



State earned income tax credits and depression and alcohol misuse among women with children

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ABSTRACT

About 30% of single mothers in the US live at or below the poverty line. Poverty is associated with higher risk of depression and substance use. We investigated associations between state earned income tax credit (EITC) policies and reported depressive symptoms and alcohol misuse among birthing parents who responded to Pregnancy Risk Assessment Monitoring Survey spanning 1990–2017. Nearly half of birthing parents reported no more than a high school education (45.4%; 95% CI: 45.3%–45.6%). An estimated 28.5% of birthing parents reported binge drinking in the three months prior to conception (95% CI: 28.3–28.8%). Among birthing parents, each 10 percentage-point increase in the generosity of state EITC relative to the federal EITC was associated with a lower prevalence of binge drinking (prevalence ratio = 0.96; 95% CI: 0.93–0.99) prior to conception. This association was more pronounced among birthing parents with no more than high school education (prevalence ratio = 0.92; 95% CI: 0.88–0.97). There was no association between state EITC and number of reported depressive symptoms prior to conception or after birth, except among those with lower educational attainment (prevalence ratio = 0.94; 95% CI: 0.89–0.99). Anti-poverty policies such as EITC may reduce the burden of alcohol misuse, especially among people with children.

1. Introduction

Poverty and financial precarity lead to suboptimal physical and mental health (The World Health Organization, 2018; Muennig, 2008; de Ruffi and Zdanowicz, 2018; Burns, 2015). Income and employment are especially strong predictors of health for individuals living at or below the poverty line, where even the slightest gradation in income can have large impacts (Yeung et al., 2002; Currie and Stabile, 2003). Families with lower annual incomes are less likely to live in well-resourced neighborhoods and are more likely to be exposed to crime; they also depend on unpredictable employment more frequently than their higher-earning peers (Evans and English, 2002). Financial instability and high stress environments contribute to the higher rates of anxiety and depression reported by low-income adults (Burns, 2015; Mair and Diez Roux, 2008). Similarly, low-income adults are more likely

to engage in problematic alcohol use behaviors (Mossakowski, 2008; Dawson et al., 1995; Shields-Zeeman et al., 2021). Mental health and health behaviors may be especially affected by income through exposure to stressors. During the Great Recession, suicide rates were strongly associated with neighborhood- and individual-level poverty, as were rates of alcohol-related deaths (Kerr et al., 2017). Single women with children are particularly exposed to the deleterious mental health impacts of poverty; 30% of single mothers in the United States live at or below the poverty line (Pew Research Center).

Given the cyclical relationship between poverty, poor mental health, and substance misuse, policies that aim to reduce economic hardship may also alleviate depressive symptoms and alcohol misuse (McHugh and Weiss, 2019; Boden and Fergusson, 2011). One such policy, the Earned Income Tax Credit (EITC), may especially benefit mental health and health behaviors among unmarried women with children as these

Abbreviations: EITC, Earned Income Tax Credit; PRAMS, Pregnancy Risk Assessment and Monitoring System.

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women make-up the largest portion of EITC recipients (Markowitz et al., 2017; Meyer and Rosenbaum, 2001). The federal EITC, introduced in 1975 as a tax credit to low-earning working families and currently the largest federal anti-poverty program for working parents (Internal Revenue Service, 2019); is a credit received by beneficiaries based on pretax earnings, marital status, and the number of children in the household (Center on Budget and Policy Priorities). The federal EITC is also “refundable” meaning that the credit can exceed the filer’s tax liability and be received in the form as a tax refund (Internal Revenue Service, 2019). The credit is effective as an antipoverty policy not only through the cash transfer that occurs as a tax refund but also by further incentivizing employment thus increasing employment rates and earned income (Bastian, 1975; Meyer and Rosenbaum, 2001).

Many states have enacted EITC policies that supplement the federal credit. As of 2017, 29 states and the District of Columbia had their own EITC (Center on Budget and Policy Priorities). These state-level policies began in 1986, when Rhode Island implemented the first supplement to the federal credit. Most states offer refundable EITCs; however, a few states only offer non-refundable EITCs—where credits can offset tax liability but cannot convert to a refund. Frequently, states establish the value of their EITC as a percentage of the federal credit. State policies were implemented in different years and vary in generosity over time and between states. This variation allows for quasi-experimental assessment of state EITC impacts, i.e., the effect of instituting the intervention can be observed, however implementation is not at random.

Because women with children represent the largest group of EITC recipients, research focused on the health impacts of EITC has largely targeted the physical wellbeing of women and their children (Strully et al., 2011; Hoynes et al., 2015; Hamad and Rehkopf, 2015). These prior studies have found reductions in pregnancy complications, adverse birth outcomes, and childhood behavior problems to be associated with EITC at the population- and individual-levels (Strully et al., 2011; Hoynes et al., 2015; Hamad and Rehkopf, 2015; Hamad and Rehkopf, 2016; Kovski et al., 2021; Morgan et al., 2021). While evidence supports a beneficial effect of EITC on maternal physical wellbeing, less is known about the impact that such policies may have on mental health and substance use for the mother. Prior research has found a relationship between EITC and reduced rates of suicide death and suicide attempts in the general population (Dow et al., 2019; Lenhart, 2019; Morgan et al., 2020). Similarly, there is evidence that EITC reduces the frequency of poor mental health days among adults with lower educational attainment (Wolfe et al., 2012). However, the mechanism by which EITC leads to reduced suicide risk is not well understood because few studies have assessed the impact of EITC on maternal mental health outcomes. Research assessing EITC and other cash transfer programs suggests that the tax refund, i.e. lump-sum cash receipt, from the EITC may explain some of the observed benefits in mental health, such as reduced poor mental health days (Rambotti, 2020). While the EITC was found to be associated with reduced suicide risk in some studies, others found no impact (Collin et al., 2020). Because the EITC increases maternal employment rates, this policy could plausibly increase stress resulting in deleterious impacts on mental health and alcohol misuse. One study found no short-term impact of EITC on mental health and alcohol use (Gangopadhyaya et al., 2020); whereas another found that mothers reported fewer days of poor mental health as state EITC generosity increased (Courtin et al., 2020). These mixed findings suggest a need for further investigation of the association of EITC with mental health and substance misuse outcomes.

We sought to assess the relationship between EITC and maternal depressive symptoms and alcohol misuse in a representative sample of people who had recently given birth using variation in state EITC programs. While previous studies have examined these outcomes among women with children (Shields-Zeeman et al., 2021; Courtin et al., 2020; Boyd-Swan et al., 2016; Collin et al., 2021; Evans and Garthwaite, 2014); their findings are mixed. Across a variety of parameterizations of

EITC, some have found a positive relationship between EITC and mental health (Shields-Zeeman et al., 2021; Courtin et al., 2020; Shulman et al., 2018); while other studies have found no such relationship (Gangopadhyaya et al., 2020; Evans and Garthwaite, 2014). Among the limited subset of studies that assessed EITC and alcohol use, none have found any association; however, these studies tended to use measures that were not specifically indicative of problematic alcohol use (Shields-Zeeman et al., 2021; Gangopadhyaya et al., 2020; Evans and Garthwaite, 2014). To build on the existent literature, we analyzed the Pregnancy Risk Assessment and Monitoring System (PRAMS)—a yearly cross-sectional survey of parents—that has been in place for 25 years and allowed us to observe changes in state EITC generosity over time. We examined measures of depression, depressive symptoms, and alcohol misuse before conception and after birth thereby allowing us to further assess the impact of this policy during a very critical period. The study contributes plausibly causal estimates of the effects of a large anti-poverty program on mental health and substance misuse among individuals who recently gave birth during the vital and vulnerable period around a pregnancy.

2. Methods

2.1. Pregnancy Risk Assessment Monitoring System (PRAMS)

PRAMS is a survey of people who have given birth in the past 2 to 4 months conducted by state health departments in partnership with the CDC. The pen and paper survey asks questions about various health behaviors and outcomes for the months immediately before conception (this ranges from 3 to 12 months depending on the outcome), the duration of the pregnancy, and in the time between the birth and the survey. A stratified random sample is drawn from birth certificates in each state and new parents are invited to participate by mail. Survey weights based on demographic characteristics are available to construct state-level estimates; these characteristics have varied by state and over time, but typically include birth weight, maternal race/ethnicity, and substate geographical region. The details of sampling and the survey weighting have been previously described (2015-2020 Dietary Guidelines for Americans, 2015).

We stacked PRAMS data from 1990 to 2017 ($n = 624,610$). Owing to PRAMS survey design, data were not available for every outcome for every state-year. Details regarding years during which each of the questions was included and the total number of responses can be found in Appendix A; a detailed breakdown of data availability by state-year is in Appendix B.

For outcomes, we focused on respondents’ reported alcohol consumption and diagnosed depression prior to pregnancy, and depressive symptoms prior to pregnancy and in the weeks since birth. Pre-pregnancy questions inquired about the three months prior to conception and included whether an individual had chronic heavy alcohol use (7 or more drinks per week), engaged in heavy episodic alcohol consumption (4 or more drinks in one sitting) (Klevenes et al., 2017), and whether they had been diagnosed with depression. Post-birth questions assessed general depressive symptoms (reporting feeling “down, depressed, or hopeless” most or all of the time) and whether the individual reported a loss of interest in usual activities (having “little interest or little pleasure in doing things you used to enjoy” most or all of the time) since the delivery. The exact phrasing of questions and possible responses are included in Appendix C.

2.2. Exposure & covariates

In all analyses, the exposure of interest was the presence and generosity of a refundable state EITC. State EITCs are generally set as a percentage of the federal credit (exceptions include Minnesota, Wisconsin, and California) and are either refundable or non-refundable. Twenty-one states had a refundable EITC during the study period and

the generosity of these programs varied from 3.5 to 37% of the federal credit. Thirty-seven percent of the maximum federal EITC during the study period was \$1800. If the EITC is non-refundable, it reduces the taxes owed by a tax filer but does not act as direct income support to low-income families because such families have little or no tax liability. Previous analyses have found that non-refundable EITCs have little to no impact on health outcomes (Hamad and Rehkopf, 2015; Morgan et al., 2020; Rostad et al., 2020; University of Kentucky Center for Poverty Research, 2019). Subsequently, many prior studies on EITC and health have focused only on refundable EITC or have calculated the estimated EITC refund for a specific individual (Shields-Zeeman et al., 2021; Gangopadhyaya et al., 2020; Courtin et al., 2020). For this reason, we only considered refundable EITCs; for the few state-years that had a partially refundable EITC, we included only the portion of the credit that was refundable. We measured the generosity of a state's EITC in 10 percentage-point units relative to the federal EITC tax credit. A state without an EITC was set at 0 in the measure of generosity.

Other economic or policy changes in the state could coincide with changes in EITC and impact birth parents' mental health and alcohol misuse, confounding our estimates. Accordingly, we controlled for state gross domestic product (GDP), the state's minimum wage, and the maximum TANF benefit offered in that state-year. We additionally included measures of Medicaid expansion in individual states. Outcomes occurring prior to pregnancy were matched to the state-year exposure and covariates prior to the survey year; outcomes occurring in the period following birth were matched to the state-year exposure and covariates of the same year that the survey was administered. All data on EITC and financial covariates were obtained from the University of Kentucky Center for Poverty Research (Wing et al., 2018).

2.3. Analytic techniques

Analyses used Poisson regression to calculate Prevalence Ratios (PR) and 95% confidence intervals (CI). Recommended survey weights were applied to make estimates representative of all birthing parents (2015–2020 Dietary Guidelines for Americans, 2015). We first estimated models including state and year fixed effects and then added the aforementioned time-varying economic and policy covariates. These models took the following form:

$$\log(Y_{ij}) = \alpha + \beta_1 EITC_{ij} + \beta_2 \sum X_{ij} + \gamma_j + \delta_t + \epsilon_{ij},$$

where i indexed individual respondents, t indexed years, and j states. Y_{ij} was the outcome for each individual endorsing that in a specific state-year. $EITC_{ij}$ denoted a continuous variable, for which each one-unit increase represented a 10 percentage-point increase in the state refundable EITC (as a percentage of the federal EITC). X_{ij} was a vector of time-varying state-year covariates and γ_j and δ_t were state and year fixed-effects, respectively (Center, 2021). Inclusion of state fixed-effects adjust for time-invariant state characteristics while year fixed-effects address national temporal trends. A sensitivity analysis additionally included an interaction between time as a continuous measure and state. The last model included the above state-level variables in addition to the following individual-level covariates: race/ethnicity (American Indian/Alaska Native, Asian or Native Hawaiian/Other Pacific Islander, Black, Hispanic/Latinx, Mixed Race or Other Race Not Specified, and White), marital status at time of the birth, number of prior dependents (0, 1, or 2+), and highest educational attainment (no more than high school or at least some post-secondary education).

We additionally conducted sensitivity analyses that limited the population to "likely eligible" groups for the EITC because the average earnings for this group fall below the EITC eligibility limit (U.S. Bureau of Labor Statistics, 2019; Rehm et al., 2017). These groups were respondents reporting no more than a high school education and those who were unmarried at the time of the birth. Because the number of dependents in the tax year (i.e., the year prior to interview) is used as a

parameter to determine the value of the EITC, an additional sensitivity analysis restricted analyses to parents with at least one dependent prior to this pregnancy. All analyses were conducted in Stata version 16.1 (Copyright©2019 StataCorp LLC). The University of Washington Institutional Review Board approved this study.

3. Results

We used PRAMS interviews of people who had given birth in the past 2–4 months, from 1990 to 2017 (Table 1). Almost half reported no post-secondary education, while 29.7% reported having graduated college. An estimated 38.0% of pregnancies were among individuals with no prior dependents. When asked about alcohol use prior to this pregnancy, 8.0% reported chronic heavy consumption while 28.5% reported heavy episodic consumption. One-third of respondents reported depressive symptoms since the birth and two-thirds reported little to no interest in engaging in activities that they previously enjoyed.

For each 10-percentage point increase in state EITC generosity (Table 2), we observed a 6% lower prevalence of chronic heavy alcohol use (PR: 0.94; 95% CI: 0.91–0.98) and a 4% lower prevalence of episodic heavy alcohol use (PR: 0.96; 95% CI: 0.93–0.99) in the pre-pregnancy period. The estimates remained similar when we added time-varying and individual-level controls in Models II and III, but estimates became less precise. Similarly, when state and year interaction terms were included in the model, point estimates varied only slightly, however, estimates lost statistical significance (Appendix D). State EITC generosity was not significantly associated with measures of diagnosed depression prior to pregnancy and, among the general population of new parents, neither were depressive symptoms or little interest in activities after the birth.

The estimates were the same or increased in magnitude when we limited the sample to single mothers with no more than a high school education and single mothers with a previous dependent (Table 3). Only the estimates for heavy episodic alcohol use remained statistically significant. However, when restricting to the likely eligible population of people with no more than a high-school education, we additionally observed a 6% reduction in depressive symptoms in the time since the birth (PR: 0.94; 95% CI: 0.89–0.99). We additionally restricted to individuals who were unmarried at the time of the birth and observed a significant relationship between EITC and reduced pre-pregnancy heavy episodic alcohol use (PR: 0.95; 95% CI: 0.91–1.00) and a reduction in postpartum depressive symptoms (PR: 0.92; 95% CI: 0.88–0.97). We additionally performed a placebo test which restricted the sample to individuals with no prior dependents who were under the age of 25 at the time of the birth and were thus unlikely to have been previously eligible for any EITC. Among this ineligible population, we observed no relationship between EITC and our outcomes of interest (Appendix E).

4. Discussion

We found that state EITC generosity was associated with reductions in reports of chronic and episodic heavy alcohol use among individuals who had recently given birth. For those with no more than a high school education, we observed that a 10 percentage-point increase in state EITC (roughly \$480 among those receiving a maximum federal credit) was associated with decreased reports of depressive symptoms after the birth. However, for most birthing parents, we did not find a relationship between state EITC generosity and fewer depressive symptoms either pre- or post-pregnancy.

Given that 30% of unmarried women with children live at or below the poverty line, policies such as the EITC that benefit low-income families are likely to benefit this population (Pew Research Center). Therefore, examining the mental health and substance misuse impacts of EITC on women with children is important in exploring the additional effects of this policy, beyond the intended economic impacts. Reductions in symptoms of postpartum depression among those with lower

Table 1
Characteristics of Pregnancy Risk Assessment and Monitoring System population, 1990–2017.

	Total		EITC State-Years		Non-EITC State Years	
	Weighted %	95% Confidence Interval	Weighted %	95% Confidence Interval	Weighted %	95% Confidence Interval
Married (at time of Birth)	63.7%	(63.5%–63.8%)	63.4%	(63.1%–63.7%)	63.8%	(63.6%–64.0%)
Education						
<=HS	45.4%	(45.3%–45.6%)	39.3%	(39.0%–39.5%)	48.7%	(48.4%–48.9%)
Some College	24.9%	(24.7%–25.1%)	25.0%	(24.7%–25.2%)	24.9%	(24.7%–25.1%)
College Grad	29.7%	(29.5%–29.8%)	35.8%	(35.5%–36.0%)	26.5%	(26.3%–26.7%)
Race/Ethnicity						
American Indian/Alaska Native	1.1%	(1.1%–1.1%)	1.1%	(1.1%–1.2%)	1.1%	(1.0%–1.1%)
Asian or Native Hawaiian/Other Pacific Islander	4.1%	(4.0%–4.1%)	4.9%	(4.8%–5.0%)	3.6%	(3.5%–3.7%)
Black	15.1%	(15.0%–15.2%)	13.3%	(13.1%–13.4%)	16.1%	(16.0%–16.2%)
Hispanic	14.9%	(14.8%–15.0%)	16.2%	(16.0%–16.4%)	14.2%	(14.1%–14.4%)
Mixed Race or Other Race Not Specified	1.6%	(1.6%–1.6%)	2.1%	(2.0%–2.2%)	1.3%	(1.3%–1.4%)
White	63.3%	(63.1%–63.4%)	62.4%	(62.2%–62.6%)	63.7%	(63.5%–63.9%)
Dependents Prior to this Pregnancy						
0	38.0%	(37.8%–38.1%)	40.7%	(40.4%–41.0%)	36.4%	(36.2%–36.6%)
1	31.5%	(31.3%–31.7%)	31.4%	(31.1%–31.7%)	31.5%	(31.3%–31.8%)
2+	30.6%	(30.4%–30.7%)	27.9%	(27.7%–28.2%)	32.1%	(31.9%–32.3%)
Pre-pregnancy Outcomes						
Heavy Alcohol	8.0%	(7.8%–8.1%)	4.8%	(4.6%–4.9%)	9.5%	(9.3%–9.6%)
Binge Alcohol	28.5%	(28.3%–28.8%)	32.2%	(31.8%–32.6%)	26.8%	(26.5%–27.1%)
Diagnosed Depression	11.7%	(11.5%–11.9%)	11.5%	(11.2%–11.8%)	12.0%	(11.6%–12.3%)
Post-pregnancy Outcomes						
Depressive Symptoms	32.6%	(32.4%–32.8%)	30.7%	(30.4%–31.0%)	34.1%	(33.8%–34.5%)
No Interest in Activities	67.7%	(67.2%–68.1%)	67.9%	(67.2%–68.5%)	67.5%	(66.8%–68.2%)

Point estimates and confidence intervals reflect the estimated prevalence in the population after survey weights are applied.

Table 2
Association between 10-percentage-point increase in state-level Earned Income Tax Credits and mental health and alcohol misuse outcomes among mothers interviewed in the Pregnancy Risk Assessment and Monitoring System.

		Model I		Model II		Model III	
		PR	95% CI	PR	95% CI	PR	95% CI
Pre-Pregnancy	Chronic Heavy Alcohol Use	0.94	(0.91–0.98)	0.96	(0.91–1.01)	0.94	(0.86–1.02)
	Heavy Episodic Alcohol Use	0.96	(0.93–0.99)	0.96	(0.93–0.99)	0.96	(0.94–0.99)
	Diagnosed Depression	1.01	(0.91–1.12)	1.01	(0.91–1.12)	1.00	(0.90–1.11)
Post-Pregnancy	Depressive Symptoms	0.99	(0.96–1.03)	0.99	(0.96–1.02)	0.98	(0.95–1.01)
	Little Interest	0.99	(0.95–1.03)	0.99	(0.95–1.04)	1.01	(0.96–1.05)

Model I: State & Year Fixed Effects.

Model II: Additional effects for GDP, state minimum wage, max TANF benefits, and Medicaid Expansion.

Model III: Additional terms for individual race/ethnicity, educational attainment, marital status at birth, and number of prior dependents.

Table 3
Association between 10-percentage-point increase in state-level Earned Income Tax Credits and mental health and alcohol misuse outcomes among Pregnancy Risk Assessment and Monitoring System respondents in likely eligible populations.

		Lower Educational Attainment		Prior Dependent(s)		Unmarried Respondents	
		PR	95% CI	PR	95% CI	PR	95% CI
Pre-Pregnancy	Chronic Heavy Alcohol Use	1.01	(0.92–1.10)	0.93	(0.82–1.06)	1.05	(0.97–1.14)
	Heavy Episodic Alcohol Use	0.91	(0.87–0.97)	0.95	(0.91–1.00)	0.95	(0.91–1.00)
	Diagnosed Depression	1.00	(0.85–1.17)	0.90	(0.78–1.04)	1.06	(0.91–1.23)
Post-Pregnancy	Depressive Symptoms	0.94	(0.89–0.99)	0.97	(0.92–1.01)	0.92	(0.88–0.97)
	Little Interest	1.01	(0.95–1.09)	1.01	(0.95–1.06)	1.04	(0.97–1.12)

All models include state and year fixed effects in addition to GDP, state minimum wage, max TANF benefits, and Medicaid Expansion.

educational attainment is one benefit of EITC. Our findings of reductions in chronic and episodic heavy alcohol consumption add to the other observed health benefits of EITC in this population, including reductions in reported cases of child maltreatment (Morgan et al., 2021). The potential downstream improvements in maternal and child health (Strully et al., 2011; Hoynes et al., 2015; Hamad and Rehkopf, 2015; Hamad and Rehkopf, 2016; Kovski et al., 2021); as well as the intrinsic health benefits of reduced alcohol misuse, such as cardiac and liver health (Rocco et al., 2014; Platt, 1984); are ways in which economic policies such as EITC can have positive impacts on physical and mental health

and wellbeing (Wolfe et al., 2012).

In addition to the direct benefit of alleviating the burden of alcohol misuse, reducing alcohol use contributes to a developing literature suggesting the association between EITC generosity may prevent suicide (Dow et al., 2019; Lenhart, 2019; Morgan et al., 2020). Several key suicide risk factors, including heavy episodic alcohol use identified here, and frequent mental distress, identified previously (Wolfe et al., 2012); may be lessened by state EITC. Taken together, these findings suggest EITC's impacts on economic security may also improve mental wellbeing (de Ruffi and Zdanowicz, 2018; Burns, 2015; Kerr et al., 2017;

Schisterman et al., 2009); providing support for leveraging anti-poverty and other economic policies to improve health (Dow et al., 2019).

Prior studies have found no significant association between EITC benefits and alcohol use (Shields-Zeeman et al., 2021; Gangopadhyaya et al., 2020; Evans and Garthwaite, 2014). Our novel findings of a possible relationship between state EITC generosity and reduced alcohol misuse during the critical period around pregnancy are plausibly due to our specific definitions of alcohol misuse or to our unique study population. Many studies of alcohol use and EITC have used measures of any alcohol use—this broad definition does not distinguish between casual drinking and alcohol misuse making it difficult to discern if the policy impacts problematic substance use (Shields-Zeeman et al., 2021; Gangopadhyaya et al., 2020; Evans and Garthwaite, 2014). While other investigations did include a metric as 3 + drinks in a day, this does not fit any formally defined measure of alcohol misuse; additionally, the estimates for these measures were negative, though not statistically significant (Gangopadhyaya et al., 2020; Evans and Garthwaite, 2014). Our study may have been more well equipped to detect such relationships because episodic heavy alcohol use is a concrete event that might be preceded by a specific stressful event; additional income or the cash transfer of the EITC may help stave off these crisis events (Kerr et al., 2017). Our study population was also distinct from these previous studies, which assessed these outcomes in the entire adult population (Shields-Zeeman et al., 2021; Gangopadhyaya et al., 2020; Evans and Garthwaite, 2014). By focusing on women with children—a “likely treated” group—we may have been better suited to identify a positive effect on problematic alcohol consumption.

Some prior studies have found a relationship between EITC—including the increases in the federal policy in the 1990s—and continuous measures of depression (Shields-Zeeman et al., 2021; Courtin et al., 2020; Collin et al., 2021; Shulman et al., 2018); however, there are plausible explanations for the absence of a significant association of EITC with depressive symptoms despite observing such a relationship with alcohol use in this study. In a nation where health insurance is tied to employment, increased employment rates may allow individuals better access to healthier coping mechanisms, even if it cannot resolve the underlying stress and mental illnesses. This may include workplace wellness programs or access to some mental health resources. Unlike episodic heavy alcohol use, depressive symptoms are more likely to be lingering and long-term. The annual cash transfer and increase in earned income via increased employment may not be sufficient to overcome the long-term stress and depression that accompany financial precarity. Similarly, these increases in income may not be enough to cover the cost of psychiatric medication or treatment. This is plausibly why similar statistically insignificant findings were seen in other analyses of depression in the Panel Study of Income Dynamics (Gangopadhyaya et al., 2020; Evans and Garthwaite, 2014); including one focused explicitly on state policy (Evans and Garthwaite, 2014).

4.1. Limitations

Our findings may be affected by social desirability bias. Heavy alcohol consumption and mental health concerns are sensitive and stigmatized topics, potentially resulting in misreporting. PRAMS is conducted on paper and respondents can fill out the survey in the privacy of their own home. This anonymity may result in participants feeling more comfortable answering sensitive questions. However, we have no reason to believe that any measurement error would differ by the presence or generosity of a state EITC; we expect that any social desirability bias would result in an underestimate of the true effect of EITC. The estimates we presented could also be biased by unobserved time variant state characteristics correlated with EITC generosity and new mothers' mental health and alcohol use. In addition, we used self-reported outcome measures, which could be biased by a respondent's state of mind and access to health care. Finally, the generalizability of this study might be limited by the exclusion of states with small sample sizes in some years

4.2. Implications

This study contributes further evidence on the potential positive health impacts of anti-poverty policies, such as federal and state EITCs. Policy makers should consider that EITC and similar income supports, in addition to their intended economic effects, could also reduce alcohol misuse in the United States. These policies may improve health in economically disadvantaged populations by reducing financial stress, increasing income, or increasing employment rates. Advocacy for large scale policies that address poverty as a social determinant of health could be an important tool for improving population-level maternal and child health.

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CRediT authorship contribution statement

Erin R. Morgan: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft. **Heather D. Hill:** Conceptualization, Methodology, Writing – review & editing. **Stephen J. Mooney:** Conceptualization, Methodology, Writing – review & editing. **Frederick P. Rivara:** Conceptualization, Methodology, Writing – review & editing, Supervision. **Ali Rowhani-Rahbar:** Conceptualization, Methodology, Writing – review & editing, Supervision, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2022.101695>.

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