Economic Costs of Early Childhood Poverty

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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 and many poor families had income well below that amount. Empirical research suggests that, relative to non-poor children, poor children are less successful in school and in the labor market; have poorer health; and be more likely to commit crimes and engage in other forms of problem behavior (see for example Holzer, Schanzenbach, Duncan, & Ludwig, 2007). Despite these associations, it is not clear to what extent poverty itself is the cause of these differences and what are the impacts of low income early in life, net of correlated family factors, on long-run adult outcomes. Additionally, the timing of poverty during the lifecourse may play a particularly important role in its association with measures of adult well-being.

Emerging evidence from human and animal studies highlights the critical importance of early childhood for brain development and for setting in place the structures that will shape future cognitive, social, and emotional outcomes (Shonkoff & Phillips, 2000). Epidemiological studies in the fetal programming literature illustrates that in utero environments directly affect adult health (e.g. Barker, 1998; Gluckman & Hanson, 2005) and parallel research in economics illustrates the importance of early environmental conditions on adult cognitive and non-cognitive skills (Cunha & Heckman, 2007; Knudsen, Heckman, Cameron, & Shonkoff, 2006). 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 (Cunha, Heckman, Lochner, & Masterov, 2005).

Our study draws on data from the Panel Study of Income Dynamics (PSID) the longest running longitudinal study of household income in the US. We selected all PSID sample individuals born between 1968 and 1975, who were tracked in the annual interviews between their prenatal year and at least age 21. 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. We measure income using the PSID 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 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.

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, nonmarital childbearing, crime, and mental and physical health.

Educational attainment is measured with years of completed schooling 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. 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 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.

Food stamp and AFDC/TANF assistance are measured at the household level and are taken from all available surveys when the child was age 25 or older. 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?" 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."

Finally, behavior variables are measured as crime for males and fertility for females. 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. The teen birth outcome is based on a dichotomous indicator of whether the individual (females only) reported a nonmarital birth prior to her 21st birthday in the PSID's fertility and marital histories.

Figure 1 presents weighted descriptive statistics of 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, received $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.

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.

All of our regressions were run in STATA and adjust 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; dichotomous outcomes (poor health, high distress, ever arrested, ever jailed, and nonmarital birth before age 21) were analyzed with logistic regression. The arrest and incarceration models are only run on males, whereas the AFDC/TANF and nonmarital childbearing models are only run on females.

Regression analysis suggests that the causal connections between early poverty and several adult outcomes proved strong enough to pass our rigorous statistical tests. Namely, we find links

between early 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.

Table 1 illustrates the regressions for years of completed schooling, annual average earnings, and annual hours worked. As shown, in the case of adult work and earnings, we estimate that a $10,000 increase in annual income early in life would boost annual work hours by 435 hours (or 24%) and earnings by 79% percent (exp (.584)) per year. When translated into the dollars needed to eliminate early childhood poverty, the latter amounts to lifetime earnings increases of between $53,000 and $100,000 per child, depending on the assumed duration of the poverty effect. In the case of education, we estimate that eliminating poverty in early childhood would boost completed schooling by about one-fifth of a year. 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.

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; suggesting the measures 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.

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

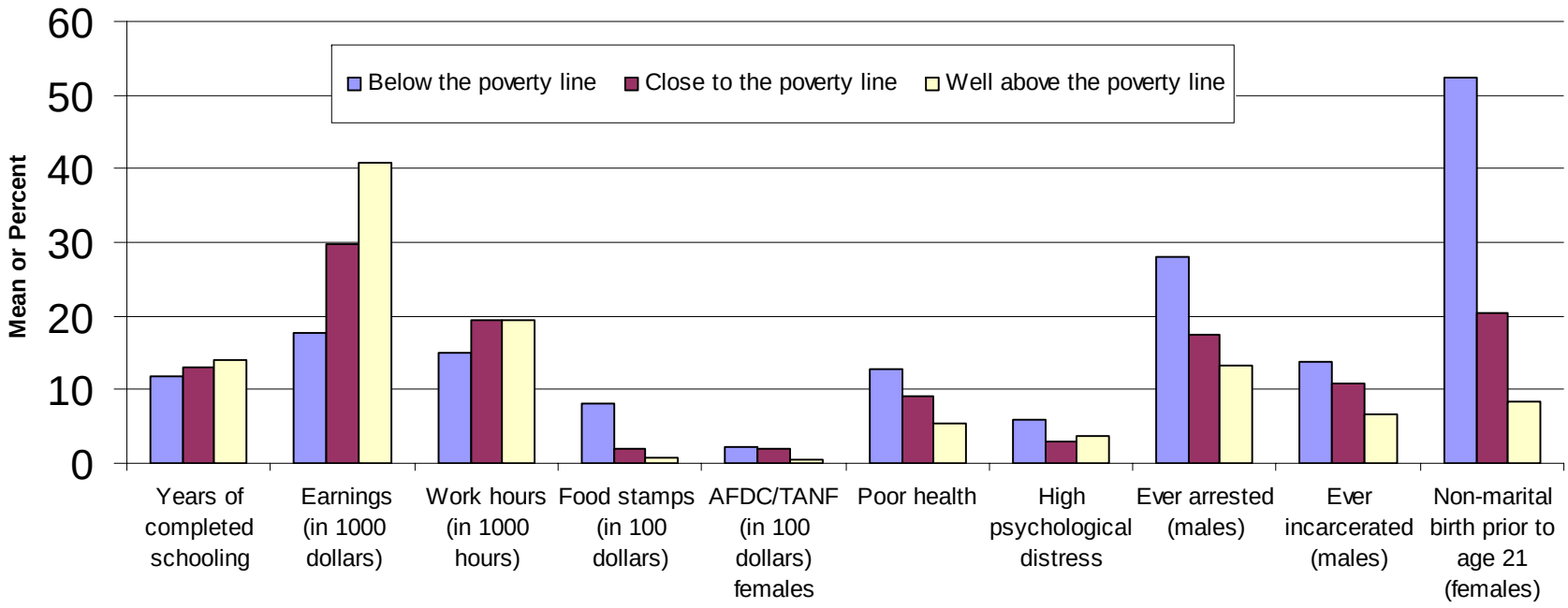

Table 1: Coefficients and Standard Errors from OLS Spline Models of Childhood Income and Completed Schooling and Adult Earnings and Annual Work Hours

		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)	
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.