTRITION REV. 267, 273 (2014).

4. See Douglas Almond et al., *Childhood Circumstances & Adult Outcomes: Act II*, (Nat’l Bur. of Econ. Research, Working Paper No. 23017, 2017); Hilary W. Hoynes & Diane Whitmore Schanzenbach, *Safety Net Investments in Children*, BROOKINGS PAPERS ON ECON. ACTIVITY (forthcoming 2018), <https://www.brookings.edu/bpea-articles/safety-net-investments-in-children/>.

I. POVERTY AND THE SAFETY NET TODAY

To set the stage, it is worthwhile to review the national statistics documenting the substantial share of children in the United States that grow up in poverty. Figure 1⁵ shows the poverty rate—measured as the share of households with annual incomes below the government-defined poverty threshold for a family of a particular size—for families with children over time. The poverty rate tends to rise during bad economic times and fall during good ones. In 2016, eighteen percent of families with children were in poverty—down from a rate of about twenty-two percent during the Great Recession.⁶ In addition to the official poverty rate, Figure 1 displays the rate of food insecurity among households with children.⁷ Researchers measure food insecurity through a household survey that asks a series of questions that measure whether a family has adequate resources to purchase food necessary to live an active, healthy lifestyle.⁸ In 2016, 16.5 percent of households with children reported food insecurity.⁹ Poverty and food insecurity measure somewhat different concepts of disadvantage. While poverty measures a household's financial resources and compares them to a national standard, food insecurity asks families a series of questions about the resources they have available to purchase food.¹⁰ The food insecurity measure then implicitly considers a host of other factors that affect their ability to buy food, including the family's expenditures on housing, transportation and other items, food prices, and the family's ability to budget their expenses. The measures are correlated, but not perfectly so—for example, about forty-four percent of households

5. ALISHA COLEMAN-JENSEN ET AL., U.S. DEP'T OF AGRIC., ECONOMIC RESEARCH REPORT NUMBER 237, HOUSEHOLD FOOD SECURITY IN THE UNITED STATES IN 2016 10 (2017), <https://www.ers.usda.gov/webdocs/publications/84973/err-237.pdf?v=42979>; JESSICA L. SEMEGA, KAYLA R. FONTENOT & MELISSA A. KOLLAR, U.S. CENSUS BUREAU, INCOME AND POVERTY IN THE UNITED STATES: 2016 50 (2016), <https://www.census.gov/content/dam/Census/library/publications/2017/demo/P60-259.pdf>.

6. See SEMEGA ET AL., *supra* note 5.

7. COLEMAN-JENSEN ET AL., *supra* note 5.

8. COLEMAN-JENSEN ET AL., *supra* note 5, at 2.

9. COLEMAN-JENSEN ET AL., *supra* note 5, at 9.

10. COLEMAN-JENSEN ET AL., *supra* note 5, at 2; See SEMEGA ET AL., *supra* note 5, at 3.

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with children who live in poverty also experience food insecurity,¹¹ and many children who are not in poverty are nonetheless food insecure.¹² Furthermore, many families cycle in and out of food insecurity from one year to the next,¹³ so a one-year measure understates the share of children who will experience food insecurity at one or more points during their childhood. As a result, the share of children who experience material deprivation in the United States is substantially larger than the sixteen to eighteen percent official static rates.

Several safety net policies play important roles in alleviating poverty among children. Figure 2, drawn from Sherman and Trisi (2015),¹⁴ shows the number of children lifted out of poverty by various safety net programs, after adjusting for the well-known problem of the under-reporting of program participation in the Current Population Survey. The Earned Income Tax Credit (EITC) and the Supplemental Nutrition Assistance Program (SNAP), which used to be known as food stamps, each lifted about five million children out of poverty in 2012.¹⁵ Other programs, including housing assistance, supplemental security income, the national school lunch program, and Temporary Assistance to Needy Families (TANF), have also played an important role, but individually lift many fewer children out of poverty.¹⁶

Below, I summarize research documenting the long-term benefits of having access to the Food Stamp Program during childhood. Similar studies have been conducted on later impacts of cash welfare programs¹⁷ and Medicaid.¹⁸ In addition, studies conducted through young adulthood

11. COLEMAN-JENSEN ET AL., *supra* note 5, at 16.

12. Diane Whitmore Schanzenback, Lauren Bauer & Greg Nantz, *Twelve Facts About Food Insecurity and SNAP*, BROOKINGS (Apr. 21, 2016), <https://www.brookings.edu/research/twelve-facts-about-food-insecurity-and-snap/>.

13. *Id.* at 6.

14. ARLOC SHERMAN & DANILO TRISI, CTR. ON BUDGET & POLICY PRIORITIES, SAFETY NET MORE EFFECTIVE AGAINST POVERTY THAN PREVIOUSLY THOUGHT 5 (2015), <https://www.cbpp.org/research/poverty-and-inequality/safety-net-more-effective-against-poverty-than-previously-thought>.

15. *Id.*

16. *Id.*

17. Anna Aizer, Shari Eli, Joseph Ferrie & Adriana Lleras-Muney, *The Long-Run Impact of Cash Transfers to Poor Families*, 106 AM. ECON. REV. 935, 937 (2016).

18. David W. Brown, Amanda E. Kowalski & Ithai Z. Lurie, *Medicaid as an Investment in Children: What Is the Long-Term Impact on Tax Receipts?* 2-4 (Nat'l Bureau of Econ. Research, Working Paper No. 20835, 2015).

on the Earned Income Tax Credit find impacts on education outcomes and health¹⁹ suggesting that in time we will expect to see similar long-term results as well. Together, these studies suggest that, in addition to the short-term poverty reduction offered by safety net programs, they also deliver longer-run benefits to those aided by the programs. By better understanding these longer-run benefits, and including them in current decisions about safety net policy, society can make better-informed decisions about the value of spending on safety net programs.

II. IMPACTS OF REDUCING POVERTY IN EARLY LIFE

To study the impacts of reducing poverty during early life on long-term outcomes, a research team has to be fortunate enough to find an event that satisfies several criteria. For one, the event needs to have occurred decades ago so that its impacts can be traced over the long run. In addition, there must be some variation in access to the program that allows researchers to use techniques to isolate the causal impact of the event. Furthermore, data must be available to use for measurements. My coauthors and I found that we could use the introduction of the food stamp program (now called SNAP) to estimate the impact of an increase in resources during childhood on long-term outcomes.²⁰

As background, food stamps are vouchers that can be used to purchase most types of food at most grocery stores. While the value of the vouchers were relatively modest, they nonetheless made a large impact on the recipients' budgets. When an eligible family signed up for food stamps, on average, their purchasing power was increased by fifteen to twenty-two percent.²¹ The research described below measures the benefits of access to

19. Hilary Hoynes, Doug Miller & David Simon, *Income, the Earned Income Tax Credit, and Infant Health*, AMER. ECON. J.: ECON. POL'Y, Feb. 2015, at 172, 174.; Kate W. Strully, David H. Rehkopf & Ziming Xuan, *Effects of Prenatal Poverty on Infant Health: State Earned Income Tax Credits and Birth Weight*, 75 AM. SOC. REV. 534, 549 (2010) (health effects); Raj Chetty, John N. Friedman & Jonah Rockoff, *New Evidence on the Long-Term Impacts of Tax Credits*, 104 PROC. ANN. CONF. ON TAX'N 116, 116 (2011); Gordon Dahl & Lance Lochner, *The Impact of Family Income on Child Achievement: Evidence from Changes in the Earned Income Tax Credit*, 102 AM. ECON. REV. 1927, 1930 (2012).

20. Hilary Hoynes, Diane Whitmore Schanzenbach & Douglas Almond, *Long-Run Impacts of Childhood Access to the Safety Net*, 106 AM. ECON. REV. 903-04 (2016).

21. Hilary Hoynes & Diane Whitmore Schanzenbach, *Consumption Responses to In-Kind Transfers: Evidence From the Introduction of the Food Stamp Program*, AMER. ECON. J.: APPLIED

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this safety net program, but at this point we have been unable to shed additional light on the mechanisms at work. It could be that families have more consistent access to food (i.e., it may improve the quantity of food consumed), or that they are able to purchase healthier foods that provide better nutrition (i.e. it may improve the quality of food consumed). The additional resources could also impact other aspects of the family's life, potentially reducing stress levels.

A. Research Design

To measure the impact of gaining access to food stamps, our research leverages the fact that when the program was originally introduced, it was rolled out on a county by county basis over a long period of time starting in 1963 and continuing through 1975. As the result of this slow rollout, there is substantial variation in access to food stamps across counties within the same state. Take for example county A, which adopted the program in 1966, and its neighbor county B, that adopted it in 1970. Our research can compare differences across the counties in 1965 (when neither county had the program), in 1968 (when only one had it but not the other), and in 1972 (when they both had it). Similarly, we can compare children born in each of these years in each county. For children living in county A, one born in 1965 would have had access to food stamps starting at age one, while one born in 1968 or 1972 would have had access at the time of birth and during the prenatal period. The research design we use compares across all of these differences in order to isolate the impact of having access to food stamps, and to measure its impacts when children are different ages. We include statistical controls covering a variety of other characteristics of the counties, and control for trends, fixed differences across states, and other potentially confounding effects to isolate the impact of the food stamp program.²²

ECON., Oct. 2009, at 109, 135.

22. See Hoynes, Schanzenbach & Almond, *supra* note 20, at 914-15 (technical details).

B. Impacts of Food Stamps

In a research project prior to our study of the long-term impacts of food stamps, we first investigated their short-term impacts.²³ Using comprehensive birth records data from the time period, we asked what happens to a baby's health if the mother has access to food stamps when she is pregnant. Using the food stamp rollout to identify the impact of the program, we found that availability of the food stamp program in a county led to increases in average birth weights for both African-Americans and whites. It also reduced the incidence of low birth weight for both groups, with impacts largest among the lowest-weight babies.²⁴

Prior research literature strongly suggests that the improvements in health at birth we documented as a result of food stamps would be expected to spill over to longer-run impacts during adulthood.²⁵ However, this literature also suggests that interventions done later in childhood can also have lasting impacts.²⁶ With our research design, and data on adult outcomes across a variety of birth cohorts, we are able to dig into the timing of impacts—testing what happens if, instead of starting the intervention before birth, we start the same type of intervention with a one-year-old, or a four-year-old, or a fifteen-year-old.

The theory we are testing, built upon decades of research, is that access to the food stamp program increases a family's resources to buy food, which results in better nutrition and less stress for the child and his or her family. The literature described above suggests that better early-life nutrition should result in better adult health, especially as measured by metabolic syndrome—the clustered association between obesity, heart disease, diabetes, and related conditions.²⁷ We also measure whether there are impacts on economic outcomes. We combine a series of economic outcomes into an index self-sufficiency measure, which includes whether the individual graduated from high school, is currently employed, their earnings and family income, and indicator variables for whether they are

23. Douglas Almond, Hilary W. Hoynes & Diane Whitmore Schanzenbach, *Inside the War on Poverty: The Impact of Food Stamps on Birth Outcomes*, 93 REV. ECON. & STAT. 387 (2011).

24. *Id.*

25. Almond & Currie, *supra* note 1.

26. *Id.*

27. *Id.*

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currently not living in poverty or participating in the cash welfare program (TANF) or SNAP.

We find that having access to the food stamp program from the time of conception through age five—over a period of approximately six years at the beginning of life— reduces a person’s metabolic syndrome score in adults by three-tenths of a standard deviation. These impacts are measured on a sample of individuals approximately between ages forty and sixty. These are large and meaningful reductions. Each of the component measures—diabetes, high blood pressure, obesity, heart disease and heart attack—show signs of improvement, however, when tested individually only the impacts on obesity reach statistical significance.

We investigate other health measures as well, and find evidence that the program may have reduced the incidence of stunted growth, as measured by the fraction of adults with very short stature in adulthood. In addition, we find positive impacts on the likelihood that an individual reports being in good health in adulthood, though the estimate is not statistically significant. We also can measure self-reported health behaviors during adulthood to try to better understand potential mechanisms for the health improvements. Those with access to food stamps in childhood reported that they were less likely to smoke or drink alcohol in adulthood, though these results are also not statistically significant.

For self-sufficiency outcomes, we find similar overall impacts. Access to the program from *in utero* through age five increases our index measure by about two-tenths of a standard deviation. When we look separately at each of the components of the index, we find that access to food stamps improved the likelihood of graduating from high school by eighteen percentage points. We also find evidence that access during childhood reduces the likelihood that the individual would then participate in social safety net programs during adulthood, although these effects are not individually statistically significant. Note that these findings are in direct contrast to the theory that there is a welfare trap—that is, that access to the safety net dooms children to a lifetime of reliance on it. Our results—which due to our research design are among the first that can establish a causal pathway between childhood program access and adult outcomes—

are consistent with the human capital theory of early childhood investments, as laid out by James Heckman and colleagues²⁸, and others. This theory posits that having more resources during childhood allows for more investments in activities that enhance their later-life productivity—for example, attending more school, putting more effort into school when they are there, and so on.

Looking at impacts separately by gender, we find that health impacts are quite similar for males and females, with large improvements in the metabolic syndrome index measure for both groups. We find striking differences for economic outcomes, though. There are large increases in economic self-sufficiency—0.3 of a standard deviation—for women, but no impact on these measures for men. While the reasons for the gender differences are not well understood, this pattern of results with larger impacts for females than males is relatively common in the literature on early-life investments.²⁹

In further work to investigate heterogeneity of impacts, we find that those living in counties with the highest poverty rates received the largest benefits from the program.

We take many steps in the research to ensure we are isolating the impact of access to the food stamp program, and not picking up impacts of other factors. For example, as a placebo test we investigate whether access to food stamps had an impact on children with highly educated parents—since these families are very unlikely to participate in the program. There was no relationship between program availability and outcomes for this group—a finding consistent with our expectations. In a separate robustness check, we add a wider array of county variables, including the availability of community health centers, hospital resources, and health spending. Our results are unchanged by the inclusion of these additional control variables.

28. Frances Campbell et. al, *Early Childhood Investments Substantially Boost Adult Health*, 343 SCIENCE 1478 (2014).

29. See, e.g., Michael L. Anderson, *Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects*, 103 J. AM. STAT. ASS'N 1481, 1482 (2008); Hoyt Bleakley, *Disease and Development: Evidence from Hookworm Eradication in the American South*, 122 Q.J. ECON. 73, 98 (2007); Kevin Milligan & Mark Stabile, *Do Child Tax Benefits Affect the Wellbeing of Children? Evidence from Canadian Child Benefit Expansions*, AMER. ECON. J.: ECON. POL'Y, Aug. 2011, at 175, 176.

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C. Timing of Effects

There is great interest in better understanding how impacts vary across the age at which a child experiences an intervention. Because our research design uses the staggered introduction of the program, we can separately identify impacts by the child's starting age. The results are shown in Figures 3 and 4. In each figure, the horizontal axis represents the child's age when the food stamp program was made available in their county of birth. To improve statistical precision, we average across two-year age bins, and the point marked "0 to 1" represents the impact for children who had access starting at birth or age 1. Negative numbers indicate that the program was adopted prior to the child's birth—these impacts are particularly interesting, because it suggests that if the mother has had more access to the program prior to conception, she and her fetus may be healthier throughout pregnancy.

Figure 3³⁰ represents the impacts on later-life health metabolic syndrome outcomes, and a negative coefficient represents better health. We find large impacts—nearly 0.4 of a standard deviation—of the program when it is in place prior to the child's birth. If the program is adopted in the first few years of life, the program still improves later-life health, but the impacts are somewhat smaller—a little less than 0.3 standard deviation in the first two years of life, and a little more than 0.1 standard deviation at ages two to three. The opportunity for the program to improve long-term metabolic syndrome outcomes appears to close around age four to five, and zero from there on. These findings are consistent with the hypothesis that there is a sensitive period for interventions during early life to impact these later-life health outcomes. In particular, it points to the importance of ensuring that pregnant women and young children have adequate resources for nutrition.

Figure 4³¹ shows the impacts of childhood access to food stamps on adult economic outcomes. Here we find important positive impacts for interventions during the in-utero period and during the first two years of life. These patterns are quite consistent with research on critical periods for brain development, and—if the hypothesized mechanism is correct—it

30. Hoynes, Schanzenbach & Almond, *supra* note 20, at 928.

31. *Id.* at 929.

suggests that a boost of additional resources to poor families with very young children can make a difference in children's brain development.

Note that a limitation of our study is that the variation runs only one way—from having no program to having a program. In other words, once the program was introduced, it was never taken away during the time period studied. As a result, we cannot identify what would happen if a child had access to the program at a particular age for only a limited time period. These results show the impact of having access to food stamps starting at a certain age, and continuing on throughout childhood as long as their family income continues to be at a level that qualified them for the program.

CONCLUSIONS

These findings have wide-ranging implications. For example, they further bolster the literature by brain scientists and others that point to critical periods for positive intervention during early life. They should also inform our policies regarding the social safety net. In particular, it is important for policy makers to keep in mind that in addition to the role of the safety net as charity to the needy, resources to young children also serve as real economic investments in children's future health and economic well-being.

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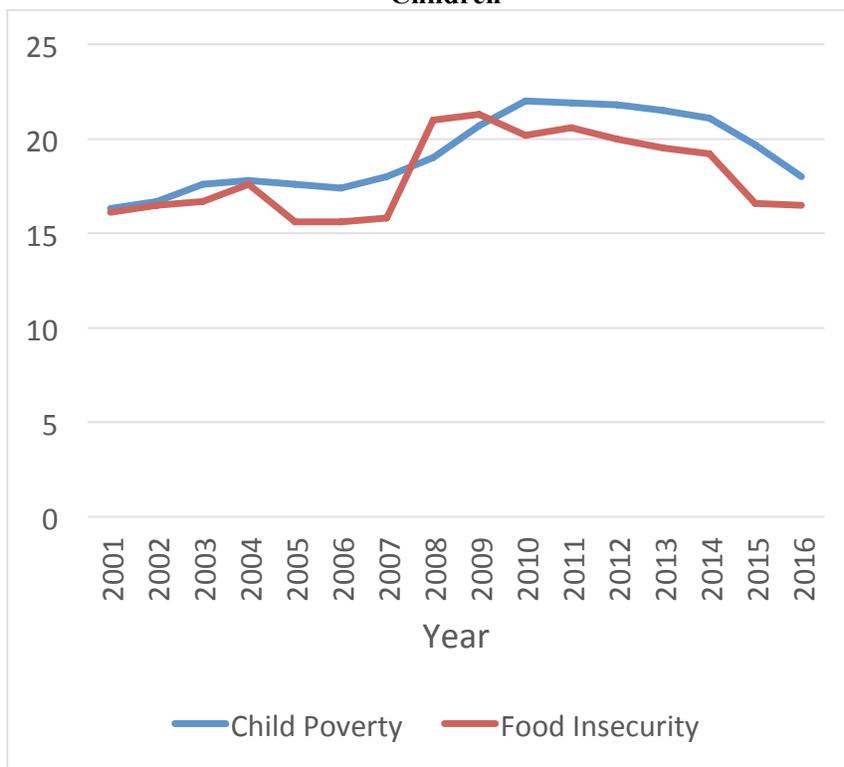
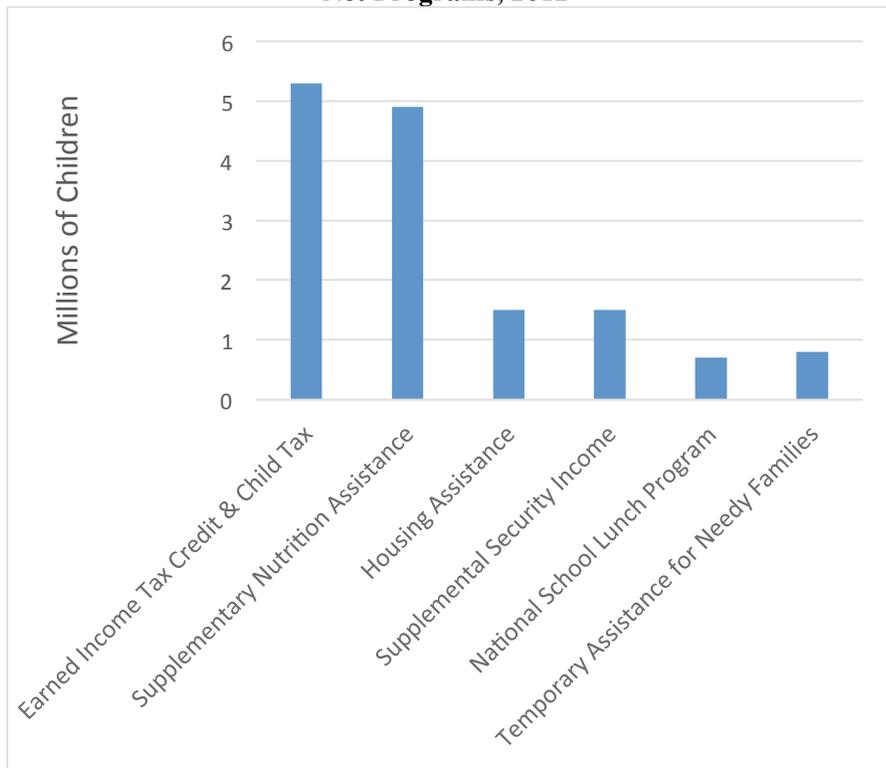
Figure 1: Poverty and Food Insecurity Rates in Households with ChildrenSource: U.S. CENSUS BUREAU, *supra* note 5.

Figure 2: The Number of Children Lifted Out of Poverty by Safety Net Programs, 2012



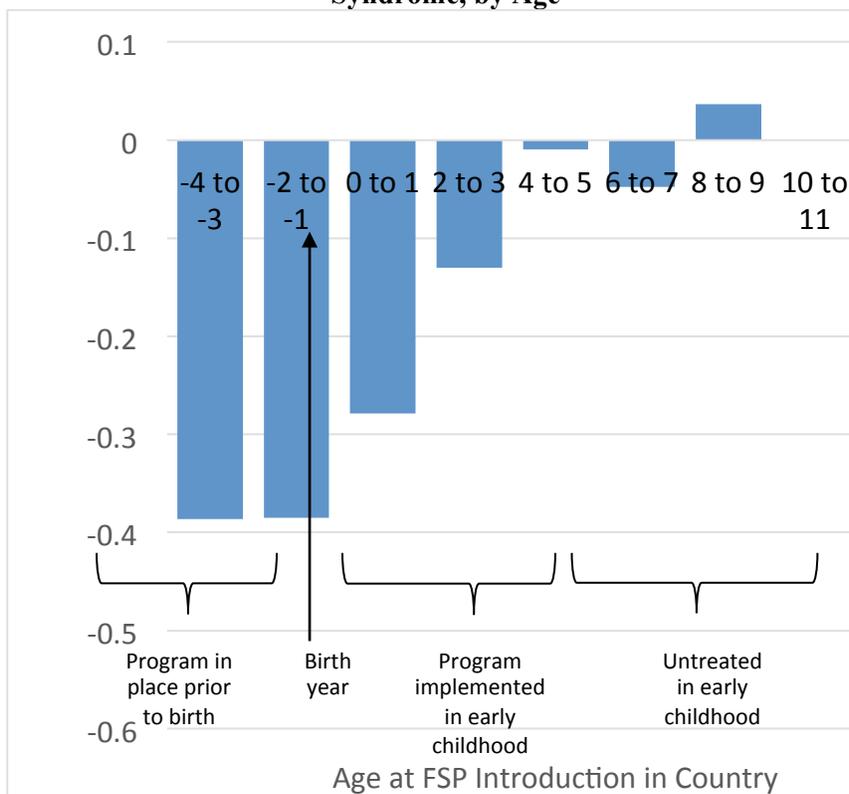
Source: SHERMAN AND TRISI, *supra* note 14.

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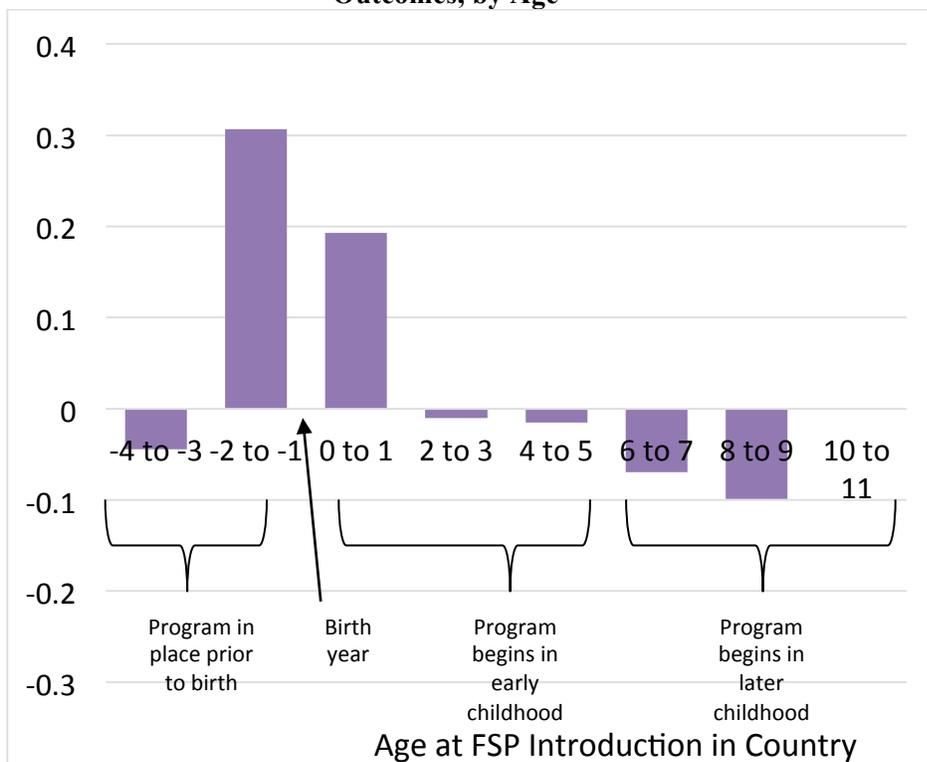
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Figure 3: Impacts of Access to Food Stamps on Later Life Metabolic Syndrome, by Age



Source: Hoynes et al., *supra* note 20.

Figure 4: Impacts of Access to Food Stamps on Later Life Economic Outcomes, by Age



Source: Hoynes et al., *supra* note 20.