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Economic Costs of Early Childhood Poverty

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Executive Summary

More than four million infants, toddlers and preschoolers lived in poverty in the United States in 2005. Our paper focuses on this question: *What economic benefits would a policy provide that brought poor children's prenatal-through-age 5 family incomes up to the poverty line but made no other concurrent changes in the socioeconomic status of those children's families?*

We first calculate simple differences in a number of adult outcomes between individuals whose early childhood incomes were below, close to and well above the poverty line. Relative to children with early childhood incomes exceeding at least twice the poverty line, poor children complete nearly two fewer years of schooling, work 25% fewer hours, earn only about half as much, receive $750 more per year in food stamps, and are more than twice as likely to report poor overall health or high levels of psychological distress. Poor males are nearly twice as likely to be arrested, and their rates of incarceration are three times as high, as those of males in higher-income families. For females, early poverty is associated with a nearly $200 increase in annual cash assistance from the AFDC or TANF programs and a five-fold increase in the likelihood of bearing a child out of wedlock prior to age 21.

We next attempt to estimate the causal connections between early poverty and these adult outcomes and find that links between early childhood poverty and five outcomes – completed schooling, labor-market hours and earnings, and receipt of income from both the food stamp and AFDC/TANF cash assistance programs – proved strong enough to pass our rigorous statistical tests.

- In the case of adult work and earnings, we estimate that eliminating poverty in early childhood (through annual income transfers that average $4,326 between the prenatal year and age 5 and bring poor children's family income just up to the poverty line) would boost annual work hours by 12.4% percent and earnings by 28.7% percent per year. In dollar terms, **this amounts to lifetime earnings increases of between $53,000 and $100,000 per child**, depending on the assumed duration of the poverty effect.

- **Bringing poor children up to 150% of the poverty line** from their prenatal year to age 5 would cost $7,066 per year, and **would increase lifetime earnings by between $105,000 and $193,000**, again, depending on the assumed duration of the poverty effect.

- Nationally, there are roughly 4 million young adults of any given age. With 366,800 of them estimated to have spent their early childhoods in poverty, **the aggregate earnings benefit of eliminating poverty from the prenatal year through age 5 for children born each year amounts to between $20 billion and $36 billion.**

- In the case of food stamps, we estimate that eliminating poverty in early childhood would reduce lifetime food stamp receipt in adulthood by at least $1,600. For cash assistance from the old AFDC or newer TANF programs, eliminating early poverty for females is estimated to lead to lifetime reductions of at least $1,250. **These translate into aggregate taxpayer saving of between $590 million and $230 million for eliminating poverty from the prenatal year through age 5 for children born each year.**

- In the case of education, we estimate that eliminating poverty in early childhood would boost completed schooling by about one-fifth of a year. Some of the financial benefits of this boost are reflected in the earning increases and reductions in cash assistance described above. The dollar value of a number of other likely benefits – such as greater civic involvement, or, for children, the happiness of spending childhood in a non-poor household – is difficult to quantify.

- From a taxpayer perspective, eliminating poverty from the prenatal year through age 5 provides three measureable benefits: more tax revenue (between $10,600 and $20,000 per poor child), and fewer expenditures on food stamps ($2,000 per poor child) and cash welfare ($1,600 per poor female child).

Economic Costs of Early Childhood Poverty

Some 4.1 million infants, toddlers and preschoolers lived in poverty in the United States in 2005. For a family of three, this meant that total income was less than $15,577; many poor families had income well below that amount.[1] Ample research shows that, relative to non-poor children, poor children will be less successful in school and, as adults, in the labor market; have poorer health; and be more likely to commit crimes and engage in other forms of problem behavior.[2] Despite these associations, it is far from clear to what extent poverty *itself* is the cause of these differences. Our paper focuses on estimates of the long-run impacts of low income early in life, net of correlated family factors. Specifically, our policy question is: *What economic benefits would a policy provide that brought poor children's prenatal-to-age 5 family incomes up to the poverty line but made no other concurrent changes in the socioeconomic status of those children's families?*

The potential for detrimental impacts from early childhood poverty is obvious. Emerging evidence from human and animal studies highlights the critical importance of infancy and early childhood for brain development and for setting in place the structures that will shape future cognitive, social, and emotional outcomes.[3] Poverty and its attendant stressors have the potential to shape the neurobiology of the developing child in powerful ways, which may lead directly to poorer physical and mental health later in life. Poverty in early childhood can also reduce material investments in children's learning and development, as well as interfere with the development of strong parent-child bonds and supportive parenting practices. Such a lack of material and emotional resources in the family environment can compound and amplify the neurobiological disadvantages that many poor children already face. The sensitivity of early childhood to environmental influences has been demonstrated in a wide range of infant, toddler, and preschooler intervention studies. Taken together, they show that early-life interventions may well be the most effective and cost-efficient approaches to promoting human capital development.[4]

Our study draws on national data from the Panel Study of Income Dynamics (PSID) to estimate linkages between income early in childhood and later life outcomes. The PSID is the longest-running longitudinal study of household income in the United States and offers detailed economic and demographic information across the life course. Ours is the first study to link high-quality income data across the entire childhood period with adult outcomes measured as late as age 37.

Our strategy is to measure income in every year of a child's life from the prenatal period through age 15, distinguishing income early in life (prenatal through 5th year) from income in middle childhood and adolescence. Our analyses relate an array of adult achievement, social assistance, health and behavior measures to these childhood stage-specific measures of income, plus a host of relevant control variables. The adult outcomes we consider include educational attainment, earnings, work hours, receipt of food stamps and cash assistance, non-marital childbearing, crime, and mental and physical health. With details provided in an appendix, our approach employs the following procedures.

Adult outcomes that might be linked to childhood poverty

We examine impacts of early childhood poverty on a diverse set of adult achievements, behaviors and health conditions, all of which either add to the productive capacity of the nation or drain its resources. As reflected by *completed schooling, work hours, and earned income,* the productivity of workers is an obvious economic component of adult attainment. Poverty early in childhood may hinder the acquisition of formal schooling and job-related skills, reduce labor-market productivity, and limit a worker's access to high-wage jobs.

Behaviors that impose notable costs on society include *crime* and *teen non-marital childbearing*, so we also estimate impacts of early poverty on arrests and incarceration for males and, for females, the likelihood of a non-marital birth prior to age 21.

Poor job skills, limited participation in the labor market, and early childbearing may increase the likelihood and amount of public assistance receipt from programs like *food stamps* and *AFDC/TANF* cash assistance programs.

Poor *physical and mental health* can also drain society's resources, partly by reducing its potential productivity (which should be reflected in part by lower earnings), but also through the costs to the healthcare system of treating such health problems. Accordingly, we estimate the impacts of poverty early in life on poor overall health, as well as on the likelihood of showing high levels of psychological distress in adulthood.

Linking early childhood poverty to adult outcomes

Figure 1 shows striking differences in these outcomes, depending on whether childhood income prior to age 6 was below, close to, or well above the poverty line. Compared with children whose families had incomes of at least twice the poverty line during their early childhood, poor children complete two fewer years of schooling, work 424 fewer hours per year, earn about half as much, receive $750 per year more in food stamps as adults, and are about twice as likely to report poor overall health or high levels of psychological distress. Poor males are more than twice as likely to be arrested and have rates of incarceration that are two times as high as those of males in higher-income families. For females, poverty is associated with a nearly $200 annual increase in cash assistance and a six-fold increase in the likelihood of bearing a child out of wedlock prior to age 21.

The strong associations between poverty and adult outcomes shown in Figure 1 do not prove that early poverty itself is the cause of these differences. Perhaps family economic conditions later in childhood are what really matter. Or perhaps some third factor, such as inadequate parental education, is the cause of family poverty as well as lower child achievement, worse behavior, and poorer health. If so, then eliminating early childhood poverty, but failing to boost parental schooling, would not improve the life chances of the children concerned. We employ statistical techniques to account for as many confounding factors as possible in order to isolate the impact of early poverty itself.

Our statistical models relate the adult achievement, behavior, and health measures to a given child's average family income between conception and age 5. We express the estimated impacts as improvement in adult outcomes that would result from increasing poor children's family

income by $4,326 per year between the prenatal year and age 5. The $4,326 figure is chosen because, as explained below, it is the annual increase in income we estimate to be required to bring poor children's early childhood income up to the poverty line. We also estimate benefits associated with increasing income to 150% of the poverty line, which would require annual expenditures of $7,066 per family.

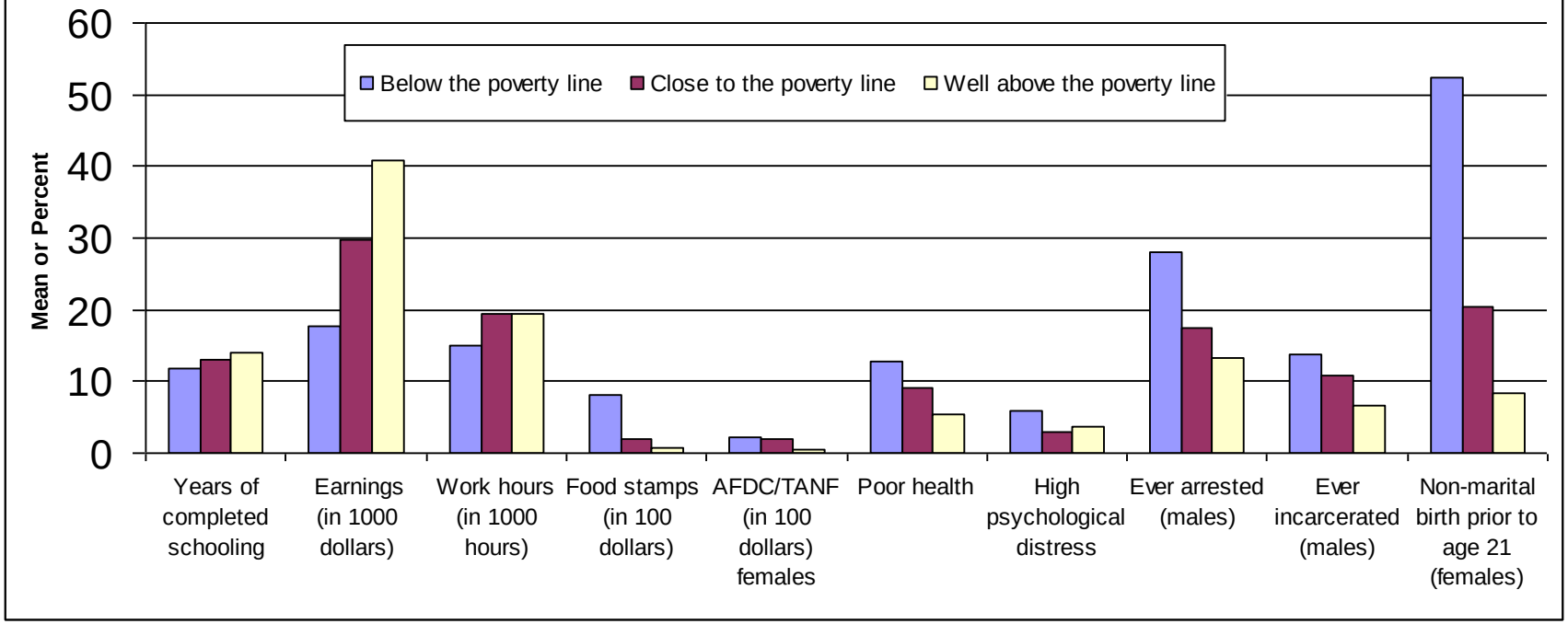
As shown in Table 1, the links between early childhood poverty and five outcomes – completed schooling, labor-market hours and earnings, receipt of food stamps, and, for females, receipt of cash assistance – proved strong enough to pass our rigorous statistical tests. For most of the remaining outcomes, increases in early childhood income were estimated to be beneficial, but the magnitudes of the effects were not large enough for us to be confident that they were real.

How important are the earnings and public assistance impacts? Closing the early-childhood poverty gap is estimated to increase adult labor market earnings by 29%, potentially quite an important increase in long-run earnings. As shown in Table 1, the average earnings of adults whose early childhoods are spent in families with incomes below the poverty line amount to $17,115; 28.7% of that figure is $4,919. With that increase sustained over the 13 years between age 25 and 37, the increment to lifetime earnings is over $63,000. If sustained over a 30-year working life, the increment is nearly $150,000. Several refinements of this estimate are required, some of which would result in these simple calculations overstating the lifetime earnings impact and others of which would lead to underestimates. As explained in the appendix, **we estimate the total value of the earnings impacts to range between $53,000 (if, as appears likely, it is sustained between ages 25 and 37) and $100,000 (if sustained through age 54)**.

Nationally, there are roughly four million young adults of any given age. With 366,800 (9.1%) of them estimated to have spent their early childhoods in poverty, **the aggregate earnings benefit of eliminating poverty from the prenatal year through age 5 for children born each year amounts to between $20 billion and $36 billion.**

In the case of public assistance, we estimate that eliminating poverty in early childhood would reduce the value amount of food stamps received by $1,600. For cash assistance from the AFDC/TANF program, the reduction for females is estimated to be $1,200 per year. This translates into reductions of **$590 million and $230 million, respectively, for poor children born each year.**

Figure 1: Early adult attainments, program participation, health, and behavior by poverty status between the prenatal year and age 5



Note: "Close to the poverty line" includes average cash incomes 1-2 times the poverty line. "Well above the poverty line" includes incomes that averaged at least twice the poverty line. In 2005, the poverty line for a family of three was $15,736.

Table 1: Impacts of Additional Income on Adult Outcomes for Children Who Are Poor When They are Young

	We estimate that it would take $4,326 per year to eliminate early childhood poverty An added $4,326 of annual income prior to age six…	
	is estimated to change outcomes for poor children from…	to…
Years of schooling completed	**11.8 years**	**12.0 years, or an increase of .18 years**
Annual earnings	**$17,115**	**$22,027 or an increase of 29%**
Annual work hours	**1,512 hours**	**1,700 or an increase of 12%**
Food stamps	**$810**	**$666 or a decrease of 18%**
AFDC/TANF (females only)	**$231**	**$87 or a decrease of 62%**
Percent with "fair" or "poor" overall health	12.9%	10.8%, a non-significant change
Percent with high levels of psychological distress	6.0%	4.0%, a non-significant change
Percent ever arrested (males only)	28.1%	28.2%, a non-significant change
Percent with non-marital birth before age 21 (females only)	52.4%	52.4%, a non-significant change

Note: "non-significant" indicates that we could not be confident that the estimated relationship between the added income and the change in the given outcome was different from zero.

Appendix on Procedures

We sought to estimate the influence of low family income prior to school entry on children's adult achievement, health and behavior. To secure these estimates, we used 1968-2005 data from the Panel Study of Income Dynamics (PSID), which has followed a nationally-representative sample of families and their children since 1968 (http://psidonline.isr.umich.edu/). Our general strategy was to select children observed in the PSID between the prenatal year and at least age 21, use the PSID's careful annual measurements of family income to compute average income during both the early (prior to age six) and later periods of childhood, and then relate childhood income to the children's adult earnings, completed schooling, crime, non-marital childbearing, physical health, and mental health.

Sample

We selected all PSID sample individuals who were tracked in the annual interviews between their prenatal year and at least age 21. Drawing on PSID interviewing waves 1968-2005, this amounted to the eight cohorts born between 1968 and 1975. We required these individuals to be in response families in at least 12 of the 17 years from the prenatal period to age 15. Additional sample restrictions varied along with the dependent variable. In the case of completed schooling, we required that completed schooling be observed when the individual was 25 or older. In the case of crime, information about the individual had to have been gathered in 1995, the year in which crime questions were asked. In the case of earnings, work hours, and program assistance the individual had to have been observed at least once after age 25. In the case of physical health, information about the general health of the individual had to have been gathered at age 21 or later. In the case of mental health, the individual had to have responded to the 2003 interview wave questions on psychological distress.

Childhood Income

We used the PSID's edited measure of annual total family income, inflated to 2005 levels using the Consumer Price Index. To adjust for the time value of money, we further discounted all income amounts to the child's birth year, using a discount rate of 3%. We averaged these annual income measures across three periods: the prenatal year[5] through the calendar years in which the child turned 5; ages 6-10; and ages 11-15. To account for a differential impact of increments to low as opposed to higher family income, we allowed the coefficients on average income within each childhood period to have distinct linear effects for average incomes up to $25,000 and for incomes $25,000 and higher.

Adult Outcomes

Dependent variables in our analyses spanned achievement, health, and behavioral domains. The adult *work hours* and natural logarithm of the child's *adult earnings* was gleaned from all available reports of annual earned income and work hours reported by or for the child when the child was age 25 or older. As with childhood income, we inflated the dollar values of earnings to 2005 price levels using the Consumer Price Index (CPI) and discounted all earnings amounts to

age 25, using a discount rate of 3%. To adjust for age and calendar year effects, we regressed all of these earnings observations, including those reporting zero earnings, on age and calendar year dummies, obtained residuals, and then used the sum of the residuals and the overall sample mean earnings, averaged across all available years for a given individual and then logged, as our dependent variable.

Years of *completed schooling* are based on the most recent report of schooling available in the data. In all cases, the report was taken when the individual was at least 22 years old and in most cases the individual was at least 25.

Food stamp and *AFDC/TANF* are measured at the household level and are taken from all available surveys when the child was age 25 or older.[6] We created calendar-year values of both programs, inflated the values to 2005 price levels using the CPI, and discounted all values to age 25 using a discount rate of 3%. Like average annual earnings, we adjust for age and calendar year effects by regressing all food stamp and AFDC/TANF values on age and calendar year dummies, obtained the residuals, and calculated the average residuals and sample mean values across all available years for a given individual.

Our measure of *poor overall health* was based on the most recent response to the question "I have a few questions about your health, including any serious limitations you might have. Would you say your health in general is excellent, very good, good, fair, or poor?"[7] Individuals are considered in poor health if they responded that their health was either fair or poor.

Our measure of *psychological distress* was based on responses to a 2003 administration of the K-6 Non-Specific Psychological Distress Scale, developed by Dr. Ronald Kessler of the Harvard Medical School. It includes six items, ranging from 'All of the Time' = 4, 'Most of the Time' = 3, 'Some of the Time' = 2, 'A Little of the Time' = 1, and 'None of the Time' = 0. The questions are: "Now, I am going to ask you some questions about feelings you may have had over the past 30 days. Please answer using one of the following choices: all of the time, most of the time, some of the time, a little of the time, none of the time. In the past 30 days, about how often did you feel: i) so sad nothing could cheer you up?; ii) nervous?; iii) restless or fidgety?; iv) hopeless?; v) that everything was an effort?; vi) worthless? The scores are summed; a score of 13 or higher is considered to be the threshold for the clinically significant range of the distribution of nonspecific psychological distress, which we refer to here as "high distress."[8]

Our *crime* outcomes consisted of responses to questions asked in the 1995 interviewing wave regarding past arrests and time in jail. A dichotomous "arrest" outcome was coded for an affirmative response to the question: "Not counting minor traffic offenses, (has he/has she/have you) ever been booked or charged for breaking a law?" A dichotomous "jail" outcome was coded for an affirmative response to the question: "(Has he/Has she/Have you) ever spent time in a corrections institution like a jail, a prison or a youth training or reform school?" Owing to the infrequency of arrest and incarceration among females, this analysis was restricted to males.[9]

Our *teen birth* outcome is based on a dichotomous indicator of whether the individual (females only) reported a non-marital birth prior to her 21st birthday in the PSID's fertility and marital histories.

Control Variables

To avoid attributing to income what should be attributed to correlated determinants of both childhood income and our outcomes of interest, we included the following control variables in all of our regressions: i) dummy variables for seven of the eight birth years; ii) race (black, other, with white the reference category); iii) child sex (male=1); iv) whether the child's parents were married and living together at the time of the birth; v) the age of the mother at the time of the birth; vi) whether the child lived in the South at the time of the birth; vii) the total number of siblings born to the child's mother; viii) years of completed schooling of the household head (usually the father in two-parent households, the mother in single-parent households) of the child's household in the birth year; and ix) the head's score on a sentence completion test administered in the 1972 interviewing wave. Because we used the most recently available report of self-rated health, this analysis also includes calendar year dummy variables for when the individual's report was taken.

Regression Procedures

All of our regressions were run in STATA and adjusted for the PSID's complex survey stratification and clustering using STATA's *svy* commands. Continuous outcomes (*ln* earnings, work hours, and completed schooling) were analyzed with OLS; measures with substantial concentrations of zeroes (food stamp and AFDC/TANF receipt) were analyzed with Tobit regressions;[10] dichotomous outcomes (poor health, high distress, ever arrested, ever jailed, and non-marital birth before age 21) were analyzed with logistic regression. The arrest and incarceration models are only run on males, whereas the AFDC/TANF and non-marital childbearing models are only run on females. To facilitate their interpretation, logistic regression coefficients and standard errors are expressed in the tables in the form of marginal effects on the probabilities of the given event occurring.

Descriptive Statistics

Case counts, means, and standard deviations of all of our outcome variables are provided in Appendix Table 1, and these are the data used in Figure 1. The summary statistics presented in Appendix Table 1 are weighted using the weight for the year in which the outcome was measured (high distress, arrest, and incarceration), or the most recent weight of the PSID for earnings, work hours, food stamp and AFCD/TANF receipt, and non-marital childbearing. Appendix Table 2 presents the weighted means and standard deviations of the control variables. Descriptive statistics are presented for both the overall sample and for children whose prenatal-to-age-5 incomes averaged: i) below the official poverty line; ii) between one and two times the poverty line; and iii) more than twice the poverty line. The final column of Appendix Tables 1 and 2 provides information on the statistical significance (at $p<.05$ or below, two-tailed test) of the mean differences across the three groups.

In almost every case, the mean outcomes for children with prenatal to age-5 incomes below the poverty line are significantly worse than outcomes for children with incomes more than twice the poverty line. These differences are not significant for high distress or incarceration. In the case of schooling, the difference between those who were poor and those with early childhood

incomes greater than 200% of the federal poverty threshold is greater than one standard deviation in size. Differences in earnings exceed one standard deviation, children who were poor receive 12 times the value of food stamps, and women who were poor receive over five times more AFDC/TANF.

Appendix Table 2 reports the weighted descriptive statistics of the childhood period income measures and control variables for the total sample, as well as by poverty status in early childhood. Not surprisingly, children with average annual incomes below poverty in the earliest period have lower average income in all three periods compared to the other two groups. Additionally, the poorest children are less likely to be White and born into an intact family, and more likely to be born in the South, have younger mothers, have more siblings, and have household heads with lower test scores and educational attainment compared with their higher income counterparts.

Regression Results

Results from our various regression models of adult outcomes are summarized in Appendix Tables 3 (with the achievement outcomes), 4 (with public assistance and health outcomes), and 5 (with behavioral outcomes). Coefficients and standard errors for the childhood-stage-specific income variables are presented first. For each stage's income, two coefficients are presented, the first reflecting the estimated effect of an additional $10,000 of annual income in the given stage for children whose income in that stage averaged less than $25,000, and the second reflecting comparable effects for higher-income children. The column labeled "Different slopes" reports results from a statistical test of the null hypothesis of equal within-period slopes. Regression coefficients and standard errors on the other two pairs of income segments, as well as the other variables in the models, are also shown in the tables. The final row shows results for a test of equality of all three <$25,000 segment slopes.

Appendix Table 3 shows that additional income in the prenatal-to–age- 5 period for the lowest-income children is associated with significantly greater schooling, earnings, and work hours in adulthood. In particular, an additional $10,000 per year of family income is associated with an increase of .42 years of schooling, 435 additional work hours and an increase in the natural logarithm of adult earnings of .584 – or 79.3%.[11] The p-values reported in the "Different slopes" column indicates that the slopes for those with incomes less than $25,000 per year in the respective period is significantly different from the slope for those with incomes greater than $25,000 in the same period. For example, in the case of schooling, the $p < .05$ indicates that the slope on annual income between prenatal and age 5 under $25,000 (.416) is significantly different than the slope on annual income between prenatal and age 5 over $25,000 (.008). The final row of Table 3 indicates that the three coefficients on the <$25,000 spline slopes across the childhood stages are significantly different from one another in the case of work hours and earnings ($p<.10$), but not schooling.[12]

Appendix Table 4 presents findings from Tobit spline regressions for food stamps for the entire sample and AFDC/TANF receipt for women, and the marginal effects from logistic spline models for poor health and high distress. These findings suggest that increases in income in the early childhood period are associated with large and statistically significant reductions in both

food stamps (for a combined male and female sample) and in AFDC/TANF (females only).[13] In the case of food stamps, the coefficient implies a $340 decrease in annual food stamp use for a $10,000 increase in early childhood income for those below $25,000. For AFDC/TANF, the corresponding reduction for the female sample is $338. In both cases, the slopes between the two income segments in early childhood are significantly different from one another.

Appendix Table 5 presents marginal effects for the behavioral outcomes for men (arrests and jail) and women (non-marital childbearing). The early childhood income segments are not statistically significant in any of these models.

How Robust are the Results?

Estimated effects from regression models such as ours are sometimes sensitive to small changes in assumptions or construction of measures. We investigated this possibility in the following ways.

First, we worried that our estimates of the effects of early childhood income might be sensitive to the age range chosen to represent early childhood, perhaps because particular years (e.g., the prenatal year or ages 4-5) are more important than others. We experimented with various ways of grouping the prenatal and early childhood years and found no consistently powerful subset of years.

Second, since discounting income in not common in studies such as ours, we estimated undiscounted models and models using a 5% discount rate. Again, the results proved insensitive to these changes. For example, in our log earnings models, discount rates of 0%, 3% and 5% produced coefficients (standard errors) on the low-income slope for early-childhood income of .54 (17), .58 (.19) and .55 (.16).

Third, our data only cover earnings and public assistance receipt between ages 25 and up to age 37 for those in the earliest cohort, so it is uncertain how many years the earnings and assistance increments could be sustained. We estimated a model in which the spline segments were interacted with the average age at which earnings are measured, and we estimated a near zero coefficient (-.003 per year of average age) and a standard error of .014. This indicates that the proportionate effect of early poverty does not change with age, so our estimated impacts can be assumed to persist for at least the 13-year period (age 25-37) covered in our data. In the case of food stamps and AFDC/TANF, the interaction was positive and, in the case of AFDC/TANF, statistically significant, indicating that the impact of early childhood income becomes less negative with age. In light of this, we chose to confine our estimates of public assistance to the age 25-37 span of the data.

Fourth, we estimated sibling (family fixed-effects) models relating sibling differences in childhood-stage specific income *differences* to sibling differences in earnings, hours worked, schooling, and our other outcomes. We found that sibling variability was not sufficient to produce reasonably precise estimates of the income splines.

Fifth, weighting and survey design adjustments can sometime produce substantial changes in coefficients and standard errors. Some of the results proved sensitive to weighting. In the case of earnings, we report a weighted coefficient of .584; the corresponding unweighted, but survey-sampling adjusted, coefficient is .251 ($p < .05$). Similarly, the coefficient for completed schooling declines to .207, the coefficient for annual work hours declines to 182, and smaller coefficients are seen in the food stamp and AFDC/TANF results. This sensitivity is worrisome and suggests that there may be interactions between early income and demographic characteristics associated with PSID weights.[14] For the unweighted earnings model, we found a fairly large and statistically significant difference in the coefficients of whites and blacks, with larger effects for whites than blacks. For the hours worked model, as well as the government assistance model for women, we found non-significant differences between blacks and whites. Given the population perspective taken in our analysis, and the design of the weights to produce population estimates, we report the weighted results. Use of the unweighted earnings coefficients would cut our estimated earnings-related benefits of eliminating early childhood poverty by about half.

Appendix Table 6 presents some additional analysis designed to investigate the robustness of the prenatal-to-age-5 low-income coefficients is a number of ways. The coefficients and standard errors in the first column are the same as those presented in the regression tables (Appendix Tables 3 through 5). In the second column, we include all of the control variables, but exclude income from the other childhood stages (age six to ten and age 11 to 15). This almost certainly overstates the unique contribution of early childhood income, but it gives some idea of the role played by holding later childhood income constant.

The third column includes all of the basic controls and the three sets of income splines, as well as two additional variables to proxy for unobserved family characteristics that may be associated with low family income and the outcomes being measured. We use the 1968-72 average response to an interviewer observation regarding the cleanliness of the respondent's dwelling and the 1968-72 average of an index of parental expectations for children. The fourth column includes the basic controls and income segments, as well as stage-specific controls for the average annual work hours of the mother.

The fifth column repeats the Appendix Tables 3 through 5 analyses, except that childhood income is not discounted – a change that has very small effects on estimated coefficients. The sixth column presents the coefficients and standard errors from regressions that include all of the basic controls, but in this case maternal earnings have been subtracted from all three stage-specific income variables. This helps to address the methodological challenge posed by the fact that childhood income is a function of mothers' earnings, and that mothers' labor supply decisions have implications for the amount of time mothers can spend with their children and may be affected by how successful the child's development is viewed by the family.

Finally, the last column includes both the basic controls, as well as a measure of permanent childhood income (all-childhood-year average between prenatal and age 15) and just the early childhood component. In this case, the coefficient on the early income component shows the coefficient *difference* from permanent income.

In virtually all of these specifications,[15] early childhood income continues to be a significant predictor of adult earnings. Since these earnings effects drive the benefit/cost calculations, we are confident that our general conclusions regarding the economic benefit to eliminating poverty early in childhood are robust.

What About Costly Outcomes in Childhood?

We have focused our efforts on estimating links between poverty early in life and adult outcomes. While childhood outcomes, such as achievement test scores, might also be affected by poverty, it is not clear how test score differences should be treated in estimating the economic costs of early-childhood poverty. Suppose that higher test scores benefit society in two ways – by making workers more productive and by reducing the chance that a youth would commit costly crimes. Since our analysis already includes these outcomes, attempting to add some independent estimate of the economic value of test scores would double-count benefits.

In other cases, such as avoiding grade failure or assignment to special education classes, the social benefits are more straightforward, since providing teachers and classrooms for an extra year of class or for special education services is costly for taxpayers.[16] Lacking a reliable measure of grade failure and special education for our cohorts, we conducted an analysis of these outcomes using data from the PSID's 1997 and 2002 Child Development Supplements. Our models paralleled those used in estimating the adult outcome models. We examined whether the child had to repeat a grade or was ever assigned to a special education class. Our key independent variable was average annual income between the prenatal year and age 5. Control variables were similar to those in the adult regressions, with one important exception: since grade failure and assignment to special education could happen shortly after age 5, we did not control for income after age 5.

In the case of grade repetition, the coefficients suggested that an additional $10,000 of family income between the prenatal year and age 5 was associated with a 1.6 percentage point drop in the probability of grade failure, although the coefficients were not statistically significant at conventional levels ($p = .14$). Experimentation with alternative sample definitions and treatment of missing data produced results that were, at best, at the margin of statistical significance. Likewise, in the case of special education, the sign of the low-income coefficients was consistent with the hypothesis of lower rates of placement in special education, but in this case, the statistical significance was even less ($p = .33$). Given the statistical insignificance of these coefficients, we did not include school-related benefits that might be associated with the elimination of early-childhood poverty.

How Convincing are the Regression Estimates?

Among the many approaches to estimating the causal impacts of childhood income on adult outcomes, ours is more sophisticated than some but less sophisticated than others. It is the first study to link high-quality income data across the entire childhood period with adult outcomes measured as late as age 37. On the other hand, the incomes we observe are determined, in part, by the actions of parents and other family members, which leaves them open to omitted-variable bias. Our list of control variables includes a parent's test scores (as well as schooling), which

helps reduce bias. More important, and unusual for studies such as ours, is that our estimates of the impacts of early childhood income control for income in middle childhood and adolescence. It is difficult to think of omitted variables correlated strongly with our outcomes and with early childhood income that would not also correlate with income at other stages. The usual suspects, such as genetic influences, are as likely to affect later and early childhood income, and thus be controlled, in some degree, by our inclusion of income in other childhood stages. Nevertheless, the possibility of lingering omitted-variable bias remains.

Translating Regression Results into Aggregate Effects

Given the scaling of the income measures, the regression results presented in the appendix tables provide estimates of the adult impacts of adding $10,000 per year to the family incomes of children in low-income families across the early childhood period. In order to translate these effect sizes into those likely to result from the elimination of poverty in early childhood, we undertook the following steps.

First, we obtained Current Population Survey (CPS) estimates of the U.S. "poverty gap" for families with children under age 6.[17] The gap is calculated as the total amount of money that would need to be added to family income to bring every poor family's income just up to the poverty line.[18] In terms of cash income, this gap amounted to $30.5 billion in 2004 for the 3.415 million poor U.S. families with young children. Using an expanded definition of income ("disposable income," in Census Bureau terminology) that includes near-cash benefits and subtracts taxes, the gap amounted to $19.0 billion for the 2.622 million families with young children who were poor in terms of disposable income.

We next converted these family-based estimates to child-based estimates. In the CPS, the average number of children under age 6 per poor family was 1.44 – a figure virtually identical to its counterpart in the PSID. Dividing, one obtains the 2004 poverty gap per poor child under age 6 of $6,196 using cash income and $5,043 using disposable income.

Since our interest is in poverty gaps across the seven-year period between the prenatal year and the child's sixth birthday, we needed to convert single-year poverty gaps into seven-year poverty gaps. We used the PSID for this purpose, drawing data from all PSID individuals born between June 1992 and June 1997 whose cash incomes were observed across the prenatal-to–age- 5 period.[19] We calculated seven-year poverty gaps for these individuals as the amount of money (in 2005 dollars) needed to bring their seven-year total cash incomes up to their corresponding seven-year total poverty thresholds. We also calculated CPS-type single-year poverty gaps using the PSID and obtained a conversion factor (5.35) in going from single-year to seven-year poverty gaps. Using this conversion factor, we calculated that it would require a total of $33,149 to bring poor children's families up to the poverty line across the entire period up to age 5. Converting to an annual amount and adjusting for a 3% discount factor, this amounts to **an average poverty gap of $4,326 per year**. Corresponding calculations show that **it would take $7,066 per year to bring children with families below 150% of the poverty line up to that threshold.**

With these per-child annual poverty gaps and the regression results from Appendix Tables 3-5 in hand, we can develop estimates of the economic impacts of closing the poverty gap during early

childhood. We explain our procedures separately for the three outcomes that appeared to be affected by early childhood income – adult earnings and food stamp and AFDC/TANF receipt.

Regression results presented in Appendix Table 3 show that an additional $10,000 per year of family income is associated with an increase in the natural logarithm of adult earnings by .584 – or 79.3%. (Analyses not shown in the table found that this percentage increment was nearly identical for males and females.) Based on the CPS and PSID, it appears that closing the poverty gap would cost $4,326, rather than $10,000, per year, so the log earnings impact of closing the gap is $e^{.4326*.584}$, or 28.7%.

Key questions are: to what earnings amount and for what period of time should the 28.7% increment be applied? We developed two estimates of earnings gains, the first assuming that the 28.7% gains last 13 years – over the 25-37 year age span covered by our data – and the second that the gains last the 30 years from age 25 to 54. With regression results indicating that the proportionate impact of early childhood poverty increased over the ages for which we are able to track the sample (ages 25 to 37), the 13-year assumption seemed a solid lower bound. Using the $17,114 observed earnings for sample individuals who were poor in early childhood and applying a 3% discount rate beginning at age 25 produces a 13-year earnings gain estimate of $53,884. If the gains were to persist for 30 years, the $17,114 earnings average held for the full 30 years,[20] and we discount back to age 25 at 3%, then the 30-year gain amounts to $99,308. The corresponding gains from raising family income to 150% of the poverty level are $105,000 and $193,000. Thus:

- **We estimate that eliminating early childhood poverty among today's young adult workers would boost the lifetime earnings of each by an average of between $53,000 and nearly $100,000.**

- **Nationally, there are roughly four million young adults of any given age. With 366,800 (9.1%) of them estimated to have spent their early childhood in poverty, the aggregate earnings benefit of eliminating early childhood poverty for all children born in a given year amounts to between $20 billion and $36 billion.**

- **Raising poor children to 150% of the poverty level, which many believe is necessary to allow a family to provide the "basics," is estimated to boost lifetime earnings by between $105,000 and $193,000.**

In the case of food stamps and AFDC/TANF, regression results presented in Appendix Table 4 show that an additional $10,000 per year of family income is associated with a decrease in annual food stamp receipt of $339 and a decrease of $265 for female AFDC/TANF receipt.

- **When these average annual amounts are translated into per child savings from eliminating early childhood poverty, they total $1,600 and $1,250.**

- **For the 366,800 adults of any given age estimated to have spent their early childhood in poverty, the aggregate benefit of eliminating early childhood poverty for all children born in a given year amounts to $820 million.**

- **When income is raised to 150% of poverty, lifetime reduction in food stamp receipt comes to $2,603, and cash welfare benefits are reduced by $2,041.**

Costs and Benefits

We have estimated the cost of closing the early childhood poverty gap to be $4,326 per child per year, for a seven-year total of $33,149 per child. Corresponding earnings benefits have been estimated to range from $53,000 to $100,000 per child, savings owing to reduced food stamp expenditures to be $1,600, and reduced AFDC/ TANF expenditures to be $1,250 per female.

It is tempting to conclude that the earnings and public assistance benefits of eliminating early childhood poverty alone are sufficient to justify the $33,149 cost. That conclusion is not necessarily warranted, however, for several reasons. A first consideration is the temporal nature of the costs and benefits. The cost of poverty reduction early in childhood precedes the onset of earning and public assistance benefits by two decades. Any positive discounting of future costs and benefits will lead to a reduction in the size of benefits relative to costs.

If we retain the estimates of benefits, which have been discounted back to age 25, we need to estimate an age 25 counterpart figure for the $33,149 cost. At a reverse discount rate of 3%, a dollar at birth is worth $2.09 at age 25, so the $33,149 cost[21] of eliminating poverty in early childhood translates into a $69,281 cost at age 25. This, then, is the cost figure to be compared with the $53,000 to $99,000 earnings benefit, the $1,600 reduction in food stamps, and the $1,250 reduction in AFDC/TANF. Using 150% of the poverty line as the income threshold, the corresponding cost of eliminating low income in early childhood is $113,000, which would then be compared to earnings increases of between $105,000 and $193,000, with AFDC/TANF reductions of $2,041 and food stamp reductions of $2,603.

A second consideration is the perspective from which costs and benefits should be viewed. Cost-benefit accounting typically distinguishes costs borne by and benefits accruing to the poor child (and his or her family) and the rest of society (commonly referred to as "taxpayers"). Summing across these two groups provides estimates of total social costs and benefits. Although policymakers sometimes choose to focus only on taxpayers' costs and benefits, economic logic stresses the need to compare total resource costs, regardless of the degree to which they are borne by taxpayers or participants, and total benefits, regardless of whether they are enjoyed by taxpayers or only by participants. If total benefits exceed total costs, then the program constitutes a worthy social investment. Who pays and who benefits may be important politically, but not economically.

Suppose we adopt a *taxpayer's* perspective. As mentioned above, the cost of eliminating poverty prior to age 6 is $69,281. The higher earnings generated by this transfer will benefit taxpayers in the form of higher tax revenues. Assuming that 20% of earned income is taxed away by Social Security, Medicare, and income taxes,[22] the $53,884 earnings benefit would generate $10,777 for taxpayers. At the high end, $99,308 in higher earnings generates $19,861 in tax revenues.

The reductions in food stamps and AFDC/TANF expenditures are an obvious benefit to taxpayers. In fact, taxpayer benefits are likely to be somewhat larger than the reduction in paid benefits, since administrative costs should fall as well. Some estimates suggest that administrative costs account for 28% for the food stamp program in 2001[23] and that these costs

amount to about 30% of AFDC/TANF benefits[24]. This implies that the $1,600 reduction in Food Stamp benefits estimated to result from the elimination of early-childhood poverty translates into a $2,000 benefit per poor child in Food Stamp savings. For AFDC/TANF, the taxpayer benefit is $1,600 (=$1,250 times 1.30). All told:

- **Total taxpayer benefits of eliminating early childhood poverty range from $14,200 and $23,600 per poor child.**
- **Taxpayer benefits of bringing poor children's family income up to 150% of poverty is correspondingly greater, with increased tax revenue accounting for most of the increase and reductions in AFDC/TANF adding smaller sums.**

It proved impossible to quantify the education impacts that we estimated. Education's role in boosting earnings, reducing social assistance, promoting health, and reducing crime or out-of-wedlock childbearing are already included in our estimates of poverty's impacts on those outcomes. Still other possible social benefits, such as better citizenship or higher social integration for the children of our target children, have not been included.

From the *poor child's* perspective, the poverty-eliminating transfer will eventually generate higher after-tax earnings but it will also have the more immediate benefit of enabling families of the children to meet more basic needs and, more generally, lead happier lives. It is difficult to attach a dollar value to this increase in utility.

Appendix Table 1: Weighted Descriptive Statistics of Adult Outcomes by Prenatal to Age 5 Poverty

	Total Sample		Income below the official poverty line		Income between one and two times the poverty line		Income more than twice the poverty line		Significant Differences
			(A)		(B)		(C)		
	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD	
Completed schooling	13.40	2.14	11.81	1.81	12.94	2.07	14.10	1.96	A<B,C; B<C
Unweighted n	*1,397*		*338*		*499*		*560*		
Earnings (2005$ not discounted)	34462.80	30815.19	17114.60	14440.33	29810.31	21762.53	40752.37	35467.50	A<B,C; B<C
Unweighted n	*1,111*		*234*		*388*		*489*		
Annual work hours	1887.33	700.72	1512.88	764.52	1942.70	737.35	1936.66	639.59	A<B,C
Unweighted n	*1114*		*234*		*389*		*491*		
Food stamps (2005$ not discounted)	202.92	702.62	810.77	1343.83	205.32	681.16	65.84	343.96	A>B,C; B>C
Unweighted n	*1,271*		*287*		*452*		*532*		
AFDC/TANF (2005$ not discounted; women only)	117.77	593.42	231.02	855.55	197.54	771.77	41.85	318.03	A>C
Unweighted n	*649*		*171*		*221*		*257*		
Poor health	7.64%	---	12.90%	---	9.01%	---	5.53%	---	A>C
Unweighted n	*1,292*		*285*		*465*		*542*		
High distress	3.74%	---	5.96%	---	3.03%	---	3.77%	---	ns
Unweighted n	*769*		*149*		*256*		*364*		
Arrested (men only)	16.49%	---	28.09%	---	17.48%	---	13.38%	---	A>C
Unweighted n	*796*		*173*		*290*		*333*		
Incarcerated (men only)	8.78%	---	13.87%	---	10.70%	---	6.59%	---	ns
Unweighted n	*796*		*173*		*290*		*333*		

	Total Sample		Income below the official poverty line		Income between one and two times the poverty line		Income more than twice the poverty line		Significant Differences
Nonmarital birth (women only)	18.58%	---	52.42%	---	20.51%	---	8.34%	---	A>B,C; B>C
Unweighted n	*836*		*217*		*297*		*322*		

Note: Significant differences column indicates the mean differences are significant in tests using STATA survey analysis and weights. A<B signifies that the mean of those less than the poverty line is statistically significantly smaller than those between 1 and 2 times the poverty line at $p < .05$ (two-tail). A>B signifies that the mean of those less than the poverty line is statistically significantly larger than those between 1 and 2 times the poverty line at $p < .05$ (two-tail).

Appendix Table 2: Weighted Descriptive Statistics of Control Variables by Prenatal to Age 5 Poverty

	Total Sample		Income below the official poverty line		Income between one and two times the poverty line		Income more than twice the poverty line		Differences
			(A)		(B)		(C)		
	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD	
Prenatal to age 5 average annual income (2005$)	49149.55	27774.31	22582.36	14558.32	37018.05	12208.31	63927.41	28445.47	A<B,C; B<C
Age 6 to age 10 average annual income (2005$)	58733.15	35850.14	26343.56	20024.47	47527.24	20750.76	74521.94	38021.07	A<B,C; B<C
Age 11 to age 15 average annual income (2005$)	69630.27	48154.03	30753.18	25557.08	56093.30	28824.19	88635.29	53041.92	A<B,C; B<C
White	77.16%	---	34.64%	---	75.11%	---	90.03%	---	A<B,C; B<C
Black	16.59%	---	54.17%	---	18.67%	---	5.06%	---	A>B,C; B>C
Other minority	5.21%	---	10.86%	---	5.77%	---	3.32%	---	A>C
Male	53.32%	---	53.16%	---	52.79%	---	53.69%	---	ns
Born into intact family	85.35%	---	49.33%	---	84.24%	---	95.85%	---	A<B,C; B<C
Born in the South	31.47%	---	50.65%	---	35.26%	---	23.88%	---	A>B,C; B>C
Age of mother at birth	25.41	5.88	24.56	7.07	24.27	6.31	26.34	5.04	A,B<C
Number of siblings	2.25	1.80	3.67	2.88	2.56	1.67	1.67	1.10	A>B,C; B>C
Household head test score (1972)	9.57	2.14	7.76	2.44	9.36	1.93	10.20	1.85	A<B,C; B<C
Household head schooling (1972)	11.77	3.38	8.39	3.89	11.07	2.99	13.14	2.57	A<B,C; B<C
Unweighted n	*1,723*		*419*		*629*		*675*		

Note: Significant differences column indicates the mean differences are significant in tests using STATA survey analysis and weights. A<B signifies that the mean of those less than the poverty line is statistically significantly smaller than those between 1 and 2 times the poverty line at $p < .05$ (two-tail). A>B signifies that the mean of those less than the poverty line is statistically significantly larger than those between 1 and 2 times the poverty line at $p < .05$ (two-tail).

Appendix Table 3: Coefficients and Standard Errors from OLS Spline Models of Childhood Income and Completed Schooling and Adult Earnings and Annual Work Hours

		Years of completed schooling		ln Earnings (age 25-37)		Annual hours worked (age 25-37)	
Childhood income (in $10,000)			Different slopes?		Different slopes?		Different slopes?
Annual income prenatal to age 5	<$25K	.416* (.178)	$p < .05$	.584** (.191)	$p < .01$	435.5** (102.9)	$p < .001$
	>$25K	.008 (.051)		.032* (.014)		17.0 (8.8)	
Annual income age 6-10	<$25K	.279 (.172)	ns	.118 (.137)	ns	-61/0 (101.7)	ns
	>$25K	-.003 (.060)		.021 (.022)		9.1 (10.7)	
Annual income age 11-15	<$25K	.128 (.185)	ns	.087 (.097)	ns	123.9 (67.9)	$p < .10$
	>$25K	.101** (.048)		.000 (.019)		-15.2 (9.2)	
Other variables							
Black		.757** (.269)		.179 (.119)		4.4 (72.2)	
Other minority		.101 (.400)		-.091 (.266)		-306.6 (153.8)	
Child is male		-.423** (.105)		.541** (.066)		535.6** (44.4)	
Child born into intact family		.700** (.240)		.006 (.091)		-31.7 (75.5)	
Child born in South		-.191 (.176)		-.116 (.077)		-62.9 (49.5)	

		Years of completed schooling		ln Earnings (age 25-37)		Annual hours worked (age 25-37)	
Age of mother at time of birth		.035* (.014)		-.002 (.008)		-3.4 (6.7)	
Number of siblings		-.150** (.053)		-.035 (.025)		-12.0 (14.8)	
Household head test score in 1972		.060 (.045)		-.014 (.014)		-21.2 (15.7)	
Household head schooling in 1972		.136** (.030)		.034* (.012)		8.7 (10.5)	
Birth year dummies included?		Yes		Yes		Yes	
Regression statistics							
R-squared		.244		.225		.230	
Number of observations		1,383		1,085		1,103	
p level of test of equality for the three <$25K spline segments		.538		.070		.022	

Notes: * indicates p<.05; ** p<.01
Sample consists of PSID children born between 1968 and 1975. Incomes are in 2005 dollars and are discounted back to the birth year using a 3% interest rate. Earnings are in 2005 dollars and are discounted back to age 25 using a 3% interest rate. Childhood incomes are scaled in $10,000. Data in the "Different slopes?" column show p-levels of test of equality of within-period <$25K and >$25K slopes.

Appendix Table 4: Coefficients and Standard Errors from Spline Models of Transfer Program Participation and Health

		Annual Food Stamp receipt (age 25-37)		Annual AFDC/TANF receipt (females; age 25-37)		Poor Health		High distress	
Childhood income (in $10,000)			Different slopes?		Different slopes?		Different slopes?		Different slopes?
Annual income prenatal to age 5	<$25K	-340** (110)	$p < .01$	-338** (126)	$p < .01$	-.021 (.019)	ns	-.020 (.011)	$p < .10$
	>$25K	15 (16)		18 (12)		.004 (.004)		.000 (.002)	
Annual income age 6 to age 10	<$25K	-239* (99)	$p < .05$	-77 (107)	ns	-.036* (.015)	$p < .05$	.015 (.009)	ns
	>$25K	-8 (19)		-13 (21)		.011* (.005)		.006* (.002)	
Annual income age 11 to age 15	<$25K	-184* (81)	$p < .05$	124 (94)	ns	.016 (.016)	$p < .10$	-.023 (.014)	ns
	>$25K	-3 (14)		-14 (15)		-.025** (.004)		-.008** (.002)	
Other variables									
Black		215** (81)		602** (93)		.035 (.025)		-.019* (.008)	
Other minority		-2 (118)		123 (145)		-.012 (.033)		.004 (.017)	
Child is male		-162** (50)		--- (---)		.024 (.013)		-.002 (.009)	
Child born into intact family		5 (86)		297** (103)		.026* (.013)		-.002 (.013)	
Child born in South		-40 (58)		-204** (64)		.006 (.012)		.016 (.009)	

		Annual Food Stamp receipt (age 25-37)		Annual AFDC/TANF receipt (females; age 25-37)		Poor Health		High distress	
Age of mother at time of birth		-11* (5)		-11 (6)		.000 (.001)		.000 (.000)	
Number of siblings		17 (16)		10 (17)		-.003 (.003)		-.001 (.002)	
Household head test score in 1972		1 (14)		20 (16)		.004 (.003)		-.004* (.002)	
Household head schooling in 1972		-12 (10)		9 (12)		-.004 (.002)		.001 (.001)	
Birth year dummies included?		Yes		Yes		Yes		Yes	
Regression statistics									
R-squared		.029		.027		NA		NA	
Number of observations		1,258		642		1,275		769	
p-level of test of equality for the three <$25K spline segments		.531		.022		.192		.084	

Notes: * indicates p<.05; ** p<.01
Sample consists of PSID children born between 1968 and 1975. Incomes are in 2005 dollar and are discounted back to the birth year using a 3% interest rate. Food stamps and AFDC/TANF are in 2005 dollars and are discounted back to age 25 using a 3% interest rate. Childhood incomes are scaled in $10,000. Data in the "Different slopes?" column show p-levels of test of equality of within-period <$25K and >$25K slopes. Coefficients from Tobit spline regressions presented for the food stamp and AFDC/TANF analysis. Marginal effects from logistic spline regressions presented for poor health and high distress. Poor health regression also includes year of report dummy variables.

Appendix Table 5: Marginal Effects and Standard Errors from Logistic Spline models of Childhood Income and Arrests, Jailed, and Nonmarital Births

		Ever Arrested (males)		Ever Jailed (males)		Nonmarital Birth (females)	
Childhood income (in $10,000)			Different slopes?		Different slopes?		Different slopes?
Annual income prenatal to age 5	<$25K	.008 (.047)	ns	-.001 (.016)	ns	.004 (.042)	ns
	>$25K	-.011 (.014)		.007 (.007)		.011 (.013)	
Annual income age 6-10	<$25K	.002 (.061)	ns	.030 (.027)	ns	-.001 (.027)	ns
	>$25K	.025 (.015)		-.005 (.007)		-.010 (.013)	
Annual income age 11-15	<$25K	-.038 (.064)	ns	-.035 (.025)	ns	-.025 (.022)	ns
	>$25K	-.018 (.013)		-.006 (.006)		-.032* (.007)	
Other variables							
Black		-.044 (.035)		-.010 (.017)		.164** (.063)	
Other minority		-.073 (.065)		-.020 (.033)		.099 (.100)	
Child born into intact family		-.107 (.072)		-.036 (.051)		.014 (.027)	
Child born in South		-.005 (.048)		-.013 (.024)		-.041 (.031)	
Age of mother at time of birth		-.007* (.003)		-.005* (.002)		-.007* (.003)	

		Ever Arrested (males)		Ever Jailed (males)		Nonmarital Birth (females)	
Number of siblings		.022*		.006		.020*	
		(.011)		(.008)		(.009)	
Household head test score in 1972		.000		.005		-.008	
		(.008)		(.004)		(.008)	
Household head schooling in 1972		-.008		-.006*		-.003	
		(.005)		(.003)		(.004)	
Birth year dummies included?		Yes		Yes		Yes	
Regression statistics							
Pseudo R-squared		NA		NA		NA	
Number of observations		796		796		825	
p level of test of equality for the three <$25K spline segments		.084		.492		.360	

Notes: * indicates p<.05; ** p<.01
Sample consists of PSID children born between 1968 and 1975. Incomes are in 2005 dollar and are discounted back to the birth year using a 3% interest rate. Childhood incomes are scaled in $10,000. Data in the "Different slopes?" column show p-levels of test of equality of within-period <$25K and >$25K slopes.

Appendix Table 6: Coefficients and Standard Errors on Average Annual Income Prenatal to Age 5 <25K for Various Model Specification Robustness Checks

	Basic regression	No controls for age 6 to 15 income	Include two measures of home cleanliness and expectations	Include stage-specific maternal employment hours	No discounting of stage-specific incomes	Exclude maternal earnings from all childhood income measures	Controls for permanent (prenatal to age 15) income
Completed schooling	.416* (.178)	.706** (.236)	.312 (.160)	.399* (.172)	.396* (.190)	-.027 (.169)	-.104 (.312)
ln Earnings	.584** (.191)	.746** (.152)	.573** (.185)	.577** (.192)	.581* (.212)	.337** (.195)	.445 (.231)
Annual hours worked	436** (103)	470** (82)	454** (102)	431** (104)	460** (115)	232** (64)	370** (149)
Annual Food Stamp receipt	-340** (110)	-695** (94)	-371** (117)	-347** (116)	-328* (127)	-165* (78)	-103 (167)
Annual AFDC/TANF receipt (females only)	-338** (126)	-370** (119)	-435** (154)	-400* (154)	-451** (166)	-108 (99)	-368 (224)
Poor health	-.021 (.019)	-.028 (.020)	.017 (.021)	.023 (.021)	.008 (.028)	.004 (.013)	-.005 (.033)
High distress	-.020 (.011)	-.040** (.016)	-.009 (.011)	-.018 (.011)	-.018 (.010)	-.009 (.006)	-.048* (.018)
Arrested	.008 (.047)	-.012 (.045)	-.004 (.044)	.006 (.049)	.021 (.049)	.014 (.042)	.056 (.090)
Incarcerated	-.001 (.016)	.003 (.016)	-.003 (.017)	.000 (.015)	.004 (.019)	.008 (.018)	.008 (.027)
Non-marital childbearing	.004 (.042)	-.034 (.042)	.009 (.044)	.013 (.042)	.006 (.044)	.012 (.032)	.047 (.052)

Notes: * indicates p<.05; ** p<.01
Marginal effects reported for the dichotomous outcomes, Tobit coefficients reported for program participation outcomes.

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Endnotes

[1] This is the 2005 OMB poverty threshold. See http://www.census.gov/hhes/www/poverty/threshld/thresh05.html.
[2] Holzer, Whitmore-Schanzenbach, Duncan, and Ludwig (2007).
[3] Shonkoff and Phillips (2000).
[4] Cuhna, Heckman, and Masterov (2005).
[5] With income reported for calendar years and conceptions occurring continuously, there was some imprecision in matching income to the prenatal year. If a child was born prior to July 1, we took the prenatal year to be the prior calendar year. If the birth was after July 1, then the prenatal year was considered to be the year in which the birth occurred. Similarly, we defined "under age 6" as the last calendar year before the child's sixth birthday. Thus defined, our "early childhood" period consists of seven calendar years.
[6] It is common for adults under age 25 to be recipients of income from these programs. We chose 25 as our starting point since it appears that early childhood income does not become a significant correlate of transfer income receipt until about age 25 and it was difficult to assign transfer income sources to individual household members prior to around age 25.
[7] We also ran our models using a continuous measures of health assigning integer values of 1-5 for these respective categories and with an alternative scaling of excellent=100, very good=85, good=70, fair=30, and poor=0. In neither case did significant impacts of early income emerge.
[8] As with our general health measure, we also analyzed a continuous measure of distress and failed to find significant impacts of early-childhood income.
[9] Some PSID respondents are incarcerated at the time of the survey. The PSID attempts to secure interviews with these potential respondents in all such cases.
[10] Since the STATA Tobit procedure does not allow for *svy* adjustments, we estimated our Tobit models with weights. Tobit procedures also do not allow for the Huber-White correction.
[11] $e^{.584} = 1.793$, which corresponds to a 79.3 percent increase.
[12] We tested several alternative schooling specifications, including completed schooling by age 21, on time high school graduation (by age 18 or 19), had dropped out of high school as of age 21, and had attended some college as of age 21. In the case of completed schooling by age 21, we found that the coefficient on early income was .338 and statistically significant ($p < .05$).
[13] When we ran separate food stamp models for males and females, we found a much larger and statistically different effect of early poverty for females than for males. The respective coefficients and standard errors for females were -$551 (182) and for males were -$200 (86). The females coefficient has a $p<.01$; the male coefficient has a $p=.02$.
[14] DuMouchel and Duncan (1983).
[15] An exception is in the last column's test of the difference in the effect of early childhood income from "permanent" childhood income. The p-level of this difference is .06.
[16] Chambers, Parrish, and Harr (2004).
[17] Arloc Sherman of the Center for Policy and Budget Priorities kindly provided us with these estimates.
[18] In effect, this assumes no behavioral responses (e.g., working and earning less) to the increased income.
[19] A disposable income counterpart to the CPS is not available in the PSID.
[20] Note that this is quite a conservative assumption since real earnings typically increase with age and work experience, although more so for higher- than lower-skilled workers (Mincer, 1974).
[21] The $33,149 cost has already been discounted back to the birth year.
[22] A single person earning $25,000 and receiving no other income pays about 14% of it as Federal Income taxes and close to 8% in Social Security and Medicare taxes.
[23] Logan et al. (2006).
[24] Belfield et al. (2005).