Long-Run Impact of Welfare Reform on Educational Attainment and Family Structure

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Abstract

In the 1990's, the United States reformed its welfare system through state waivers and the Temporary Assistance for Needy Families program. These changes altered family resources and potential investments for childhood human capital. Using data from the Panel Study of Income Dynamics, I examine the impact of early welfare reform exposure on education and family structure through age 28. I find that as children, these individuals have higher reading test scores and utilize more formal child care. As adults, I find robust evidence that these individuals are on more likely to graduate college and more likely to be married.

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1 Introduction

In the 1990s, the Aid to Families with Dependent Children (AFDC) entitlement program was overhauled through the use of state welfare waivers and the federal Temporary Assistance for Needy Families program (TANF). This change is commonly referred to as welfare reform and was undertaken with the goals of promoting work and marriage among the primarily single mother households that benefitted from the program.

Like its predecessor, TANF provides in-kind and financial assistance to low income families with children, typically a single mother household. However, under TANF, individuals now face work requirements, time limits on assistance, stringent sanctions for noncompliance, and family caps for benefits among other conditions. While much has been written on how welfare reform immediately impacted these families (Blank, 2002; Ziliak, 2016), these rule changes can also affect household investment decisions as the mother's time and income endowments changed. However, we can only now begin to understand how the changes to the program have affected the next generation of families, as first done by Hartley et al. (2017), as TANF approaches the twenty-five-year mark.

In this paper, I examine the long-term impact of welfare reform on the educational attainment and family structure of individuals who were children when the reforms were implemented. In particular, I utilize the state by state rollout of welfare reform to test how the implementation of welfare reform before the age of five affects college attendance and completion as well as marriage and having a child born out of wedlock as a young adult. The data used is a longitudinal sample of individuals who are observed as children and young adults and comes from the Panel Study of Income Dynamics (PSID) Child Development Supplement (CDS) and Transition to Adulthood Supplement (TAS). The supplements are unique in that they follow the same sample of individuals from childhood to young adulthood, covering the years 1997 to 2017, and can incorporate family information from the core waves as well. Applying a model of the technology of human capital, (Cunha and Heckman, 2007), to welfare reform, I show that if the change in wel-

fare policies changed the investment decisions of affected mothers, then those affected children should have different levels of skills as adults. This is empirically estimated by exploiting the state variation in welfare reform implantation dates and the differential likelihood of participating in the program by family structure to estimate a triple difference (diff-in-diff-in-diff) model.

This paper is one of the first to test for the long-run effect of welfare reform on educational attainment and family structure. I also contribute to the existing literature on the short-run, or immediate, effects of welfare reform by showing that at-risk children who were exposed to welfare reform score higher on reading achievement tests by on average 7 percent of a standard deviation. I find that these same children are on average 9 percent more likely to complete college and 15 percent more likely to be married, as well as some evidence of fewer adults having children out of wedlock, an explicit goal of the TANF program. I find that increased usage of formal childcare is a likely mechanism for improvements to childhood cognitive function. Overall, these effects tend to be larger in magnitude for women than men. Using an event study model, I allow the impact of welfare reform to vary by age of first exposure. I find that early exposure to welfare reform in-utero through the age of one has the largest impact on college completion.

My results not only contribute to the existing welfare reform literature but also inform the larger literature on childhood circumstance and later life outcomes. Events and circumstances in childhood have lasting effects into adulthood. This relationship has been shown for not only intuitively important measures such as childhood health and family income (Case et al., 2005; Duncan et al., 1998), but also interrelated individual, family, and community level factors (Heckman et al., 2013; Chetty et al., 2016; Hoynes et al., 2016). The magnitude and extent of these factors should be an important consideration to policy makers when they are designing and implementing programs that are targeted for children, particularly if the goal is improving intergenerational mobility, as TANF has the potential to do.

2 The TANF Program and Prior Research

TANF was implemented in 1996, and replaced the AFDC welfare program. AFDC was a federal entitlement program that provided financial assistance to low income families with children, typically a low-educated single mother household. In the years prior to PRWORA, welfare caseloads had swelled under AFDC and starting in 1992 states started seeking and receiving waivers to experiment with their state welfare program to deal with the rising caseloads.[1] PRWORA codified many of these changes into federal law. PRWORA sought to decrease welfare dependency by moving recipients towards employment by changing the incentives AFDC recipients faced. Under TANF, individuals now face work requirements, time limits on assistance, and family caps for benefits among other conditions.

The year that a state first implemented some type of welfare reform, either a welfare waiver or TANF, is shown in Figure 1, with implementation dates taken from Crouse (1999). Thirty states implemented a major welfare waiver before TANF. Nineteen of those thirty implemented a waiver in the years before TANF was passed, 1992-1995, with the remaining states implementing either a waiver or TANF in either 1996 or 1997.[2] Figure 1 also shows the geographic variation in implementation dates with no region of states all implementing reform at the same time. As over twenty years have now passed since TANF became law, we can now begin to study its long-term impacts on the children affected. Early work on this topic comes from Hartley et al. (2017) who model intergenerational transmission of welfare use from mother to their daughters before and after welfare reform. They find that welfare reform attenuated the transmission of dependence by at least one-third. That research, as well as this paper, complements existing research that finds positive

[1] Politically, rising caseloads appeared to be the motivator for welfare reform, with Bill Clinton campaigning in 1992 to "end welfare as we know it." However, Ziliak et al. (2000) show that states with high caseloads were not more likely to request federal waivers.

[2] Hawaii and Alaska implemented welfare reform in 1997.

effects of exposure to social safety net programs as a child including ETIC, SNAP, and Medicaid (Bastian and Michelmore, 2018; Hoynes et al., 2016; Brown et al., 2017).

There are two main channels that PRWORA could affect the cognitive and noncognitive skills of children, which in turn could affect their livelihood as adults. First, PRWORA could change the income of families. Evidence on this point is somewhat mixed. Early work by Schoeni and Blank (2000) and Grogger (2003) find modest, positive effects of welfare reform on earnings, income, and poverty rates. However, the proceeding work tried to account for the heterogeneity in welfare reform and found varying effects. Work by Bitler et al. (2006a) and Bollinger et al. (2009) shows that PRWORA lowered the income of less skilled mothers in the bottom half of the income distribution and raised income among more skilled mothers. As outlined above, less income also means less resources to invest into the children though high quality child care, education, and other learning experiences.

The second avenue for PRWORA to affect childhood mental traits is the time endowment of the mother. In many states' TANF programs, adults must be engaged in an acceptable work activity, commonly defined as participation in the paid workforce and usually 20-30 hours per week. In addition, states have the option to levy a sanction equal to all or part of the welfare benefit on those who fail to comply with the work requirements. As PRWORA moved mothers to work, they have less time to spend with their children and may choose low-quality child care as a substitute. However, it is possible that attachment to work could increase the subjective well-being of mothers as found by Herbst (2013). This increase in subjective well-being could spillover to the child. Therefore, the effect of welfare reform on child cognitive development is unclear.

The evidence on welfare reform and child mental attributes is slightly mixed. Morris et al. (2009) examine the relationship between welfare reform and the achievement scores of children using 7 different welfare experiments carried out across the United States in the 1990's. For children aged five or less, the programs that were the most effective were the

ones that not only boosted employment of the mother but also raised income through an earnings supplement. Young children in these programs saw an increase in their achievement tests by 7 percent of a standard deviation.

Heflin and Acevedo (2011) examine the non-income effects of TANF participation on child cognitive development. Their results indicate that welfare receipt is associated with an 11 percent of a standard deviation decrease in child cognitive score. They find that 7 percent of the effect of TANF is through maternal stress while income accounts for 18 percent. Herbst (2014) also examines child cognitive ability but studies the impact of a specific TANF policy, the age-of-youngest-child exemptions. Following PRWORA there was substantial variation across states in regards to when a mother had to return to work following the birth of a child. Herbst uses this variation to estimate the impact of maternal employment on early life cognitive ability. His result indicates that each month of maternal work corresponds to an 8 percent of a standard deviation reduction in cognitive score.

This paper adds to this literature by estimating the effect of welfare reform on reading and math skills as well as testing for changes to noncognitive behavior. The PSID panel data allows me to test the impact of welfare reform on a variety of outcomes in childhood and adulthood relating to educational attainment and family structure. The education outcomes are a natural extension of the test scores examined in childhood and the work so far in the welfare reform literature, suggesting potential improvements to childhood human capital. The existing literature finds reduced high school drop out rates, with teenage girls showing the largest gains in completion (Offner, 2005; Miller and Zhang, 2012; Dave et al., 2012). In light of these results, I expect higher college attendance and completion rates as adults, with welfare reform potentially having stronger effects for women.

The family structure outcomes presented in this paper are motivated by two of the explicit goals of TANF, "prevent and reduce the incidence of out of wedlock pregnancies and establish annual numerical goals for preventing and reducing the incidence of these pregnancies" and "encourage the formation and maintenance of two parent families." Early

evidence of the effect of welfare reform on family structure is mixed with studies finding no robust effects (Fitzgerald and Ribar, 2004; Graefe and Lichter, 2008; Dunifon et al., 2009; Knab et al., 2009), lower rates of marriage (Bitler et al., 2004), more children living in married families (Bitler et al., 2006b), and more children in blended families (Cherlin and Fomby, 2005). This paper seeks to provide clarity to this literature by estimating the long-run impacts of welfare reform on family structure for the children of welfare reform.

3 Model

Key to this project is modeling the technology of human capital or skills production. My model is similar to the one described by Cunha and Heckman (2007), whereby skills in the current period are a function of skills and investments made previously as well as fixed family characteristics. Specifically, for any period, t $\forall t \geq 0$, the production function is written as

$$\theta_{t+1} = f(h, \theta_t, I_t), \tag{1}$$

where θ represents a vector of skills or attributes, h denotes time-invariant family and parental characteristics, and I_t is investment in human capital in the previous period.

Equation 1 can be rewritten in recursive form by substituting for θ_t, θ_{t-1}, ... repeatedly:

$$\theta_{t+1} = g(h, \theta_0, I_1, ..., I_t), \tag{2}$$

where θ_0 is the individual's endowment of skills at birth.

For simplicity, suppose that birth/prenatal is period 0, childhood is period 1, and young adulthood is period 2. In this case, I can rewrite equation (2) as:

$$\theta_2 = g(h, \theta_0, I_1) \tag{3}$$

In words, skills as a young adult are a function of fixed family characteristics, ones endowment of skills at birth, and investments made when in childhood. Applying this framework to welfare reform, the change in welfare policies potentially changes the investment decisions of affected mothers. If the child is young enough, these policy changes could also affect the decision-making of the pregnant mother, thus changing the child's birth endowment as well. Adulthood outcomes are then a function of these changes to childhood endowments and investments.

With some assumptions, equation (3) can be estimated with the use of proxies for each of the production inputs. First, I assume that the production function g is linear in inputs and is constant across time and individuals. Young adulthood human capital, θ_2, can be proxied by educational attainment and family structure. Let birth weight and being breastfed be proxies for initial skill endowment, θ_0. Early childhood exposure to welfare reform, explained in detail below, is a proxy for the family investment decisions in childhood human capital, I_1. A model with siblings and family fixed effects is also estimated to control for time-invariant parental characteristics, h.

With these assumptions, the task is to compare children affected by welfare reform to similar children who were not. Here I exploit the differential rollout of state welfare waivers and TANF implementation between the years of 1992 to 1997 to empirically estimate a triple difference model. The triple difference model allows me to compare the outcomes of adults who were exposed to welfare reform to those who were not, as a standard difference-in-difference model would, while also taking likelihood of welfare participation into account. The model is used for the childhood, short-run analysis, and the adulthood sample.

The empirical model takes the form:

$$Y_{istb} = \gamma W_{isb} + \delta T_i + \beta (W_{isb} * T_i) + \Gamma X_{istb} + \eta_t + \eta_s + \eta_b + u_{istb}, \tag{4}$$

where i denotes the individual, t the survey year, s the state of residence, and b the birth year. Y_{istb} is the outcome of interest, W_{isb} indicates exposure to welfare reform, T_i takes a value of one if the child is from a low-educated single mother household, X_{istb} is a vector of demographic and state level controls and includes measures of birth weight and being breastfed, η_t, η_s, and η_b are interview year, state, and birth year fixed effects, respectively. Lastly, u_{istb} is the error term that is assumed to be uncorrelated with the covariates. All reported standard errors are clustered at the state level.

To control for family and parental characteristics, h in equation (2), I include demographic information about the individual's mother and what family structure they were raised in for all regressions. I also try to control for unobserved family characteristics, I also run a model with family fixed effects. Here the sample only includes individuals that have a sibling in the data as well. This model compares individuals who were exposed to welfare reform to their siblings that were not exposed while sweeping out time-invariant family characteristics. In this model, identification comes from pairs of siblings with different amounts of welfare exposure due to being born at different times. These results can be found in the Appendix.

In the model, the outcomes for both childhood and adulthood are the individual's skills. Ideally, measured skills would be the same between the two periods but in practice this is unfortunately not the case in the data. In childhood, the vector of human capital skills consists of test scores and behavior scales for cognitive and noncognitive skills, respectively. For cognitive skills, I use the Woodcock-Johnson Revised Tests of Achievement (WJ-R) originally developed by Woodcock et al. (1989). My measure of childhood noncognitive function comes from the Behavioral Problem Index (BPI). Because measures of cognitive and noncognitive skills are not available in adulthood, I examine outcomes that are at least partly determined by their cognitive and noncognitive skills. This includes educational attainment and changes to family structure. Education is used because it is a natural extension of the childhood test scores and family structure because it is an explicit goal of

the TANF program. In both cases, these outcomes vary over time as the individuals age in the sample.

For the main independent variable, W_{isb}, I follow the approach of Hoynes et al. (2016) and measure how much of the individual's life before the age of five they were exposed to welfare reform. The variable is the share of months between conception and the age of five that either welfare waivers or TANF were in place in their state of residence in childhood. Given the evidence from Kaestner and Lee (2005) that welfare reform affects a mother's prenatal decision it is important to account for welfare reform exposure that occurs in-utero. The variable takes a value of 0 if the child turned five before any welfare reform was implemented in their state and a value of 1 if they were conceived after welfare reform.[3] Any in-between value will be some fraction expressed as $x/69$ where x is the number of months they were exposed. While exposure can change as the child ages, welfare reform occurred prior to the start of the data collection, meaning that exposure is a time invariant measure. Major welfare waiver and TANF implementation dates are taken from Crouse (1999).

The variable T_i is used to indicate which individuals are likely to be affected by welfare reform, the "target" or at-risk group. As is common in the literature this group consists of individuals who were raised in a low-educated, single mother household. These households were the primary recipients of AFDC and thus would be most likely to be affected by any rule changes to the program through waivers or TANF. Here, low-educated means having twelve years of education or less and mother includes biological, step, adoptive mother, or grandmother. The comparison group for these at-risk individuals is those who were raised by single mothers with more education or are from two parent families where no more than one parent has less than a college degree. Individuals from households with two college-educated parents are omitted from the analysis.

[3] I assume a 9 month gestation period between birth and conception

Interpreting the coefficients from equation (4), γ is the effect of welfare reform exposure before the age of five, determined by birth year and state. The coefficient δ is the own effect of growing up in a disadvantaged low-educated, single mother household that is at risk of being affected by welfare reform. The parameter of interest is then β and represents the impact of full welfare reform exposure, being exposed from conception to age 5, for someone who's likely to be affected by welfare reform ($T_i = 1$). Note that γ then represents the impact of welfare reform exposure on someone who is not at-risk ($T_i = 0$) to take up AFDC/TANF. As such I expect the coefficient to be zero. The coefficient β is an intent-to-treat estimate. Because going from zero months of exposure to sixty-nine months of exposure can be seen as a drastic change, I also present treatment estimates at the mean level of exposure.

Looking at the mean level of exposure gives me an average intent-to-treat effect. This assumes that all children of single low-educated mothers were affected by welfare reform. The model also assumes that the effect of one additional month of welfare reform exposure is constant regardless of age, an assumption I relax in section 5.3 with an event study model. Identification of β is given by variation in states' passage of welfare waivers and TANF, the birth year of the adults, and their family status when they were children. The model assumes there is no difference in cognitive and noncognitive trends between children of low-educated single mothers and high educated single mothers or children from low-educated two parent families before the implementation of welfare reform.

As noted by Hoynes et al. (2016), this method is different from natural experiments that are episodic, in that they "turn on" and then later "turn off." Here, once a state reforms its AFDC program either through welfare waivers or by implementing TANF, it keeps the reform and does not revert or "turn off." This restricts the comparisons that can be made because there will never an adult that was exposed in early childhood, but not later childhood. As such, comparisons are about additional welfare reform exposure earlier in childhood, conditional on having it later in childhood as well.

4 Data

Data for this project comes from two supplements of the Panel Study of Income Dynamics (PSID), the Child Development Supplement (CDS) and the Transition to Adulthood Supplement (TAS). The PSID is longest running longitudinal survey, starting with 4,802 households in 1968 and still follows all members and descendants to this day. In 1997, the PSID supplemented its main data collection with additional information on 3,563 0-12 year-old children and their parents for the CDS. The children were drawn at random from participating core families with the condition that there cannot be more than 2 children from any household. The children were followed up twice after the 1997 survey, once in 2002 and again in 2007. Information about the children was collected from their Primary Care Giver (PCG), typically their mother. Once children reached the age of 18 they left the CDS and entered the TAS. Given that these surveys were administered in the years immediately following welfare reform, the short-run analysis is done with the sample of CDS children.

The TAS was first fielded in 2005 with the aim of collecting information on young adults who had not yet formed their own household, a growing group of individuals that many surveys miss. The TAS has been fielded every two years since 2005, with the most recent wave being in 2017, and collects information on schooling, labor force outcomes, and health. Individuals enter the TAS when they turn 18 and stay until they are 28 years old, even if they have formed their own household during that time. The analysis sample includes one observation for each interview year that the individual satisfies these age restrictions. Adults in the TAS were children when welfare reform was enacted. This supplement is used to test for the long-run effects of welfare reform.

Because of the longitudinal structure of the PSID, I am able to follow these young adults back to their childhood and measure their welfare reform exposure and investment in their human capital production. This information comes from the core family files and the CDS. I assign family status and state of residency to the child using information from

the 1997 wave for computing their welfare exposure and treatment. The TAS sample consists only of children who were interviewed for the CDS. This means I have data on their childhood human capital levels as well as measures of human capital investment. Following the welfare reform literature, I use achievement test scores as measures of cognitive human capital in childhood. Additionally, I also test for effects on a noncognitive measure as well, given its importance in the broader childhood circumstance literature (Chetty et al., 2011; Heckman et al., 2013). All relevant information on measures of cognitive and noncognitive skill and tables come from the PSID CDS 1997 User Guide by Hofferth et al. (1997). In section 5, I begin by examining if welfare had an impact on childhood outcomes to motivate the effects I see on adult outcomes. In the regressions, I control for demographic information about the individual, their mother, and their family structure as a child. Additionally, given the importance of early life health on outcomes beyond later life health (Currie et al., 2010; Almond and Currie, 2011), I control for the individuals birth weight in ounces and weather or not they were breastfed as a child.

For cognitive skills, I use the Woodcock-Johnson Revised Tests of Achievement (WJ-R) originally developed by Woodcock et al. (1989). The WJ-R test contains nine subtests measuring different aspects of academic achievement and was used in the NLSY-Child Study and the Carolina Abecedarian Project as well. The WJ-R test has been used throughout the psychology literature to measure child achievement (Nelson et al., 2004; Davis-Kean, 2005; Hughes and Kwok, 2007). For the CDS, the PSID administered 3 subtests in each of the three waves that cover the reading and math portions of the test. The three subtests are Letter-Word Identification, Passage Comprehension, and Applied Problems. The letter-word and applied problems tests were administered to children over the age of one, and the passage comprehension test was administered to children ages five and older. A description of each individual subtest is found in Appendix Table A.1.

My measure of childhood noncognitive function comes from the Behavioral Problem Index (BPI). The BPI is a 30-item questionnaire administered to the child's PCG developed

by Peterson and Zill (1986). Each question describes a different problematic behavior and asks the PCG whether the child exhibits the problem behavior often, sometimes, or never. Behaviors include external and internal measures such as having sudden changes in mood or feeling, is fearful or anxious, bullies or is cruel or mean, demands a lot of attention. The index is then the total number of affirmative responses among the 30 questions. The BPI has been used to study children across a variety of disciplines in the US and the UK (McCormick et al., 1990; McCulloch et al., 2000; Christakis et al., 2004; Bernal and Keane, 2011). In the CDS, the questions are asked for every child 3 and older. Appendix Table A.2 lists each of the 30 questions and lists if they are external or internal behaviors as well as their reliability taken from Hofferth et al. (1997).

Survey weighted descriptive statistics for the CDS sample can be found in Table 1. Given that the tests were administered at different ages, the sample sizes here fluctuate. For the WJ-R subtests the age-standardized score is the outcome of interest. For BPI, I examine the raw score. The BPI has a maximum score of thirty and a minimum score of zero. A higher BPI score means the child exhibits more problematic behaviors. The average amount of welfare reform exposure is 0.30 which translates to about twenty months. In the sample there are 2,464 observations of children with no welfare reform exposure, and there are 2,992 observations of children with a nonzero amount of exposure. For these children with exposure the average amount is 0.54 which is about three years. Roughly twenty percent of children are from an at-risk household. Information on state controls comes from University of Kentucky Center for Poverty Research Welfare Data. The child's birth weight and if they were breastfed are included in the models to control for in-utero/birth characteristics, θ_0 from equation (2). State controls are used to try to account for the local macroeconomy. State minimum wage and maximum TANF benefits are measured in 2007 dollars. State EITC is calculated as a percentage of the federal rate.

Survey weighted descriptive statistics for the TAS sample are found in Table 2. The descriptive statistics show a sample that is moving through the initial stages of adulthood.

Almost three-quarters report that they have at least attended college and 45 percent over the age of twenty-two have a two or four year college degree.[4] For family structure, 20 percent of the sample is married and 15 percent had a child out of wedlock. Fifteen percent of them grew up in an at-risk household. For these adults, the average amount of exposure is 0.42 which means approximately twenty-eight months of their childhood was spent in a state that had enacted some kind of welfare reform. There are just over 4,100 observations of adults with no welfare reform exposure, and for the remaining 3,000 observations of adults with non-zero exposure the average amount is 0.57 or about thirty-nine months. The same demographic controls from the CDS are included in the TAS sample as well, with the addition of state higher ed spending per capita being included as a control and TANF benefits omitted.

5 Results

5.1 Main Results

I first present results for the childhood sample. While these results are informative on their own, if welfare reform affects the livelihood of the adults, I should expect to find some effect of welfare reform on their cognitive or noncognitive skills when they are children. Though as described previously in section 2, sometimes these effects can be latent and not manifest themselves until later years. The results from equation (4) are shown in Table 3.

In these tables, the coefficient for welfare exposure corresponds to γ, being from an at-risk household corresponds to δ, and the coefficient for the interaction term corresponds to β, from equations (4). For the interaction term, which is the intent-to-treat estimate and will henceforth refer to as "welfare treatment", the interpretation of the coefficient is the effect of an at-risk child going from no welfare reform exposure before the age

[4]Because of the time it takes to complete a college degree, all analysis examining college completion is restricted to the sample of individuals twenty-two years or older.

of five to full welfare reform exposure before the age of 5. The two tables show that at-risk children exposed to welfare reform experienced better outcomes compared to the comparison group. The magnitudes are generally larger in the fixed effect specification, but both specifications show that fully treated children improved their reading test scores by a statistically significant and fairly large amount, between 23-39 percent of a standard deviation. At the mean level of exposure of twenty months, this translates to a 6-7 percent of a standard deviation increase in reading test scores.

The effect of treatment also has a positive but statistically insignificant effect on the applied problems mathematics test score. Though the coefficient is negative in both specifications, suggesting an improvement in behavior, I do not see a statistically significant effect of welfare treatment on my noncognitive measure, the BPI. As expected, the coefficients for welfare exposure for those at low risk of being affected by welfare reform are statistically not different from zero as apart from one instance, the fixed effect model for letter word score, suggesting there is potentially some kind of cohort effect beyond what is captured by the birth-year fixed effects. The coefficients for being from an at-risk household matches what one would expect. Children from disadvantaged families have lower test scores and exhibit more problematic behaviors. The results show that the short-run effect of welfare reform treatment suggests improvement to reading test scores with potential gains to mathematics and behavior as well. With gains potentially this large for fully exposed children, I should expect to see improvements in adulthood as well, particularly with regard to educational attainment.

It is helpful to put the magnitude of these effects in the context of the larger literature. For the childhood results, my findings of an average effect of a 5-7 percent of a standard deviation increase in reading scores are in line with the earlier work of Morris et al. (2009) who found that young children whose family participated in a state welfare experiment that raised earnings and employment saw an increase in their achievement tests by 7 percent of a standard deviation. However, these magnitudes are smaller than what researchers

have found examining the Project STAR results. As outlined by Schanzenbach (2006), researchers have consistently found that smaller class sizes increase test scores by 15 percent of a standard deviation, with minority students getting an even larger boost.

I now turn to the TAS sample to test for the long-run impacts of welfare reform. Table 4 presents the main results for the young adult sample. The results are in line with the childhood results of higher test scores and fewer problematic behaviors. Adults who were treated by welfare reform as children show strong improvements in the likelihood of graduating college, the likelihood they are married, and are less likely to have a child out of wedlock. Interestingly, there is no statistically significant effect of welfare reform treatment on the likelihood of attending college, but full welfare reform treatment increases the likelihood of graduating college by about 12 percentage points. At the mean level of exposure of twenty-eight months, this is a 9 percent increase from the baseline means.

The table also shows that the fully treated adults are 7 percentage points more likely to be married, with the average welfare treatment effect being 15 percent more likely. Similarly, the fully treated adults are 13 percentage points less likely to have a child out of wedlock. As expected, the coefficients for welfare exposure among low-risk children are zero except when marriage is the outcome. The coefficients for growing up in a disadvantaged household suggest that young adults have lower rates of educational attainment, less likely to be married, and more likely to have a child out of wedlock.

These results show strong improvements for children who grew up affected by welfare reform. It appears the gains to reading test scores as a child translate to higher educational attainment later in life. Perhaps because they are more educated, they also find themselves in more stable family environments. Treated adults show some evidence of higher rates of marriage and fewer children born out of wedlock, suggesting that TANF is meeting its goal of more two parent, stable families. However, it should be noted that these are all relatively young adults whose ultimate family structure may yet to be determined, but these early results are consistent with program goals.

Here again, it is helpful to put these effect sizes into context. Bastian and Michelmore (2018) find that teenage exposure to EITC increases the likelihood of completing college by 4.2 percent while Cohodes et al. (2016) find that Medicaid expansion between the 1980 and 1990 birth cohorts increased college completion by 6 percent. While these are both slightly smaller effects than what I find, it should be noted that these papers both focus on completion of a four year college degree, while I examine both two year completion and four year completion. For family structure, Bitler et al. (2004) find that TANF implementation is associated with a 13-21 percent reduction in marriage rates. My estimate for the second generation of welfare reform suggests an almost equal but opposite increase in marriage. For fertility, Garfinkel et al. (2003) and Horvath-Rose et al. (2008) examine specific attributes of welfare reform, state welfare benefits and family caps respectively, and find reductions in non-marital births of 4-6 percent. This suggests that my drops in non-marital births may be driven more by gains to education and increases to marriage.

The improvements to childhood test scores coincides with improvements to adult educational attainment. The next question is what could be inducing improvements to childhood cognitive function? One of the significant changes of welfare reform is that TANF moved away from cash benefits to more in-kind benefits. Child care subsidies make up a significant portion of states' in-kind benefits (Ziliak, 2016). Combined with the work requirements, these policies may induce mothers to opt for formal child care. High quality formal child care has been shown to improve childhood cognitive and noncognitive function (Morris et al., 2009; Heckman et al., 2013; Elango et al., 2015). The effect of welfare reform on child care use is shown in Table 5.

Here I test if welfare reform led to more child care use overall child care use and specifically if the care was informal care or formal care. Here informal care is defined as being watched by a relative or other individual and formal care encompasses daycare, pre-K, before and after school programs, and extra curricular programs. Parents may report multiple forms of formal and informal care. Table 5 shows that total child care

use increased but only usage of formal child care increased by a statistically significant amount. At-risk children with the mean level of welfare reform exposure are 26 percent more likely to be enrolled in formal child care, while only being 4 percent more likely to use informal child care. This shift to formal care helps explain the increase in childhood reading test scores.

5.2 Results By Gender

Given that TANF and its predecessor AFDC primarily benefit single mothers, and the work of Hartley et al. (2017) on the transmission of welfare use from mothers to daughters, I also test if the children of welfare reform have different results by gender. Tables 6 & 8 show results for boys and girls, respectively. Tables 7 & 9 show results for adult men and women, respectively. From childhood to adulthood, the effects of welfare treatment are much stronger for females than males.

Tables 6 & 7 show the results for males. Here the results are much weaker compared to full sample results show in Tables 3 & 4. For the childhood sample, welfare reform treatment does not have an impact on the reading scores or behavior of young boys. The coefficients for the reading test scores are still positive, but not at a statistically significant level. Boys also do not appear to be as affected by growing up in a disadvantaged household. Given the lack of a measurable effect of welfare reform on young boys, it is perhaps not surprising that I also find a lack of an impact of welfare reform treatment when these boys are young men, as seen in Table 7.

I find that treated men are not more likely to complete college at a statistically significant level. However, the men are still more likely to be married at a rate roughly equal to that for the whole sample, 5 percentage points for the fully treated and 12 percent for those with mean level of exposure. There are no statistically significant effects of welfare treatment on college attendance, starting their own family unit, or having a child out of wedlock. Here again, men appear to be less affected by growing up in a disadvantaged

household, though they are statistically significantly more likely to have a child out of wedlock if they are from a disadvantaged household.

For females however, I find strong effects of welfare reform on childhood test scores and adult outcomes. These results are shown in Tables 8 & 9. Girls seem to be entirely driving the main results from Table 3. Girls who were fully treated by welfare reform score 35-47 percent of a standard deviation higher on their reading tests. At the mean level of treatment, this is a 10-14 percent of a standard deviation improvement. Girls appear to be deeply affected by growing up in a disadvantage household. Girls from these families score much worse on their reading and math tests and they exhibit more problematic behaviors.

These gains seen for the girls in childhood carries over into young adulthood. Young women who were fully treated by welfare reform are 16 percentage points more likely to graduate college. For the mean level of exposure this is a 11 percent increase from baseline. Women with full treatment are 8 percentage points more likely to be currently married. At the mean level of treatment, this is a 16 percent increase. The coefficient on having a child out of wedlock is negative but not statistically significant. The disadvantages of growing up in a family at-risk of being affected by welfare reform continues into adulthood. Those women from low-educated single mother households are less likely to attend and complete college, more likely to be a single parent, and are less likely to be married.

It appears that the gains from welfare treatment shown in the model in Table 4 are primarily driven by women. While men do see increases in the likelihood of being married, the results are much stronger for women. Interestingly, the effects of welfare reform on child care usage is the same between boys and girls as seen in Appendix Tables A.5 & A.6. As in the whole sample, both boys and girls are significantly more likely to use formal child care use. While somewhat surprising, these results do match some of the larger literature. The results for female educational attainment are in line with the literature

that finds that welfare reform reduced the rates of female high school dropouts (Offner, 2005; Dave et al., 2012; Miller and Zhang, 2012; Hartley et al., 2017). Other programs such as the Moving to Opportunity experiment, which moved young children to nicer neighborhoods, also found that teenage girls were the largest beneficiary of the improved environment (Chetty et al., 2016).

5.3 Robustness Checks

I now turn my attention to the possibility of endogenous migration. To this point there have been no restrictions on the individuals staying in the same state all throughout childhood. If parents and their children migrated in response to welfare generosity, then the movement would be endogenous and bias the results of the model. To address this, I re-estimate equation (4), for childhood and adult outcomes, on individuals who never moved states during childhood. These results are shown in Tables 10 and 11.

For the childhood results, Table 10, the results are generally similar to the main results shown in Table 3 both in terms of magnitude and percent change. The exception being that the estimates for the effect of full welfare treatment are stronger for the reading tests for the sample of non-movers. The effect of welfare treatment is now positive for the behavior problem index, but still not statistically different from zero. Given the point estimates, this is likely due to the smaller sample size and resulting larger standard errors for the estimates. The own effect of welfare reform exposure persists between specifications as does the effect of being from a disadvantaged household. This trend holds for the young adult results as well, seen in Table 11. The effect of welfare reform treatment on college completion and marriage is robust to the sample of non-movers only and nearly identical in magnitude and percent change. The results of the fixed effect specification for the sample of nonmovers are seen in Appendix Tables A.7 & A.8.

One might also be concerned about the effect of changing state policies over these time periods such as Medicaid expansion or SNAP liberalization that won't be captured

by state and survey year fixed effects. To control for any state specific time trends I re-estimate equation (4) and include state-year fixed effects. This is done for both childhood and adult outcomes and the results are seen in Tables 12 and 13. Here again the results are quite similar to the main specifications, with the exception of the effect of treatment college completion. This suggests that my results are not driven by other changing state specific policies. I also re-estimate the fixed effect specifications including state-year fixed effects. These results are seen in Appendix Tables A.9 & A.10.

In Appendix Tables A.11 & A.12 I test the sensitivity of my results to the inclusion of particular control variables. Here I focus on childhood letter word reading test scores and adult college completion, the two results that are the most directly linked to one another. For identification purposes, each of the triple difference terms and the fixed effects are included in each specification. Appendix Table A.11 shows that the effect of welfare reform on reading scores is statistically significant in all variations. Appendix Table (A.12) shows the importance of controlling for demographic and mother characteristics. The individual demographic controls shown in column (2) have large effects on the welfare treatment coefficient, as it increases from the no controls specification in column (1). Adding in controls for the mother's characteristics also dramatically attenuates the coefficient for being from an at-risk household.

Lastly, I explore an alternative specification for childhood exposure to welfare reform and adult outcomes to examine the effect of the timing of exposure. Though the literature agrees that early childhood is a crucial time, it is possible that welfare reform exposure at all ages matters for later life outcomes. In this alternative specification, I use an event study model that allows me to explore the timing of welfare reform exposure more thoroughly.

In the event study framework, I allow the effect of welfare reform to vary by the individual's age at welfare reform implementation in their state for the sample of individuals that were raised by a low-educated single mother. For example, If a person was eight years old when welfare reform was implemented in their state, they would have an event time of

8. If welfare reform was implemented two years before they were born, they would have an event time of -2. I then replace the exposure measure with a series of dummy variables based on the individuals age at welfare reform from two years prior to birth through age 9 with age 10 being the omitted category. The model is written as

$$Y_{istb} = \sum_{a=-2}^{9} \gamma_a D_{isb} + \Gamma X_{istb} + \eta_t + \eta_s + \eta_b + u_{istb}, \tag{5}$$

where $D_{isb} = 1$ if their age at welfare reform implementation is equal to a. I present the results for college completion for the sample of individuals that were raised by low-educated single mothers in Figure 2 and as a placebo test for the advantaged sample of adults who were not raised by a low-educated single mother household in Figure 3.

Here I focus on the college completion outcome as well. It is important to note that this graph is the opposite of the typical event study graph. Here, exposure decreases as one moves to the right of the graph. A person with an event time of -1 is exposed from in-utero through all of childhood, while a person with event time of 8 is only exposed from age 8 onwards. The results for the at-risk sample match the literature which suggests that in-utero and very early childhood exposure will have the largest impact on adult outcomes. The figure shows those exposed pre-birth to the age of one have the largest gains when it comes to college completion as an adult. The effect of welfare reform exposure steadily decreases as the child's age at first exposure increases, though the effects of exposure are still positive through age nine. The effect is less precisely measured at young ages though, reflecting the relatively low amount of full welfare exposure in the sample. The relative flatness of the line in negative time to birth also helps rule out the possibility of any pre-trends that could be influencing my results. The results in Figure 3 are also encouraging for my estimation approach, as welfare reform exposure for those not at-risk of being affected by welfare reform has no effect on college completion across all ages.

6 Conclusion

Childhood circumstance can have wide reaching implications for adulthood. In the economics literature everything from childhood health and income to neighborhood to school has been shown to have effects later in life. This paper is part of a growing section of literature to seeks to answer what are the long-run effects of childhood exposure to the social safety net. As welfare reform is past its twenty year anniversary, this is one of the first tests for the long-run effects of the TANF program. These results are crucial to our understanding of the total impact of the TANF program, and its implications for policy changes to other programs in the future.

Using data from the PSID, I model the human capital production technology as a function of childhood investment. I estimate the model empirically using a triple difference framework. I first contribute to the existing literature on the short-run effects of welfare reform by showing that at-risk children who were exposed to welfare reform score higher on reading achievement tests. Turning to the adult sample, I find that these same children are more likely to complete college, more likely to be married, and are less likely to have a child out of wedlock. The latter two results suggesting that PRWORA was successful in its goal of promoting two-parent families. Increased formal child care use is a likely mechanism for these improvements.

Women benefit more from this treatment than men. As girls, they score much higher on their cognitive reading tests. For women affected by welfare reform, they are much more likely to complete college and be married. For children, the effect of welfare treatment on higher reading scores is robust to the addition of family fixed effects, the sample of non-movers, and the inclusion of state-time fixed effects. For adults, college completion and marriage are robust to the sample of nonmovers with marriage also being robust to the addition of state-time trends. Using an event study model I find that first exposure has the largest impact when the individual is in-utero through the age of one.

Finally, putting these results into the context of the larger literature on welfare reform, it is helpful to recall the words of Blank (2009). In her survey chapter, she concludes by saying, "It is perhaps surprising that these very large changes in welfare use, work, and earnings have had at best small effects on other domains of family life among single-mother families . . . It is possible that these other domains will show effects only over time, with longer-term cumulative effects on health, child outcomes, or fertility that are simply not yet visible in the data." The results presented here reflect her belief that the wider effects from welfare reform are not found in the single-mothers themselves but in the lives of their grown children.

The changes to household environment brought on by welfare reform were perhaps felt the strongest by the children of the household during their formative years than by the parents themselves. My work presented here, along with Hartley et al. (2017), suggests this to be the case. Both papers find noticeable effects of welfare reform on adult outcomes for those who were children at the time of welfare waivers and PRWORA. These results are among the first in an emerging literature on the long-run effect of welfare reform. However, there is still more work to be done. As the sample ages we will be able to examine long-run effects of welfare reform on outcomes such as health, earnings, and family structure.

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Tables and Figures

Figure 1: Welfare Reform Implementation Year, By State

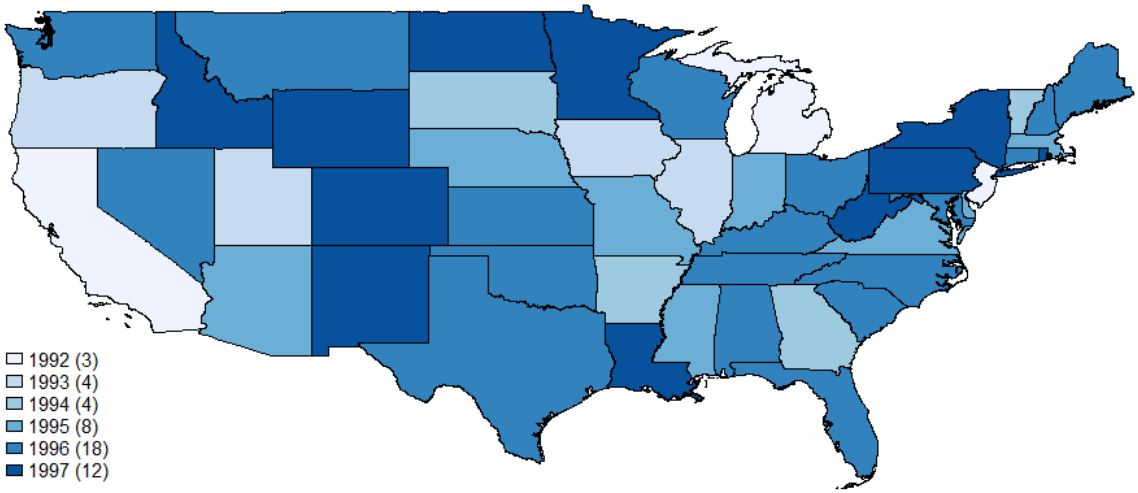

Figure 2: Event Study Estimates of the Impact of Welfare Reform on College Completion - At-Risk Sample

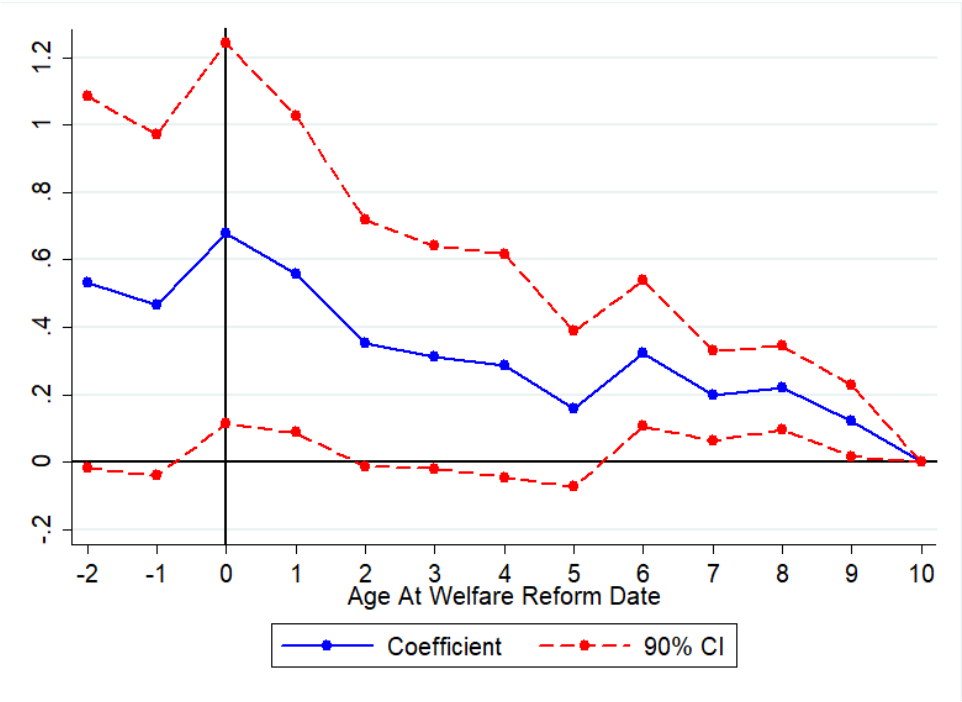

Figure 3: Event Study Estimates of the Impact of Welfare Reform on College Completion - Advantaged Sample Placebo Test

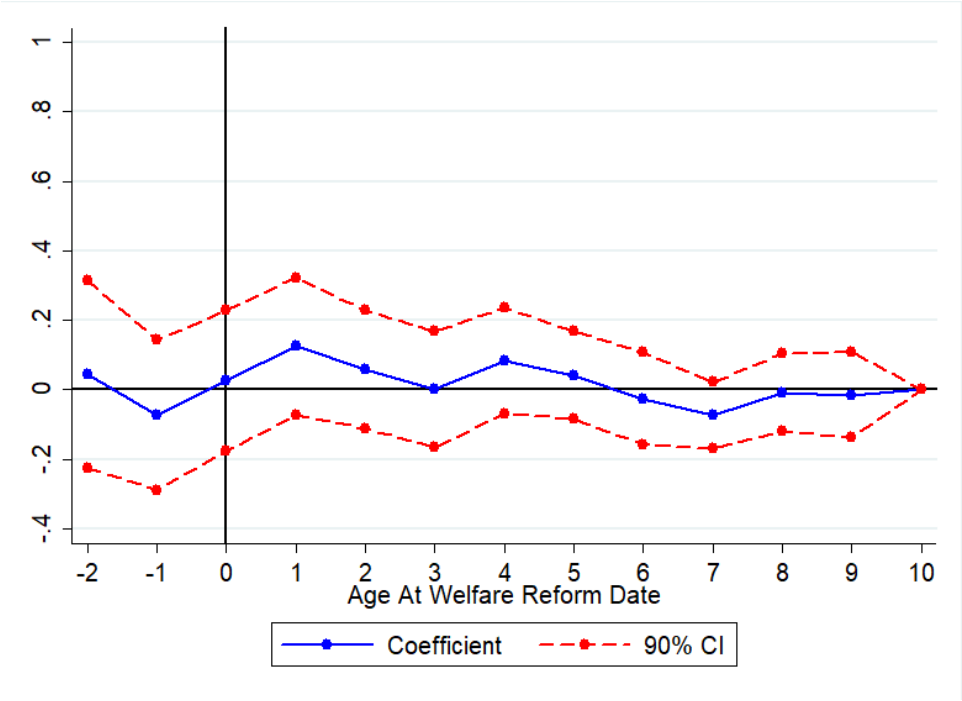

Table 1: Descriptive Statistics - Child Development Supplement

	Mean	SD	Observations
Welfare Exposure	0.30	0.36	5456
Raised by Low-Edu Single Mom	0.17	0.38	5456
Cognitive Outcomes			
Letter Word Score	103.75	18.19	4760
Applied Problems Score	104.05	16.51	4741
Passage Comprehension Score	102.25	16.33	4173
Noncognitive Outcome			
Behavior Problem Index	8.49	6.31	5341
Demographics			
Child Age	11.49	4.04	5456
Male	0.51	0.50	5456
White	0.61	0.49	5456
Black	0.18	0.38	5456
Number of Siblings	1.46	1.14	5456
Birth Weight (ounces)	119.01	21.74	5456
Was Breastfed	0.54	0.50	5456
Mother Age	38.90	7.82	5456
Mother Less Than HS Edu.	0.22	0.41	5456
Mother HS Degree	0.36	0.48	5456
Mother Some College Edu.	0.33	0.47	5456
Mother College Degree	0.07	0.26	5456
Mother Postgraduate	0.03	0.17	5456
Raised By Grandparents	0.03	0.16	5456
Urban Residency	0.63	0.48	5456
State Controls			
State Unemployment Rate	5.29	1.05	5456
State Minimum Wage	6.33	0.82	5456
State EITC Rate	0.04	0.08	5456
Maximum TANF Benefit 2-Person	378.97	145.09	5456
Maximum TANF Benefit 3-Person	471.29	181.08	5456
Maximum TANF Benefit 4-Person	552.18	206.44	5456

Table 2: Descriptive Statistics - Transition to Adulthood Supplement

	Mean	SD	Observations
Welfare Exposure	0.42	0.37	7224
Raised By Low-Edu Single Mom	0.15	0.36	7224
Outcomes			
Some College	0.77	0.42	7224
College Degree	0.45	0.50	3593
Currently Married	0.20	0.40	7224
Single Parent	0.15	0.36	7224
Demographics			
White	0.68	0.47	7224
Black	0.12	0.32	7224
Male	0.50	0.50	7224
Age	24.3	2.47	7224
Number of Siblings	1.53	1.06	7224
Childhood Characteristics			
Birth Weight (ounces)	119.13	21.61	7224
Was Breastfed	0.59	0.49	7224
Mother Less Than HS Edu.	0.24	0.43	7224
Mother HS Degree	0.32	0.47	7224
Mother Some College Edu.	0.33	0.47	7224
Mother College Degree	0.08	0.27	7224
Mother Postgraduate	0.02	0.15	7224
Raised By Grandparents	0.04	0.20	7224
State Controls			
State Minimum Wage	8.42	1.18	7224
State Unemployment Rate	4.36	0.64	7224
State EITC Rate	0.19	0.28	7224
Higher-Ed $per capita	913	214	7224

Table 3: Childhood Human Capital

	Letter Word	Passage Comp.	Applied Problems	BPI
Welfare Exposure (γ)	-1.69	-2.46	-2.13	0.40
	(1.98)	(2.06)	(1.85)	(0.66)
At-Risk (δ)	-3.75***	-2.98***	-0.12	1.25***
	(0.69)	(0.86)	(0.82)	(0.31)
Exposure * At-Risk (β)	4.33***	3.07**	0.57	-0.07
	(1.13)	(1.39)	(1.25)	(0.67)
Outcome SD	18.14	16.48	16.47	6.31
Percent Change	23.89	18.60	3.48	-1.08
Treatment at Mean W_{isb}	1.34	0.90	0.18	-0.02
Perc. Change at Mean	7.37	5.43	1.07	-0.32
Obs.	4,884	4,267	4,865	5,503

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child gender, child race, number of siblings, child age, mother's age, mother education, birth weight, if breastfed, if raised by grandparent, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table 4: Adulthood Human Capital

	Attend College	College Degree	Married	Single Parent
Welfare Exposure (γ)	0.01	0.05	-0.06	-0.03
	(0.06)	(0.05)	(0.04)	(0.04)
At-Risk (δ)	-0.08**	-0.05	-0.05***	0.10***
	(0.03)	(0.03)	(0.02)	(0.03)
Exposure * At-Risk (β)	0.05	0.13**	0.07***	-0.13*
	(0.06)	(0.06)	(0.02)	(0.07)
Sample Mean	0.77	0.45	0.20	0.15
Percent Change	5.96	28.03	35.02	-88.10
Treatment at Mean W_{isb}	0.02	0.04	0.03	-0.06
Perc. Change at Mean	2.51	9.29	14.74	-37.08
Obs.	7,224	3,593	7,224	7,224

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include gender, race, number of siblings, age, birth weight, if breastfed, mother's education, if raised by grandparent, state unemployment rate, state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included.

Table 5: Child Care Use

	Childcare Use	Informal Care	Formal Care
Welfare Exposure (γ)	-0.01	-0.02	0.01
	(0.03)	(0.03)	(0.02)
At-Risk (δ)	0.02	0.03**	-0.02*
	(0.02)	(0.01)	(0.01)
Exposure * At-Risk (β)	0.09	0.02	0.06**
	(0.06)	(0.05)	(0.02)
Outcome Mean	0.22	0.15	0.07
Percent Change	40.51	13.48	88.76
Treatment at Mean W_{isb}	0.03	0.01	0.02
Perc. Change at Mean	12.93	4.31	28.36
Obs.	6,204	6,209	6,209

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child gender, child race, number of siblings, child age, mother's age, mother education, birth weight, if breastfed, if raised by grandparent, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table 6: Childhood Human Capital - Boys

	Letter Word	Passage Comp.	Applied Problems	BPI
Welfare Exposure (γ)	0.30	-0.90	-3.79*	-0.45
	(2.15)	(2.90)	(2.03)	(0.90)
At-Risk (δ)	-1.54	-1.54	0.92	1.08**
	(1.20)	(1.23)	(1.14)	(0.50)
Exposure * At-Risk (β)	0.93	0.98	-1.26	1.09
	(1.99)	(2.21)	(2.07)	(1.01)
Outcome SD	18.76	17.00	17.39	6.41
Percent Change	4.94	5.76	-7.27	17.00
Treatment at Mean W_{isb}	0.28	0.28	-0.38	0.32
Perc. Change at Mean	1.50	1.65	-2.20	5.00
Obs.	2,461	2,128	2,455	2,789

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child race, number of siblings, child age, mother's age, mother education, birth weight, if breastfed, if raised by grandparent, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table 7: Adulthood Human Capital - Men

	Attend College	College Degree	Married	Single Parent
Welfare Exposure (γ)	0.06	-0.01	-0.04	-0.00
	(0.09)	(0.09)	(0.04)	(0.05)
At-Risk (δ)	-0.04	-0.00	-0.02	0.10***
	(0.05)	(0.04)	(0.02)	(0.03)
Exposure * At-Risk (β)	-0.07	0.08	0.06*	-0.09
	(0.10)	(0.11)	(0.03)	(0.07)
Sample Mean	0.73	0.41	0.18	0.09
Percent Change	-10.14	20.62	30.97	-100.00
Treatment at Mean W_{isb}	-0.03	0.03	0.02	-0.04
Perc. Change at Mean	-4.01	6.21	12.24	-42.37
Obs.	3,413	1,674	3,413	3,413

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include race, number of siblings, age, birth weight, if breastfed, mother's education, if raised by grandparent, state unemployment rate, state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included.

Table 8: Childhood Human Capital - Girls

	Letter Word	Passage Comp.	Applied Problems	BPI
Welfare Exposure (γ)	-2.36	-2.89	0.16	2.09**
	(2.95)	(2.89)	(2.63)	(0.90)
At-Risk (δ)	-6.41***	-4.89***	-1.55*	1.53***
	(1.06)	(1.02)	(0.92)	(0.47)
Exposure * At-Risk (β)	8.28***	5.55***	2.48	-1.39
	(1.74)	(1.99)	(2.00)	(0.98)
Outcome SD	17.38	15.90	15.40	6.19
Percent Change	47.66	34.90	16.12	-22.48
Treatment at Mean W_{isb}	2.59	1.66	0.78	-0.42
Perc. Change at Mean	14.91	10.42	5.05	-6.76
Obs.	2,423	2,139	2,410	2,714

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child race, number of siblings, child age, mother's age, mother education, birth weight, if breastfed, if raised by grandparent, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table 9: Adulthood Human Capital - Women

	Attend College	College Degree	Married	Single Parent
Welfare Exposure (γ)	-0.04	0.11	-0.09*	-0.07
	(0.08)	(0.11)	(0.05)	(0.07)
At-Risk (δ)	-0.11**	-0.09**	-0.07***	0.09*
	(0.04)	(0.04)	(0.02)	(0.05)
Exposure * At-Risk (β)	0.14	0.17**	0.08**	-0.16
	(0.09)	(0.08)	(0.03)	(0.10)
Sample Mean	0.80	0.50	0.22	0.22
Percent Change	17.63	33.40	36.96	-74.04
Treatment at Mean W_{isb}	0.06	0.06	0.04	-0.07
Perc. Change at Mean	7.87	12.08	16.50	-33.06
Obs.	3,811	1,919	3,811	3,811

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include race, number of siblings, age, birth weight, if breastfed, mother's education, if raised by grandparent, state unemployment rate, state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included.

Table 10: Childhood Human Capital - Nonmovers

	Letter Word	Passage Comp.	Applied Problems	BPI
Welfare Exposure (γ)	0.09	-0.28	-2.54	0.11
	(2.07)	(2.07)	(2.09)	(0.81)
At-Risk (δ)	-3.53***	-2.95***	0.10	1.43***
	(0.91)	(0.92)	(1.03)	(0.34)
Exposure * At-Risk (β)	4.68***	3.38**	0.33	0.03
	(1.51)	(1.61)	(1.28)	(0.75)
Outcome SD	18.31	16.73	16.48	6.30
Percent Change	25.56	20.18	1.97	0.46
Treatment at Mean W_{isb}	1.46	1.01	0.10	0.01
Perc. Change at Mean	7.98	6.02	0.62	0.14
Obs.	4,125	3,652	4,110	4,539

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child gender, child race, number of siblings, child age, mother's age, mother education, birth weight, if breastfed, if raised by grandparent, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table 11: Adulthood Human Capital - Nonmovers

	Attend College	College Degree	Married	Single Parent
Welfare Exposure (γ)	0.03	0.12*	-0.05	-0.05
	(0.07)	(0.07)	(0.04)	(0.04)
At-Risk (δ)	-0.08*	-0.03	-0.05***	0.10**
	(0.04)	(0.03)	(0.02)	(0.04)
Exposure * At-Risk (β)	0.02	0.14**	0.07***	-0.13
	(0.07)	(0.07)	(0.02)	(0.08)
Sample Mean	0.76	0.44	0.20	0.15
Percent Change	2.01	31.59	33.20	-87.41
Treatment at Mean W_{isb}	0.01	0.05	0.03	-0.06
Perc. Change at Mean	0.85	10.54	14.05	-37.01
Obs.	6,085	3,020	6,085	6,085

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include gender, race, number of siblings, age, birth weight, if breastfed, mother's education, if raised by grandparent, state unemployment rate, state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included.

Table 12: Childhood Human Capital - Time Trends

	Letter Word	Passage Comp.	Applied Problems	BPI
Welfare Exposure (γ)	-1.85	-2.16	-2.26	0.31
	(2.10)	(2.40)	(1.90)	(0.71)
At-Risk (δ)	-3.76***	-2.93***	-0.14	1.20***
	(0.69)	(0.87)	(0.83)	(0.30)
Exposure * At-Risk (β)	4.50***	3.16**	0.77	-0.02
	(1.17)	(1.42)	(1.29)	(0.68)
Outcome SD	18.14	16.48	16.47	6.31
Percent Change	24.80	19.15	4.66	-0.25
Treatment at Mean W_{isb}	1.39	0.92	0.24	-0.00
Perc. Change at Mean	7.65	5.60	1.44	-0.07
Obs.	4,884	4,267	4,865	5,503

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child gender, child race, number of siblings, child age, mother's age, mother education, birth weight, if breastfed, if raised by grandparent, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table 13: Adulthood Human Capital - Time Trends

	Attend College	College Degree	Married	Single Parent
Welfare Exposure (γ)	-0.00	0.01	-0.07	-0.03
	(0.05)	(0.05)	(0.04)	(0.04)
At-Risk (δ)	-0.08**	-0.04	-0.05***	0.10***
	(0.03)	(0.03)	(0.02)	(0.03)
Exposure * At-Risk (β)	0.04	0.11	0.08***	-0.14*
	(0.07)	(0.07)	(0.02)	(0.07)
Sample Mean	0.77	0.45	0.20	0.15
Percent Change	5.34	24.62	39.18	-90.91
Treatment at Mean W_{isb}	0.02	0.04	0.03	-0.06
Perc. Change at Mean	2.25	8.15	16.49	-38.26
Obs.	7,224	3,593	7,224	7,224

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include gender, race, number of siblings, age, birth weight, if breastfed, mother's education, if raised by grandparent, state unemployment rate, state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included.

Appendix A

Table A.1: Description of Woodcock-Johnson-R Subtests

Subscale	**Description**
Letter-Word Identification	Tests for symbolic learning (matching pictures with words) as well as reading identification skills (identifying letters and words).
Applied Problems	Measures skill in analyzing solving practical problems in mathematics
Passage Comprehension	Measures comprehension and vocabulary skills using multiple-choice and fill-in-the-blank format

Source:Hofferth et al. (1997)

Table A.2: Behavior Problems Index Factors and Reliabilities

For the next set of statements, decide whether they are not true, sometimes true, or often true, of (CHILD)s behavior.	External	Internal	Total
(He/She) has sudden changes in mood or feeling	X		X
(He/She feels or complains that no one loves him/her		X	X
(He/She) is rather high strung and nervous	X		X
(He/She) cheats or tells lies	X		X
(He/She) is too fearful or anxious		X	X
(He/She) argues too much	X		X
(He/She) his difficulty concentrating, cannot pay attention for long	X		X
(He/She) is easily confused, seems to be in a fog		X	X
(He/She) bullies or is cruel or mean to others	X		X
(He/She) is disobedient	X		X
(He/She) does not seem to feel sorry after (he/she misbehaves)	X		X
(He/She) has trouble getting along with other children	X	X	X
(He/She) is impulsive, or acts without thinking	X		X
(He/She) feels worthless or inferior		X	X
(He/She) is not liked by other children		X	X
(He/She) has difficulty getting (his/her) mind off certain thoughts		X	X
(He/She) is restless or overly active, cannot sit still	X		X
(He/She) is stubborn, sullen, or irritable	X		X
(He/She) has a very strong temper and loses it easily	X		X
(He/She) is unhappy, sad, or depressed		X	X
(He/She) is withdrawn, does not get involved with others		X	X
(He/She) breaks things on purpose or deliberately destroys things	X		X
(He/She) clings to adults	*	*	X
(He/She) cries too much	X		X
(He/She) demands a lot of attention	X		X
(He/She) is too dependant on others		X	X
(He/She) feels others are out to get (him/her)		X	X
(He/She) hangs around with kids who get into trouble	*	*	X
(He/She) is secretive, keeps things to (himself/herself)		X	X
(He/She) worries too much		X	X
Number of Items	16	13	30
Cronbach's alpha	0.86	0.81	0.9

Source:Hofferth et al. (1997)

Table A.3: Childhood Human Capital Family Fixed Effects

	Letter Word	Passage Comp.	Applied Problems	BPI
Welfare Exposure (γ)	-6.41**	-1.31	-4.48	0.50
	(2.40)	(4.31)	(3.78)	(1.02)
Exposure * At-Risk (β)	7.43*	2.68	2.17	-1.42
	(3.81)	(2.96)	(2.26)	(1.07)
Outcome SD	18.11	16.78	16.12	6.37
Percent Change	41.05	15.99	13.47	-22.32
Treatment at Mean W_{isb}	2.25	0.77	0.66	-0.42
Perc. Change at Mean	12.42	4.61	4.07	-6.51
Obs.	3,063	2,705	3,050	3,414
Sibling Pairs	786	777	786	813

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child gender, child age, mother's age, birth weight, if breastfed, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table A.4: Adulthood Human Capital Family Fixed Effects

	Attend College	College Degree	Married	Single Parent
Welfare Exposure (γ)	-0.05	-0.14	-0.11	-0.03
	(0.09)	(0.12)	(0.06)	(0.10)
Exposure * At-Risk (β)	0.11	0.05	0.07	-0.02
	(0.13)	(0.15)	(0.06)	(0.09)
Sample Mean	0.78	0.46	0.22	0.17
Percent Change	14.76	10.51	32.46	-15.06
Treatment at Mean W_{isb}	0.05	0.02	0.03	-0.01
Perc. Change at Mean	5.80	3.37	12.75	-5.91
Obs.	4,335	2,148	4,335	4,335
Sibling Pairs	711	637	711	711

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include gender, age, birth weight, if breastfed, state unemployment rate, state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included.

Table A.5: Child Care Use - Boys

	Childcare Use	Informal Care	Formal Care
Welfare Exposure (γ)	-0.03	-0.05	0.01
	(0.05)	(0.05)	(0.03)
At-Risk (δ)	0.03	0.03	-0.01
	(0.02)	(0.02)	(0.02)
Exposure * At-Risk (β)	0.09	0.06	0.07*
	(0.08)	(0.07)	(0.04)
Outcome Mean	0.21	0.15	0.06
Percent Change	45.20	39.31	112.50
Treatment at Mean W_{isb}	0.03	0.02	0.02
Perc. Change at Mean	14.35	12.50	35.77
Obs.	3,141	3,144	3,144

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child race, number of siblings, child age, mother's age, mother education, birth weight, if breastfed, if raised by grandparent, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table A.6: Child Care Use - Girls

	Childcare Use	Informal Care	Formal Care
Welfare Exposure (γ)	0.03	0.02	0.01
	(0.04)	(0.04)	(0.03)
At-Risk (δ)	0.01	0.04*	-0.03
	(0.03)	(0.02)	(0.02)
Exposure * At-Risk (β)	0.08	-0.01	0.05*
	(0.07)	(0.06)	(0.03)
Outcome Mean	0.23	0.16	0.08
Percent Change	35.21	-4.20	67.99
Treatment at Mean W_{isb}	0.03	-0.00	0.02
Perc. Change at Mean	11.29	-1.35	21.82
Obs.	3,063	3,065	3,065

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child race, number of siblings, child age, mother's age, mother education, birth weight, if breastfed, if raised by grandparent, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table A.7: Childhood Human Capital Family Fixed Effects - Nonmovers

	Letter Word	Passage Comp.	Applied Problems	BPI
Welfare Exposure (γ)	-5.24**	0.45	-3.86	-0.28
	(2.41)	(4.53)	(3.69)	(1.08)
Exposure * At-Risk (β)	7.07*	3.12	2.86	-1.03
	(4.19)	(3.43)	(2.20)	(1.11)
Outcome SD	18.15	16.90	16.10	6.37
Percent Change	38.95	18.44	17.80	-16.16
Treatment at Mean W_{isb}	2.14	0.90	0.87	-0.30
Perc. Change at Mean	11.80	5.33	5.38	-4.70
Obs.	2,793	2,475	2,782	3,087
Sibling Pairs	716	709	716	736

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child gender, child age, mother's age, birth weight, if breastfed, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table A.8: Adulthood Human Capital Family Fixed Effects - Nonmovers

	Attend College	College Degree	Married	Single Parent
Welfare Exposure (γ)	-0.03	-0.11	-0.12*	-0.07
	(0.08)	(0.13)	(0.07)	(0.10)
Exposure * At-Risk (β)	0.07	0.03	0.09	0.09
	(0.14)	(0.17)	(0.06)	(0.07)
Sample Mean	0.76	0.44	0.20	0.17
Percent Change	8.70	6.28	44.47	53.53
Treatment at Mean W_{isb}	0.03	0.01	0.04	0.04
Perc. Change at Mean	3.40	2.00	17.41	20.96
Obs.	3,954	1,973	3,954	3,954
Sibling Pairs	653	586	653	653

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include gender, age, birth weight, if breastfed, state unemployment rate, state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included.

Table A.9: Childhood Human Capital Family Fixed Effects - Time Trend

	Letter Word	Passage Comp.	Applied Problems	BPI
Welfare Exposure (γ)	-6.44**	-1.11	-5.12	0.61
	(2.46)	(4.91)	(3.84)	(1.18)
Exposure * At-Risk (β)	7.71*	2.71	2.52	-1.48
	(3.90)	(3.03)	(2.27)	(1.07)
Outcome SD	18.11	16.78	16.12	6.37
Percent Change	42.58	16.17	15.63	-23.14
Treatment at Mean W_{isb}	2.33	0.78	0.76	-0.43
Perc. Change at Mean	12.88	4.66	4.72	-6.75
Obs.	3,063	2,705	3,050	3,414
Sibling Pairs	786	777	786	813

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include child gender, child age, mother's age, birth weight, if breastfed, urban residency, state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included.

Table A.10: Adulthood Human Capital Family Fixed Effects -Time Trends

	Attend College	College Degree	Married	Single Parent
Welfare Exposure (γ)	-0.04	-0.14	-0.11	-0.04
	(0.10)	(0.12)	(0.07)	(0.09)
Exposure * At-Risk (β)	0.10	0.08	0.09	-0.04
	(0.14)	(0.18)	(0.06)	(0.09)
Sample Mean	0.78	0.46	0.22	0.17
Percent Change	12.66	16.99	40.24	-23.24
Treatment at Mean W_{isb}	0.04	0.02	0.03	-0.02
Perc. Change at Mean	4.97	5.46	15.80	-9.13
Obs.	4,335	2,148	4,335	4,335
Sibling Pairs	711	637	711	711

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Controls include gender, age, birth weight, if breastfed, state unemployment rate, state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included.

Table A.11: Childhood Letter Word Reading Score

	(1)	(2)	(3)	(4)	(5)
Welfare Exposure (γ)	-1.25	-1.58	-0.90	-1.19	-1.69
	(2.02)	(2.10)	(2.04)	(2.01)	(1.98)
At-Risk (δ)	-9.03***	-6.50***	-3.84***	-3.72***	-3.75***
	(0.81)	(0.66)	(0.65)	(0.70)	(0.69)
Exposure * At-Risk (β)	3.60**	4.10***	4.23***	4.35***	4.33***
	(1.50)	(1.29)	(1.17)	(1.13)	(1.13)
Child/HH Controls	NO	YES	YES	YES	YES
Mother Controls	NO	NO	YES	YES	YES
Early Health	NO	NO	NO	YES	YES
State Controls	NO	NO	NO	NO	YES
Obs.	4,884	4,884	4,884	4,884	4,884

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Child/HH Controls: child gender, child race, number of siblings, child age, if raised by grandparent, and urban residency. Mother's Controls: mother's age and mother education. Early Health: birth weight and if breastfed. State Controls: state unemployment rate, state minimum wage, state EITC, maximum TANF benefit for 2,3,4 person families. State, interview year, and birth-year fixed effects included in all specifications.

Table A.12: Adulthood College Completion

	(1)	(2)	(3)	(4)	(5)
Welfare Exposure (γ)	0.05	0.04	0.04	0.04	0.05
	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)
At-Risk (δ)	-0.19***	-0.15***	-0.05*	-0.05	-0.05
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Exposure * At-Risk (β)	0.07	0.09	0.12*	0.12**	0.13**
	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)
Demographics	NO	YES	YES	YES	YES
Mother Controls	NO	NO	YES	YES	YES
Early Health	NO	NO	NO	YES	YES
State Controls	NO	NO	NO	NO	YES
Obs.	3,593	3,593	3,593	3,593	3,593

Note: standard errors clustered at the state level, * p <0.10, ** p <0.05, *** p <0.01. Demographics: gender, race, number of siblings, age, and if raised by grandparent. Mom Controls: mother's education. Early Controls: birth weight and if breastfed. State Controls: state unemployment rate and state minimum wage, state EITC, and state Higher-Ed spending per capita. State, interview year, and birth-year fixed effects included in all specifications.