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ABSTRACT

This study estimated the effects of welfare reform in the 1990s, which permanently restructured and contracted the cash assistance system in the U.S., on food insecurity—a fundamental form of hardship—of the next generation of households. An implicit goal underlying welfare reform was the disruption of an assumed intergenerational transmission of disadvantage; however, little is known about the effects of welfare reform on the well-being of the next generation. Using intergenerational data from the Panel Study of Income Dynamics and a variation on a difference-in-differences framework, this study exploits 3 sources of variation in childhood exposure to welfare reform: (1) risk of exposure across birth cohorts;(2) variation of exposure within cohorts because different states implemented welfare reform in different years; and (3) variation between individuals with the same exposure who were more likely and less likely to rely on welfare. We found that exposure to welfare reform led to decreases in food insecurity of the next generation of households, by about 10% for a 5-year increase in exposure, with stronger effects for women, individuals exposed for longer durations during childhood, individuals exposed in early childhood (0-5 years), and individuals whose mothers had a high school education (versus less).

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Introduction

Food insecurity, which the U.S. Department of Agriculture (USDA) defines as a lack of consistent access to enough food for an active and healthy life (Coleman-Jensen et al., 2020), is a common form of poverty-related deprivation in the United States and has been associated with many adverse health outcomes. Specifically, food insecurity has been associated with diabetes, hypertension, hyperlipidemia, depression, hospitalizations, and all-cause mortality among adults, as well as birth defects, anemia, cognitive and behavioral problems, and acute and chronic health problems among children (Gundersen and Ziliak, 2018; Walker et al., 2019; Thomas, Miller and Morrissey, 2019). Female-headed households with children were almost four times more likely than married-couple households with children to be food insecure in 2019, with a rate of over 28% for the former group (Coleman-Jensen et al., 2020). Food insecurity has become even more prevalent since the COVID-19 pandemic, with a projected increase of 17 million people over the 2018 figure in the U.S. overall (Gundersen et al., 2021), and a substantial increase among households with children since 2016–2017 (Ahn and Norwood, 2021). Rates of food insecurity also vary substantially across states, ranging from 6.6% in New Hampshire to 15.7% in Mississippi in 2017–2019 (Coleman-Jensen, 2020) and geographic and temporal variations in household food insecurity have been associated with state policies, including those that do not directly target food insecurity such as the Earned Income Tax Credit, unemployment insurance, and minimum wage (Bartfeld and Men, 2017).

The 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) and state-level reforms in the early 1990s that preceded it (collectively referred to as welfare reform) represented a major policy shift in the U.S. that aimed to reduce dependence on cash assistance by imposing work requirements, time limits on assistance, and other conditions. The PRWORA legislation ended entitlement to welfare benefits under Aid to Families with Dependent Children (AFDC) and replaced AFDC with Temporary Assistance for Needy Families (TANF) block grants to states, which were granted considerable latitude in establishing eligibility and program rules subject to national guidelines that mandated work requirements and a 5-year lifetime limit on the receipt of cash assistance.

This new (and currently ongoing) focus on employment and contraction of cash assistance stands in stark contrast to the human capital focus of the AFDC program that was established in 1960s as part of the War on Poverty. The Biden administration recently incorporated a third approach into the 2021 American Rescue Plan by temporarily expanding the current child tax credit for eligible families, making the credit fully refundable and not tied to earnings from labor, and providing some of the credit through direct monthly payments—all for year 2021 only. All three approaches have had the same overarching goal (economic self-sufficiency) but distinctly different strategies (human capital building in the AFDC period, strong employment incentives implemented starting in the 1990s, and temporary direct cash transfers), but how best to achieve that goal remains an open question.

Food security is a fundamental aspect of economic self-sufficiency. The War on Poverty, which included the implementation of the former AFDC cash assistance program, had largely positive effects on adults and children (Bailey and Danziger, 2013), but the effects on food insecurity—a vitally important outcome in its own right and an excellent marker of economic self-sufficiency—are not known because food insecurity was not defined, measured, and tracked by the USDA until 1996, and a consistent measure was not available until 1999 (Coleman-Jensen, 2020). The reforms implemented in the 1990s ("welfare reform") have led to large declines in welfare caseloads (e.g., average monthly family welfare caseloads in the U.S. fell from 5.05 million in 1994 to 1.10 million in 2017—a 78% decrease) (ACF, 2018) and increases in employment of low-skilled women (by as much as 27 percent) (Fang and Keane, 2004). However, large proportions of unmarried mothers, even those who were employed, had trouble making ends meet and experienced extreme material hardships (hunger, eviction, utility shutoffs, and homelessness) in the aftermath of welfare reform (Teitler, Reichman and Nepomnyaschy, 2004), suggesting that the reforms did not make all families better off and may even have caused some households to become food insecure.

It is not known whether welfare reform had causal effects on food insecurity, either in the aggregate or for at-risk groups such as mothers with low job skills or poor health who may be ill-equipped to cope with the conditions of the work-first regime. A major reason for the lack of evidence

about how welfare reform may have affected food insecurity is that because the USDA did not start collecting consistent data on food insecurity until 1998, the datasets that could potentially be used to answer this question only have information on food insecurity amid or after welfare reform implementation. As such, although there was substantial variation across states in the timing of welfare reform implementation, there was little observable variation that could help identify causal effects of welfare reform on food insecurity of households affected by welfare reform. One study used Current Population Survey data from 1995–1996 and 1998–1999 to estimate effects of welfare reform on food insecurity using variations in welfare policies specifically relating to eligibility of immigrants and found that eligibility restrictions increased food insecurity among immigrants (Borjas, 2004).

Although the methodological barriers to identifying the effects of welfare reform on food insecurity of households exposed to the reforms are substantial, it is now possible to investigate the effects of welfare reform on food insecurity of the households of young adults (ages ~19 to ~40 years) who were exposed to welfare reform as children (these households could include their own young children), by exploiting variations in age and exposure to welfare reform during childhood. This variation is driven by the child's birth cohort and when his or her childhood state of residence implemented the new reforms. This line of research is important not only for understanding the effects of welfare reform on food insecurity, but also for testing the implicit assumption underlying welfare reform that it would disrupt the intergenerational persistence of poverty.

Very little is known about effects of welfare reform on economic self-sufficiency of the next generation. In this study, we address this gap by estimating the effects of welfare reform on food insecurity—a fundamental indicator of economic hardship and human deprivation—of the next generation of households, overall as well as by gender, at different stages of childhood, and for vulnerable subgroups.

Background

Aside from the direct effects of welfare reform on welfare caseloads and women's employment highlighted earlier, quasi-experimental studies have found that welfare reform led to declines in women's

substance abuse (Corman et al., 2013; Kaestner and Tarlov, 2006) and crime (Corman, Dave and Reichman, 2014) and increases in women's civic participation in the form of voting (Corman, Dave and Reichman, 2017). Effects on marriage, cohabitation, and non-marital fertility of adult women were mixed or weak (Ziliak, 2016). Overall, the effects of welfare reform on the women's outcomes that have been studied suggest that welfare reform increased self-sufficiency. However, the findings of high rates of material hardship following the implementation of welfare reform (Teitler, Reichman and Nepomnyaschy, 2004) suggest that these overall effects may mask substantial variation by women's ability to succeed in the labor market.

In terms of the next generation, quasi-experimental studies have found that PRWORA led to decreased high school dropout (reviewed in Dave et al., 2012) and teen fertility (reviewed in Lopoo and Raissian, 2012), at least in part due to specific provisions regarding school attendance and living arrangements of minor mothers. The studies of dropout focused on girls, as did those of teen fertility, although the latter outcome does not cleanly reflect gender-specific behavior. Another recent study found that welfare reform led to increases in skipping school, damaging property, and fighting among teenage boys and increases in smoking and drug use among both boys and girls, with larger effects for boys (Dave et al., 2021); this study built on a very limited and inconclusive literature on effects of welfare reform on adolescents (Gennetian et al., 2002) and the findings underscore the importance of considering gender-specific second-generation effects.

We know of only two studies that investigated the effects of welfare reform on adult economic outcomes of the next generation because, until recently, the second generation was not old enough to observe their adult outcomes. However, those individuals are now in their twenties and thirties. Hartley, Lamarche and Ziliak (2017) found that welfare reform attenuated the association in welfare participation between mothers and daughters by >50%, with no association for participation in *any* public assistance (welfare, Supplemental Nutrition Assistance Program (SNAP), or Supplemental Security Income). Vaughn (2021) found that exposure to welfare reform during ages 0–5 years was associated with better adult outcomes (higher educational attainment, fewer out-of-wedlock pregnancies, and higher likelihood

of marriage), with stronger estimated effects for women than men.

Both the Hartley et al. and Vaughn studies addressed specific questions: The former focused on adult women whose mothers had ever received welfare (not necessarily during the daughter's childhood) and the latter focused on a specific stage of early childhood and did not consider individuals who were exposed to welfare reform over the age 5. The findings from the Hartley et al. study suggest that welfare reform did not increase self-sufficiency among women whose mothers had ever received welfare, while those from the Vaughn study indicate some better human capital outcomes (higher educational attainment, higher likelihood of marriage) among women exposed to welfare reform in early childhood but did not assess whether those improvements translated to self-sufficiency. Another contribution of the Vaughn study is the consideration of differential effects by gender and the focus on a specific age range, both of which the developmental psychology literature suggests would be important.

This study contributes to the very small literature on second-generation adult economic outcomes of welfare reform by providing the first analysis of the intergenerational effects of the reforms on food insecurity among individuals at risk for having relied on welfare as a child, overall and by gender, age and duration of exposure, and specific maternal characteristics. The findings by Vaughn (2021) that exposure to welfare reform as a young child was associated with increased educational attainment and marriage among young adults, particularly women, suggests that welfare reform could lead to improvements in material and financial well-being of the next generation of adults as they form their own households. However, as the new welfare regime also led to high rates of material hardship for some mothers (Teitler, Reichman and Nepomnyaschy, 2004), it is likely that any net average impact likely conceals heterogeneity in terms of positive and/or adverse intergenerational effects across these groups of mothers. In this study, we provide some of the first evidence on how welfare reform impacted a direct measure of financial and material hardship – food insecurity – of the next generation of adults and further assess heterogeneous treatment effects across maternal characteristics and exposure across various stages of childhood.

Data and measures

We use data from the Panel Study of Income Dynamics (PSID), which began in 1968 as a nationally representative sample of about 5,000 families and follows the original respondents and their descendants. The study focuses on individual and family demographic and economic factors and outcomes. Because young adults in the second generations can be linked to their parents, the PSID includes information about young adults' circumstances both during childhood and when they became adults. The PSID is particularly well-suited for our analysis for several reasons: (1) It spans the time period before, during, and post-welfare reform. (2) It includes detailed information on family circumstances when young adults were children, as well as during their adulthood. (3) State identifiers are available at all stages of the adult's observed life cycle and for their mothers, allowing the researcher to merge measures of economic and policy environments at all relevant time points. (4) The USDA Household Food Security module is available for six survey waves during the post-welfare reform era.

We focus our analyses on adults born in 1975–1999 for two reasons.[1] First, as discussed below, some of these adults were never exposed to the new welfare policy regime as children, some were exposed for part of their childhood, and some were exposed to the reforms over their entire childhood. Second, these cohorts are old enough to allow us to observe their food security outcomes as adults.

Characterizing welfare reform

Welfare reform was implemented in two general phases. The first phase consisted of pre-PRWORA waivers to AFDC. Although not federally mandated, pre-PRWORA waivers were implemented in most states by the time the federal PRWORA was enacted in 1996 (Schoeni and Blank, 2000). The second phase of welfare reform came with the enactment of PRWORA. States were required to submit plans for their TANF programs to the U.S. Department of Health and Human Services and, once approved as meeting federal guidelines, implement them.

[1] We show later that our estimates are not sensitive to further restricting our sample to cohorts who were exposed for at least some of their childhood. For our main analyses, we focus on adults ages 18 and older and do not restrict to older adults since a non-negligible fraction of young adults (ages 18–23) have formed their own separate households (30.4% based on the March 2019 CPS; 29.4% in our PSID target sample). In supplementary analyses (reported in the Appendix), we show that our estimates or conclusions are not materially changed if we restrict to adults ages 24+ or specifically restrict to adults who are household heads and their spouses.

Appendix Table 1 presents the implementation dates for both AFDC waivers and TANF for all states in the U.S. The waivers were introduced in 29 states over a period of 53 months, and TANF was implemented in all states over a period of 17 months between September 1996 (Massachusetts, Michigan, and Vermont) and January 1998 (California). Combining both waivers and TANF, states implemented any welfare reform over a period of 64 months, spanning from October 1992 (MI and NJ being the earliest states to implement waivers) through January 1998 (CA being the last state to implement TANF). In our analyses, we use a single indicator for any welfare reform (AFDC waiver or TANF) in a given a month/year in the respondent's state of residence in childhood.[2]

Food insecurity

During the survey years 1999, 2001, 2003, 2015, 2017, and 2019 the PSID included the USDA Household Food Security module, which was developed by the U.S. Department of Agriculture and provides the official measures of food insecurity in the U.S. The module consists of 18 questions about food hardship during the past year and the PSID categorizes the level of food security based on the responses to those questions (Appendix Table 2 includes the module and a description of the scoring). A score of 1 or 2 indicates marginal food security and a score of 3 or more indicates low or very low food security. We consider two measures of food insecurity, a broad measure of marginal, low, or very low food security (any positive numerical score) and a narrower measure of low or very low food security (a score of 3 or more).

Sample and timeline

Figure 1 presents a simplified timeline of maternal exposure to welfare reform, childhood exposure to welfare reform, and adult food security outcomes for the birth cohorts studied. For simplicity of presentation in the figure, we combined the birth cohorts into four groups: (1) Individuals born between 1975 and 1979, who were exposed to welfare reform for only a few years or not at all when they were children. This group reached adulthood either before any welfare reform was implemented at all or

[22] In supplementary analyses, we also separately assess effects of exposure to the early AFDC waivers and TANF, and were not able to reject the null of similar effects across these two phases of the reforms.

during one of the years that AFDC waivers were implemented in some but not all states and not in the individual's childhood state of residence. (2) Individuals born between 1980 and 1985, who were exposed to welfare reform for up to 10 years before reaching adulthood (age 18). This group was generally exposed to welfare reform for less than half of their childhood. (3) Individuals born between 1986 and 1992, who were generally exposed to welfare reform for at least half their childhood. (4) Individuals born between 1993 and 1999, who were exposed to welfare reform for most (or all) of their childhood.

The shaded area represents the rollout of welfare reform between late 1992 and 1997; "partial" refers to the period before which every single state had implemented welfare reform (waiver or TANF) and "full" refers to the period when all states had implemented welfare reform. For most of the individuals in our sample, maternal (and by inference, their childhood) exposure to welfare reform started on the date that welfare reform was implemented in their childhood state of residence. However, for those born after welfare reform was implemented in their state, we use their date of birth as the starting point for maternal (and by inference, childhood) exposure to welfare reform.

Also shown are the ranges of dates that we observe each of the four cohorts as young adults and the specific years that food insecurity outcomes are available in the PSID. For the oldest cohort (those born between 1975 and 1979), we observe food insecurity outcomes at six timepoints (1999, 2001, 2003, 2015, 2017, and 2017), whereas for the youngest cohort (those born between 1993 and 1999), we observe food insecurity outcomes at 2 or 3 time points depending on the individual's exact year of birth.

Methods

Our main analyses are based on a quasi-experimental research design, a cohort-based variant on a difference-in-difference-in-differences (DDD) setup. It leverages variation in childhood exposure to welfare reform across cohorts and compares target and comparison groups within differentially exposed cohorts, to estimate the intergenerational effects of childhood exposure to welfare reform on household food insecurity of young adults. Consider the following reduced-form baseline specification that directly links food insecurity in the adult's household adult to their exposure to welfare reform during childhood:

Equation 1

$$FI_{imbst}^{2nd} = \alpha Exposure_{imbs|age\ 0-17} + \pi\left(Exposure_{imbs|age\ 0-17}\right) * \left(Target_{ms,j<t}\right) + X_{imbst}^{2nd}\beta + M_{ms,j<t}^{1st}\theta + Z_{st}\varphi + \sum_{c=age\ 5-17} Z_{sc}\varphi_c + State_{s,j<t} + Year_t + Cohort_b \left[+ \sum_s State_{s,j<t} * b\right] \left[+ \sum_s \sum_{b=5year\ cohorts} State_{s,j<t} * Cohort_b\right] \left[+ \sum_s \sum_b State_{s,j<t} * Cohort_b\right] \left[+ \left(\sum_s \sum_{b=5year\ cohorts} State_{s,j<t} * Cohort_b\right) * \left(Target_{ms,j<t}\right)\right] + \varepsilon_{imbst}$$

The outcome, *FI*, captures household food insecurity measured in year *t*, for the i^{th} young adult (2nd-generation), born in year *b* to mother *m* (1st-generation) who resided in state *s*. *Exposure* to welfare reform is defined as the number of years that adult *i* was exposed to the new welfare policy regime as a child (ages 0-17). We control for vectors of characteristics of young adults (*X*) and their mothers (*M*). Additionally, to account for potential confounding of individuals' adult and childhood exposures, we include a rich set of time-varying state factors (*Z*) measured at period *t* (concurrent with the young adult food insecurity outcomes) and at various points over childhood (specifically, when the young adult was age 5, 11, and 17 years old).[3] Models further include fixed effects for the period (*Year*), childhood state of residence (*State*), and single birth year cohort (*Cohort*). We estimate all models using Ordinary Least Squares (linear probability models) and report standard errors adjusted for arbitrary correlation in the error term (ε) across and within individuals in their current residential state (i.e., clustered at the state level).[4]

Identifying variation in the degree of childhood exposure to welfare reform comes from a combination of the young adult's birth cohort and when their childhood state of residence implemented welfare reform.

[3] States policies during childhood include the unemployment rate, poverty rate, personal income per capita, minimum wage, refundable Earned Income Tax Credit (EITC), and generosity of EITC. Our estimates are fully robust to broadening the set of these controls to additional or different ages (e.g., ages 0, 2, 7, 14). In all specifications, we also separately control for the unemployment rate in the state of residence when the adult was aged 18, 19, 20, 21, and 22 in order to account for the persistent adverse effects of graduating in a bad economy (Kahn, 2010; Maclean, 2013; von Wachter, 2020). State policies and economic conditions during year of young adult interview include: unemployment rate, personal income per capita, poverty rate, indicators for the SNAP policy index, percent of low-income children who are uninsured, refundable EITC, EITC rate, minimum wage, log of the number of Medicaid beneficiaries, and log population.

[4] Our estimates are not sensitive to estimation via logit or probit regression.

The population of interest is young adults whose mothers were *at risk of* relying on public assistance, whether or not their childhood household actually relied on welfare. Traditionally, the welfare caseload has consisted primarily of low-educated unmarried mothers (Bitler and Hoynes, 2010). This at-risk population is the target group of mothers for whom welfare reform would be expected to have the largest effects on employment, income, and other household conditions and potentially the largest effects (if any exist) on their children as they transition into adulthood. While we control for a large set of confounding childhood exposures to economic conditions and other policies, the possibility of omitted cohort-specific influences remains. Specifically, childhood exposure to welfare reform (*Exposure*) may be correlated with unobserved state-specific cohort trends.

We address this issue by considering a comparison group – adults with mothers who are similar in many ways to the target group but unlikely to participate in public cash assistance programs and therefore not expected to be affected by welfare reform policies. In Equation 1 above, *Target* represents a dichotomous indicator for young adults whose mothers were in the target group (i.e., had mothers who were unmarried with at most a high school education and thus at risk of relying on welfare) versus young adults whose mothers were in the comparison group (and thus not at risk of relying on welfare). As marriage generally precludes eligibility for cash assistance, we follow the convention in the welfare reform literature and consider adults with low-educated mothers who were married as our primary comparison group.[5] In supplementary analyses, we assess sensitivity to an alternate comparison group that is also used in the literature: adults whose mothers were unmarried and had more than a high school education, as well as a third comparison group that combines the two (e.g., includes both unmarried

[5] When classifying young adults into target and comparison groups, we consider their mother's marital status when the young adult was born if that took place after welfare reform was implemented in their mother's state of residence, or her marital status at the time welfare reform was implemented if the young adult was born prior to the implementation of welfare reform in the mother's state of residence. This fixed definition of marital status at baseline levels bypasses compositional selection issues that could arise if the definition of the mother's marital status was time-varying over the childhood exposure period. Specifically, if marital status was affected by welfare reform (although evidence on that is mixed; see Ziliak, 2016), then treatment assignment would be endogenous since welfare reform would affect assignment into target and comparison groups and thus bias the estimated treatment effects.

mothers with more than a high school education and low-educated married mothers).[6]

The parameter of interest is π, which captures the net effects of an additional year of exposure to welfare reform during childhood on young adult food insecurity, for those growing up with an unmarried low-educated mother (target group) relative to similar individuals from the same cohort and state who grew up in households that were generally ineligible for welfare and thus would not be impacted by the new policy regime (comparison group).

We extend the baseline specification in various ways to address challenges inherent in our methodology. First, we assess the sensitivity of our estimates to progressively more inclusive controls for unobserved state-specific birth cohort trends. We include, in turn: parametric controls for state-specific linear cohort trends $\left[\sum_s State_{s,j<t} * b\right]$; state-specific 5-year birth cohort fixed effects $\left[\sum_s \sum_{b=5year\ cohorts} State_{s,j<t} * Cohort_b\right]$; and state-specific single-year birth cohort fixed effects $\left[\sum_s \sum_b State_{s,j<t} * Cohort_b\right]$. Note that this last specification would normally not be feasible in analyses that rely solely on policy variation across cohorts. However, an additional source of identifying variation – that between target and comparison groups – allows us to flexibly account for all measured and unmeasured state-specific heterogeneity across cohorts by saturating the models with fixed effects at the level of the state by single-year birth cohort. We also gauge the sensitivity of our estimates to allowing the state-specific-cohort trends to differ across target and comparison groups, flexibly across five-year cohort sets, by interacting the 5-year birth cohort fixed effects with the target indicator: $\left[\left(\sum_s \sum_{b=5year\ cohorts} State_{s,j<t} * Cohort_b\right) * \left(Target_{ms,j<t}\right)\right]$.

Second, we relax the imposed linearity in Equation 1 on the marginal effects of childhood exposure to welfare reform by assessing non-linear effects of the duration of exposure as well as heterogeneity based on the child's age of exposure. Third, we evaluate differential treatment effects across adult and maternal characteristics since the average effect identified above may mask important

[6] The factors (marital status, educational attainment) used to define the target and comparison groups are subsumed in the vector of controls for maternal characteristics (vector *M* in Equation 1); as such, a separate indicator differentiating the target and comparison groups is not needed in Equation 1.

heterogeneity in how welfare reform affected families in different situations. We assess heterogeneous effects across gender, because there is evidence that boys and girls respond differently to changes in household circumstances during childhood (Bertrand and Pan, 2013; Kling, Ludwig and Katz, 2005), including welfare reform (Dave et al., 2021). We also evaluate heterogeneity based on maternal human capital. While the target group consists of low-educated (at most possessing a high school degree) unmarried mothers, the subgroup of mothers who did not complete high school would have been particularly disadvantaged in the labor market and may not have been well-equipped to meet the work requirements under the new welfare regime. Finally, we implement several additional robustness checks, including alternate counterfactuals and a falsification check by estimating pseudo-treatment effects of childhood exposure to welfare reform for a group for which we would not plausibly expect any substantial impact – young adults whose mothers were married and relatively highly educated.

Results

Sample characteristics

Table 1 presents weighted sample characteristics of the young adults in the sample. The full sample (~13,300 observations) consists of person/years observations of individuals born between 1975 and 1999 who were at least 18 years old in at least one of the years food security was assessed in the PSID (1999, 2001, 2003, 2015, 2017 and 2019) and whose mothers who were at least 18 years old and had non-missing marital status and education just prior to WR implementation in their childhood state of residence.[7] The target group consists of those individuals whose mothers were unmarried and had at most a high school education. The primary comparison group consists of those individuals whose mothers were married and had at most a high school education.

In adulthood, about 10% of the full sample and 13% of the comparison group experienced low or very low food security, compared to about one quarter of the target group. Less than a quarter of both the

[7] There are ~3,500 unique individuals in the full sample, and ~1,800 individuals in our main analysis sample of ~6950.

full sample and the comparison group experienced marginal, low, or very low food security, compared to 40% of the target group. Thus, the target group was more disadvantaged in adulthood than the comparison group and the comparison group was somewhat more disadvantaged than the full sample. Overall, about 11% of the full sample of young adults (and about 10% of the target group) was not exposed to welfare reform as children, about 24% was exposed between one and four years during their childhood, about 38% was exposed between five and twelve years, and over 27% was exposed for all or most of childhood (a period of 13–18 years). Almost 78% of the young adult observations took place during the last three survey waves—2015, 2017 and 2019. The mean age at which we observed the young adults was 29 years.

Appendix Table 3 presents characteristics of the mothers of the young adults in our sample. Education and marital status were measured the year prior to welfare reform implementation, and maternal age was measured both in 1999 and when the young adult was born. By design, all of the mothers in the target group were unmarried, while all of the comparison group mothers were married. Mothers in the target group were more likely to be Black and less likely to have completed high school than mothers in the comparison group and (even more so, in both cases) than mothers in the full sample, indicating that the target group is particularly disadvantaged and thus at high risk of relying on public assistance.

Main analyses

We present baseline estimates from Equation 1 in Table 2, separately for the broader and narrower measures of food insecurity, in Panels A and B respectively. Across all specifications reported in the top panel, we find consistent evidence that childhood exposure to welfare reform significantly reduced the likelihood of food insecurity (marginal, low, or very low food security) among adults in the target group relative to the comparison group. Specifically, the estimate from the most parsimonious specification (model 1) indicates that an additional year of exposure to welfare reform during childhood lowered the probability of marginal, low, or very low food security by about 0.8 percentage points. Controlling for state policies and economic conditions in the adult's childhood state of residence,

measured at various ages during their childhood, does not materially alter this treatment effect (model 2).[8]

The treatment effects estimated in models (1) and (2) are identified off of two key sources of variation, differences in ages adults were when their childhood states implemented welfare reform and differences in trends across the target and comparison groups within equally exposed cohorts in a given state. The next set of models progressively adds more inclusive controls for potentially confounding trends, and in the process evaluates the identifying assumptions and assesses robustness to dampening or completely switching off alternate sources of variation. Models (3) and (4) add parametric and non-parametric controls for unobserved state-specific cohort trends and model (6) is fully saturated with a set of state-cohort fixed effects, thereby controlling for all measured and unmeasured differential cohort trends across each state.[9] These models rely less on the variation in exposure across cohorts, and more on the variation in trends within similarly exposed cohorts across the target and comparison groups. Alternately, model (5) allows the unobserved state-specific cohort trends, across 5-year cohort groups, to differ between the target and comparison groups. Given that the target group is somewhat more disadvantaged at baseline than the control group (Table 1), it is important to assess whether the treatment effects reflect differential trends across these groups. In controlling for these differential trends in model (5), we are relying less on the comparison group for identification and relatively more on the variation in exposure due to age cohort and when states implemented the reforms.

While more saturated fixed effects and trend controls restrict the identifying variation and somewhat reduce precision (models 5 and 6), it is validating that the estimated treatment effects are not materially altered. With the average adult in the target group exposed to the new welfare regime for approximately eight years (mean exposure = 8.1 years) over his or her childhood, the coefficient magnitudes across these models imply that this mean level of exposure lowered food insecurity by between 6.2 – 8.4 percentage points (or 15.3 – 20.8 percent relative to the mean for the target group).

[8] Estimates are also not sensitive to separately controlling for fixed effects for the adult's current state of residence (see Appendix Table 4).

[9] In the saturated model the main effect of *Exposure*, shown in Equation 1, would drop out since it is perfectly collinear with the state-cohort fixed effects.

Panel B reports estimates for the stricter measure of food insecurity—low or very low food security. Though less precisely estimated (the estimates are not uniformly statistically significant), the estimated effects are statistically significant in four out of the six specifications, similar across specifications, and consistent with childhood exposure to welfare reform resulting in an improvement in the adult household's circumstances, as proxied by a reduction in low or very low food security. The effect magnitudes, evaluated at the mean level of exposure and relative to the outcome mean for the target group, suggest an improvement on the order of 13.7 to 19.9 percent.

Prior work has found that food insecurity is highly elastic with income. In a review of the literature on the economics of food insecurity, Gundersen et al. (2011) found that low income is associated with food insecurity; for example, about 35% of households with an income poverty ratio below one experience food insecurity (low or very low), compared to 20% of households with an income poverty ratio below two, and 10% with a ratio below three, suggesting a very steep gradient with respect to income. It was also noted that average income over multiple years was an even better predictor of food insecurity than current year income, and that liquid assets were protective against food insecurity. This suggests that even small accumulating changes in household circumstances for the first generation (mother exposed to welfare reform) can lead to meaningful changes for the next generation.[10]

Duration and timing of exposure

Estimates from Table 2, based on Equation 1, linearized the effects of each additional year of childhood exposure to welfare reform. We relax this linearity assumption and explore effects of varying levels of exposure duration in Panel A of Table 3. Reported estimates are relative to adults with zero

[10] Assuming a causal link, the income elasticity of food insecurity (among low-income households) implied by this gradient is between -0.4 and -1.0. Thus, if household income is the sole channel through which welfare reform impacts food insecurity of the next generation, extrapolating from this income effect would imply that an increase in average household income over the childhood years of at least 15-20 percent could generate gains in food security of the magnitudes that we observe for the average exposed adult. There are other indirect channels as well through which maternal exposure to welfare reform could produce gains among their children; for instance, as Vaughn (2021) finds, at-risk children exposed to welfare reform over the prenatal period and first five years of their childhood are on average 29 percent more likely to complete college and 35 percent more likely to be married, as well less likely to have children out of wedlock, with stronger effects realized among girls. All of these mechanisms would be predicted to reduce food insecurity through their effects on income as well as directly through other positive effects of human capital acquisition on health, health behaviors, and well-being.

years of exposure to welfare reform. For the broader measure of food insecurity (reported in models 1 and 2), significant welfare-reform associated improvements materialize for adults who were exposed longest, for at least 13 years of their childhood – on average by about 13.6 to 15.5 percentage points.[11] For adults exposed minimally between 1–4 years, or even exposed for longer amounts between 5–12 years, there are no economically or statistically significant welfare-reform associated improvements when considering the broader measure of food insecurity. When we turn to the stricter and narrower measure of food insecurity in models 3 and 4, we find a similar pattern. The magnitudes are non-trivial, suggesting that those exposed to welfare reform the longest experienced an improvement by about 6 to 8 percentage points, though only the latter estimate is marginally significant.

Models reported in Panel B attempt to parse out differential effects of exposure based on the age of the child when his/her mother was initially exposed to welfare reform. Doing so allows us to investigate the extent to which certain periods of child development are more or less sensitive to changes in household circumstances induced by welfare reform (Cunha and Heckman, 2007; Vaughn, 2021). Complicating this endeavor is that age of exposure and duration of exposure over the childhood period are perfectly correlated, making it impossible to fully disentangle the separate effects of age and duration of exposure. To address this challenge, we estimated regression splines that allowed the marginal effect of each additional year of exposure to differ depending on the age range of the child when he/she was exposed. These estimates suggest that children who were relatively young (ages 0–5 years) when their mothers were exposed to welfare reform experienced the strongest declines in food insecurity as adults; each additional year of exposure resulted in an improvement in the broader measure of food insecurity for this group by between 0.8 and 0.9 percentage points, and an improvement in the stricter measure by between 0.5 and 0.6 percent points. In contrast, additional years of exposure had no significant or meaningful effects if the children were older than age 5 when their state implemented welfare reform.

In summary, the evidence from Table 3 underscores two complementary points. First,

[11] Among this group that was exposed the longest, the effect magnitude is largely similar to that derived from Table 2, for an additional year of exposure multiplied by 15 (midpoint of exposure between 13–18 years).

improvements in food insecurity associated with welfare reform were strongest for adults in the target group that had the longest childhood exposure. Second, the effects are also largest for, and largely driven by, those who were exposed at very early ages, underscoring the importance of early life circumstances in determining later adult outcomes.

Heterogeneity

We further explore heterogeneity in the treatment effects across gender (Table 4) and across maternal educational attainment (Table 5). In light of our prior discussion and work that has found some evidence that the intergenerational effects of welfare reform (at least on adolescents; see Dave et al. 2021) are gender-specific, it is plausible to expect that men and women may have responded differently to changes in household circumstances due to maternal exposure to the new welfare rules. Estimates reported in Table 4 consistently show stronger welfare reform-associated improvements in food security for adult women relative to adult men, especially for the more intense measure of food insecurity (low/very low food insecurity, reported in models 4-6), for which there were no significant improvements for men (thus, all of the overall improvement was for women). These gender patterns are consistent with previous work that found stronger unfavorable effects of welfare reform on delinquent behaviors among male adolescents relative to female adolescents (Dave et al., 2021) and stronger effects on educational attainment for second-generation adult females than for second-generation adult males (Vaughn, 2021).

While adults in the target group, by definition, grew up in households with (unmarried) low-educated mothers, it is possible that mothers who were particularly disadvantaged in the labor market due to especially low levels of human capital may have fared quite differently under the more restrictive welfare rules and that this could have spilled over into differential effects on their children as they transitioned into adulthood. Estimates in Table 5 broadly indicate that exposure to welfare reform during childhood had little beneficial effects on food security for adults whose mothers had less than a high school education; the overall improvements in food insecurity that we found appear to accrue to the adult children of mothers who had relatively higher levels of human capital, as proxied by having a high school diploma.

Robustness checks

We conduct several additional checks to verify that our estimated treatment effects are robust to alternate specifications and samples and to more generally assess their plausibility. Our sample for the main analyses was limited to adults ages 18 and older. Some of these adults may still be residing with their mothers or part of extended households headed by other family members, in which case the estimated effects on food insecurity would be more reflective of the circumstances of other household adult heads rather than the sample adult's own circumstances. In Appendix Table 5, we restrict our sample specifically to adults who are household heads or partners of heads. These estimates should be interpreted with care since household formation is potentially endogenous to childhood exposure to welfare reform, which was why we did not restrict the sample this way for our primary analyses. Alternately, in Appendix Table 6, we exclude the very young adults from the sample, focusing on older adults ages 24+, a group more likely to have formed their own households.[12] It is validating that we find effect magnitudes were very similar to those in our main analyses across both of these sample restrictions.

Our main analyses were based on cohorts born between 1975 and 1999, which include adults who were never exposed partially exposed, and fully exposed to welfare reform during childhood. Including the earlier never-exposed cohorts can be important for fitting cohort-specific trends. In Appendix Table 7, we assess the robustness of the estimates to relying on variation in exposure only among ever-exposed cohorts – those born between 1980–1999; every adult in these birth cohorts had some exposure to welfare reform during childhood. Our results and conclusions are not materially changed from excluding the never-exposed adults.

We present estimates based on an alternate comparison group (unmarried mothers with more than a high school education), as well as a combination of that comparison and our original comparison group (which was low-educated married mothers) in Appendix Table 8. That is, the third comparison group

[12] Using data from the March 2019 Current Population Survey, we found that 64% of adults aged 24 were living in households without adult relatives. This percentage is similar to that in our PSID analysis sample in which about 62% of 24-year-old adults whose mothers had a high school degree or less were living in households without adult relatives.

includes both unmarried mothers with more than a high school education and low-educated married mothers. Our estimates are insensitive to these alternative comparison groups.

We also estimated effects for adults whose mothers were married and had higher educational attainment as a placebo check, as it would not be plausible to expect substantive or significant effects of childhood exposure to welfare reform for this group. If there were significant effects, it would point to spurious time-varying cohort trends. The treatment effects in these models are statistically insignificant, with magnitudes that are small and close to zero (shown in Table 6), instilling a degree of confidence in our research design.

Finally, potential biases have been recently recognized in the standard two-way fixed effects (TWFE) model in the presence of staggered treatment adoption and treatment effect heterogeneity (Goodman-Bacon, 2021; Sun and Abraham, 2020; Callaway and Sant'Anna, 2020). We note that our research design is not the standard TWFE approach and that we are not identifying the dynamic effects of policy in calendar or relative time – two issues which are at the center of this emerging literature. Our interest is in identifying the intergenerational life cycle effects of mothers' exposure, when their children were young, on their children (at a point in time) as young adults. Nevertheless, we draw on this literature to ensure that our estimates are not contaminated by similar biases. Specifically, the bias in the TWFE model largely arises due to a problematic use of earlier-treated units as a counterfactual for later-treated units when there is treatment effect heterogeneity. Comparison of the treated units (earlier-treated or later-treated) with "never-treated" is not problematic (Goodman-Bacon, 2021), even with dynamic treatment effects. Drawing on this insight and applying it to our approach, we assess robustness to using only the never-exposed individuals as a counterfactual for each separate treatment block of cohorts defined according to the duration of their exposure (see Appendix Table 9). For example, the first column presents estimates from Equation 1, but for young adults who were exposed to welfare reform as children for 1–3 years versus those adults who were never exposed to welfare reform as children. Each subsequent column varies the treatment group, but keeps the counterfactual fixed to the never-exposed young adults. All of these models bypass counterfactual comparisons within ever-exposed adults (for example, they do

not compare more vs. less exposed young adults, which could be problematic). Sample sizes drop considerably as expected. Nevertheless, it is reassuring that our earlier results and patterns continue to be reflected in these models. Similar to the estimates presented in Table 3, young adults who were exposed to welfare reform during most of their childhood (13–18 years) experienced significant reductions in their households' food insecurity. For adults who were minimally exposed, the estimates suggest some improvement in food security, but the magnitudes are much smaller and not statistically significant.

Conclusion

This study estimated the effects of welfare reform in the 1990s, which permanently restructured and contracted the cash assistance system in the U.S., on food insecurity—a fundamental form of hardship—of the next generation of young adults. We found that longer exposure to welfare reform led to decreases in food insecurity of the next generation of households, by about 10% for a 5-year increase in exposure, with stronger effects for women, individuals exposed at least 13 years, individuals exposed in early childhood (0–5 years), and individuals whose mothers had completed high school (versus less than high school). These results are consistent with, and complement, those of Vaughn (2021), who found that early childhood exposure to welfare reform led to higher educational attainment and a higher likelihood of being married in young adults up to age 28, particularly for women. That study, which also used data from the PSID, suggests potential mechanisms underlying our findings for food insecurity—education and marriage. Future research should explicitly model these aspects of human capital as potential mediators.

While welfare reform led to an overall improvement in food security of the next generation of adults, it is important to place the findings in context. We investigated one key indicator of material hardship (or conversely, well-being), but the findings may not translate to other forms of hardship such as housing instability and inadequate medical care. In addition, the findings highlight that the improvements in food security associated with welfare reform were not uniform across the relevant population. Notably, men did not fare as well as women and young adults with very low educated mothers (less than high school) did not experience improvements in food security as a result of welfare reform. It is important to

take such heterogeneity into account when making policy decisions to continue or modify the cash assistance system in the U.S.

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Figure 1

Timeline of Maternal Exposure to Welfare Reform (WR), Childhood Exposure to WR, and Next Generation Adult Food Security, PSID

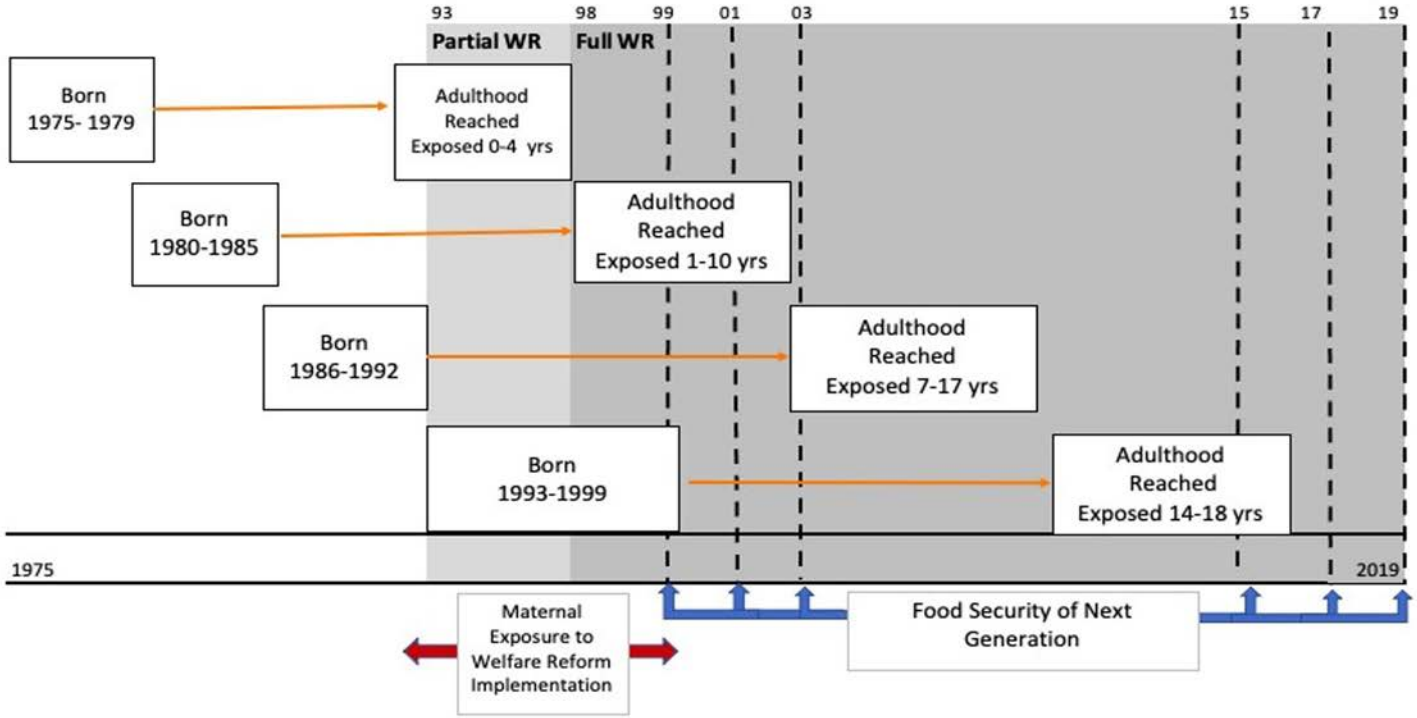

Table 1: Weighted Sample Characteristics of Young Adults (second generation), PSID

	Full Sample	Primary Comparison Group	Target Group
Food insecurity			
Marginal, low, or very low food security	.194	.235	.406
Low or very low food security	.104	.127	.237
Food Stamp receipt*			
Past year	.102	.133	.307
Past month	.086	.108	.278
Exposure to welfare reform			
0 years	.109	.118	.094
1-4 years	.237	.269	.265
5-12 years	.381	.391	.382
13-18 years	.273	.222	.259
Year food insecurity outcomes assessed			
1999	.052	.058	.053
2001	.072	.078	.076
2003	.098	.106	.097
2015	.249	.246	.251
2017	.259	.250	.255
2019	.271	.262	.268
Other characteristics			
Age, mean years (s.d.)	28.8 (7.0)	29.3 (7.0)	28.9 (6.9)
Year of birth, mean	1984	1983	1984
Male	.506	.501	.546
N	**13,303**	**6,161**	**1,896**

Notes: Figures are proportions unless indicated otherwise. Full sample consists of young adults at least 18 years of age who were born in 1975 or later and whose mothers were age 18+ years when the young adult was born and had known marital status and education when the young adult was first exposed to welfare reform as a child. Target group consists of young adults in the full sample whose mothers had at most a high school education and were unmarried when the young adults was first exposed to welfare reform as a child. *Food stamp receipt is based on a slightly smaller sample: Full sample: 9,123; comparison group: 3,610; target group: 1,263.

Table 2
Estimated Effects of Exposure to Welfare Reform during Childhood on Adult Food Insecurity, PSID

Model	1	2	3	4	5	6
Cohorts	1975-1999	1975-1999	1975-1999	1975-1999	1975-1999	1975-1999
Panel A	Marginal, Low, or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.02265**	-0.02007*	-0.02164*	-0.02463*	-0.01720	_
	(0.01070)	(0.01160)	(0.01127)	(0.01443)	(0.01575)	
Number of Years Exposed to Welfare Reform as Child * Target	-0.00777***	-0.00779***	-0.00883***	-0.00841***	-0.01055***	-0.00833**
	(0.00239)	(0.00252)	(0.00269)	(0.00288)	(0.00355)	(0.00391)
Outcome mean for target group	0.404	0.404	0.404	0.404	0.404	0.404
Panel B	Low or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.02273**	-0.01989*	-0.02178*	-0.02557*	-0.01721	_
	(0.01119)	(0.01173)	(0.01258)	(0.01461)	(0.01632)	
Number of Years Exposed to Welfare Reform as Child * Target	-0.00431*	-0.00489*	-0.00584**	-0.00564**	-0.00401	-0.00501
	(0.00250)	(0.00243)	(0.00241)	(0.00257)	(0.00410)	(0.00356)
Outcome mean for target group	0.235	0.235	0.235	0.235	0.235	0.235
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	No	Yes	Yes	Yes	Yes	Yes
Cohort-specific linear trends	No	No	Yes	No	No	No
State*5-year cohort group fixed effects	No	No	No	Yes	Yes	No
State*5-year cohort group fixed effects*Target	No	No	No	No	Yes	No
State*Cohort fixed effects	No	No	No	No	No	Yes
Sample Size	6946	6946	6946	6946	6946	6946

Notes: Each column in Panel A and Panel B presents results from separate regression model. Coefficients from fixed effects OLS estimation are reported, with robust standard errors, allowing for correlation of observations within current state of residence, reported in parentheses. All specifications control for childhood state of residence, sociodemographic characteristics of young adults and their mothers (indicators for ages 18-22, 23-27, 28-32, 33-37, and 38-42, gender, and the mother's race/ethnicity, education and marital status (timing described in text), and age when the young adult was born), state policies and economic conditions during year of interview (unemployment rate, personal income per capita, poverty rate, indicators for the SNAP policy index, percent of low-income children who are uninsured, refundable EITC, EITC rate, minimum wage, log of the number of Medicaid beneficiaries, and log population), and the state unemployment rate separately at ages 18-22. All specifications further control for fixed effects for the child's state of residence, cohort, and year of interview (when food security outcome was assessed). States policies during childhood include the unemployment rate, poverty rate, personal income per capita, minimum wage, refundable EITC, and generosity of EITC, all measured when the adult was age 5, 11, and 17. In Model 6, the main effect of exposure is captured by the State*Cohort fixed effects. Asterisks denote significance as follows: *** p-value $\leq$ 0.01; ** 0.01 < p-value $\leq$ 0.05; * 0.05 < p-value $\leq$ 0.10.

Table 3
Estimated Effects of Exposure to Welfare Reform during Childhood on Adult Food Insecurity, Non-Linear Effects of Duration of Exposure and by Age of Exposure

Model	1	2	3	4
Outcome	Marginal, Low, or Very Low Food Security		Low or Very Low Food Security	
Panel A	Cohorts 1975 - 1999			
Exposed 1-4 Years*Target	-0.02178	-0.04310	-0.01377	-0.02846
	(0.06673)	(0.07431)	(0.05750)	(0.06516)
Exposed 5-12 Years*Target	-0.03230	-0.03219	-0.01127	-0.01982
	(0.04849)	(0.05408)	(0.04722)	(0.05251)
Exposed 13-18 Years*Target	-0.13635**	-0.15508***	-0.06189	-0.08042*
	(0.05105)	(0.05725)	(0.04486)	(0.04726)
Outcome mean for target group	0.404	0.404	0.235	0.235
Panel B	Cohorts 1975 - 1999			
Number of Years Exposed to Welfare Reform as Child * Target * Age Exposed 0-5	-0.00784**	-0.00885**	-0.00548**	-0.00637**
	(0.00301)	(0.00348)	(0.00254)	(0.00263)
Number of Years Exposed to Welfare Reform as Child * Target*Age Exposed 6-13	-0.00273	-0.00221	-0.00531	-0.00577
	(0.00532)	(0.00606)	(0.00414)	(0.00460)
Number of Years Exposed to Welfare Reform as Child * Target * Age Exposed 14-17	-0.00611	-0.00945	-0.01586	-0.01727
	(0.02174)	(0.02562)	(0.01443)	(0.01635)
Outcome mean for target group	0.404	0.404	0.235	0.235
Cohort fixed effects	Yes	Yes	Yes	Yes
Period fixed effects	Yes	Yes	Yes	Yes
State policies during childhood	Yes	Yes	Yes	Yes
State*5-year cohort group fixed effects	No	Yes	No	Yes
Sample Size	6946	6946	6946	6946

Notes: Each column in Panel A and Panel B represents a separate regression model. See Table 2 for full notes. In Panel A, "Exposed Zero Years*Target" is the reference group.

Table 4
Estimated Effects of Exposure to Welfare Reform during Childhood on Adult Food Insecurity, Heterogeneity across Gender

Model	1	2	3	4	5	6
Outcome	Marginal, Low, or Very Low Food Security			Low or Very Low Food Security		
	Cohorts 1975 - 1999					
Number of Years Exposed to Welfare Reform as Child * Target * Male	-0.00563*	-0.00650**	-0.00623	-0.00165	-0.00272	-0.00149
	(0.00298)	(0.00316)	(0.00424)	(0.00298)	(0.00315)	(0.00399)
Number of Years Exposed to Welfare Reform as Child * Target * Female	-0.00953***	-0.00993***	-0.00969**	-0.00754***	-0.00797***	-0.00753*
	(0.00288)	(0.00338)	(0.00426)	(0.00248)	(0.00263)	(0.00378)
Gender Difference (Target) [p-value]	[0.185]	[0.269]	[0.307]	[0.010]***	[0.024]**	[0.010]***
Outcome mean for target group	0.404	0.404	0.404	0.235	0.235	0.235
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	Yes	Yes	Yes	Yes	Yes	Yes
State*5-year cohort group fixed effects	No	Yes	No	No	Yes	No
State*Cohort fixed effects	No	No	Yes	No	No	Yes
Sample Size	6946	6946	6946	6946	6946	6946

Notes: Each column represents a separate regression model. See Table 2 for full notes.

Table 5
Estimated Effects of Exposure to Welfare Reform during Childhood on Adult Food Insecurity, Heterogeneity across Maternal Educational Attainment

Model	1	2	3	4	5	6
Outcome	Marginal, Low, or Very Low Food Security			Low or Very Low Food Security		
Panel A	Cohorts 1975 - 1999					
Number of Years Exposed*Target* Less than High School	-0.00079	-0.00161	-0.00568	-0.00072	-0.00253	-0.00547
	(0.00501)	(0.00538)	(0.00630)	(0.00550)	(0.00576)	(0.00667)
Number of Years Exposed*Target* High School	-0.00892***	-0.00965***	-0.00745	-0.00547**	-0.00583*	-0.00377
	(0.00299)	(0.00357)	(0.00477)	(0.00269)	(0.00308)	(0.00375)
Educ. Difference (Target) [p-value]	[0.171]	[0.226]	[0.830]	[0.439]	[0.630]	[0.815]
Outcome mean for target group	0.404	0.404	0.404	0.235	0.235	0.235
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	Yes	Yes	Yes	Yes	Yes	Yes
State*5-yr. cohort group fixed effects	No	Yes	No	No	Yes	No
State*Cohort fixed effects	No	No	Yes	No	No	Yes
Sample Size	6946	6946	6946	6946	6946	6946

Notes: Each column represents a separate regression model. See Table 2 for full notes.

Table 6
Estimates of Exposure to Welfare Reform during Childhood on Adult Food Insecurity, Using Placebo Group: Higher Educated (More than High School Graduate) Married Mothers

Model	1	2	3	4	5	6	7	8
Outcome	Marginal, Low, or Very Low Food Security				Low or Very Low Food Security			
	Cohorts 1975 - 1999							
Number of Years Exposed to Welfare Reform as Child	-0.00174 (0.01117)	-0.00365 (0.01145)	-0.00422 (0.01306)	0.00792 (0.01671)	0.00369 (0.00988)	0.00195 (0.01061)	0.00222 (0.01141)	0.01018 (0.01400)
Outcome mean	0.119	0.119	0.119	0.119	0.061	0.061	0.061	0.061
Childhood state fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Current state policies	No	Yes	Yes	Yes	No	Yes	Yes	Yes
State policies during childhood	No	No	Yes	Yes	No	No	Yes	Yes
State*5-year cohort group fixed effects	No	No	No	Yes	No	No	No	Yes
Sample Size	4945	4945	4945	4945	4945	4945	4945	4945

Notes: Each column represents a separate regression model. See Table 2 for full notes.

Appendix Table 1
Implementation Dates of Welfare Reform by State

	10/92 to 2/97 **AFDC Waiver**	9/96 to 1/98 **TANF**	10/92 to 1/98 **Any Welfare Reform**
Alabama		Nov-96	Nov-96
Alaska		Jul-97	Jul-97
Arizona	Nov-95	Oct-96	Nov-95
Arkansas	Jul-94	Jul-97	Jul-94
California	Dec-92	Jan-98	Dec-92
Colorado		Jul-97	Jul-97
Connecticut	Jan-96	Oct-96	Jan-96
DC		Mar-97	Mar-97
Delaware	Oct-95	Mar-97	Oct-95
Florida			Oct-96
Georgia	Jan-94	Jan-97	Jan-94
Hawaii	Feb-97	Jul-97	Feb-97
Idaho		Jul-97	Jul-97
Illinois	Nov-93	Jul-97	Nov-93
Indiana	May-95	Oct-96	May-95
Iowa	Oct-93	Jan-97	Oct-93
Kansas		Oct-96	Oct-96
Kentucky		Oct-96	Oct-96
Louisiana		Jan-97	Jan-97
Maine		Nov-96	Nov-96
Maryland	Mar-96	Dec-96	Mar-96
Massachusetts	Nov-95	Sep-96	Nov-95
Michigan	Oct-92	Sep-96	Oct-92
Minnesota		Jul-97	Jul-97
Mississippi	Oct-95	Jul-97	Oct-95
Missouri	Jun-95	Dec-96	Jun-95
Montana	Feb-96	Feb-97	Feb-96
Nebraska	Oct-95	Dec-96	Oct-95
Nevada		Dec-96	Dec-96
New Hampshire		Oct-96	Oct-96
New Jersey	Oct-92	Jul-97	Oct-92
New Mexico		Jul-97	Jul-97
New York		Nov-97	Nov-97
North Carolina	Jul-96	Jan-97	Jul-96
North Dakota		Jul-97	Jul-97
Ohio	Jul-96	Oct-96	Jul-96
Oklahoma		Oct-96	Oct-96
Oregon	Feb-93	Oct-96	Feb-93
Pennsylvania		Mar-97	Mar-97
Rhode Island		May-97	May-97
South Carolina		Oct-96	Oct-96
South Dakota	Jun-94	Dec-96	Jun-94
Tennessee	Sep-96	Oct-96	Sep-96
Texas	Jun-96	Nov-96	Jun-96
Utah	Jan-93	Oct-96	Jan-93
Vermont	Jul-94	Sep-96	Jul-94
Virginia	Jul-95	Feb-97	Jul-95
Washington	Jan-96	Jan-97	Jan-96
West Virginia		Jan-97	Jan-97
Wisconsin	Jan-96	Sep-97	Jan-96
Wyoming		Jan-97	Jan-97

Source: U.S. Department of Health and Human Services (1999)

Appendix Table 2: Core Food Security Module Questions

Questions Used To Assess the Food Security of Households in the CPS Food Security Supplement

1. "We worried whether our food would run out before we got money to buy more." Was that often, sometimes, or never true for you in the last 12 months?
2. "The food that we bought just didn't last and we didn't have money to get more." Was that often, sometimes, or never true for you in the last 12 months?
3. "We couldn't afford to eat balanced meals." Was that often, sometimes, or never true for you in the last 12 months?
4. In the last 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food? (Yes/No)
5. (If yes to question 4) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
6. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? (Yes/No)
7. In the last 12 months, were you ever hungry, but didn't eat, because there wasn't enough money for food? (Yes/No)
8. In the last 12 months, did you lose weight because there wasn't enough money for food? (Yes/No)
9. In the last 12 months did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food? (Yes/No)
10. (If yes to question 9) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

(Questions 11-18 were asked only if the household included children age 0-17)

11. "We relied on only a few kinds of low-cost food to feed our children because we were running out of money to buy food." Was that often, sometimes, or never true for you in the last 12 months?
12. "We couldn't feed our children a balanced meal, because we couldn't afford that." Was that often, sometimes, or never true for you in the last 12 months?
13. "The children were not eating enough because we just couldn't afford enough food." Was that often, sometimes, or never true for you in the last 12 months?
14. In the last 12 months, did you ever cut the size of any of the children's meals because there wasn't enough money for food? (Yes/No)
15. In the last 12 months, were the children ever hungry but you just couldn't afford more food? (Yes/No)
16. In the last 12 months, did any of the children ever skip a meal because there wasn't enough money for food? (Yes/No)
17. (If yes to question 16) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
18. In the last 12 months did any of the children ever not eat for a whole day because there wasn't enough money for food? (Yes/No)

Coding of Responses

Questions 1-3 and 11-13 are coded as affirmative (i.e., possibly indicating food insecurity) if the response is "often" or "sometimes." Questions 5, 10, and 17 are coded as affirmative if the response is "almost every month" or "some months but not every month." The remaining questions are coded as affirmative if the response is "yes."

Assessing Food Security Status in Households without Children

Households without children are classified as *food insecure* if they report 3 or more indications of food insecurity in response to the first 10 questions; they are classified as having *very low food security* if they report 6 or more food-insecure conditions out of the first 10 questions.

Assessing Food Security Status in Households with Children Age 0-17

Households with children are classified as *food insecure* if they report 3 or more indications of food insecurity in response to the entire set of 18 questions; they are classified as having *very low food security* if they report 8 or more food-insecure conditions in response to the entire set of 18 questions.

The food security status of children in the household is assessed by responses to the child-referenced questions (questions 11-18). Households reporting two or more of these conditions are classified as having *food insecurity among children*. Households reporting five or more are classified as having *very low food security among children*.

Source: Coleman-Jensen, 2020, p. 5

Appendix Table 3
Weighted Maternal Characteristics, PSID

	1 Full Sample	2 Comparison Group	3 Target Group
Maternal Characteristics			
Age in years in 1999, mean (s.d.)	42.55 (5.14)	41.75 (5.68)	40.08 (4.82)
Age in years when young adult was born, mean (s.d.)	26.95 (5.08)	25.52 (5.04)	24.50 (5.55)
Race			
White	.804	.821	.330
Black	.153	.122	.639
Other	.043	.057	.031
Educational attainment year before welfare reform implementation (or at time of birth of child if child was born after welfare reform)			
Less than high school	.095	.156	.371
High school education	.401	.844	.629
More than high school education	.504	n/a	n/a
Married	.87	1.00	.00
N	13,303	3,925	1,375

Notes: Figures are proportions unless indicated otherwise. Full sample consists of mothers (of young adults who were at least 18 years of age and born in 1975 or later) who were age 18+ years when the young adult was born and had known marital status and education when the young adult was first exposed to welfare reform as a child. Target group consists mothers of young adults in the full sample who had at most a high school education and were unmarried when the young adult was first exposed to welfare reform as a child. Comparison group consists of mothers of young adults in the full sample who had at most a high school education and were married when the young adult was first exposed to welfare reform as a child.

Appendix Table 4
Estimates of Exposure to Welfare Reform during Childhood on Adult Food Insecurity
Controlling for Current Residential State Fixed Effects

Model	1	2	3	4	5	6
Cohorts	1975-1999	1975-1999	1975-1999	1975-1999	1975-1999	1975-1999
Panel A	Marginal, Low, or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.02386**	-0.02050*	-0.02134*	-0.02483*	-0.01777	_
	(0.01078)	(0.01179)	(0.01173)	(0.01468)	(0.01586)	
Number of Years Exposed to Welfare Reform as Child * Target	-0.00768***	-0.00767***	-0.00855***	-0.00806***	-0.01052***	-0.00790*
	(0.00230)	(0.00248)	(0.00266)	(0.00288)	(0.00356)	(0.00399)
Outcome mean for target group	0.404	0.404	0.404	0.404	0.404	0.404
Panel B	Low or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.02463**	-0.02103*	-0.02214	-0.02649*	-0.01822	_
	(0.01165)	(0.01223)	(0.01331)	(0.01510)	(0.01667)	
Number of Years Exposed to Welfare Reform as Child * Target	-0.00423*	-0.00474*	-0.00553**	-0.00521*	-0.00363	-0.00466
	(0.00247)	(0.00245)	(0.00241)	(0.00261)	(0.00429)	(0.00368)
Outcome mean for target group	0.235	0.235	0.235	0.235	0.235	0.235
Childhood state of residence fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Current state of residence fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	No	Yes	Yes	Yes	Yes	Yes
Cohort-specific linear trends	No	No	Yes	No	No	No
State*5-year cohort group fixed effects	No	No	No	Yes	Yes	No
State*5-year cohort group fixed effects*Target	No	No	No	No	Yes	No
State*Cohort fixed effects	No	No	No	No	No	Yes
Sample Size	6946	6946	6946	6946	6946	6946

Notes: Each column within each panel represents a separate regression model. See Table 2 for full notes.

Appendix Table 5
Estimates of Exposure to Welfare Reform during Childhood on Adult Food Insecurity
Sample: Adult is household head or spouse/partner of household head

Model	1	2	3	4	5	6
Cohorts	1975-1999	1975-1999	1975-1999	1975-1999	1975-1999	1975-1999
Panel A	Marginal, Low, or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.01259 (0.01285)	-0.00987 (0.01269)	-0.01785 (0.01373)	-0.01139 (0.01832)	0.00048 (0.01931)	_
Number of Years Exposed to Welfare Reform as Child * Target	-0.00692** (0.00325)	-0.00771** (0.00351)	-0.00739** (0.00363)	-0.00918** (0.00413)	-0.01063 (0.00981)	-0.00756 (0.00476)
Outcome mean for target group	0.429	0.429	0.429	0.429	0.429	0.429
Panel B	Low or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.01902 (0.01308)	-0.01873 (0.01242)	-0.01970 (0.01393)	-0.01663 (0.01675)	0.00058 (0.01841)	_
Number of Years Exposed to Welfare Reform as Child * Target	-0.00548** (0.00252)	-0.00715*** (0.00234)	-0.00709*** (0.00254)	-0.00781*** (0.00259)	-0.01290 (0.00927)	-0.00722* (0.00371)
Outcome mean for target group	0.243	0.243	0.243	0.243	0.243	0.243
Childhood state of residence fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	No	Yes	Yes	Yes	Yes	Yes
Cohort-specific linear trends	No	No	Yes	No	No	No
State*5-year cohort group fixed effects	No	No	No	Yes	Yes	No
State*5-year cohort group fixed effects*Target	No	No	No	No	Yes	No
State*Cohort fixed effects	No	No	No	No	No	Yes
Sample Size	4601	4601	4601	4601	4601	4601

Notes: Each column within each panel represents a separate regression model. See Table 2 for full notes.

Appendix Table 6
Estimates of Exposure to Welfare Reform during Childhood on Adult Food Insecurity
Sample: Ages 24+

Model	1	2	3	4	5	6
Cohorts	1975-1999	1975-1999	1975-1999	1975-1999	1975-1999	1975-1999
Panel A	Marginal, Low, or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.01508 (0.01529)	-0.01062 (0.01611)	-0.01818 (0.01729)	-0.02254 (0.01637)	-0.00890 (0.01753)	_
Number of Years Exposed to Welfare Reform as Child * Target	-0.00930** (0.00384)	-0.00910** (0.00409)	-0.00927** (0.00439)	-0.00958* (0.00484)	-0.02086 (0.01480)	-0.00975* (0.00563)
Outcome mean for target group	0.396	0.396	0.396	0.396	0.396	0.396
Panel B	Low or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.02382 (0.01505)	-0.02257 (0.01500)	-0.02367 (0.01681)	-0.02792 (0.01715)	-0.01519 (0.01930)	_
Number of Years Exposed to Welfare Reform as Child * Target	-0.00815*** (0.00286)	-0.00892*** (0.00283)	-0.00926*** (0.00294)	-0.00815** (0.00327)	-0.01452 (0.01144)	-0.00809* (0.00424)
Outcome mean for target group	0.228	0.228	0.228	0.228	0.228	0.228
Childhood state of residence fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	No	Yes	Yes	Yes	Yes	Yes
Cohort-specific linear trends	No	No	Yes	No	No	No
State*5-year cohort group fixed effects	No	No	No	Yes	Yes	No
State*5-year cohort group fixed effects*Target	No	No	No	No	Yes	No
State*Cohort fixed effects	No	No	No	No	No	Yes
Sample Size	4758	4758	4758	4758	4758	4758

Notes: Each column within each panel represents a separate regression model. See Table 2 for full notes.

Appendix Table 7
Estimates of Exposure to Welfare Reform during Childhood on Adult Food Insecurity – Exposed Cohorts 1980-1999

Model	1	2	3	4	5	6
Cohorts	1980-1999	1980-1999	1980-1999	1980-1999	1980-1999	1980-1999
Panel A	Marginal, Low, or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.02750**	-0.02596*	-0.03557**	-0.02655	-0.01737	_
	(0.01323)	(0.01415)	(0.01728)	(0.02114)	(0.02445)	
Number of Years Exposed to Welfare Reform as Child * Target	-0.00973***	-0.00893**	-0.01172***	-0.01173***	-0.01081***	-0.00950*
	(0.00311)	(0.00337)	(0.00338)	(0.00347)	(0.00398)	(0.00483)
Outcome mean for target group	0.439	0.439	0.439	0.439	0.439	0.439
Panel B	Low or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.02315*	-0.01802	-0.03039*	-0.02632	-0.01667	_
	(0.01180)	(0.01350)	(0.01530)	(0.01788)	(0.02124)	
Number of Years Exposed to Welfare Reform as Child * Target	-0.00398	-0.00395	-0.00590*	-0.00569*	-0.00370	-0.00407
	(0.00295)	(0.00294)	(0.00307)	(0.00328)	(0.00437)	(0.00419)
Outcome mean for target group	0.253	0.253	0.253	0.253	0.253	0.253
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	No	Yes	Yes	Yes	Yes	Yes
Cohort-specific linear trends	No	No	Yes	No	No	No
State*5-year cohort group fixed effects	No	No	No	Yes	Yes	No
State*5-year cohort group fixed effects*Target	No	No	No	No	Yes	No
State*Cohort fixed effects	No	No	No	No	No	Yes
Sample Size	4980	4980	4980	4980	4980	4980

Notes: Each column within each panel represents a separate regression model. See Table 2 for full notes.

Appendix Table 8
Estimates of Exposure to Welfare Reform during Childhood on Adult Food Insecurity
Alternate Comparison Groups

Model	1	2	3	4	5	6
Comparison Group	Low-educated married mothers (From Table 2)		Higher-educated unmarried mothers		Low-educated married mothers or higher-educated unmarried mothers	
Panel A	Marginal, Low, or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.02007*	-0.02463*	-0.04185*	-0.04318	-0.01306	-0.01546
	(0.01160)	(0.01443)	(0.02135)	(0.02842)	(0.01103)	(0.01403)
Number of Years Exposed to Welfare Reform as Child * Target	-0.00779***	-0.00841***	-0.00807*	-0.01144***	-0.00830***	-0.00837***
	(0.00252)	(0.00288)	(0.00469)	(0.00401)	(0.00244)	(0.00277)
Outcome mean for target group	0.404	0.404	0.404	0.404	0.404	0.404
Panel B	Low or Very Low Food Security					
Number of Years Exposed to Welfare Reform as Child	-0.01989*	-0.02557*	-0.03607*	-0.03122	-0.01437	-0.01748
	(0.01173)	(0.01461)	(0.02049)	(0.02884)	(0.01097)	(0.01421)
Number of Years Exposed to Welfare Reform as Child * Target	-0.00489*	-0.00564**	-0.00765*	-0.00619	-0.00522**	-0.00513**
	(0.00243)	(0.00257)	(0.00438)	(0.00406)	(0.00231)	(0.00249)
Outcome mean for target group	0.235	0.235	0.235	0.235	0.235	0.235
Childhood state of residence fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	Yes	Yes	Yes	Yes	Yes	Yes
State*5-year cohort group fixed effects	No	Yes	No	Yes	No	Yes
Sample Size	6946	6946	2595	2595	7689	7689

Notes: Each column within each panel represents a separate regression model. See Table 2 for full notes.

Appendix Table 9
Estimates of Exposure to Welfare Reform during Childhood on Adult Food Insecurity
Comparisons of Specific Groups of Treated Individuals to Never-exposed Individuals

Model	1	2	3	4	5	6
Panel A	Marginal, Low, or Very Low Food Security					
Treatment (Exposed)	Exposed 1-3 Years	Exposed 4-6 Years	Exposed 7-9 Years	Exposed 10-12 Years	Exposed 13-15 Years	Exposed 16-18 Years
Exposed * Target	-0.00051	-0.06293	-0.15686	0.04013	-0.16812*	-0.14926**
	(0.09792)	(0.10023)	(0.10163)	(0.08456)	(0.09134)	(0.07347)
Outcome mean for target group	0.368	0.375	0.382	0.387	0.415	0.411
Panel B	Low or Very Low Food Security					
Treatment (Exposed)	Exposed 1-3 Years	Exposed 4-6 Years	Exposed 7-9 Years	Exposed 10-12 Years	Exposed 13-15 Years	Exposed 16-18 Years
Exposed * Target	-0.03595	-0.04613	-0.13313*	-0.04098	-0.12640*	-0.10231
	(0.08492)	(0.07434)	(0.07301)	(0.06799)	(0.07477)	(0.08049)
Outcome mean for target group	0.227	0.234	0.216	0.236	0.258	0.257
Childhood state of residence fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort & period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State policies during childhood	Yes	Yes	Yes	Yes	Yes	Yes
State*5-year cohort group fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sample Size	2012	2074	1785	1595	1474	1851

Notes: Each column within each panel represents a separate regression model. See Table 2 for full notes.