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THE EFFECT OF SAFETY NET GENEROSITY ON MATERNAL MENTAL HEALTH AND RISKY HEALTH BEHAVIORS

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ABSTRACT

Single mothers are more likely to experience mental health problems and stress-related negative health behaviors, but a more generous safety net may improve these outcomes. We use a simulated safety net eligibility approach that accounts for interactions across safety net programs and relies on changing policies across states and time to identify causal effects of safety net generosity on psychological distress and risky behaviors of single mothers. Results suggest that a more generous safety net is protective of maternal mental health: a $1000 increase to the simulated potential combined cash and food benefit package reduces severe psychological distress by 8.4 percent. Breaking out effects by individual programs while still controlling for potential benefits from other programs, we find protective effects of tax credits, cash benefits provided by Temporary Assistance for Needy Families, and food benefits provided by Supplemental Nutritional Assistance, but no effects of Medicaid eligibility. The effects are primarily driven by single mothers with the lowest levels of education. We find no significant effects of generosity on daily smoking, but we find evidence that benefits reduce the likelihood of heavy drinking. Results suggest that government investments in resources available to low-income families are effective at improving well-being.

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I. INTRODUCTION

Low-income families headed by single mothers often face economic and social challenges. Perhaps as a result of stressful life circumstances, single mothers are significantly more likely to suffer from mental health problems and are more likely to engage in risky health behaviors such as smoking and heavy drinking (DeKlyen et al., 2006; Jun & Acevedo-Garcia, 2007). Both maternal mental health problems and risky health behaviors are associated with negative outcomes for children (Case & Paxson, 2002; Oyserman et al., 2002; Bernstein et al., 2005; Oyserman et al., 2005; Sabia, 2008; Allen-Meares et al., 2010; Kalliola et al., 2013, Rossow et al., 2016).

The social safety net is intended to ameliorate the effects of economic hardship for low-income families. However, the literature examining the impact of various safety net programs suggests mixed effects on maternal mental health. For example, as we review later, researchers have often found evidence of mental health benefits from the Earned Income Tax Credit (EITC), but less consistent or even detrimental effects for other programs. Moreover, the literature to date on the impact of the safety net on the mental health of low-income parents typically focuses on one safety net program at a time. However, the US social safety net includes a number of different programs, and recipients of one program often receive benefits from multiple other programs simultaneously. Furthermore, participation in one program may directly or indirectly reduce the benefits received from another. These complex inter-relationships across major safety net programs mean that analyses of one program in isolation may as a result yield biased estimates of program effects.

In this paper, we examine the impact of multiple safety net programs on maternal mental health and risky behaviors, attempting to account for the complex relationships across programs

and relying on policy-driven variation in the benefits available to single mothers with different demographic characteristics living in different states over time. We use a multi-program safety net calculator first introduced by Schmidt, Shore-Sheppard, and Watson (2016) that imputes eligibility and benefit levels for cash assistance through the Temporary Assistance for Needy Families Program (TANF), tax credits including the EITC and Child Tax Credit (CTC), food assistance through the Supplemental Nutrition Assistance Program (SNAP), and public health insurance through Medicaid and the Children's Health Insurance Program (CHIP). This calculator accounts for interactions between these programs in eligibility and generosity. For example, our estimated effects of SNAP account for the fact that receipt of higher TANF benefits will reduce the SNAP benefits for which a family is eligible. Using a simulated eligibility technique as in Currie and Gruber (1996) that allows us to isolate the effects of policy changes from the effects of economic conditions or individual decisions, we generate estimates of the potential safety net benefits for which single mother families are eligible using the Current Population Survey (CPS).[1] We then merge those simulated potential benefits by state, year, and demographic cell to the restricted-access National Health Interview Survey (NHIS) to estimate causal effects of safety net generosity on the mental health and stress-related health behavior of single mothers.

We first show that our simulated safety net benefits strongly predict self-reports of safety net benefits in the CPS and participation in the NHIS, as expected. Our primary result suggests that a more generous safety net is protective of maternal mental health, such that a $1000 increase to the simulated potential combined cash and food benefit package reduces severe psychological distress by about a third of a percentage point (8.4 percent of the mean). The

[1] For reasons discussed below, we focus on a sample of non-immigrant single mothers without work-limiting disabilities.

difference in the total cash and food package between the 10th percentile state in terms of generosity (Georgia) and the 90th percentile state (New York) is $1,902, so our estimated coefficient implies that moving from the 10th to the 90th percentile of generosity would reduce severe psychological distress by 16.0 percent. We find somewhat smaller effects on combined moderate or severe psychological distress, with the difference between the 10th and 90th percentile states indicating a reduction of 4.8 percent.

We then look at effects of individual safety net programs to examine whether the benefits delivered by different programs have different impacts on maternal mental health, continuing to account for cross-program interactions in eligibility and benefit levels. We find that all three programs providing cash or food significantly reduce maternal psychological distress, but we find no significant effect of simulated Medicaid eligibility. Beneficial effects of the safety net are strongest among single mothers without a high school degree.

We also examine the effects of safety net generosity on two risky health behaviors: daily smoking and heavy drinking. We find no detectable effects on daily smoking, but we find evidence that cash benefits, particularly tax credits, reduce the likelihood of heavy drinking. Overall, our results show that cash and food safety net benefits improve mental health among single mothers, adding to the growing literature showing that government investments in low-income families can improve well-being.

II. BACKGROUND

A. Maternal Mental Health and Risky Behaviors

Single parent families are more likely to live in poverty than families with married parents, and as a result face a number of challenges to well-being. The economic uncertainty that many face can lead to both mental health problems and risky health behaviors such as smoking

and heavy drinking (Barnes & Smith, 2009). Poor maternal mental health and risky health behaviors have broad-ranging impacts within the family. For example, poor maternal mental health is associated with worse parenting behaviors (Oyserman et al., 2005), worse academic outcomes for children (Allen-Meares et al., 2010), and worse psychological outcomes for adolescents (Oyserman et al., 2002). Maternal smoking is associated with low birthweight (see for example, Sexton & Hebel, 1984; Almond, Chay, & Lee, 2005; Chen, 2012) and children's respiratory ailments including asthma (e.g. Weitzman et al., 1990; Sabia, 2008; Kalliola et al., 2013). Maternal heavy drinking is also associated with low birthweight (Chen, 2012), and a range of other negative outcomes for children, including lower academic achievement (Scholder et al., 2014).

B. Variation in Safety Net Programs

The safety net in the US operates through a number of interrelated programs. These include traditional cash transfer programs like TANF, which provides cash support to low-income families with children with either a single parent or an unemployed parent, refundable or partially refundable tax credits that are conditional on work like the EITC or CTC, food assistance programs like SNAP, and health insurance programs for children and some adults in low-income families like Medicaid and CHIP. The policy changes that we rely on to identify effects of the safety net are generated by federal and state decisions and the interactions of those decisions.

We show a timeline of the major policy changes affecting these programs in Figure 1. Our analysis time period begins after the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) fundamentally reformed cash assistance in the US, replacing the Aid to Families with Dependent Children (AFDC) program with TANF, and giving states a great

deal of flexibility in redesigning their welfare programs. Variation in TANF benefits comes from state-level decisions between 1996 and 2016 to change maximum benefit levels and benefit structures, gross and net income tests, disregards for earned and unearned income, and the definition of the assistance unit.

The variation in refundable tax credits comes from several federal changes, including the 2001 change to make the Child Tax Credit refundable to families with more than $10,000 of income,[2] and the 2009 American Recovery and Reinvestment Act (ARRA), which expanded the EITC for families with three or more children and also reduced the CTC refundability threshold to $3,000. We also exploit variation coming from the implementation or expansion of state EITCs over the period that we study (during this time period, 26 states began or changed their state EITCs).[3]

For SNAP, the major policy-driven changes are federal: the ARRA expanded SNAP in 2009, and these expansions sunsetted in late 2013. However, due to the nature of our safety net calculator, we also incorporate state-level variation in SNAP from changes to TANF. Since TANF benefits are counted as income towards SNAP eligibility and benefits, any state-level changes that increase TANF benefits will reduce SNAP benefits.

In 1996, PRWORA severed the automatic link between cash welfare and Medicaid, leading to more state-level variation in public health insurance. In 1997, the State Children's Health Insurance Program (CHIP) allowed states to cover uninsured children in families below 200% of the federal poverty line (FPL) who were ineligible for Medicaid, with levels set at state

[2] It was enacted in 1998 as a non-refundable credit per child.
[3] The states that began or changed a state EITC over the time period we study are: California, Colorado, Connecticut, Delaware, the District of Columbia, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Rhode Island, Vermont, Virginia, and Wisconsin. See https://taxsim.nber.org/state-eitc.html for details of the changes.

option. In 2009, CHIP was reauthorized with a 300% FPL upper limit to allow some states to receive a more generous matching rate. The 2010 Affordable Care Act expanded Medicaid to include everyone under age 65 in families with income below 138% of the FPL beginning in 2014. A Supreme Court ruling in 2012 made the Medicaid expansion optional to the states, leading to additional state variation in eligibility for coverage.

C. Mechanisms for Effects of Safety Net Programs on Mental Health and Risky Behaviors

Safety net programs would be expected to affect maternal mental health through several channels. First, additional cash and/or food benefits increase family income and reduce poverty. Increased resources along with reduction in economic hardships may improve family well-being and maternal mental health (Yeung et al., 2002; Milligan & Stabile, 2011). On the other hand, factors such as internalized stigma, a stressful assistance application process, or other forms of administrative burden could cause psychological distress associated with program participation (Heflin & Ziliak, 2008; Herd & Moynihan, 2018 & 2020). Public health insurance could increase access to diagnosis and treatment for mental health conditions, leading to higher or lower reported mental health concerns.

Finally, mental health may be affected by a labor market channel. The structure of traditional cash transfer programs disincentivizes work as benefits are largest for the lowest levels of income and are reduced as income rises, although work requirements in TANF are intended to ameliorate this effect (see, e.g., Ziliak, 2016 for a discussion of the labor supply incentives of TANF and review of the literature). In contrast, receiving the EITC requires work and thus may increase the labor supply of single mothers.[4] Changes in labor supply could

[4] See, e.g., Eissa and Liebman (1996) and Meyer and Rosenbaum (2001); Eissa and Hoynes (2011) and Guldi and Schmidt (2018) provide reviews of the extensive literature on EITC labor supply effects. However, in recent work, Kleven (2022) suggests that estimated EITC effects may be confounded by effects of welfare reform and the macroeconomy.

directly affect maternal mental health in either direction. Employment itself may improve subjective well-being (Edin & Lein, 1997; Herbst, 2013), and with increased labor supply, additional earned income could expand financial resources. However, low-wage jobs may be a source of stress (Edin & Lein, 1997), and may reduce time for home production or leisure (Bastian & Lochner, 2022).

In addition, the way in which programs are administered may affect their impact. For example, qualitative research on the EITC suggests that it might have benefits for mental health that go beyond the direct effects associated with higher income. Halpern-Meekin et al. (2015) stress the enhanced sense of dignity and reduced stigma that EITC recipients receive. "[The EITC] confers dignity by confirming claimants' identities as workers, rather than marking them as dependents waiting for a government handout" (p. 19). The authors go on to note that "traditional means-tested benefits like cash welfare … and SNAP… are not designed to prevent families from experiencing scarcity. In contrast, [EITC recipients] enjoy a considerable surplus in the months following receipt of the tax refund" (p. 20). Income support provided through tax refunds allows recipients to pay off debts, to purchase a used car, or to move to a better neighborhood, and Halpern-Meekin et al. show that 4 of every 10 refund dollars are invested or saved.

Safety net programs could also affect risky behaviors such as maternal smoking and heavy drinking. The increase in resources associated with safety net transfers could facilitate the purchase of cigarettes and alcohol in addition to other goods.[5] Conversely, increases in income have been shown to increase demand for healthy behaviors, which could reduce smoking and drinking (Averett & Wang, 2013; Hoynes, Miller, & Simon, 2015). Psychological distress can

[5] Tobacco and alcohol products cannot be purchased with SNAP benefits, so any effects of SNAP would be indirect.

lead to smoking and heavy drinking as short-term outlets for stress reduction, so any of the mechanisms described above could affect smoking or drinking behavior (Pratt & Brody, 2010; Prochaska et al., 2011; Cook et al., 2014; Sheals et al., 2016). Finally, changes in labor supply induced by changes in safety net benefits might affect opportunities to smoke, for example due to workplace bans on smoking (Hoynes, Miller, & Simon, 2015).

D. Effects of Individual Programs on Mental Health and Risky Behaviors

A number of papers have examined the effects of individual safety net programs on maternal mental health and risky behaviors. Ifcher (2011) and Herbst (2013) examine the impact of welfare reform and find that measures of subjective well-being improved following the welfare reform period for single mothers relative to comparison groups such as single childless women. Oddo and Mabli (2015) find that psychological distress is lower after participating in SNAP for six months than at the point of entry into the program, and Munger et al. (2016) find that losing SNAP is associated with an increased probability of depression, although Heflin and Ziliak (2008) find that entry into SNAP is associated with negative effects on mental health. Hoynes and Schanzenbach (2016) note that the income effect of SNAP, by shifting out the family's budget constraint, could lead to behaviors that are detrimental for health like drinking and smoking, even though those goods cannot be purchased directly with SNAP benefits. While there is some evidence that the timing of SNAP payments over the month might affect purchases of alcohol (e.g. Castellari et al., 2017), we are unaware of prior literature that finds a causal relationship between SNAP benefits and smoking behavior.[6]

The most robust evidence on the effects of safety net programs on mental health comes from the Earned Income Tax Credit. Evans and Garthwaite (2014) look at Earned Income Tax

[6] Hastings and Washington (2010) find that while food expenditures decrease through the month from the time of SNAP benefit payment, alcohol and cigarettes experience a much smaller decline.

Credit expansions passed in 1993 that increased benefits for families with two or more children relative to families with one child and find that the expansions were associated with reduced maternal depression among these larger families. Boyd-Swan et al. (2016) find that the 1990 expansion in eligibility for the EITC improved mental health and happiness, while Lenhart (2019) and Dow et al. (2020) find that higher state EITC generosity leads to a reduction in suicides. Gangopadhyaya et al. (2020) examine a combination of federal and state EITC policies and find that less-educated mothers exposed to a larger maximum possible credit report fewer days of poor mental health.[7]

Higher EITC payments have also been shown to reduce smoking. Averett and Wang (2013) and Cowan and Tefft (2012) both exploit the 1993 policy change and find that higher benefit levels led to less smoking among mothers with lower levels of education. Hoynes, Miller and Simon (2015) exploit the same policy change and show that the EITC improves infant health, with one of the mechanisms being reduced maternal smoking during pregnancy. In contrast, Markowitz et al. (2017) examine the impacts of state EITCs, and though they also find improvements in infant health, they find limited evidence of changes in smoking and drinking during pregnancy.

Research on the impact of Medicaid has also focused on variation generated by state decisions. Guldi and Hamersma (2022) find that pregnancy-related Medicaid expansions in the late 1980s significantly improved maternal mental health; McMorrow et al. (2016) find that state increases in parental Medicaid income eligibility thresholds in the 1997-2010 period reduced the incidence of moderate psychological distress for low-income parents; and Grossman

[7] Collin et al. (2021) examine implementation of state EITCs using individual longitudinal data and are unable to distinguish any impact on psychological distress. In contrast, Courtin et al. (2022) conduct a randomized controlled trial of an EITC expansion to adults without dependent children and find a reduction in psychological distress.

et al. (2022) find that expansions of Medicaid to children in the same time period also led to improved mental health for their mothers.[8] Two papers focus on more recent state-level variation in Medicaid eligibility due to the Affordable Care Act: McMorrow et al. (2017) find a reduction in severe psychological distress among parents with incomes below the Medicaid income limit that is concentrated among men, and Simon, Soni, and Cawley (2017) find a reduction in days of poor mental health among men with incomes below the poverty line but find no effect for women or parents, and they find no detectable effect on smoking or drinking for any group.

E. Accounting for Multiple Programs

In sum, the existing literature finds mixed impacts of various elements of the safety net on mental health and risky behaviors. However, the US safety net is a patchwork of programs, and many families receive benefits from multiple programs at once. For example, Schmidt, Shore-Sheppard, and Watson (2016) show that among a sample of low-income single parent families from 2002-2010 that are estimated to receive the EITC, 28.5 percent also report SNAP receipt, and 53.8 percent report at least one family member receiving health insurance through Medicaid.[9] In addition, US safety net programs interact in complex ways. Receipt of some programs provides categorical eligibility for other programs (for example, TANF confers eligibility for SNAP). In the other direction, benefits from some programs are considered countable income towards others; higher state TANF benefits reduce SNAP benefits for recipients of both programs, for example. As a result, analyses that focus on one program in

[8] There is a sizeable and growing literature examining the impacts of various safety net programs on child well-being, including mental health. As our focus in this paper is maternal mental health and risky behaviors we do not attempt to review this literature here.

[9] See also Edwards and Schwam (2022) for a discussion of multi-program participation in the 2014 and 2018 waves of the Survey of Income and Program Participation (SIPP).

isolation might lead to biased estimates of program benefits on outcomes. Our paper adds to the literature by measuring the effects of the combined package of a number of important safety net programs on mental health, smoking, and heavy drinking, accounting for interactions among major benefit programs. In previous work, we have used a similar approach to examine the impact of safety net generosity on food insecurity, finding that a more generous safety net significantly reduces food insecurity among low-income single parent households (Schmidt, Shore-Sheppard, & Watson, 2016).[10]

In accounting for cross-program interactions, our work follows a strand of the literature examining the labor supply impact of welfare policies while accounting for other programs. For example, Fang and Keane (2004) use a combination of policy parameters for AFDC/TANF, Food Stamps, and Medicaid to explain changes in welfare participation and work, Grogger (2003, 2004) accounts for the federal maximum EITC amount when investigating the impact of time limits and other TANF parameters on welfare use and labor supply, and Ham and Shore-Sheppard (2005) examine the impact of Medicaid and welfare generosity on labor force and welfare participation. Looney (2005) and Herbst (2008) estimate models of labor supply and welfare participation accounting for a number of programs simultaneously. Our approach is similar to much of the literature in that we also rely on policy variation by state, year, and demographics to identify our models, but we generate a nuanced measure of program generosity that incorporates a number of state policy choices and interactions between programs.

Our concept of program generosity is closest in its approach to that of Meyer and Rosenbaum (2001) in their paper examining the impact of welfare and tax policies including Aid

[10] Another paper that accounts for interactions between the same programs we examine is McKernan, Ratcliffe, and Braga (2021), who use state SNAP outreach spending and the share of children simulated to be eligible for public health insurance as instruments when examining the impact of program participation on material hardship, finding that participation in TANF, SNAP, or public health insurance reduces material hardships.

to Families with Dependent Children (the cash assistance program prior to TANF), Food Stamps (the former name for SNAP), state and federal taxes including the EITC, and Medicaid, on the labor supply of single mothers in the welfare reform period and earlier (1984-1996). Meyer and Rosenbaum calculate the tax liabilities and safety net benefits available to single mothers using the rules of the various programs to simulate the liabilities and benefits each woman in their sample would receive based on her state, family composition, and year observed at each of 50 discrete values of annual earnings. These benefits are then weighted appropriately to generate a summary measure of program generosity. Our approach is similar in spirit, using the observed continuous income distribution and other characteristics of a simulated sample to summarize potential benefits within demographic cells. Both approaches focus on the potential benefits that an individual woman might qualify for based on her characteristics and incorporate the complex nonlinearities in the program rules rather than relying solely on measures of maximum benefits. Both also explicitly model program interactions, specifically the impact of cash welfare benefits on food assistance.

III. DATA

We use individual-level data from two primary sources in this project. The first is the 1998-2016 National Health Interview Survey, an annual, nationally representative survey of the U.S. civilian, noninstitutionalized population with a typical annual sample size of about 35,000 households containing about 87,500 persons (National Center for Health Statistics, 2017). We use the restricted-use version with state identifiers, accessed at the Research Data Center at the National Center for Health Statistics. Questions are asked at the household level and family level covering all persons in the household, and one randomly selected adult per family is asked an

additional set of questions (the "sample adult" questionnaire).[11] We begin with the sample adult files, and then merge in data from the person, household, and family files. We conduct all of our analyses using the sample adult weights to account for the complex sampling procedures. Our sample consists of single mothers in non-immigrant families ages 18-64 without work-limiting disabilities.[12] Summary statistics for demographics, safety net program participation, and our outcomes of interest are presented in Table 1. Approximately 35.7 percent of the single mothers in our sample report receipt of at least one program, with SNAP being the program with the most extensive participation, at 28.1 percent.

For maternal mental health, we use responses to a series of questions asked by the NHIS to create a standard Kessler-6 (K6) indicator of psychological distress (Kessler et al., 2010). Respondents are asked six questions about how often in the past 30 days they felt: so sad that nothing could cheer them up; nervous; restless; hopeless; that everything was an effort; and worthless. For each question, responses include all of the time, most of the time, some of the time, a little of the time, or none of the time. Each all of the time response receives 4 points, most of the time receives 3, some of the time receives 2, a little receives 1 and never receives zero. The points are summed over the six questions to create a K6 index that ranges from 0 to 24. The K6 index is most commonly used to identify severe psychological distress (K6 $\geq$ 13). However, Prochaska et al. (2012) note the importance of identifying more moderate psychological distress

[11] Prior to 2016, some racial and ethnic groups were oversampled at the household level (Black and Hispanic beginning before the start of our sample and Asian beginning in 2006). In addition, throughout our sample period Black, Hispanic, and Asian adults over age 65 had an increased chance of selection as the "sample adult."

[12] Appendix Table 1 shows how many observations we lose with each sample restriction. Our sample of non-immigrant, non-disabled single mothers makes up 33.3% of the sample adult women under the age of 65 reporting receipt of one of the safety net programs discussed in the paper (Medicaid/CHIP, SNAP, or TANF). The remainder are largely married women or women without children receiving SNAP, or women with disabilities receiving Medicaid. We exclude single mothers who are immigrants, since the benefit and eligibility rules are different for this group and are difficult to categorize without information on legal status and time in the United States, both of which are unavailable in the NHIS data. The children of immigrant mothers are often citizens, and mixed-status families are often eligible for partial benefits, but we do not attempt to characterize those benefits here.

(K6 ≥ 5 and K6 ≤ 12) that would still justify medical intervention. We examine severe psychological distress (SPD), as well as a measure of moderate or severe psychological distress (MSPD). In our sample, 3.8 percent of single mothers experience SPD, while 24.2 percent experience MSPD.

We also examine smoking and heavy drinking behavior.[13] The NHIS asks "Do you NOW smoke cigarettes every day, some days, or not at all?" We create an indicator variable if the mother answers that she smokes every day. About 22.3 percent of the sample smokes daily. The NHIS question on heavy drinking is only asked of those who drank at least once in the past year, and asks if in the last year the respondent ever drank 4 or more drinks in one day. We code those who did not drink in the past year as zeroes, and approximately 20.4 percent of our sample is classified as heavy drinking based on this definition.

Our second primary data set is the Current Population Survey Annual Social and Economic Supplement (CPS-ASEC) for years 1997 to 2016. The CPS contains key information on demographic characteristics (including marital status, number and age of children, and so on), and income, which allows us to impute potential eligibility and benefits for safety net programs. We use this information to simulate potential eligibility and benefits for individuals with a given set of demographic characteristics given the policies in place for each state and year.

We also include controls in the regression analyses for time-varying economic and policy factors; these come from a variety of sources.[14] The unemployment rate comes from the Bureau of Labor Statistics. The dependent allowance for Unemployment Insurance comes from the US

[13] Smoking and drinking are two common risky behaviors examined in the previous literature (see, for example, Cawley and Ruhm's 2011 chapter "The Economics of Risky Health Behaviors" in the *Handbook of Health Economics*). We considered examining an indicator for drug problems, but the relevant questions in the NHIS are only asked of sample adults with a functional limitation, so we decided not to pursue this in our analysis.
[14] See the Appendix for more details on the sources of these variables.

Department of Labor Employment and Training Administration. Dollars spent on child support enforcement come from the Department of Health and Human Services Office of Child Support Enforcement, and the number of public housing units and vouchers come from the Department of Housing and Urban Development. These last two items are converted to per capita measures by dividing by state level population counts from the US Census Bureau.

IV. METHODOLOGY

Our work builds directly on the multi-program safety net eligibility and potential benefit calculator developed by Schmidt, Shore-Sheppard, and Watson (2016). As described in more detail below, we use the calculator to impute potential benefits for a fixed sample of families from the Current Population Survey Annual Social and Economic Supplement (CPS-ASEC) rather than families in the NHIS analysis sample.[15] We then generate a measure of mean imputed potential benefits that apply to families in the fixed CPS-ASEC sample for different states, years, and demographic cells, with the aim of simulating differences in program generosity stemming from policy variation only. This simulated eligibility technique was first used by Currie and Gruber (1996).

The simulated sample is created by considering a national sample of non-disabled, non-immigrant single mother families in the CPS-ASEC data pooled over 14 years. Specifically, we include all reference persons in the CPS-ASEC from 1997-2013 that are unmarried women aged 18-64 with at least one child under 19 living with them in their family unit.[16] We drop families

[15] The NHIS lacks earned income information which would be necessary to impute potential benefits.

[16] CPS income questions were redesigned beginning in 2014. The 2014 survey used a split sample design where respondents received one of two possible sets of survey questions. To have a consistent measure of income throughout the simulated sample, we used years 1997 to 2013 to generate the pool of individuals who were run through the safety net calculator. Mothers with children ages 19 and older in the CPS family unit are included in the sample only if there is also a child under 19 in the family. If children are ever married or have their own children, they are not considered part of the CPS family unit. We model benefits for adult children ages 19-23 in the family

with no valid income measure, and we drop families with any immigrants (non-citizens or naturalized citizens) as the safety net rules for immigrants are complex and beyond the scope of the calculator. We then drop state and year identifiers from this pooled national sample, and replicate each family so they are assigned to each state and analysis year 1997-2016 (with income levels adjusted for inflation). We use this simulated sample – the same for each state and year - to calculate the potential benefit levels and share of Medicaid/CHIP eligibility based on policies in place in each state and year, as described below. We then compute the mean level of simulated potential benefits and eligibility by state, year, and demographic group, which we use as a measure of safety net generosity.

The calculator covers policy years 1997-2016, and includes the most important cash, food, and health care safety net programs available nationally to single parents without disabilities: refundable tax credits, TANF, SNAP, and Medicaid.[17,18] It incorporates the program rules for each state in place for the majority of the year, accounting for any interactions between programs.[19] We use the calculator to impute program eligibility and the potential dollar value of benefits for families, assuming full take-up of the TANF benefits for which a family is eligible when calculating potential benefits from SNAP. It is important to acknowledge that take-up is, in

according to program rules. For example, 19-to-23-year-olds are considered dependents for the purposes of the EITC if they are full time students or disabled. For SNAP, children under age 22 are considered part of the assistance unit and their earnings are considered in calculating eligibility and benefit amounts. TANF rules vary by state based on the age of the child and whether the child is in school.

[17] The calculator used in Schmidt, Shore-Sheppard and Watson (2016) also estimated potential cash benefits from Supplemental Security Income (SSI), which would provide income support to those with work-limiting disabilities. However, in the NHIS data used in this project the presence of a work-limiting disability is indicated by an affirmative answer to a question about whether physical, mental, or emotional problems limit the work an individual can do. As a result, this measure is correlated with our key variable of interest, mental health; thus we chose to focus in this paper on the sample of single mothers without work-limiting disabilities, and simulated SSI benefits are set equal to zero.

[18] There are a number of other important safety net programs excluded from our calculator, for example, public housing. Where possible we control for state-level differences in generosity in these programs outside of our calculator.

[19] We describe the sources for these program rules in the Data Appendix.

fact, less than complete, so the simulated potential benefits are akin to an intent-to-treat measure of generosity. The common approach in the literature of using the maximum possible benefits for each program is also an intent-to-treat measure of generosity, but it is the intent-to-treat measure for families with income at the level that would generate the maximum benefit (e.g. no income for TANF and SNAP, and incomes between the end of the phase-in and the start of the phase-out for EITC), whereas our generosity measure is matched more closely to the income distribution for families in a given demographic cell. Differences in administrative burdens or other barriers to participation that affect program take-up across states are not modeled, but our measure of program generosity is positively correlated with benefits received, as shown below. In the conclusion, we discuss the interpretation of our coefficients in the context of incomplete take-up.

The first step in the calculator is to estimate federal and state Earned Income Tax Credits and the Child Tax Credit by running family-level survey data through the TAXSIM program at the National Bureau of Economic Research (Feenberg & Coutts, 1993).[20] The data are then run through a TANF calculator to determine the family's potential TANF benefits, followed by a program to estimate Medicaid and CHIP eligibility for each individual in the family based on the rules applying to children and non-pregnant single mothers in each state and year, and finally run through a program that estimates eligibility and benefits for SNAP. Data inputs to the calculator for our sample of families headed by non-immigrant single mothers without disabilities include: mother's earnings, employment status, number and ages of children, state of residence, and year.

Once we have imputed eligibility and benefit levels for families in the simulated CPS sample based on their simulated state and year, we calculate mean imputed eligibility and benefit levels by state, year, and demographic cell. Demographic cells are defined by level of education

[20] EITC and CTC benefits do not affect benefits from the other programs in our calculator, so the TAXSIM step could be done at any point in the process.

of the single mother (less than high school, high school exactly, some college, or college degree or more), number of children (one, two, or three or more), and the presence of a child less than six in the family. Though one could use mean simulated benefits at the state-year level without considering demographic characteristics, doing so would discard useful within-state-year variation driven by policy changes that differentially affect families based on the age and number of children as well as income. For example, state expansions in the EITC for large families are more impactful for those families, and TANF cutbacks will more significantly affect receipt among mothers with more and younger children, and mothers with low levels of education, because they are more likely to be income-eligible for the program. For this exercise, we assume neither family structure nor education are affected by safety net policy in the short run, and allow these factors to proxy for earnings potential.

Safety net generosity is then summarized by the mean dollar values of cash and food safety net benefits and by the mean share of the family eligible for Medicaid/CHIP in a state-year-demographic cell. We rely on information from the simulated sample for our key independent variables in the subsequent analysis rather than the potential benefits imputed for a particular family in the NHIS because using a family's actual earned income would yield significant endogeneity concerns. For example, holding program rules constant, more families would qualify for benefits in an economic downturn or with a job loss, and we might also expect mental health to worsen with these events for reasons unrelated to the safety net. By construction, these generosity measures are only related to state policy differences across cells and over time, and not to local economic conditions or to the economic circumstances of an

individual family. We are identifying our estimates from variation in safety net policy generosity over time both across states and within states by demographic group.[21]

To ensure the imputed mean benefits for the simulated sample are predictive of actual benefits received, we match families in the 1998-2016 CPS-ASEC to the mean safety net generosity simulated for their state and demographic cell in the prior calendar year.[22] Specifically, we estimate the following model:

$$actbenefit_{icst} = \beta_0 + \beta_1 simpotbenefit_{cst} + X_{icst}\alpha + \theta_s + \gamma_t + \mu_{icst} \quad (1)$$

In this equation *actbenefit* is an indicator of actual benefits (in dollars of TANF or SNAP benefits or Medicaid participation) reported by family *i* in demographic cell *c* in state *s* in year *t*; *X* is a vector of individual level controls that includes age of the mother, the number of children in the household (in three categories: one, two, and three or more) and whether there was a child under the age of 6, education in four categories, and race/ethnicity in four categories (non-Hispanic white, non-Hispanic Black, Hispanic, and Asian/Native American/Pacific Islander), as well as interactions between race and all individual level variables listed above. *Simpotbenefit* is the safety net generosity, based on the mean simulated potential benefit dollar amount for a demographic cell-state-year. The regression also controls for state and year fixed effects, and robust standard errors are clustered at the state level.

Simulated generosity is strongly related to reported program participation and benefit amounts received in the CPS (Table 2). After controlling for state, year, and demographic characteristics, simulated mean benefits at the state-year-demographic cell level are predictive of

[21] We probe the nature of the within-state variation by education group in our analyses, estimating some models where we examine each education group separately and rely only on policy variation by state, time, and family structure.

[22] Because the CPS-ASEC asks questions in March about benefit receipt in the prior calendar year, it is appropriate to examine the link with prior year safety net generosity. In the main NHIS analysis, we use current year generosity to predict current mental health outcomes.

benefit income received. The estimates indicate that a $1000 increase in mean TANF simulated potential benefits raises TANF receipt by $353, a $1000 increase in mean SNAP simulated potential benefits raises SNAP receipt by $528, and raising the mean fraction of the family eligible for Medicaid by 0.1 raises the fraction participating by 0.011. (We do not observe tax credit receipt in the Current Population Survey.)[23]

Having confirmed that simulated generosity predicts actual benefit receipt in the CPS, we merge simulated benefit generosity to the NHIS data by state-year-demographic cell for analysis. Table 3 illustrates the values for these simulated benefit levels (in thousands of real 2016 dollars), both for the full NHIS sample and separately by year. The average single mother family in our NHIS sample over the full time period has simulated potential eligibility for $1,917 in TANF benefits, $1,926 in SNAP, and $2,112 in tax credits. The total cash and food package remained roughly constant between 1998 and 2016, but this masks differential trends over time (with benefits increasing during the Great Recession) and across programs (tax credits and SNAP are increasing while TANF is decreasing). The simulated share of the family eligible for Medicaid/CHIP generally increased over the period, from less than half of the family being eligible on average in 1998 and nearly 70 percent being eligible at the end of the period.

The NHIS does not have detailed information on program benefit levels in dollars, but we confirm that the generosity measures derived from the CPS are meaningful for the NHIS sample by examining reported safety net participation in the NHIS. We use the following regression model:

$$participation_{icst} = \beta_0 + \beta_1 simpotbenefit_{cst} + X_{icst}\alpha + state\_char_{ist}\delta + \theta_s + \gamma_t + \mu_{icst} \quad (2)$$

[23] To the extent that safety net participation and benefit levels are underreported in survey data (Meyer, Mok, & Sullivan, 2015), the gap between potential benefits and reported benefits may be smaller.

In this equation *participation* is an indicator of program participation of family *i* in demographic cell *c* in state *s* in year *t*; *X* is a vector of individual level controls that are included throughout the NHIS analysis, which incorporates all individual level variables listed in equation (1) plus a control for urbanicity interacted with race. *State_char* is a vector of state-year level variables that includes the unemployment rate, the dependent allowance for Unemployment Insurance (UI), dollars spent on child support enforcement per capita, and the number of public housing units and vouchers per capita.[24] The regression also controls for state and year fixed effects, and robust standard errors are clustered at the state level.

We estimate two versions of this regression with different sets of the key independent variables: 1) total potential cash and food benefits combined and imputed family Medicaid/CHIP eligibility at the demographic cell-state-year level; and 2) separate variables for each program: EITC/CTC, TANF, and SNAP benefits, and Medicaid/CHIP eligibility. Our primary measure of safety net program participation is self-reported participation in any of the major programs under consideration: TANF, SNAP, Medicaid, or CHIP. (The NHIS does not report tax credit information.) We also examine self-reports of participation in individual programs. Results showing that simulated generosity does indeed predict reported participation in the NHIS are described below and reported in the appendix.

After establishing that our simulated safety net generosity measures are predictive of reported safety net participation in the NHIS as expected, we next examine how simulated

[24] Results are robust to a more extensive set of state policy controls that adds the number of weeks of UI extended coverage, the presence of a TANF family cap, TANF asset limits, TANF strict time limits, the state minimum wage, and the share of TANF dollars spent on basic assistance and child care and work activities. There are also a number of SNAP policy options that varied across states over our time period (Ganong & Liebman, 2018). Many of these, including broad-based categorical eligibility, waivers for able-bodied adults without dependents, and the combined application project for SSI recipients, were unlikely to have large effects on our sample population of low-income single mothers without disabilities.

potential benefits affect the key outcomes of interest: maternal mental health and risky behaviors (daily smoking and heavy drinking). We estimate:

$$outcome_{icst} = \beta_0 + \beta_1 simpotbenefit_{cst} + X_{icst}\alpha + state\_char_{ist}\delta + \theta_s + \gamma_t + \mu_{icst} \quad (3)$$

where the set of outcomes are the mental health, smoking, and drinking measures defined above.

Our main independent variable(s) of interest are the program generosity variables. As noted above, we estimate one version for total combined cash and food benefits and one where we enter benefits separately for each program. The controls are as defined previously in equation (2), and thus the model accounts for observable characteristics of families living in states in a given year, all time-invariant state characteristics, time-varying economic conditions, and year-to-year national variation in maternal mental health or risky behaviors.

The identifying variation in equation (3) comes from changes in policy over time that differ across states and demographic cells. To illustrate the variation, Figure 2 shows how the combined cash and food package for a particular demographic cell (single mothers with a high school degree and two children where one is under the age of 6) varies across states for 1999 and 2016. The maps illustrate that states vary substantially in their generosity at a point in time—in 1999, for example, the least generous states (lightest shading) have mean cash and food benefits between $6,480 and $7,280 in 2016 dollars while the most generous (darkest shading) have mean cash and food benefits between $9,120 and $14,060. They also show that some states change relative positions over time; for example, Texas and Illinois move to higher quintiles between 1999 and 2016 while Arizona and North Carolina move to lower quintiles.

Figure 3 illustrates the change in the imputed value of the full cash and food package by state over time (Panel A), with trends highlighted for the three most populous states of California, New York, and Texas. The figure illustrates large differences in levels among states

(California and New York have much higher levels of benefits than Texas), and shows the increase in benefits across all states due to the American Recovery and Reinvestment Act of 2009. However, it also shows policy-induced variation within states at different points in time. Panel B shows that, in general, real TANF benefits are trending down over our time period, but there are discrete increases and decreases as states alter their benefit policies. For example, California reduced benefits and shrank earned income disregards in the 2011-2013 period. Panel C presents SNAP benefits, which exhibit less within-state variation, since SNAP generosity is set at the federal level. Most of the state variation in generosity for the simulated sample comes from differences in unearned income generated by differential TANF generosity.[25] There is also less tax credit variation across states (Panel D) since the bulk of our tax credit measure reflects the federal EITC and CTC, although a number of states increased their state EITCs during our sample period. Finally, Panel E shows the variation in Medicaid/CHIP eligibility across states and over time, driven by different state decisions about income eligibility limits for children and parents, particularly expansions targeting children at the beginning of our time period and expansions focused on adults under the Affordable Care Act.

The variation we exploit also includes within-state differences across demographic categories, as illustrated by Figure 4 for the state of California.[26] Panel A shows, for high school graduates, variation in tax credits based on the number of children. Families with two or more children have higher imputed tax benefits than families with one child over the entire time period, and our imputed benefits reflect the additional expansion of benefits to families with three or more children that was part of the federal American Recovery and Reinvestment Act in

[25] Alaska and Hawaii are exceptions, as they have different mandated maximum benefits than the other 48 states.
[26] Similar cross-demographic cell variation exists in all states.

2009. This variation has been used by many other papers examining the effects of the Earned Income Tax Credit.[27]

Panel B illustrates variation by educational attainment of the household head in imputed tax credits, holding family demographics fixed at two children with at least one under the age of six. Differences by educational attainment largely stem from the ways in which differences in earned income by educational category interact with the tax code. The moderate earnings of high school graduates and those with some college are likely to generate the highest tax credits. The lower average earnings of single mothers without a high school degree mean that women in that category are more likely to be in the phase-in range of the EITC and therefore to receive lower benefits, while the higher average earnings of college graduates mean they are less likely to be eligible at all.

As is generally the case with simulated generosity approaches, we can interpret the coefficients as causal as long as safety net policy decisions are exogenous – that is, not driven by contemporaneous changes in mental health or their unobserved correlates. We perform a series of robustness tests to assess whether the results are sensitive to added controls, and the lack of sensitivity adds confidence to a causal interpretation. We therefore interpret the results as evidence on whether and to what extent more generous safety net benefits ameliorate mental health issues and affect risky behaviors.

[27] For example, see Evans and Garthwaite (2014) and Hoynes, Miller, and Simon (2015).

V. RESULTS

A. Self-Reported Program Participation

We estimate equation (2) in the NHIS, confirming that our simulated safety net benefit variables significantly predict self-reported safety net program participation in the NHIS (results are shown in Appendix Table 2). The main estimate (column 1, panel A) suggests that each additional $1000 of simulated real cash and food potential benefits increases the probability of reporting any non-tax safety net participation by 2.17 percentage points on a mean of 35.7 percent, or an increase of approximately 6 percent. The Medicaid eligibility coefficient implies that an increase in the simulated fraction of the family eligible of 0.225 (the change in the mean between 1998 and 2016) predicts an increase in the probability of reporting any non-tax safety net participation of 4.0 percentage points.[28]

We also show the estimated effects of simulated benefits for participation in individual programs, continuing to account for cross-program interactions in determining the simulated benefit amounts (column 1, panel B). Our estimates indicate that simulated benefits from all programs are all strongly predictive of self-reported program participation. Finally, we re-estimate these models using reported receipt of individual programs instead of overall safety net program participation as our dependent variable. Columns 2-4, for TANF, SNAP, and Medicaid/CHIP respectively, show results that are consistent with the results in column (1) and with our simulated benefits affecting reported participation in ways that would be expected. Simulated TANF benefits predict participation in TANF, simulated SNAP benefits predict participation in SNAP, and a greater fraction of the family being eligible for Medicaid predicts Medicaid receipt. These results also demonstrate the importance of accounting for multiple

[28] For brevity in the tables, we refer to the fraction of family Medicaid eligible rather than spelling out Medicaid/CHIP eligible, since the vast majority of Medicaid or CHIP eligibility is eligibility for Medicaid.

program interactions, as more generous benefits from one program in several cases predict participation in another, particularly SNAP and Medicaid.[29]

B. Maternal Mental Health

In Table 4, we present our main results from estimating equation (3), examining the effects of safety net benefit generosity on maternal mental health. Severe psychological distress (SPD) is the outcome of interest in Column 1 and shows that the total cash and food benefit package reduces maternal SPD, and this effect is statistically significant at the 5 percent level. The magnitude of this coefficient implies that a $1,000 increase in potential total cash and food benefits would lead to an 8.4 percent reduction in SPD (0.32 percentage points on a mean level of 3.8 percent). The difference in the total cash and food package between the 10th percentile state in terms of generosity (Georgia) and the 90th percentile state (New York) is $1,902, so our estimated coefficient implies that moving from the 10th to the 90th percentile of generosity would reduce SPD by 16.0 percent.

Our results for MSPD (Column 2 of Table 4) are more noisily estimated but the point estimate suggests that raising the simulated potential combined cash and food package by $1000 reduces MSPD by 0.61 percentage points, or a reduction of 2.5 percent on a baseline level of 24.2 percent. We find no significant effect of simulated Medicaid eligibility on either SPD or MSPD, suggesting that conditional on the level of cash and food benefits there is no impact of marginal changes in Medicaid eligibility detectable in the data.

Panel B breaks out the effects of individual programs and shows that all three programs providing cash or food significantly reduce maternal SPD, and tax credits and SNAP reduce

[29] As a placebo test for our safety net calculators, we examined whether simulated safety net benefit generosity affected SSI participation in our sample of single mothers without disabilities, and found no effect. Results available from authors on request.

MSPD (with TANF being imprecisely estimated). The results for SPD suggest that a $1,000 increase in potential tax credits, TANF, or SNAP would lead to reductions in SPD of 20 percent, 7 percent, and 12 percent respectively, holding other programs constant. Once again there appears to be no impact of Medicaid eligibility distinguishable in the data.

In Table 5, we examine the robustness of our SPD results across a number of different specifications.[30] Column 1 reprints our baseline results from the previous table. Column 2 includes the same individual and policy control variables but does not fully interact the individual-level variables with race in order to ensure that the results are not sensitive to these highly saturated demographic controls. Column 3 adds state-specific linear time trends to the baseline results in order to try to control for possible changes over time in states that could be correlated with the policies of interest. Column 4 replaces the state specific time trends with interactions between the number of children categories and the state level unemployment rates, helping to allay concerns that our results are being driven by the fact that both tax credits and SNAP benefits were increased to deal with the Great Recession. Column 5 replaces the limited set of policy variables with a larger set, including the number of weeks of UI extended coverage, the presence of a TANF family cap policy (such a policy prevents TANF benefits from growing as family size grows), TANF asset limits, TANF strict time limits, the state minimum wage, and the share of TANF dollars spent on basic assistance and child care and work activities. As shown in Table 5, our primary results are robust across these alternate specifications.

As an additional examination of robustness, we re-estimate all of our equations separately for respondents interviewed in the first half versus the second half of the year, since the first half of the year is when tax credits are typically received. Summary statistics by half year are

[30] Similar robustness tests for MSPD are found in Appendix Table 3.

presented in Appendix Table 4 and show that observable characteristics are largely similar for respondents interviewed in the first half versus the second half of the year.[31] Results for psychological distress can be found in Appendix Table 5. Dividing the sample in half substantially increases the standard errors, not surprisingly, but we continue to find that cash and food benefits reduce psychological distress. The results suggest that the effects of simulated cash program generosity on SPD occur entirely in the first half of the year, when tax refunds are likely to occur. This is particularly the case for tax credits, which show large and relatively precisely estimated impacts in the first half of the year but not the second.

Our baseline analyses examine the full sample of single mothers, and our simulated safety net generosity is calculated and merged to the NHIS using cells that depend on the educational status of the mother in four categories. As a result, the previous results account for differences in benefit generosity across education groups arising due to the correlation between education and earned income (for example, see Figure 3 Panel B). However, a given change in safety net generosity should have larger effects on women with fewer resources, which can also be proxied for by educational status.

In Table 6 we explore this possible heterogeneity, showing estimates of the effects of safety net generosity on SPD separately for women in each of the four education categories. The identification in this case comes only from policy variation across states, over time, and by number and age of children. The results indicate that the protective effects of safety net generosity on severe psychological distress are driven primarily by women with less than a high

[31] One exception is education: the sample interviewed in the first half of the year is more likely to have less than a high school degree, while the sample interviewed in the second half of the year is more likely to have completed high school.

school education.[32] All coefficients in Column 1 of Table 6 are negative. Panel A shows significant reductions in SPD from the overall cash and food package – the magnitude of our coefficient implies that a $1,000 increase in the potential total cash and food package would reduce SPD by 20 percent (on a baseline mean level of SPD of 6.5 percent for this educational group). The results imply that moving from the 10th percentile most generous state for mothers without a high school degree (Kentucky, $8,066) to the 90th percentile (New York, $11,492) would reduce SPD by nearly 70 percent.

Panel B indicates that these protective effects come from tax credits, TANF, and SNAP. The coefficient on tax credits is negative and of larger magnitude than our results from the overall sample, but is less precisely estimated. The lack of statistical significance here is likely due to the fact that a good portion of our variation in tax credits comes from differences across educational category, as illustrated in Figure 4B. The coefficients are both larger and more statistically significant for TANF and SNAP. Coefficients in Column 1 suggest that for women without a high school degree, an extra $1,000 in simulated potential tax credits or TANF would reduce SPD by 25-26 percent holding other benefits constant. An extra simulated potential $1,000 in SNAP benefits would reduce SPD by 54 percent. The point estimate on simulated Medicaid eligibility is also negative for the least educated women, but the coefficient is not statistically significant. Results for women with higher levels of education are generally not statistically different from zero.

C. Risky Health Behaviors

In our final set of analyses, we estimate the effect of safety net generosity on maternal daily smoking and heavy drinking (Table 7). The point estimates on the overall cash and food

[32] Appendix Table 6 presents sample means by educational status of the mother: high school dropouts (Column 1), high school graduates/GED recipients (Column 2), some college (Column 3), and college graduates (Column 4).

benefit package are negative for both the likelihood that the mother reports smoking every day (Column 1) and heavy drinking (Column 2), although the coefficients are small in magnitude and are not significantly different from zero. Disaggregating the programs, Panel B shows coefficients for most programs that are not statistically different from zero. The one exception is that higher tax credits have a statistically significant negative effect on heavy drinking. A $1000 increase in potential tax credits is estimated to reduce heavy drinking by 1.8 percentage points, or an 8.8 percent decrease from the baseline mean of 20.4 percent.

We further probe these results for risky health behaviors, conducting the same set of robustness analyses as for our main results. We continue to find no consistent effects of safety net generosity on daily smoking behavior (Appendix Table 7a) but find protective effects of tax credits on heavy drinking that are statistically significant and consistent across specifications (Appendix Table 7b). Breaking out the risky behavior regressions by educational category (Appendix Tables 8a and 8b), we generally find no significant effects of higher benefits for the education subsamples for daily smoking. For heavy drinking, it appears that the effects of higher cash benefits are marginally statistically significant and are concentrated among high school graduates. Dividing the sample by time of interview (Appendix Table 9), we find some evidence that tax credit benefits have beneficial impacts on risky behaviors during the first half of the year, as was the case for our measures of psychological distress. However, it is important to note that all of the subsample results lack precision and should be treated with caution.

VI. Discussion and Conclusions

Using a simulated eligibility approach to assess causal effects, we find that a more generous cash and food safety net is protective of mental health among single mothers. An

additional $1,000 in the potential total cash and food package would reduce severe psychological distress by 8.4 percent, and moving from the 10th percentile in state-level generosity to the 90th percentile would reduce SPD by 16 percent. After controlling for benefit eligibility from other programs, we find significant protective effects of tax credits, TANF, and SNAP. Our effects of safety net generosity on SPD are driven by single mothers with less than a high school education. In addition, we find no evidence of a relationship between the safety net and smoking, but some evidence that safety net generosity reduces heavy drinking.

These findings add to the existing evidence on the relationship between the safety net and mental health. Though we know of no other evidence that higher TANF benefits improve maternal mental health and the results from the previous literature on SNAP are mixed, Evans and Garthwaite (2014) find that a $1000 increase in EITC payments reduces the number of bad mental health days by 38 percent. Here we corroborate the finding of beneficial EITC effects and show that policy decisions to expand cash and food generosity may generate similar improvements for mental health.

We find no statistically significant effect of the simulated fraction of the family eligible for Medicaid. Our null finding contrasts with work that focuses solely on Medicaid without accounting for other program eligibility. For example, McMorrow et al. (2016) examine expansions in parental Medicaid access between 1997 and 2009 and find that a 50 percentage point increase in the Medicaid income eligibility threshold for parents is associated with a 1 percentage point reduction in moderate psychological distress. However, these results are not directly comparable to ours, as we are examining the simulated Medicaid eligibility of the family, examining a longer time period, and accounting for generosity of other programs.[33]

[33] Other work that has examined Medicaid's impacts on labor supply and welfare participation in the context of other programs has typically found no detectable effect (Meyer & Rosenbaum, 2001; Ham & Shore-Sheppard, 2005)

Our results suggest that a $1,000 increase in potential benefits from tax credits, TANF, or SNAP would lead to reductions in SPD of 0.76 percentage point, 0.25 percentage point, and 0.45 percentage point, respectively. As mentioned above, since take-up is less than complete, we are estimating intent-to-treat effects. To determine the effect of a *realized* increase of $1,000, we would need to scale these estimates up by a measure of take-up, with the implicit assumption that it is realized benefits rather than potential benefits *per se* that matter to mental health. Using our results from the CPS that show how $1,000 of predicted benefits for SNAP and TANF translate into actual dollars of benefits received for those programs (Table 2) to obtain treatment-on-the-treated effects suggests that an additional realized $1,000 of SNAP would reduce SPD by 0.85 percentage point (0.45/0.528), and an additional realized $1,000 of TANF by 0.71 percentage point (0.25/0.353). These effect sizes are similar to the difference in SPD between NHIS respondents with only a high school degree (4.3 percent) versus those with some college (3.2 percent).

To put the magnitude of the predicted benefits into context, Cutler and Summers (2020) estimate the cost of depression for a person for one year at around $20,000. If one values a statistical life year between $100,000 and $200,000, this is roughly in line with Global Burden of Disease disability weight of 0.145 for a mild depressive episode of major depressive disorder (Solomon et al., 2015). Suppose that an expansion of potential benefits to a single mother of $1000 costs the government $500 in expenditures. That same expansion would be predicted to reduce SPD by 0.0032 and MSPD by 0.0061. Multiplying by $20,000, this yields a depression-related benefit of $64 or $121. Thus, while safety net expansions do not "pay for themselves" in

or "wrong-signed" effects (Looney, 2005). An exception is Herbst (2008), who finds some evidence for positive employment effects of having all children in a family age-eligible for Medicaid when the economy is strong.

terms of direct effects on maternal mental health, mental health improvements are non-trivial relative to the government outlays, which presumably also benefit families in many other ways.

There are several limitations inherent in our analysis. First, our measures of psychological distress and risky behaviors are based on self-reports and may be inaccurate. Second, we exploit policy variation rather than true random assignment, requiring the assumption that state policy decisions are not responsive to mental health outcomes or their unobserved correlates. Finally, while we have shown that simulated benefits predict actual benefits, albeit with less than full take-up, we have not accounted for the possibility that statutory generosity might be correlated with take-up across states. For example, it might be the case that the states that are the most generous in terms of potential benefits also have lower administrative burden. This is an area worthy of exploration in future work.

In addition, our approach does not allow us to isolate the causal mechanisms by which expanded safety net generosity improves maternal mental health. We do note that tax credits, TANF, and SNAP all appear to have impacts, suggesting that increased cash and food resources to families is a likely channel. The difference in the size of the estimated effects (highest for tax credits, lower for SNAP, and lowest for TANF) may reflect differences in the degree to which simulated generosity is correlated with benefits actually received, or may reflect the degree to which stigma or administrative burden partially offset the benefit. Labor supply responses may also play a role, though they are beyond the scope of this analysis.

Overall, our results suggest that a stronger safety net may be protective of maternal mental health among some of society's most vulnerable members—single mothers. Thus one policy approach to improving maternal mental health through the social safety net would be to increase the statutory generosity of these programs. For example, our findings suggest that the

temporary expansion of the Child Tax Credit enacted as part of the American Rescue Plan in 2021 was likely to have had beneficial effects on maternal mental health.[34] Alternatively, policy could be directed at increasing take-up conditional on generosity – that is, ensuring that more people who are currently eligible for benefits from these programs actually receive them. Eliminating barriers to full take-up such as program stigma, lack of information about eligibility, and administrative burden and thereby increasing receipt of benefits would likely lead to improvements in maternal mental health, with ensuing benefits for children.

[34] Preliminary work by Kovski et al. (2022) suggests that this is the case.

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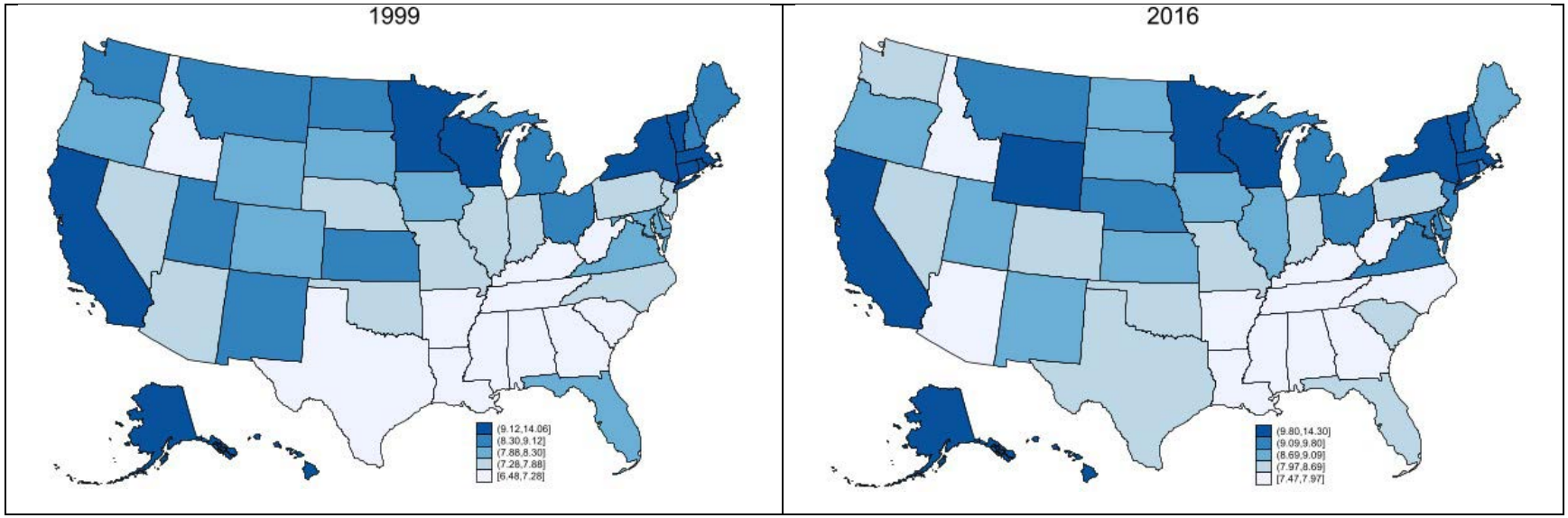
Figure 1: Key Safety Net Policy Changes 1996-2016

TANF	Tax Credits	Food Stamps/SNAP	Medicaid
All years: The 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) gave states flexibility in redesigning their cash welfare programs. States changed eligibility and benefit formulas throughout the period, and allowed the real value of benefits to erode over time.	**All years:** States made changes to state-level earned income tax credits (EITC). **1998**: The Taxpayer Relief Act enacted a nonrefundable $400 per child tax credit in 1998, $500 thereafter (CTC). **2001**: The Economic Growth and Tax Relief Reconciliation Act of 2001 temporarily increased the per-child credit amount to $600 with scheduled increases thereafter and made it available as a refundable tax credit to low-income families with more than $10,000 of earned income.	**All years:** SNAP benefits indirectly affected by state TANF generosity. (TANF benefits are counted as income in the SNAP benefit formula, so each dollar of TANF reduces SNAP benefits by 30 cents.)	**1996:** The PRWORA severed the automatic link between cash welfare and Medicaid. It mandated coverage of families who met the eligibility standards of the previous welfare program (Aid to Families with Dependent Children) in effect as of July 1996. **1997:** The Balanced Budget Act established the State Children's Health Insurance Program (SCHIP/CHIP) which allowed states to cover uninsured children in families with incomes below 200% of FPL who were ineligible for Medicaid, with levels set at state option.

	2002-2004: The scheduled increases were accelerated by the Jobs and Growth Tax Relief Reconciliation Act and the Working Families Tax Relief Act so that by 2004, the credit was $1,000 per child, with the credit amount phasing in for low-income families at 15% of earned income above $10,000. **2009:** The American Recovery and Reinvestment Act created a new larger Earned Income Tax Credit for families with three or more children. It also reduced the refundability threshold to $3,000 per family in 2009-2010 for the CTC. For the EITC, it boosted benefits for filers with three or more children.	**2009:** SNAP benefit levels increased in response to the Great Recession as part of the American Recovery and Reinvestment Act of 2009. **2013:** Enhanced benefits from ARRA were sunset early in late 2013.	**2009:** The Children's Health Insurance Program Reauthorization Act reauthorized CHIP through 2013 and established an upper income limit of 300% of the FPL for some states to receive more generous federal CHIP matching rate. **2014:** The 2010 Affordable Care Act expanded Medicaid to include everyone under age 65 in families with income below 138% of the FPL starting in 2014. The Supreme Court ruling in 2012 made this coverage expansion optional for states.

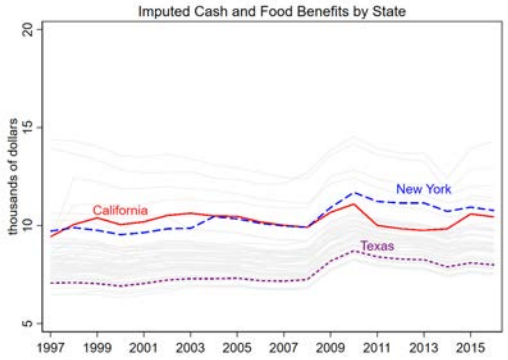
Figure 2: Imputed Benefits by State, 1999 and 2016



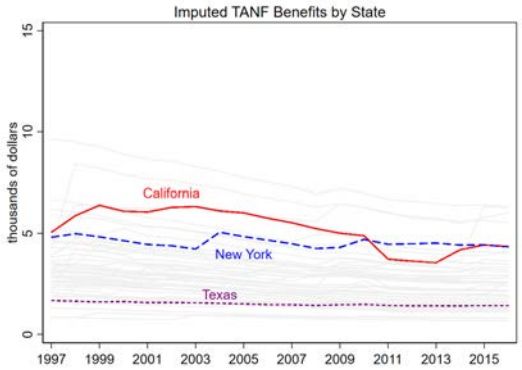
Notes: Maps show quintiles of average imputed combined cash and food benefits by state for a national simulated sample from the Current Population Survey of non-immigrant single mother families in which the mother does not have a disability, is between ages 18 and 64, has exactly a high school degree, and has at two children with at least one under age 6. Values represent average imputed cash and food benefits (TANF, EITC/CTC, and SNAP) for which the family is potentially eligible in 1999 and 2016 in thousands of 2016 dollars.

Figure 3: Imputed Benefits by State, 1997-2016

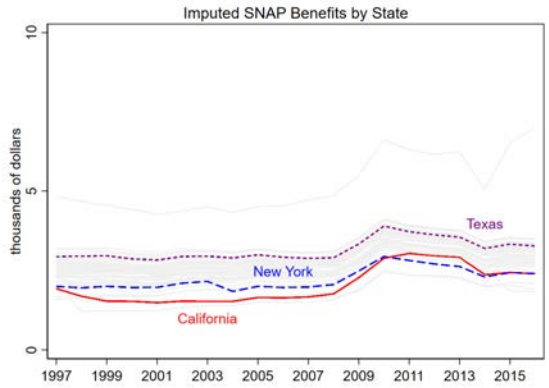
Panel A: Total Cash and Food



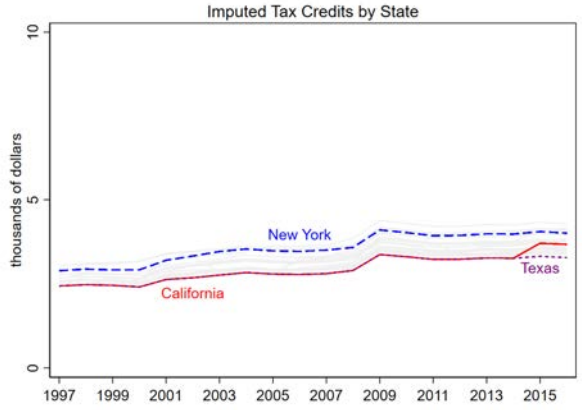
Panel B: TANF



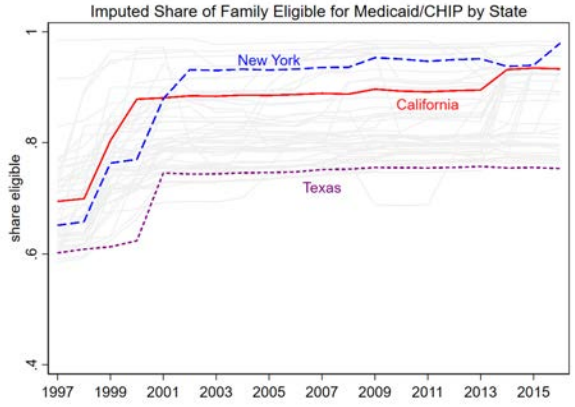
Panel C: SNAP



Panel D: Tax Credits



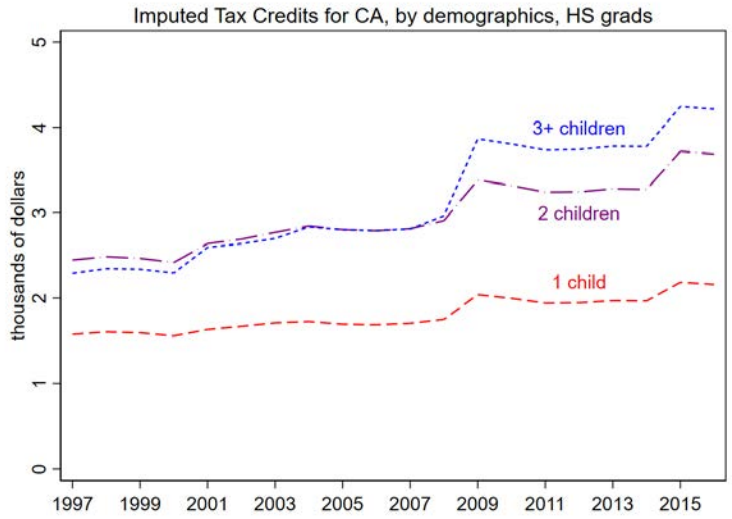
Panel E: Medicaid/CHIP Eligibility



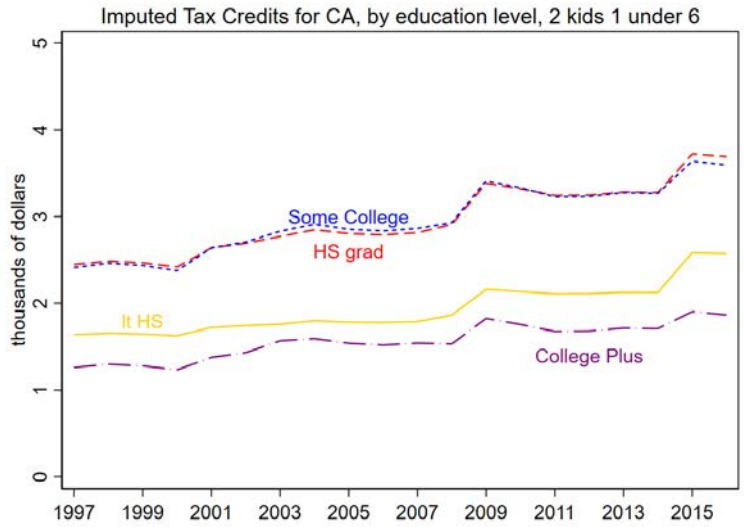
Notes: Figures illustrate average imputed benefits (including TANF, EITC, CTC, and SNAP) in thousands of dollars by state for a simulated sample of single parent families with 2 children where one is under the age of 6 and household head is a high school graduate. The three largest states (California, New York, and Texas) are highlighted. Differences across states and over time stem from state and federal policy variation and their interactions.

Figure 4: Imputed Tax Credits for California, by Demographics and Education Level, 1997-2016

Panel A: Imputed Tax Credits for CA by Number of Children



Panel B: Imputed Tax Credits for CA by Education Level



Notes: Panel A illustrates average imputed tax credits in thousands of dollars by demographic category in the state of California for a simulated sample of single parent families with a high school degree and no college. The figure reflects families with at least one child under age 6. Panel B illustrates average imputed tax credits in thousands of dollars by educational level in the state of California for a simulated sample of single parent families with 2 children where at least one is under the age of 6.

Table 1: Summary Statistics for NHIS Sample 1998-2016

	Mean (Standard Deviation)
Mother's age	31.11 (11.26)
One child	0.512
Two children	0.295
Three or more children	0.193
Child less than 6	0.391
Non-Hispanic White	0.571
Non-Hispanic Black	0.275
Hispanic	0.126
Asian/Native American/Pacific Islander	0.028
Less than high school	0.155
High school (including GED)	0.301
Some college	0.420
BA or higher	0.123
Any program participation	0.357
TANF	0.056
SNAP	0.281
Medicaid + CHIP	0.223
Severe psychological distress (SPD)	0.038
Moderate or severe psychological distress (MSPD)	0.242
Current daily smoker	0.223
Heavy drinker	0.204
Observations	39,942

Notes: Sample includes non-immigrant single mothers without disabilities from the NHIS Sample Adult Files from 1998-2016.

Table 2: Effects of Simulated Generosity on Reported Benefit Amounts Received, Current Population Survey 1998-2016

	(1) TANF benefits received (1000s)	(2) SNAP benefits received (1000s)	(3) Fraction of family enrolled in Medicaid
Simulated tax credits (1000s)	-0.068*	0.078***	0.026***
	(0.040)	(0.028)	(0.005)
Simulated TANF benefits (1000s)	0.353***	0.128***	0.026***
	(0.046)	(0.018)	(0.003)
Simulated SNAP benefits (1000s)	-0.062***	0.528***	0.043***
	(0.020)	(0.026)	(0.005)
Simulated fraction of family Medicaid eligible	-0.030	-0.588***	0.111***
	(0.219)	(0.181)	(0.047)
Observations	105,003	105,003	105,003
R-squared	0.124	0.212	0.228
Outcome variable mean	0.386	0.714	0.360
Joint Significance of Simulated Eligibility: F-test p-value	0	0	0

Notes: Dependent variable is the self-reported value of benefits received from TANF and SNAP, or the fraction of the family self-reported to be enrolled in Medicaid. Controls include number of children in three categories interacted with race/ethnicity, presence of a child under age six interacted with race/ethnicity, education in four categories interacted with race/ethnicity, and maternal age interacted with race/ethnicity. Robust standard errors clustered at the state level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Simulated Safety Net Generosity, Overall and by Year

Year	Cash and Food	Cash	SNAP	Tax Credits	TANF	Family Medicaid elig.
Overall	5.954	4.029	1.926	2.112	1.917	0.637
1998	5.948	4.184	1.764	1.743	2.441	0.466
1999	5.918	4.136	1.782	1.749	2.387	0.563
2000	5.820	4.101	1.719	1.704	2.397	0.598
2001	5.688	4.048	1.640	1.858	2.190	0.625
2002	5.909	4.166	1.743	1.944	2.223	0.636
2003	5.831	4.087	1.744	1.985	2.102	0.624
2004	5.840	4.155	1.685	2.023	2.132	0.629
2005	5.705	3.924	1.780	2.007	1.917	0.630
2006	5.727	3.913	1.815	2.008	1.905	0.642
2007	5.744	3.947	1.796	2.021	1.926	0.657
2008	5.433	3.739	1.694	2.041	1.697	0.649
2009	6.493	4.360	2.133	2.524	1.836	0.678
2010	6.744	4.214	2.530	2.419	1.795	0.675
2011	6.232	3.904	2.328	2.306	1.598	0.662
2012	6.265	3.962	2.303	2.360	1.602	0.673
2013	6.154	3.908	2.246	2.383	1.525	0.674
2014	5.835	3.892	1.943	2.358	1.534	0.686
2015	6.173	4.135	2.038	2.480	1.655	0.692
2016	5.488	3.644	1.843	2.299	1.345	0.679

Notes: All units are thousands of real 2016 dollars, with the exception of family Medicaid eligibility, which is the fraction of the family imputed to be eligible for Medicaid or CHIP (for brevity, we refer to this as fraction of family Medicaid eligible, since the vast majority of such eligibility is for Medicaid). Simulated safety net generosity is calculated by the following steps: 1) creating a simulated sample for each state and year by removing state and year identifiers from the 1997-2013 CPS-ASEC data and iteratively assigning the national sample for all years to each state in each year, 1997-2016; 2) running this simulated sample through the multi-program safety net calculator, using the policy rules for each state and each policy year 1998-2016; 3) calculating mean eligibility and mean benefit levels by 32 demographic cells, defined by whether there was a child under the age of 6, whether there was one child, two children, or three or more children, and education in four categories; 4) merging benefit generosity to the NHIS sample of nonimmigrant nondisabled single mothers by state-year-demographic cell.

Table 4: Effects of Safety Net Generosity on Psychological Distress

	(1) Severe Psychological Distress (mean=0.038)	(2) Moderate or Severe Psychological Distress (mean = 0.242)
Panel A: Cash and Food Combined		
Simulated cash and food benefits (1000s)	-0.0032*	-0.0061+
	(0.001)	(0.003)
Simulated fraction of family Medicaid eligible	0.0098	0.0515
	(0.020)	(0.057)
Panel B: Individual Programs		
Simulated tax credits (1000s)	-0.0076*	-0.0112+
	(0.003)	(0.006)
Simulated TANF benefits (1000s)	-0.0025+	-0.0045
	(0.001)	(0.004)
Simulated SNAP benefits (1000s)	-0.0045+	-0.0123*
	(0.003)	(0.005)
Simulated fraction of family Medicaid eligible	0.0149	0.0507
	(0.021)	(0.061)
Observations	39,942	39,942

Notes: Dependent variable is an indicator for whether the mother had severe (SPD) or moderate or severe psychological distress (MSPD) from a Kessler-6 (K6) indicator of psychological distress over the past 30 days; SPD defined as a K6 value of 13 or higher; MSPD defined as a K6 value of 5 or higher). Simulated benefits are in thousands of real 2016 dollars. Standard errors clustered at the state level are in parentheses. +, *, and ** indicate statistical significance at the 10, 5, and 1 percent levels respectively. All regressions include controls for age of mother, number of children in household and presence of a child under 6, education, race, and interactions between race and all other individual level variables. They also include controls for individual-level urban residence, and state-level measures of the unemployment rate, UI dependent allowance, child support enforcement dollars per capita, and public housing/voucher units per capita, as well as state and year fixed effects.

Table 5: Effects of Safety Net Generosity on SPD, Robustness to Different Specifications

	Baseline estimates	No interactions by race	State time trends	Child categories * Unemp. rate	Full policy controls
Panel A: Cash and Food Combined					
Simulated cash and food benefits	-0.0032*	-0.0036**	-0.0030*	-0.0034*	-0.0034*
(1000s)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Simulated fraction of family	0.0098	0.0144	0.0155	0.0102	0.0064
Medicaid eligible	(0.020)	(0.001)	(0.022)	(0.020)	(0.020)
Panel B: Individual Programs					
Simulated tax credits (1000s)	-0.0076*	-0.0064+	-0.0071*	-0.0080+	-0.0077*
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Simulated TANF benefits (1000s)	-0.0025+	-0.0028*	-0.0024+	-0.0026+	-0.0027*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Simulated SNAP benefits (1000s)	-0.0045+	-0.0059+	-0.0040	-0.0049	-0.0046+
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Simulated fraction of family	0.0149	0.0156	0.0216	0.0148	0.0119
Medicaid eligible	(0.021)	(0.021)	(0.023)	(0.021)	(0.021)
Demographic controls	YES	YES	YES	YES	YES
Demographic controls with full race interactions	YES	NO	YES	YES	YES
State time trends	YES	YES	YES	NO	NO
# of children categories interacted with state unemployment rate	NO	NO	NO	YES	NO
Policy variable controls	Limited	Limited	Limited	Limited	Full
Observations	39,942	39,942	39,942	39,942	39,942

Notes: Dependent variable is an indicator for whether the mother had severe psychological distress (SPD) over the past 30 days. Column 1 reprints the results from Column 1 of Table 4. Column 2 includes the same set of controls as Column 1, but does not interact all individual-level controls with indicators for race. Column 3 adds linear state time trends. Column 4 interacts the number of children indicators with the state unemployment rate. Column 5 includes an expanded set of policy controls, including the number of weeks of UI extended coverage, the presence of a TANF family cap policy (such a policy prevents TANF benefits from growing as family size grows), TANF asset limits, TANF strict time limits, the state minimum wage, and the share of TANF dollars spent on basic assistance and child care and work activities. Simulated benefits are in thousands of real 2016 dollars. Standard errors clustered at the state level are in parentheses. +, *, and ** indicate statistical significance at the 10, 5, and 1 percent levels respectively. For additional controls, see notes to Table 4.

Table 6: Effects of Safety Net Generosity on SPD by Education Level

	Less than HS (mean=0.065)	High school (mean=0.043)	Some college (mean=0.032)	College grad (mean=0.015)
Panel A: Cash and Food Combined				
Simulated cash and food	-0.0130*	-0.0025	0.0015	0.0092
benefits (1000s)	(0.006)	(0.004)	(0.003)	(0.008)
Simulated fraction of family	-0.0036	0.0401	0.0508	-0.0228
Medicaid eligible	(0.057)	(0.033)	(0.036)	(0.043)
Panel B: Individual Programs				
Simulated tax credits (1000s)	-0.0167	-0.0115	-0.0031	0.0082
	(0.014)	(0.008)	(0.008)	(0.012)
Simulated TANF benefits	-0.0171*	-0.0010	0.0051+	-0.0027
(1000s)	(0.006)	(0.008)	(0.003)	(0.011)
Simulated SNAP benefits	-0.0351*	-0.0036	-0.0090*	0.0216
(1000s)	(0.015)	(0.006)	(0.004)	(0.017)
Simulated fraction of family	-0.0255	0.0502	0.0437	-0.0277
Medicaid eligible	(0.063)	(0.036)	(0.037)	(0.042)
Observations	6,328	11,857	16,379	5,378

Notes: Dependent variable is an indicator for whether the mother had severe psychological distress (SPD) over the past 30 days. Simulated benefits are in thousands of real 2016 dollars. Standard errors clustered at the state level are in parentheses. +, *, and ** indicate statistical significance at the 10, 5, and 1 percent levels respectively. For additional controls, see notes to Table 4.

Table 7: Effects of Safety Net Generosity on Currently Smoking Every Day and Heavy Drinking

	(1) Daily Smoking (mean = 0.223)	(2) Heavy Drinking (mean = 0.204)
Panel A. Cash and Food Combined		
Simulated cash and food benefits (1000s)	-0.0027	-0.0018
	(0.003)	(0.004)
Simulated fraction of family Medicaid eligible	-0.0089	0.0470
	(0.034)	(0.053)
Panel B: Individual Programs		
Simulated tax credits (1000s)	-0.0092	-0.0180*
	(0.007)	(0.007)
Simulated TANF benefits (1000s)	-0.0030	-0.0011
	(0.003)	(0.004)
Simulated SNAP benefits (1000s)	0.0026	0.0038
	(0.005)	(0.007)
Simulated fraction of family Medicaid eligible	0.0092	0.0809
	(0.034)	(0.057)
Observations	39,777	39,599

Notes: Dependent variable in Column 1 is an indicator for whether the mother answered "every day" to the question "Do you now smoke cigarettes every day, some days, or not at all?" Dependent variable in Column 2 is an indicator for whether the mother reported heavy drinking, defined as drinking 4 or more drinks in one day in the past year. Simulated benefits are in thousands of real 2016 dollars. Standard errors clustered at the state level are in parentheses. +, *, and ** indicate statistical significance at the 10, 5, and 1 percent levels respectively. For additional controls, see notes to Table 4.