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ABSTRACT

Recent expansions of child tax, food assistance and health insurance programs have made American families' need for a robust social safety net highly evident, while researchers and policymakers continue to debate the best way to support families via the welfare state. How much do children – and which children – benefit from social spending? Using the State-by-State Spending on Kids Dataset, linked to National Vital Statistics System birth data from 1998-2017, we examine how state-level child spending affects infant health across maternal education groups. We find that social spending has benefits for both low birth weight and preterm birth rates, especially among babies born to mothers with less than a high school education. The stronger benefits of social spending among lower-educated families lead to meaningful declines in educational gaps in infant health as social spending increases. Finally, mediation analyses suggest that social spending benefits infant health through mothers' increased access to prenatal services, as well as improvements in health behaviors. Our findings are consistent with the idea that a strong local welfare state benefits child health and increases equality of opportunity, and that spending on non-health programs is equally beneficial for child health as investments in health programs.

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INTRODUCTION

Education and economic status are strong determinants of health in the United States, with large gaps in adult and child health and mortality that have persisted or grown in the last several decades (Montez, Hayward and Zajacova 2019; Rauscher and Rangel 2020). Among adults, the size of educational and income gaps in health varies widely across geographic areas, with pronounced differences in mortality risk and life expectancy across U.S. metropolitan areas and states (Elo et al. 2019; Fenelon and Boudreaux 2019). These patterns have led to increased attention to the role of U.S. states as key institutional actors in the production of population health, and a call for increased attention to the resources, policies and opportunity structures they provide (Montez, Hayward and Zajacova 2019).

Among children, social spending is a key indicator of the resources available to residents of U.S. states. The recent expansion of the Child Tax Credit, which implemented monthly cash payments to nearly all American families with children, is a particularly visible example of the many public investments in children and families that provide social supports in education, health, income support or housing. Currently, U.S. states spend about $26,000 per child each year, on average, on income support programs, health services, public education and investments in housing, parks and libraries, with striking variation in spending amounts across states (Greenberg et al. 2021). A large literature within and beyond the United States has demonstrated how income support, health and educational programs improve the outcomes of low-income children (Jackson 2015; Johnson 2015; Markowitz et al. 2017; Parolin 2021; Strully et al. 2010), and has argued that public expenditures on children may

increase equality of opportunity (Bradbury et al. 2015; Corak 2013; Waldfogel 2016).

How much do children – and which children – benefit from social spending? Using annual data from the State-by-State Spending on Kids Dataset between 1997-2016, linked to annual birth data from the National Vital Statistics System (NVSS) from 1998-2017, we draw on geographic and temporal variation in the United States to examine how social spending on the kids' share of income support, health and housing programs is associated with infant health. A focus on expenditures is useful because it affords consideration of the relative importance of different forms of spending for reducing inequality in child health. We significantly expand our portrait of public spending on children and its relationship with child health by measuring both federal and state/local spending, direct spending programs and tax credits, and the specific "kids' share" of large spending programs that serve many populations. In addition, we examine the effects of social spending across educational groups and consider its implications for educational gaps in infant health. Finally, we explore two primary pathways through which increased social spending may affect infant health—improved access and frequency of prenatal care, and improvements in maternal health behaviors.

BACKGROUND

Educational Gaps in Child Health

Socioeconomic disadvantage and child health are tightly connected in the United States, with social conditions determining access to the resources, institutions, and networks necessary for healthy development (Link and Phelan 1995; Case and Paxson 2006; Finch 2003; Lee and Jackson 2017). Stubbornly high levels of child socioeconomic disadvantage (Brady and Parolin 2020; Chen and Corak 2008; Gornick and Jantii 2012) and the risk of poor health go

hand in hand (Finch 2003; Link and Phelan 1995), and indeed rates of infant mortality and preterm birth are much higher in the United States than in most European countries, and life expectancy is lower (Chen, Oster and Williams 2016; Conley and Springer 2001; MacDorman et al. 2014; Montez et al. 2020). National statistics also mask substantial variation in child health within the United States, with wide state variation in rates of infant mortality and low birthweight (CDC 2021) and large and rising inequality of infant health by maternal education (Lawrence, Rogers and Hummer 2020; Rauscher and Rangel 2020).

How Much Does Social Spending Affect Infant Health?

Beyond families, governments are a primary source of investment in children, and a more generous provision of social supports through the state may positively affect children by augmenting their access to resources both within and outside of the home (Parolin 2021; Waldfogel 2016). Much existing research on social spending has considered its effects on child poverty and household income. Child poverty rates vary substantially within the United States, ranging from 10% in Iowa to over 20% in California (Laird et al. 2018, Renwick and Fox 2016), and this striking variation is partly a result of state differences in public benefits (Brady and Parolin 2020; Wimer et al. 2020).

Beyond poverty, how does child health vary with social spending in U.S. states? Much research examining the state context and infant health has focused on exposure to particular social policies or programs, or on the effects of political factors such as governance structure. For example, children exposed to WIC or generous school funding regimes experience better health than their peers (Jackson 2015; Johnson 2015). The introduction and subsequent expansion of the Medicaid program in 1965 led to improvements in child health and declines

in infant mortality and hospitalizations (Goodman-Bacon 2018; Currie and Gruber 1996; Currie, Decker and Lin 2008). And there are strong positive effects of the enactment of income support programs (EITC, SNAP) (e.g., Hoynes, Scanzenbach, and Almond 2016; Gundersen and Kreider 2009; Markowitz et al. 2017; Strully et al. 2010) and the provision of housing assistance (Fenelon et al. 2021) on child health. In contrast, recent work documents poorer infant health in Republican regimes and in states with punitive policies that target and restrict rights among immigrants (Torche and Sirois 2019; Torche and Ruef 2021).

While a focus on individual policies is crucial, examining actual expenditures is also useful because it affords consideration of the relative importance of different forms of spending for child health. Among adults, physical health outcomes are more strongly associated with spending on social services than with spending on health (Bradley et al. 2016; Kim and Jennings 2009; Ronzio, Pamuk and Squires 2004). The relative importance of expenditures on social services compared to spending on health and other programs is less understood among children. Although the United States has a small welfare state relative to other industrialized countries (Bradbury et al. 2015; Garfinkel, Rainwater and Smeeding 2010), public spending on children has grown over time (Isaacs et al. 2017). Federal, state and local governments must therefore determine how to spend funding for the children and families who rely on it, making it useful to understand how different forms of spending benefit children's health.

Which Children Benefit from Social Spending?

Most existing research has focused on how public policies and programs affect children in families with low income and low levels of education. This is a sensible approach given that maternal education and economic disadvantage strongly predict poor infant health (Kandel et

al. 2009; Currie and Moretti 2003). In addition, public spending on many programs is considerably higher for lower-income children than for higher-income children (Vericker et al., 2012), though the 2021 expansion of the Child Tax Credit represents a notable exception (Marr et al. 2021). Social spending should disproportionately benefit lower-SES families, both by providing direct cash assistance and by providing necessities (food, health care) that parents would otherwise need to purchase or forego (Milligan and Stabile 2009; Yeung, Linver and Brooks-Gunn 2002). Targeted investments allow low-resource families to make developmental investments in their children that are more similar to higher-resource families (Leininger, Levy and Schanzenbach 2010).

However, many income and health supports at the state level are available to children above the 200% poverty threshold. CHIP, for example, is available in many states to children between 300-400% of the poverty threshold. Social spending can also improve outcomes for all children. For example, public health insurance spending can yield medical improvements that benefit children across socioeconomic groups (Currie and Gruber 2001; Finkelstein 2007). Even adults with insurance are less likely to have accessible and high-quality medical services when they live in communities with low rates of insurance, for example, and as a result are less likely to have a place to go when they are sick and to receive regular medical care (Pauly and Pagán 2007). Moreover, studies of TANF and other income support programs suggest that lower levels of welfare generosity are associated with higher levels of community-level crime (Liebertz and Bunch 2017), and that SNAP expenditures have benefits that extend beyond the eligible income groups, increasing the incomes of SNAP-ineligible households as well (Hanson et al. 2002; Lewin and Weber 2020). Such evidence suggests that social spending should be most positively associated with health among infants born to low-SES mothers, with positive

but less pronounced health benefits of social spending among infants born to higher-SES mothers (*Hypothesis 1*). If social spending has the most positive effects among infants with low-SES mothers, then it may have an equalizing effect on pronounced gaps in infant health by SES (Corak 2013; Solon 2004) (*Hypothesis 2*). Alternatively, if higher-educated mothers are better able to leverage policy opportunities and access resources (Phelan et al. 2010; Phelan and Link 2015), then educational gaps in infant health may increase (*Hypothesis 3*).

Why Should Social Spending affect Infant Health in the United States?

A likely pathway of influence through which social spending amounts affect child health is through states' increased ability to deliver more and higher-quality services. The majority of health and economic social spending on children and families is on health (Medicaid; non-Medicaid public health spending) and income support/social services (Temporary Assistance for Needy Families (TANF), the Supplemental Nutrition Assistance Program (SNAP), child care assistance, child welfare, and earned income tax credits (EITC)). Greater expenditures on both income support and in-kind services may lead to improvements in infant health by improving maternal well-being and nutrition, as well as both the amount and quality of medical care available to mothers and babies (Currie 2008). Greater expenditures on health programs for children should make it more likely that families will have health insurance and increase the number of health care providers that will treat patients with public insurance—in turn, families have an easier time accessing care, and providers are able to spend more time with patients (Currie, Gruber and Fischer 1995; Goodman-Bacon 2018). Beyond spending on health care, increases in income through federal and state-level investments in cash or tax-credit programs such as EITC also increase mothers' ability to increase their prenatal care

usage, or even to switch from public to private insurance (Hoynes, Miller and Simon 2015; Lenhart 2019). Greater social spending on children and families may therefore improve infant health by allowing mothers to receive more and better prenatal care (*Hypothesis 4*).

Improvements in the amount and quality of services may also affect health-related behaviors associated with maternal stress. Models of family stress suggest that resource constraints affect parents' psychological well-being, levels of stress and "cognitive load" (Gennetian and Shafir 2015). Prenatal stress accounts for approximately 10% of the variation in a variety of infant health measures (Beijers et al. 2010) and prenatal maternal stress affects birth weight, gestation length, and birth length (Dancause et al. 2011; Torche 2011). Research examining public benefits and "coping" health behaviors strongly associated with financial stress and maternal mental health shows that, for example, child tax benefit expansions lead to improvements in maternal health and reductions in depression and smoking (Milligan and Stabile 2011; Strully et al 2010), and larger SNAP benefits are associated with improvements in caregiver physical health and reductions in psychological distress (Ettinger de Cuba et al. 2019; Oddo and Mabli 2015). Such evidence suggests that greater social spending on children should affect infant health by improving maternal health behaviors (*Hypothesis 5*).

DATA, MEASURES AND APPROACH

Leveraging variation in spending across states and over time, we test whether infant health is stronger, and educational gaps in infant health are narrower, when states spend more on children, and how this relationship varies across different forms of spending and different educational groups. To do this, we use a new annual state-level comprehensive database of public spending on children from 1997 to 2016 (Isaacs, Lauderback and Greenberg 2020), linked to annual National Vital Statistics System (NVSS) birth data, aggregated to the state-

level by maternal education. We merge NVSS birth data for 1998-2017 to spending data one year earlier (1997-2016), to allow spending to influence maternal context before, during, and after pregnancy. Importantly, the data we use afford measurement of both federal and state spending, direct spending programs and tax credits, and the "kids' share" of large spending programs that serve many populations, significantly expanding our portrait of public spending on children. They also permit measurement of many variables that typically confound cross-national findings about the welfare state and population health.

Data: State-Level Public Spending

We use the State-by-State Spending on Kids Dataset, a state-by-year database of public spending from federal, state and local sources that spans 1997-2016, aiming to cover the longest period feasible with existing administrative data (Isaacs, Lauderback and Greenberg 2020). The data include all 50 states and the District of Columbia, drawing on data from the U.S. Census State and Local Government Finance Survey (SLGF), federal agency websites, the State Funding for Children Database compiled by the Rockefeller Institute of Government, and other sources. The data contain per-child spending at the state-year level in the domains of income support, health, education, and other spending. Table 1 lists the relevant programs included in the state-level database, as well as the data sources for each spending program.

Data: National Vital Statistics System (NVSS)

Infant health is a useful marker of population health to examine not only because pronounced gaps exist by social class, but because childhood health strongly affects educational and economic attainment over the life course (Bleakley 2007; Conley, Strully and Bennett 2003;

Currie 2009). NVSS administrative records data provide the most complete and accurate information about births in the U.S. and include multiple measures of infant health. We use the NVSS restricted birth data from 1998-2017, which include maternal state of residence. We limit the sample to singleton births because infant health measures are often lower for multiple births, the rate of multiple births has increased over time, and the likelihood of multiple births is not randomly distributed (Saavedra 2020; Matthews et al. 2015; Kulkarni et al. 2013; Luke and Martin 2004; Russell et al. 2003). Based on 73,536,080 singleton birth records in years 1998-2017 with information on maternal residence and education, we calculate annual, aggregate measures of infant health separately by maternal state of residence and education category. We examine state-year-education observations (N= 51 states x 20 years x 4 education categories = 4,080) to measure both infant health and spending at the same level as state spending policy (Abadie et al. 2010; Kenny 1996). Sensitivity analyses predicting individual-level infant health outcomes (using a 10% random sample of births in each year) yield similar results.

NVSS birth data have low rates of missing information. Appendix Table A1 shows the percent of births in years 1998-2017 missing information for each measure used in our analyses. Overall rates are low: the state-year mean rate of missing infant health information is 0.03% for birth weight measures and 0.11% for gestational length measures. Missing rates for birth weight never exceed 3% and missing rates for gestational length rarely exceed 3% (10 state-year observations having missing rates 3-10% and sensitivity analyses excluding these observations yield consistent results). As states adopted new birth certificate formats after 1997 and 2008, maternal education is not included on a substantial subset of birth certificates in certain state-years. In these cases, maternal education is not selectively unreported by mothers, but is excluded from certain birth certificates. We conduct sensitivity analyses excluding state-years

with high missing rates for maternal education (84 state-years above 10%), and the results are consistent.

Measures

Infant Health. We examine two key measures of infant health aggregated to the state level: the percent of children who are low birth weight (less than 2,500 grams) and the percent of children who are born preterm (before 37 weeks). Low birth weight and preterm birth are thresholds that identify infants at high risk for poor health in childhood and later life (Conley et al. 2003; Johnson and Schoeni 2011; Institute of Medicine 2003).[1]

Social Spending. We measure state-level real spending per-child in 2016 dollars in several domains. We focus on types of spending that are most likely to be related to infant health in the short-term. Specifically, we focus on forms of *cash support* (TANF, other cash assistance, SNAP, Federal SSI, Social Security, unemployment compensation, worker's compensation), income support in the form of *tax credits* (Federal EITC, State EITC, Child Tax Credit, Additional Tax Credit); *health* spending (Children's Medicaid and CHIP, Public Health, and Residual Health Spending) and *housing and community development* spending[2].

The Medicaid health insurance program, jointly financed by the federal government and the states, represents the second largest form of investment in children, after K-12 education (Isaacs et al. 2017). Many states have expanded Medicaid beyond federal minimums for benefit and coverage, leading to wide variation in eligibility levels, service coverage, payment

[1] In additional analyses we also measure rates of intrauterine growth restriction (<10th percentile of birth weight for gestational age), given evidence that there have been downward trends in birth weight over time (Oken et al. 2003). The results are consistent.

[2] Our results are consistent when using log-transformed spending measures.

mechanisms and spending per enrollee. Children also benefit from spending on the Children's Health Insurance Program (CHIP) and spending on public health systems. Medicaid and other health programs are often targeted toward low- and moderate-income families. Income support programs also support families with children. Some of these programs are explicitly limited to families with children (e.g., the Child Tax Credit) and other programs that serve the low-income population have a disproportionate share of child recipients. For example, two-thirds of SNAP benefits go to households with children and, during the Great Recession, SNAP was a primary form of support for children with unemployed parents (Isaacs and Healy 2014). Most of these programs are federal or joint federal-state programs, and many target lower-income families. While both cash and tax-based programs provide income support to families, we separate them in our analyses given important differences in the way they are administered, as well as evidence that, prior to 2021, tax-based programs excluded a large percentage of low-income families (Goldin and Michelmore 2020).

Socioeconomic Status. We use maternal education as our measure of family socioeconomic status, comparing those with less than a high school degree, a high school diploma, some college, or a four-year college degree or more. We calculate annual aggregate infant health measures by maternal education and state of residence. NVSS records do not include a measure of family income. Relative to other core indicators of socioeconomic status, education (including maternal education) strongly predicts health (Harding, Morris and Hughes 2015; Montez et al. 2019).

Demographic and State-Level Controls. We include time-varying NVSS controls, measured at

the state-education category level, in an effort to account for factors that co-occur with socioeconomic status and state-level public investments: maternal age, paternal age, proportion of births to married parents, and the total number of births. Prior literature connects demographic composition with spending generosity (i.e. Alesina et al., 2000; Rogers and Tedin, 2006; Preuhs, 2007; Soss et al., 2011). We therefore control for the distribution of births by maternal race or ethnicity, based on self-reports. Within each level of maternal education, we control for the proportion of births to Black, American Indian, Asian, and Hispanic mothers.

We include additional state-year controls using data from the University of Kentucky Poverty Center's State Welfare database, the Current Population Survey, and the Bureau of Labor Statistics. Because state-level spending increases with economic need during periods of economic downturn (Edelstein et al. 2016; Rodgers and Tedin 2006; Brown and Best 2017), we control for the unemployment rate and poverty rate. As an indicator of state generosity, we control for the prevailing minimum wage. We measure states' governance structures with a variable indicating whether the governor is a Democrat, as prior research shows that Republican control is negatively associated with safety net generosity (i.e. Soss et al, 2011; Scruggs and Hayes, 2017; Brown and Best, 2017).

Mediators. We measure several indicators of mothers' access to prenatal services, including the percent receiving prenatal care, percent with first trimester care, length of prenatal care, and number of prenatal visits. To measure health behaviors associated with family stress, we examine the percent smoking during pregnancy, percent drinking alcohol during pregnancy, the number of daily cigarettes during pregnancy, number of weekly drinks during pregnancy, and weight gain during pregnancy.

Approach

We predict infant health measures in models that include state and year fixed effects to control for time-constant state differences correlated with spending and infant health (e.g., labor market structure, level of economic need), and for variation over time shared across states (e.g., recession effects). Variation across states in the strength of the labor market and the demographic composition of the population could produce a positive relationship between spending and economic need that does not reflect true variation in states' investment in children and families. Including state fixed effects helps to control for these fixed differences across states. In addition, increased economic need during periods of economic downtown is correlated with increases in spending, particularly from federal sources, to support state/local governments working to provide assistance to families (Edelstein et al. 2016). Increased spending during recessions may also be correlated with worse infant health, despite the generally positive relationship between spending and children's development (Isaacs and Edelstein 2017). Including year fixed effects helps to separate the effects of state investments from the effects of economic need. To examine the association between public investment and infant health by maternal education, we use the following linear probability model:

$$Y_{rst+1} = \beta_0 + \beta_1 SES_{rst} + \beta_2 Spend_{s,t} + \beta_3 SES_{rst} Spend_{s,t} + \beta_4 X_{rst} + \mu_s + \theta_t + \delta_{rs} + \varepsilon_{rst+1} \quad (1)$$

For each state *s* in year *t* and maternal SES category *r*, Equation 1 predicts infant health (*Y*) as a function of SES (maternal education) category; state spending (Spend) in the previous year; the interaction between SES and state spending; time-varying state-SES-level controls (*X*); state and

year fixed effects; and state-SES category fixed effects[3]. We weight analyses by the number of births in each state-education-year, in order to prevent states with a large number of births from having a disproportionate influence on the pattern of results. Finally, we predict infant health one year after the measure of state spending in order to capture the state spending environment to which mothers were exposed during pregnancy, since this is the environment that would determine their access to state-provided resources relevant to a healthy pregnancy. We begin by measuring total state spending, then disaggregating spending into cash income support, tax credits, health and housing spending.

The inclusion of state and year fixed effects means that model identification is based on within-state variation in public spending across years, as well as across-state differences in public spending in a given year. Coefficients for SES (β_1) test whether infant health differs by maternal SES category compared to mothers with less than high school (the omitted category). The coefficient for spending (β_2) tests whether infant health varies with state spending in the lowest SES category (births to mothers with less than high school). β_3 provides a test of Hypothesis 1, that social spending is most positively associated with infant health among those born to lower-educated mothers as compared to higher-educated mothers.

In order to consider the implications of these findings for educational gaps in infant health, we compute predicted rates of low birth weight and preterm birth by maternal education across the distribution of state spending. In order to test Hypotheses 2 and 3, we examine whether gaps in infant health between lower and higher-educated mothers converge, diverge or remain stable as state spending increases.

[3] In supplementary analyses we also estimate separate models by maternal education category, in order to account for possibly different distributions of our observed covariates by maternal education. The results are consistent.

Finally, we conduct mediation analyses in order to understand how indicators of service access (Hypothesis 4) and health behaviors associated with maternal stress (Hypothesis 5) mediate the effects of social spending on infant health. Using Equation 1, we estimate effects of spending on measures of prenatal health care (% receiving prenatal care, % with first trimester care, length of prenatal care, and number of prenatal visits) and prenatal health behavior (% smoking during pregnancy, % drinking alcohol during pregnancy, number of daily cigarettes during pregnancy, number of weekly drinks during pregnancy, and weight gain during pregnancy). Under the assumption of sequential ignorability (Imai et al. 2011), we estimate the proportion of the spending effect that is mediated through each potential mechanism and the sensitivity of those mediation estimates to violation of the sequential ignorability assumption (using medeff and medsens in Stata; Hicks and Tingley 2011). Sequential ignorability is the two-part assumption that: 1) the treatment is statistically independent of the outcomes and potential mechanisms, conditional on pretreatment confounders; and 2) the mediator is statistically independent of the outcomes, conditional on treatment and pretreatment confounders. Because this strong assumption is often violated, we put our mediation estimates in context with three estimates of the extent of violation of sequential ignorability required to make each mediation estimate zero: the correlation between error terms from the models predicting the mediator and the outcome measure; the percent of residual variance an omitted confounder must explain; and the percent of total variance an omitted confounder must explain (using medsens; Imai et al. 2011).

RESULTS

Table 2 shows descriptive statistics of outcome and predictor variables among the analytic

sample (weighted by the number of births in each state), both for the total sample and by maternal education. The mean proportion of low birth weight and preterm births during our study period is 6% and 10%, respectively. Consistent with prior research, this pattern varies strikingly by maternal education: the rate of low birth weight is twice as high among mothers with less than a high school education (.08) compared to mothers with a college degree or more (.04), with a gradient for the educational groups in between. There is also consistent variation across educational groups in maternal characteristics. The highest-educated mothers are more likely than the lowest-educated mothers to be older at the time of a child's birth (31 vs. 24), and births to the highest-educated mothers are more likely to occur to married parents (92% vs. 37%) and to non-Hispanic White mothers (73% vs. 30%).

Turning to state-level characteristics, the mean social spending per year on children and families between 1997-2016 on the forms of state spending we consider (cash income support, tax credit income support, health and housing) was $7,190 per child. The majority of this spending takes the form of cash or tax-based income support ($4,140), with a smaller but sizeable share on health spending ($2,330) and the smallest amount on housing ($500). During the study period, the average unemployment rate was 5.9%, poverty rate was 13.3% and minimum wage was $6.29/hour. About 12% of state residents are black, 16% Hispanic and 28% have a college degree in an average state-year, with 42% of state-years having a Democratic governor.

Figure 1 shows the amount of variation across states in per-child spending during our study period. Per-child spending on both cash and tax credit income support programs jumped sharply in 2010 due to the increased economic need (and corresponding increased government investment) during the Great Recession. While cash income support steadily declined after 2010, tax credit spending stayed at higher levels after 2010 than in previous years. Spending on both

types of income support programs also varies widely across states, as shown by the variation within particular years. Per-child spending on health increased more gradually than spending on income support programs over this roughly 20 year period, nonetheless producing ample variation across the years of our study period. Finally, increases and decreases in spending on housing and community development are more modest during our study period, with ample variation in spending across states as well.

Figure 2 presents the bivariate relationship between social spending and infant health, by maternal education. Figure 2A shows that when social spending is higher, the proportion of low birth weight births declines among mothers with less than a high school education, while remaining fairly flat among other educational groups. The proportion of preterm births declines among all educational groups as total social spending increases (Figure 2B). These descriptive patterns suggest that social spending provides benefits to infant health, but does not control for potentially important confounders at the state level. The next section describes the results from multivariate analyses that more rigorously account for correlates of social spending and infant health.

How Much Does Social Spending Affect Infant Health, and for Whom?

Tables 3 and 4 present coefficient estimates from multivariate models of the association between social spending and the share of low birth weight and preterm births, respectively. We present separate coefficient estimates for our measures of total social spending on children, two forms of income support spending (cash and tax credits), health spending and housing/community development spending. Model 1 predicts infant health from state-level social spending and time-varying controls within state-education categories, while Model 2 adds additional time-varying

control variables at the state level.

The findings in Tables 3 and 4 provide consistent support for Hypothesis 1: social spending is most positively associated with health among infants born to less-educated mothers, with less pronounced health benefits of social spending among infants born to higher-educated mothers. Table 3, Model 1 shows that a $1,000 increase in total state spending on children decreases the rate of a low birth weight birth by about .08 percentage points among infants born to the lowest-educated mothers. Model 2 shows that the addition of time-varying controls at the state level does not alter this coefficient. Figure 3A puts these findings into context for a realistic amount of spending variation. A standard deviation of total state spending is $2,900, and the range of state spending among the observed state-years is very dramatic, at about 8 SD. A 1 SD increase in total state spending (or about $2,900), therefore, decreases the rate of low birth weight by 0.23 (.08*2.9) percentage points. One standard deviation ($2,900) is a realistic amount of variation in social spending. Consider, for example, that Alabama spent $3,800 per child in 1997 and $6,600 in 2006—a change of about 1SD during that nine-year period. The difference between the 2010 spending environment for children in MA (a high spending state, $12,900 per child) and UT (a low spending state, $5,800 per child) is $6,600, or 2.2SD. A 1SD change in social spending is therefore a commonly observed amount of spending variation both within and across states.

Torche and Rauf (2021) provide a useful way to think about the population-level significance of this effect size: with 493,397 births to mothers with less than high school in the United States in 2017, a 1SD increase in total social spending on children would potentially lead to 1,134 (493,397 × .0023) fewer low birth weight infants among mothers with less than a high school education in that year. One underweight hospital birth is estimated to cost about $27,200, $24,000 more than a normal weight birth (America's Health Rankings 2021), suggesting a short-

term savings of over $27 million (1,134 x $24,000).

Among infants born to higher-educated mothers, the benefits of social spending are less pronounced, as shown in Table 3 and Figure 3A. Among infants born to the highest-educated mothers (those with a four-year degree or more), a 1SD increase in total social spending decreases the probability of a low birth weight infant by .09 percentage points [(-.0008+.0005)*2.9], compared to .23 among mothers with less than a high school degree. The benefits of total social spending decrease as maternal education increases.

Table 3 and Figures 3B-E show the coefficient estimates for cash income support, tax credits, health and housing/community development spending on children. Similar to the results for total social spending, results are extremely similar across Models 1 and 2, demonstrating that the addition of correlated state-level changes other than state spending only very slightly reduces the coefficients for social spending. The rate of low birth weight among infants born to the lowest-educated mothers decreases by .14 percentage points for a $1,000 increase in cash income support spending (or .18 for a 1SD increase: Figure 3B), by .08 percentage points for a 1SD increase in health spending (Figure 3D), and by .16 percentage points for a 1SD increase in spending on housing and community development (Figure 3E). Coefficient equality tests (shown in Table 3) demonstrate that the coefficients for specific forms of state spending are significantly different from one another. Similar to the case of total state spending, the benefits of each of these forms of social spending decrease as maternal education increases. Interestingly, the pattern of results is in the opposite direction for the case of tax credits (which include EITC and the Child Tax Credit), where the benefits of tax credit investments increase as maternal education increases. Supplementary analyses, shown in Appendix Table A2, show that this result is fairly consistent across both programs and especially pronounced for the case of the Child Tax Credit, which

during the period of our study excluded millions of low-income families by design (Goldin and Michelmore 2020).

Table 4 presents coefficient estimates for our other measure of infant health: the share of preterm births. Results are similar in direction to those for low birth weight, and slightly larger in magnitude. Table 4, Model 2 shows that a $1,000 increase in total social spending leads to a decrease in the rate of preterm birth of .16 of a percentage point—in other words, a 1SD increase in total social spending decreases the rate of preterm birth by almost half a percentage point (.464). Following the same logic as above, at the population level this amount of increase in total social spending on children would lead to 2,289 (493,397 x .00464) fewer preterm births among the lowest-educated mothers. Figures 4B-E display similar results for preterm birth for most specific forms of social spending, with significantly higher benefits of spending on cash income support programs compared to other forms of spending. A 1SD increase in spending on cash support decreases the rate of preterm birth by .41 of a percentage point (where 1SD of income support spending is $1,330), compared to .16 and .02 percentage point decreases in preterm birth rates for each 1SD of health and housing spending, respectively. Similar to low birth weight, the positive effects of social spending on preterm birth rates are less pronounced among infants born to higher-educated mothers, with the exception of tax credit spending.

Education Gaps in Infant Health

To consider the implications of these findings for educational gaps in infant health, we visualize marginal relationships between state spending and infant health by maternal education category from the results shown in Tables 3 and 4. We show predictions for low birth weight in Figure 5 (the overall pattern is similar for preterm birth). The results are more consistent with

Hypothesis 2 (that a stronger local welfare state for children and families reduces gaps in infant health across educational groups) than Hypothesis 3. Figure 5A shows that as state spending increases, there is a decrease in the gap in low birth weight between those with less than a high school education and those with a college degree. When total state spending is less than 2SD below the mean (e.g., Utah in the late 1990s), the gap in low birth weight is 21%, with 7.5% vs. 5.9% of babies predicted to be low birth weight in the lowest- and highest-educated families, respectively. In the highest-spending state contexts, this gap decreases by almost 30%. The predicted percent of low birth weight infants declines by a full percentage point among the lowest-educated mothers, and by .4 of a percentage point among the highest-educated mothers.

Figures 5B-E show the same predictions for cash income support, tax credits, health and housing spending, respectively. With the important exception of tax credit spending, the pattern of convergence is similar across spending domains and is most pronounced for cash income support and housing spending, where convergence in the percent of low birth weight infants—a reduction in the gap between the highest and lowest-educated mothers—declines by 30-40% and is driven entirely by declines in the rate of low birth weight among the lowest-educated mothers. Educational convergence in low birth weight is less pronounced for the case of health spending, where the rate of low birth weight is predicted to decline among both the lowest- and highest-educated mothers. This pattern may be driven by the relative generosity of state health insurance programs, which cover families up to 300-400% of the poverty threshold, and are therefore more likely to include higher-educated mothers. Higher-educated mothers may be more likely to take advantage of state health insurance programs when they qualify and less-educated mothers are more likely to qualify, resulting in infant health benefits at both high and low levels of education. Overall, these results suggest that, while inequality in infant health remains even in high-spending

state contexts, the gap is substantially smaller when states invest in a strong welfare state for children and families.

What Explains The Effects of Social Spending on Infant Health?

Table 5 shows results of mediation analyses for total spending. Panel A in Table 5 shows estimates predicting potential mediators. A $1,000 increase in total state spending on children increases the proportion of births that received any prenatal care by about .2 percentage points among infants born to the lowest-educated mothers. A 1SD increase in total state spending (about $2,900) increases the rate of prenatal care among mothers with less than high school by 0.58 (0.2*2.9) percentage points. Estimates are larger when predicting the proportion receiving care in the first trimester of pregnancy, length of prenatal care, and number of prenatal visits. Spending also predicts lower tobacco and alcohol use during pregnancy and lower weight gain. Among mothers with less than a high school degree, a 1SD increase in state spending on children reduces the rate of any prenatal tobacco and alcohol use by 3 and 13 percentage points (-1.1*2.9 and -4.4*2.9), respectively. Average weight gain during pregnancy also decreases among mothers with less than a high school education when state spending on children increases. Consistent with the main analyses, interaction terms indicate smaller benefits at higher levels of maternal education.

Panel B in Table 5 shows estimates of the proportion of the effect of total spending on low birth weight (shown in Table 3) that is mediated by prenatal care and prenatal behavior measures. Among mothers with less than high school, the number of prenatal visits mediates nearly 16% of the effect of total spending on low birth weight. Indicators for any prenatal care and care in the first trimester account for 2% and 4% of the total effect, while length of prenatal

care mediates nearly 8% of the effect of total spending. These results are consistent with Hypothesis 4: that mothers' ability to receive more and better prenatal care—especially more frequent care—partially explains the positive effect of social spending on infant health. Turning to prenatal behaviors, tobacco use, alcohol use, weekly drinks, and weight gain during pregnancy account for less than 1% of the total spending effect, suggesting they play little role in explaining the relationship between spending and low birth weight. In contrast, average daily cigarettes during pregnancy accounts for about 14% of the total effect of state spending on children. Mediation estimates for the effect of total spending on preterm birth are shown in Panel C. Results are consistent with those in Panel B, but suggest indicators for prenatal care and length of prenatal care mediate a larger proportion of the effect of total spending on preterm birth rate. Results of the mediation analyses provide partial evidence in support of Hypothesis 5, that maternal health behaviors during pregnancy mediate the effects of social spending on infant health.

Sensitivity estimates in Panels A and B indicate that these mediation estimates should be interpreted with some caution. Mediation estimates are predicted to become zero at relatively low levels of correlation between error terms in models predicting the outcome and the mediator. In addition, omitted variables would need to explain relatively low levels of variation in the residuals or in infant health in order for mediation estimates to be zero. Mediation estimates for prenatal visits and tobacco use are the least sensitive to potential violation of the sequential ignorability assumption. Overall, results of Table 5 suggest that spending reduces low birth weight partly by increasing prenatal care and reducing smoking during pregnancy. Mediation analyses for spending on income support, health, and housing are shown in Appendix Tables 3-5. The pattern of results by spending category is in line with

mediation analyses for total spending.

Sensitivity Analyses

The analyses presented above carefully control for both fixed and time-varying characteristics of states and state-education groups in a theoretically driven way, and should account for many of the key correlates of both states' social spending and infant health. Nonetheless, there may be other, unmeasured correlates of state spending. For example, states with more generous social spending may be those that spend more on all programs, not just services for children and families. As an additional check, we conduct a placebo test that uses the same modeling framework to regress infant health on measures of state spending that should not be plausibly related to child health, using data from the U.S. Census Survey of State and Local Government Finances. We focus on total expenditures on utilities and natural resources, which are important indicators of states' infrastructure but have a weaker theoretical connection to infant health.[4] Appendix Table 6 shows that these forms of state spending are not significantly related to infant health.

In addition to the placebo tests of utilities and natural resources spending, we repeat the main analyses when including state-specific time trends to address the possibility that infant health would have changed in certain states regardless of child spending. In addition, we repeat analyses when excluding state-year observations with high missing rates for gestational length or maternal education in NVSS data. Finally, we repeat analyses when predicting individual-level

[4] Expenditures on utilities includes water supply, electric, gas and public mass transit services. Expenditures on natural resources include the conservation, promotion, and development of natural resources, including services such as irrigation; drainage; flood control; soil conservation and reclamation including prevention of soil erosion; surveying, development, and regulation of water resources.

(rather than state-level) infant health outcomes, using a 10% random sample of births in each year. Results using each of these approaches yield consistent findings.

DISCUSSION

Strikingly large and durable effects of education on health among American adults and children (Montez, Hayward and Zajacova 2019; Rauscher and Rangel 2020), combined with pronounced differences in the size of educational gaps across geographic areas (Fenelon and Boudreaux 2019), has led to an increasing focus on the role of U.S. states as institutional actors that determine access to resources, policies and opportunity structures for their residents (Montez, Hayward and Zajacova 2019). Among children, a focus on state-level social spending provides a strategic focus on a key indicator of the resources available to children and families across states, and affords analysis of how different forms of social spending are related to child well-being. Using annual data from the State-by-State Spending on Kids Dataset between 1997-2016, linked to annual birth data from the National Vital Statistics System (NVSS) from 1998-2017, we draw on geographic and temporal variation in the United States to ask how much children—and which children—benefit from different forms of state-level social spending?

Our analyses reveal that, first, social spending has especially positive benefits for rates of both low birth weight and preterm birth among babies born to mothers with less than a high school education. These benefits are meaningful at the population level, such that a commonly observed amount of variation in social spending (1 standard deviation, or about $2,900) results in a decrease in the rate of low birth weight by .23 percentage points, or over 1,100 fewer low birth weight births among the lowest-educated mothers in a given year. This pattern is broadly consistent across the several types of social spending we examine (income support, health and

housing), with the most pronounced health benefits of social spending resulting from investments in cash income supports for families. Income support in the form of tax credits (here, EITC and the Child Tax Credit) provide an important exception to this pattern, with no infant health benefits observed among the lowest-SES mothers. While this finding is driven especially by the CTC, the benefits of EITC spending are also less pronounced among the lowest-SES mothers. This finding may be driven by the fact that, during our study period, both tax programs excluded the lowest-income families, resulting in the majority of families in the bottom 30% of the income distribution receiving a partial or no credit (Goldin and Michelmore 2020). Importantly, the recent temporary expansion of both the EITC and CTC in the American Rescue Plan eliminated many of these exclusions, making the credits much more widely available to the lowest-SES families and suggesting that this finding could change in the aftermath of the expansions.

Second, the benefits of social spending are less pronounced among children born to higher-educated mothers and, because of this pattern, educational gaps in infant health decline as social spending increases. When social spending is high, the predicted percent of low birth weight infants declines by over a full percentage point among low-educated mothers while remaining stable among higher-educated mothers, resulting in a 30% decline in the educational gap in infant health. It is notable that this pattern of convergence across educational groups is less pronounced for health spending than for other forms of social spending, perhaps because state health insurance programs are more likely to cover families further above the poverty threshold than other social services. While sample sizes limit the ability to examine racial variation within maternal education groups by state and year, a priority for future research is to consider racial inequality in the effects of social spending. Beyond socioeconomic status, racial inequality in infant health is also substantial, with

particularly large Black-White gaps in birth weight, preterm delivery, and infant mortality (Schoendorf et al. 1992; Conley et al. 2003; Cramer 1995). Even among the lowest-educated families, White mothers may benefit more from some forms of social spending, such as Medicaid, due to unequal access to quality health care (Institute of Medicine Committee 2003) and the psychological and physiological embodiment of racism and discrimination is more likely to be experienced by non-White families in their interactions with social services and the state (Rosenthal and Lobel 2011).

Finally, mediation analyses are consistent with the possibility that social spending benefits infant health through mothers' increased access to prenatal services, as well as improvements in some "coping" health behaviors related to financial stress. While these results should be interpreted with caution, increases in the number of prenatal visits and reductions in the frequency of smoking during pregnancy explain a sizeable amount of the effect of social spending on both rates of low birth weight and preterm birth. Future research could usefully examine more direct measures of maternal stress, when data permit, together with the state context of public investment and infant health outcomes.

While we conduct analyses to assess the robustness of our results to possible threats, we cannot rule out confounding from state-level economic or political factors, and so it is important to emphasize that we have not identified causal estimates of public spending on educational gaps in infant health. Families are not randomly distributed in states, but instead choose their location based on a number of factors, including job opportunities, political climates and a desire to maximize their children's development. It is possible that high public sector investment partially reflects the presence of families who prioritize child investment, both in their own behavior and in their support for state policies and programs. Our results should be interpreted as providing a

descriptive portrait of how the state-context of children's policy environments may be an important contributor to population-level infant health.

By looking beyond child poverty to direct measures of child well-being, we are able to demonstrate that a strong welfare state for children at the relatively local level of the state benefits the health of the next generation. These findings contribute to the growing body of research demonstrating how states regulate behavior and policy (Robertson 2012), and the effects of policy decisions at this level for health, psychosocial resources, and even mortality (Montez, Hayward and Wolf 2017; Strully, Rehkoph, and Xuan 2010; Torche and Rauf 2021). In addition, our consideration of multiple forms of social spending allows us to demonstrate that non-health spending can be equally or more beneficial for child health than spending on health services. An ongoing research and policy debate concerns the best way to support low-income families via the state, with some evidence suggesting that cash income support programs—cash for kids—are the most effective way to allow families to enable healthy development for their children and to make the same types of developmental investments as higher-resource families (Shaefer et al. 2018; Smeeding 2016). By providing mothers with additional resources at a critical period of development, this form of state investment may increase equality of opportunity for children as well as improve maternal well-being.

Beyond demonstrating the potential for a strong local welfare state to benefit child health and increase equality of opportunity, our findings are relevant in light of the renewed policy focus on the importance of comprehensive, multidimensional public investments in children, as evidenced by the dramatic expansion of the Child Tax Credit, food assistance (SNAP and WIC) and health insurance (Medicaid) programs in light of the tremendous need for a social safety net during the COVID-19 pandemic. Our findings suggest that many forms of government

investment are beneficial for children, and that a strong state context of investment for children and families has benefits for a marker of population health that not only improves infant well-being, but reduces costs in the short-term and durably predicts life chances throughout childhood and beyond.

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Table 1: Social Spending on Children and Families, By Spending Category

Income Security	
TANF cash assistance	TANF Expenditure Reports
Other cash assistance and social services	SLGF and TANF Expenditure Reports
SNAP	Characteristics of SNAP Households Recipients reports
Social Security	Urban Institute estimates using data from the Social Security Bulletin Annual Statistical Supplement
Federal SSI	Urban Institute estimates using data from the Social Security Bulletin Annual Statistical Supplement and SSI Annual Statistics Report
Federal EITC	IRS SOI Tax Statistics Historic Tables
Child Tax Credit	IRS SOI Tax Statistics Historic Tables
Additional Tax Credit	IRS SOI Tax Statistics Historic Tables
State EITC	Urban Institute estimates using data from the Rockefeller Institute of Government and the University of Kentucky Center for Poverty Research (UKCPR) National Welfare Database
Unemployment compensation	SLGF
Workers compensation	SLGF
Health	
Children's Medicaid (<21) and CHIP	Urban Institute estimates using data from RAND, MACPAC (Medicaid and CHIP Payment and Access Commission) and Rockefeller Institute of Government
Public health	SLGF
Residual health spending	SLGF
Housing and Community Development	
Housing and community development	SLGF

Table 2. Descriptive Statistics

	Full Sample		Less than HS		High School		Some College		College Degree	
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Proportion of low birth weight births	0.06	0.02	0.08	0.02	0.07	0.01	0.06	0.01	0.04	0.01
Proportion of preterm births	0.10	0.02	0.13	0.02	0.11	0.02	0.10	0.01	0.08	0.01
Total births	48236	41240	52030	51191	51495	42189	43272	35315	46696	36469
Average maternal age	27.60	2.85	24.28	1.51	25.86	0.80	27.92	0.69	31.55	0.72
Average paternal age	30.08	2.36	27.78	1.59	28.85	0.98	30.45	0.92	33.25	0.99
Proportion of births to married parents	0.62	0.22	0.37	0.08	0.49	0.09	0.64	0.09	0.92	0.03
Proportion of births to Black mothers	0.14	0.11	0.16	0.12	0.19	0.12	0.16	0.10	0.07	0.05
Proportion of births to AI/AN mothers	0.01	0.03	0.01	0.04	0.01	0.03	0.01	0.02	0.00	0.01
Proportion of births to Asian mothers	0.06	0.07	0.03	0.04	0.04	0.04	0.04	0.05	0.11	0.08
Proportion of births to Hispanic mothers	0.24	0.23	0.50	0.26	0.25	0.20	0.18	0.15	0.09	0.07
Proportion of births to White mothers	0.55	0.23	0.30	0.19	0.51	0.19	0.60	0.17	0.73	0.13
State-level variables										
*Total per-child spending	7.19	2.90								
*Per-child spending on cash income support	2.96	1.33								
*Per-child spending on tax credits	1.25	0.38								
*Per-child spending on health	2.33	0.87								
*Per-child spending on housing	0.50	0.30								
Unemployment rate	5.88	1.96								
Poverty rate	13.27	2.95								
Minimum wage	6.29	1.39								
Proportion of Black residents	0.12	0.08								
Proportion of Hispanic residents	0.16	0.13								
Proportion of residents with a college degree	0.28	0.05								
Proportion of states with a Democratic gov.	0.42	0.50								

*Spending reported in $1000s

Table 3. Regression of Low Birth Weight on Social Spending and Maternal Education: NVSS, 1998-2017

	Total		Cash		Tax Credits		Health		Housing	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Spending Type										
Total spending	-.0008***	-.0008***								
	(.0001)	(.0001)								
Cash			-.0015***b,c,d	-.0014***b,c,d						
			(.0002)	(.0002)						
Tax credits					.001a,d	.0019*a,c,d				
					(.001)	(.0011)				
Health							-.0004*a,d	-.0006**a,b,d		
							(.0003)	(.0003)		
Housing									-.0033***a,b,c	-.003***a,b,c
									(.0006)	(.0006)
Maternal Education										
Less than HS	*Reference*									
HS	-.0067***	-.0069***	-.0066***	-.0067***	-.0045***	-.0048***	-.0076***	-.0078***	-.0067***	-.0068***
	(.0008)	(.0008)	(.0006)	(.0006)	(.0009)	(.0009)	(.0008)	(.0008)	(.0005)	(.0005)
Some college	-.0128***	-.0131***	-.0124***	-.0126***	-.0071***	-.0075***	-.013***	-.0134***	-.0112***	-.0114***
	(.0011)	(.0011)	(.0009)	(.0009)	(.0012)	(.0012)	(.0011)	(.0011)	(.0008)	(.0008)
BA or higher	-.0155***	-.0159***	-.016***	-.0163***	-.0063***	-.0066***	-.0142***	-.0146***	-.0136***	-.0137***
	(.0015)	(.0014)	(.0012)	(.0012)	(.0016)	(.0016)	(.0015)	(.0015)	(.0012)	(.0012)
Interactions										
HS x spending	0	0	0b	0b	-.0016***a,c	-.0015***a,c	.0001b	.0002b	-.0002	-.0001
	(.0001)	(.0001)	(.0001)	(.0001)	(.0005)	(.0005)	(.0002)	(.0002)	(.0005)	(.0005)
Some college x spending	.0003***	.0004***	.0008***b	.0008***b	-.0021***a,c,d	-.002***a,c,d	.0007***b	.0007***b	.0018***b	.0018***b
	(.0001)	(.0001)	(.0001)	(.0001)	(.0005)	(.0005)	(.0002)	(.0002)	(.0006)	(.0006)
BA or higher x spending	.0005***	.0005***	.0016***b,c,d	.0016***b,c,d	-.0037***a,c,d	-.0038***a,c,d	.0001a,b,d	.0001a,b,d	.0035***a,b,c	.0035***a,b,c
	(.0001)	(.0001)	(.0002)	(.0002)	(.0005)	(.0005)	(.0002)	(.0002)	(.0005)	(.0005)
Main Controls										
Average maternal age	-.002***	-.0021***	-.0024***	-.0025***	-.0033***	-.0035***	-.0023***	-.0024***	-.0022***	-.0023***
	(.0004)	(.0004)	(.0003)	(.0003)	(.0004)	(.0004)	(.0004)	(.0004)	(.0003)	(.0003)
Average paternal age	.001***	.001***	.0013***	.0014***	.0016***	.0017***	.0011***	.0011***	.001***	.0011***
	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)	(.0003)
Proportion of births	-.0386***	-.0372***	-.0376***	-.0363***	-.03***	-.0281***	-.0336***	-.0322***	-.0366***	-.0355***

to married couples	(.0019)	(.0019)	(.0018)	(.0018)	(.002)	(.0021)	(.002)	(.002)	(.0018)	(.0018)
Total births	0***	0***	0***	0***	0	0*	0***	0***	0***	0***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Proportion of births to Black moms	.042***	.0423***	.0422***	.0423***	.0424***	.0426***	.0426***	.0427***	.0447***	.0449***
	(.0021)	(.0021)	(.0021)	(.0021)	(.0021)	(.0021)	(.0021)	(.0021)	(.0021)	(.0021)
Proportion of births to AI/AN moms	-.0353***	-.0348***	-.035***	-.0345***	-.0327***	-.0323***	-.0351***	-.0347***	-.0353***	-.0353***
	(.0043)	(.0043)	(.0042)	(.0042)	(.0043)	(.0043)	(.0043)	(.0043)	(.0043)	(.0043)
Proportion of births to Asian moms	.0284***	.0274***	.0243***	.0233***	.0286***	.0277***	.0306***	.0298***	.0291***	.0284***
	(.0027)	(.0027)	(.0026)	(.0026)	(.0026)	(.0026)	(.0027)	(.0027)	(.0026)	(.0027)
Proportion of births to Hispanic moms	-.0251***	-.0254***	-.0252***	-.0256***	-.0248***	-.0251***	-.0256***	-.0259***	-.0244***	-.0247***
	(.0012)	(.0012)	(.0012)	(.0012)	(.0012)	(.0012)	(.0012)	(.0012)	(.0012)	(.0012)
State-Level Controls										
Unemployment rate		-.0003***		-.0003***		-.0003***		-.0003***		-.0003***
		(.0001)		(.0001)		(.0001)		(.0001)		(.0001)
Poverty rate		.0001		.0001		.0001		.0001		.0001*
		(.0001)		(.0001)		(.0001)		(.0001)		(.0001)
Minimum wage		0		0		0		0		0
		(.0001)		(.0001)		(.0001)		(.0001)		(.0001)
Proportion of Black residents		-.0072		-.0038		-.0071		-.0069		-.0087
		(.0061)		(.0061)		(.0062)		(.0062)		(.0062)
Proportion of Hispanic residents		.0185***		.0207***		.0205***		.0199***		.0176***
		(.0044)		(.0044)		(.0044)		(.0045)		(.0044)
Proportion of residents with a college degree		-.01**		-.0101**		-.011***		-.0109***		-.0085**
		(.0041)		(.0041)		(.0041)		(.0042)		(.0042)
Constant	.1272***	.1317***	.1255***	.1294***	.1301***	.1341***	.1247***	.1298***	.1251***	.1299***
	(.0032)	(.0038)	(.0031)	(.0037)	(.0033)	(.0039)	(.0032)	(.0038)	(.0031)	(.0037)
Observations	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076
R-squared	.9627	.9631	.9635	.9639	.9625	.9629	.962	.9625	.9627	.9631

Notes: Standard errors are in parentheses. Coefficient testing compares main effects and interactions with maternal education for each spending type.

[a] Indicates that the coefficient differs significantly from that of cash spending ($p<0.05$)

[b] Indicates that the coefficient differs significantly from that of tax credit spending ($p<0.05$)

[c] Indicates that the coefficient differs significantly from that of health spending ($p<0.05$)

[d] Indicates that the coefficient differs significantly from that of housing spending ($p<0.05$)

*** p<.01, ** p<.05, * p<.1

Table 4. Regression of Preterm Birth on Social Spending and Maternal Education: NVSS, 1998-2017

	Total		Cash		Tax Credits		Health		Housing	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Spending Type										
Total spending	-.0017***	-.0016***								
	(.0002)	(.0002)								
Cash			-.0031***[b,c,d]	-.0031***[b,c,d]						
			(.0003)	(.0003)						
Tax credits					.0131***[a,c,d]	.0118***[a,c,d]				
					(.0015)	(.0016)				
Health							-.002***[a,b]	-.0019***[a,b]		
							(.0004)	(.0004)		
Housing									-.0004[a,b]	-.0008[a,b]
									(.0009)	(.0009)
Maternal Education										
Less than HS	*Reference*									
HS	-.0133***	-.0128***	-.0147***	-.0145***	-.008***	-.0073***	-.0132***	-.0127***	-.0135***	-.0132***
	(.0013)	(.0013)	(.001)	(.001)	(.0014)	(.0014)	(.0012)	(.0012)	(.0008)	(.0008)
Some college	-.0214***	-.0206***	-.0242***	-.0238***	-.0105***	-.0097***	-.02***	-.0193***	-.0212***	-.0208***
	(.0018)	(.0018)	(.0014)	(.0014)	(.0019)	(.0019)	(.0017)	(.0017)	(.0013)	(.0013)
BA or higher	-.0354***	-.0347***	-.0391***	-.0388***	-.0188***	-.018***	-.0317***	-.031***	-.0343***	-.0339***
	(.0023)	(.0023)	(.0019)	(.0019)	(.0025)	(.0024)	(.0023)	(.0023)	(.0018)	(.0018)
Interactions										
HS x spending	0	-.0001	.0003[b]	.0003[b]	-.0038***[a,c]	-.0041***[a,c,d]	-.0003[b]	-.0004[b]	-.001	-.0011[b]
	(.0001)	(.0001)	(.0002)	(.0002)	(.0008)	(.0008)	(.0003)	(.0003)	(.0008)	(.0008)
Some college x spending	.0001	.0001	.0011***[b,c]	.001***[b,c]	-.0063***[a,c,d]	-.0065***[a,c,d]	-.0003[a,b]	-.0004[a,b]	.0006[b]	.0005[b]
	(.0001)	(.0001)	(.0002)	(.0002)	(.0008)	(.0008)	(.0004)	(.0004)	(.0009)	(.0009)
BA or higher x spending	.0005***	.0005***	.0022***[b,c]	.0022***[b,c]	-.0076***[a,c,d]	-.0076***[a,c,d]	-.0004[a,b,d]	-.0004[a,b,d]	.0038***[b,c]	.0039***[b,c]
	(.0001)	(.0001)	(.0002)	(.0002)	(.0008)	(.0008)	(.0003)	(.0003)	(.0009)	(.0009)
Main Controls										

Average maternal age	.0019***	.002***	.0017***	.0019***	-.0003	-.0002	.0014**	.0016***	.002***	.0021***
	(.0006)	(.0006)	(.0005)	(.0005)	(.0006)	(.0006)	(.0006)	(.0006)	(.0005)	(.0005)
Average paternal age	-.0007	-.0008	-.0005	-.0006	.0003	.0002	-.0006	-.0006	-.0008	-.0009*
	(.0005)	(.0005)	(.0005)	(.0005)	(.0005)	(.0005)	(.0005)	(.0005)	(.0005)	(.0005)
Proportion of births to married couples	-.0421***	-.0442***	-.0398***	-.0415***	-.0285***	-.0309***	-.0375***	-.0394***	-.0402***	-.0418***
	(.003)	(.003)	(.0028)	(.0028)	(.0032)	(.0032)	(.0031)	(.0031)	(.0028)	(.0028)
Total births	0	0	0***	0***	0***	0***	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Proportion of births to Black moms	.0609***	.0605***	.0629***	.0623***	.0646***	.064***	.061***	.0608***	.0659***	.0654***
	(.0033)	(.0032)	(.0033)	(.0032)	(.0032)	(.0032)	(.0033)	(.0033)	(.0033)	(.0033)
Proportion of births to AI/AN moms	.0116*	.0108	.0133**	.0124*	.0186***	.018***	.0114*	.0108	.0129*	.012*
	(.0067)	(.0067)	(.0067)	(.0066)	(.0067)	(.0067)	(.0068)	(.0067)	(.0068)	(.0067)
Proportion of births to Asian moms	.0213***	.0236***	.016***	.0181***	.0209***	.0232***	.0247***	.0271***	.021***	.0235***
	(.0042)	(.0041)	(.0041)	(.0041)	(.0041)	(.0041)	(.0042)	(.0041)	(.0041)	(.0041)
Proportion of births to Hispanic moms	-.003	-.0022	-.0033*	-.0026	-.0009	-.0001	-.0034*	-.0024	-.0025	-.0016
	(.0019)	(.0019)	(.0019)	(.0019)	(.0019)	(.0019)	(.0019)	(.0019)	(.0019)	(.0019)
Unemployment rate		.0001		.0002		-.0001		-.0001		0
		(.0001)		(.0001)		(.0001)		(.0001)		(.0001)
Poverty rate		.0003***		.0003***		.0003***		.0003***		.0004***
		(.0001)		(.0001)		(.0001)		(.0001)		(.0001)
Minimum wage		-.0001		-.0002		-.0003*		-.0001		-.0002
		(.0002)		(.0002)		(.0002)		(.0002)		(.0002)
Proportion of Black residents		-.0063		.0025		.0012		-.0074		-.0012
		(.0096)		(.0095)		(.0096)		(.0096)		(.0097)
Proportion of Hispanic residents		-.0389***		-.0326***		-.0335***		-.0393***		-.0362***
		(.0069)		(.0068)		(.0069)		(.007)		(.007)
Proportion of residents with a college degree		.0088		.0086		.0052		.0042		.0065
		(.0064)		(.0064)		(.0064)		(.0065)		(.0065)
Constant	.1388***	.1331***	.134***	.126***	.1326***	.1292***	.1364***	.1326***	.1301***	.1236***
	(.005)	(.006)	(.0048)	(.0058)	(.0051)	(.006)	(.005)	(.006)	(.0049)	(.0058)
Observations	4076	4076	4076	4076	4076	4076	4076	4076	4076	4076
R-squared	.9532	.9539	.954	.9546	.9538	.9543	.9528	.9535	.9527	.9534

Notes: Standard errors are in parentheses. Coefficient testing compares main effects and interactions with maternal education for each spending type.

[a] Indicates that the coefficient differs significantly from that of cash spending ($p<0.05$)

[b] Indicates that the coefficient differs significantly from that of tax credit spending ($p<0.05$)

[c] Indicates that the coefficient differs significantly from that of health spending ($p<0.05$)

[d] Indicates that the coefficient differs significantly from that of housing spending ($p<0.05$)
*** p<.01, ** p<.05, * p<.1

Table 5: Mediation Analyses for Total Social Spending
Panel A: Predicted Relationship between Potential Mediators and Total Spending

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
Total Spending	0.002***	0.028***	0.081***	0.096***	-0.011***	-0.044**	-0.412***	-0.395**	-0.164***
	(0.000)	(0.007)	(0.008)	(0.016)	(0.002)	(0.014)	(0.058)	(0.135)	(0.032)
Maternal Educ - HS	0.015***	0.090*	0.571***	1.001***	-0.087***	0.021	-1.594***	0.243	1.074***
	(0.002)	(0.041)	(0.048)	(0.089)	(0.010)	(0.057)	(0.335)	(0.535)	(0.180)
Maternal Educ - Some College	0.021***	0.107	0.735***	1.143***	-0.155***	0.027	-1.430**	0.331	1.400***
	(0.002)	(0.058)	(0.067)	(0.124)	(0.014)	(0.083)	(0.466)	(0.776)	(0.250)
Maternal Educ - BA	0.026***	0.160*	0.900***	1.255***	-0.195***	0.030	-1.617**	0.347	2.439***
	(0.003)	(0.071)	(0.082)	(0.154)	(0.018)	(0.106)	(0.576)	(0.987)	(0.310)
Total Spending * HS	-0.001***	-0.006	-0.026***	-0.057***	0.004***	0.003	0.015	0.027	0.035
	(0.000)	(0.004)	(0.005)	(0.009)	(0.001)	(0.007)	(0.035)	(0.064)	(0.019)
Total Spending * Some Coll	-0.001***	-0.007	-0.031***	-0.048***	0.008***	0.004	-0.119**	0.032	0.122***
	(0.000)	(0.005)	(0.005)	(0.010)	(0.001)	(0.008)	(0.038)	(0.070)	(0.020)
Total Spending * BA	-0.001***	-0.010*	-0.046***	-0.079***	0.006***	0.007	-0.242***	0.059	0.160***
	(0.000)	(0.005)	(0.006)	(0.010)	(0.001)	(0.008)	(0.038)	(0.074)	(0.021)
N	4076	4076	3672	4076	4064	1835	3672	1836	4076

Standard errors are in parentheses. All models include time-varying state-level controls.
**** p<.001, ** p<.01, * p<.05*

Panel B: Mediation Analyses Predicting Proportion of Low Birth Weight Infants

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
% of Total Spending Effect Mediated									
<HS	2.17	3.71	7.62	15.90	-0.22	0.03	14.40	-0.01	0.50
HS	0.73	3.33	-2.71	4.64	-0.09	-0.16	4.26	-0.13	-0.22
Some College	0.79	2.61	-1.17	2.14	4.50	3.90	9.67	3.66	-0.93
BA	0.70	3.13	-4.46	1.01	-3.18	3.18	-0.97	3.29	5.01
Error Correlation Required for 0 Mediation									
<HS	-0.14	-0.07	-0.10	-0.26	-0.04	0.00	0.04	0.00	-0.02
HS	-0.05	-0.03	-0.04	-0.19	-0.01	0.00	0.02	0.00	-0.02
Some College	0.02	-0.08	-0.05	-0.21	-0.12	0.01	-0.07	0.01	-0.08
BA	-0.03	-0.02	-0.12	-0.15	-0.15	0.00	-0.10	0.00	0.03
% Residual Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	14.21	6.71	9.70	26.32	4.24	0.00	4.24	0.00	2.45
HS	5.39	3.00	3.61	18.73	1.41	0.00	1.73	0.00	2.00
Some College	2.00	8.19	5.39	21.24	11.92	1.00	6.63	1.00	8.06
BA	2.65	2.45	12.33	15.20	14.70	0.00	10.20	0.00	2.65
% Total Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	5.39	2.45	3.32	9.06	1.41	0.00	1.00	0.00	1.00
HS	1.73	1.00	1.00	5.29	0.00	0.00	0.00	0.00	1.00
Some College	1.00	2.65	1.00	6.78	3.74	0.00	2.24	0.00	3.61
BA	1.41	1.00	2.83	5.83	6.16	0.00	5.48	0.00	1.41

Estimates calculated using medeff and medsens packages in Stata (Hicks and Tingley 2011).

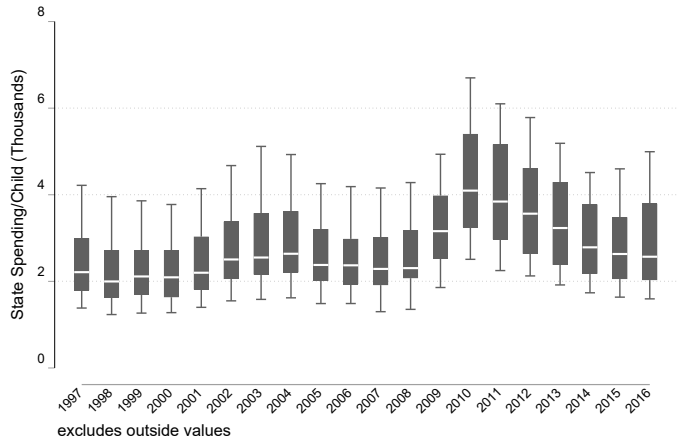
Panel C: Mediation Analyses Predicting Proportion of Preterm Infants

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
% of Total Spending Effect Mediated									
<HS	9.99	4.68	10.40	7.43	-0.91	0.88	13.10	0.39	0.55
HS	0.01	13.20	7.10	1.51	-0.26	4.12	14.10	4.07	0.13
Some College	-0.06	15.70	1.11	0.94	-7.48	5.32	6.87	5.08	0.08
BA	0.10	9.50	-2.87	0.75	-3.27	2.64	2.06	3.95	6.05
Error Correlation Required for 0 Mediation									
<HS	-0.11	-0.04	0.04	-0.14	-0.07	0.02	0.08	0.03	0.03
HS	-0.02	-0.06	0.01	-0.16	-0.04	0.02	-0.02	0.02	-0.07
Some College	0.11	-0.07	0.05	-0.17	-0.07	0.02	-0.01	0.02	0.01
BA	-0.07	-0.05	-0.05	-0.15	-0.15	0.01	-0.06	0.01	-0.04
% Residual Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	10.86	3.74	4.12	13.78	7.14	2.24	8.19	2.65	3.32
HS	2.45	5.74	1.00	16.06	4.00	2.24	1.73	2.45	6.56
Some College	10.54	7.21	4.90	17.32	6.78	2.45	1.41	2.45	1.41
BA	6.86	4.58	5.10	14.76	15.20	1.00	5.74	1.41	4.47
% Total Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	3.87	1.41	1.41	4.69	2.24	0.00	2.24	0.00	1.41
HS	1.00	2.00	0.00	5.00	1.41	0.00	0.00	0.00	3.16
Some College	3.61	2.24	1.00	5.29	2.00	0.00	0.00	0.00	0.00
BA	3.00	1.41	1.00	4.47	5.10	0.00	2.45	0.00	1.73

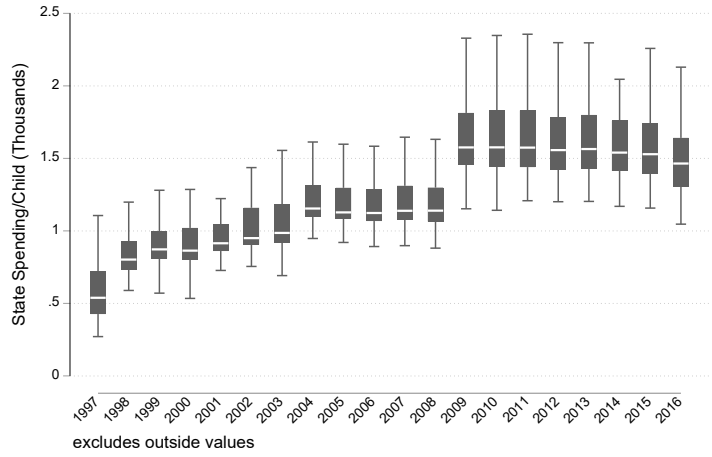
Estimates calculated using medeff and medsens packages in Stata (Hicks and Tingley 2011).

Figure 1: Box Plots of State Spending, 1998-2017

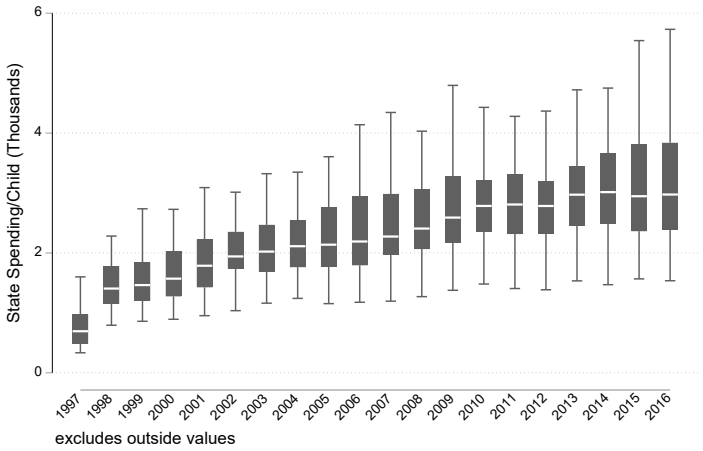
A: Cash Income Support



B: Tax Credit Income Support



C: Health



D: Housing

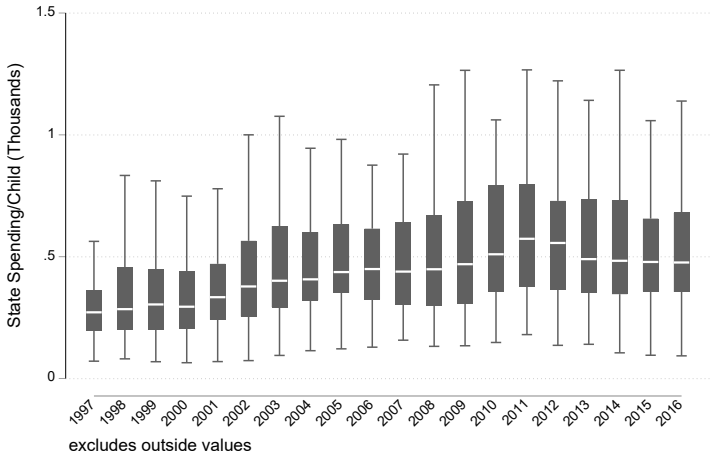
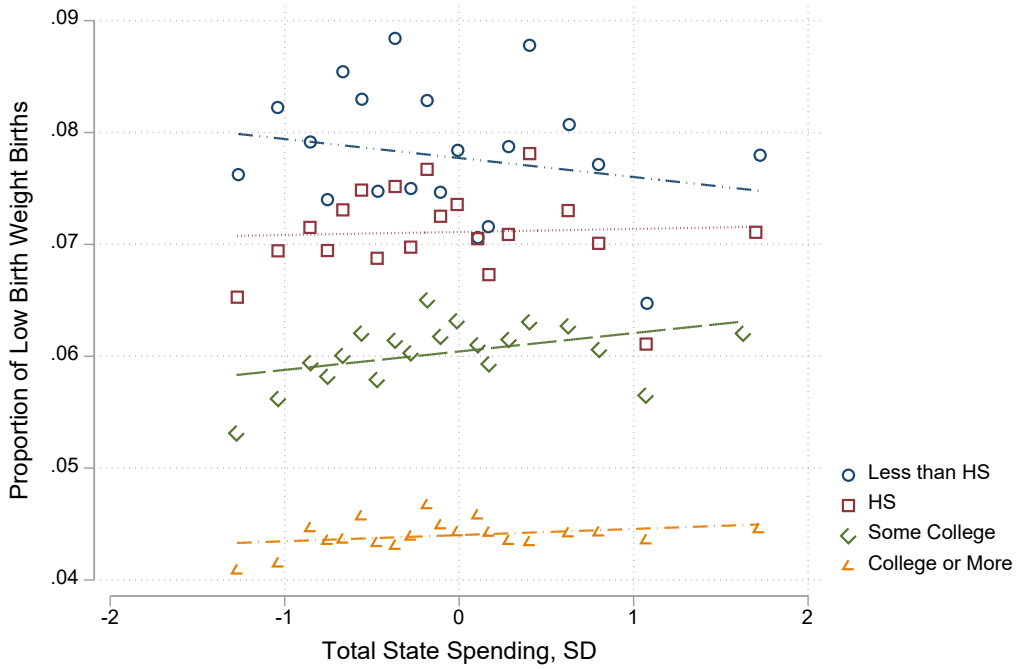


Figure 2: Binned Scatterplot of Proportion Low Birth Weight by Total State Spending: 1998-2017

A: Low Birth Weight



B: Preterm Birth

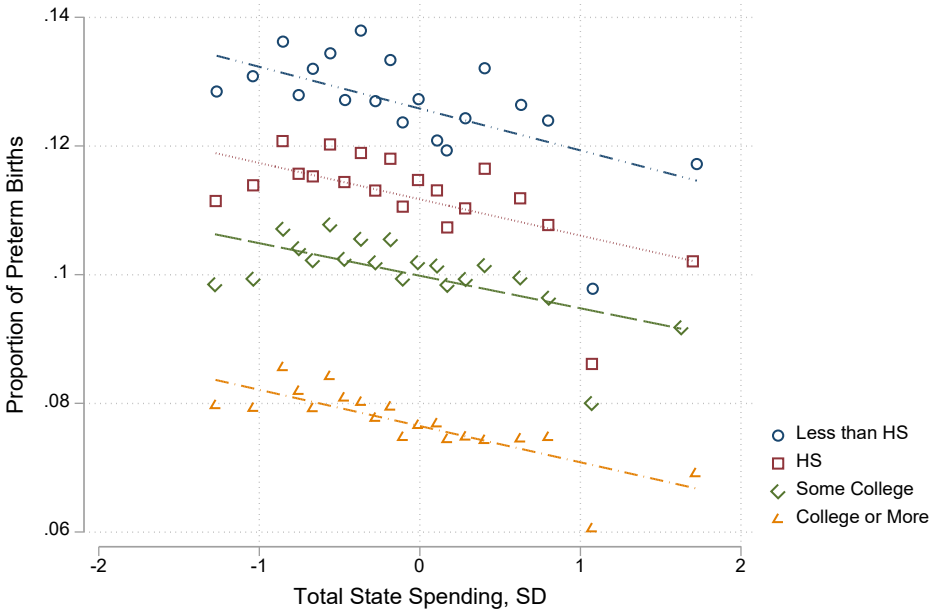
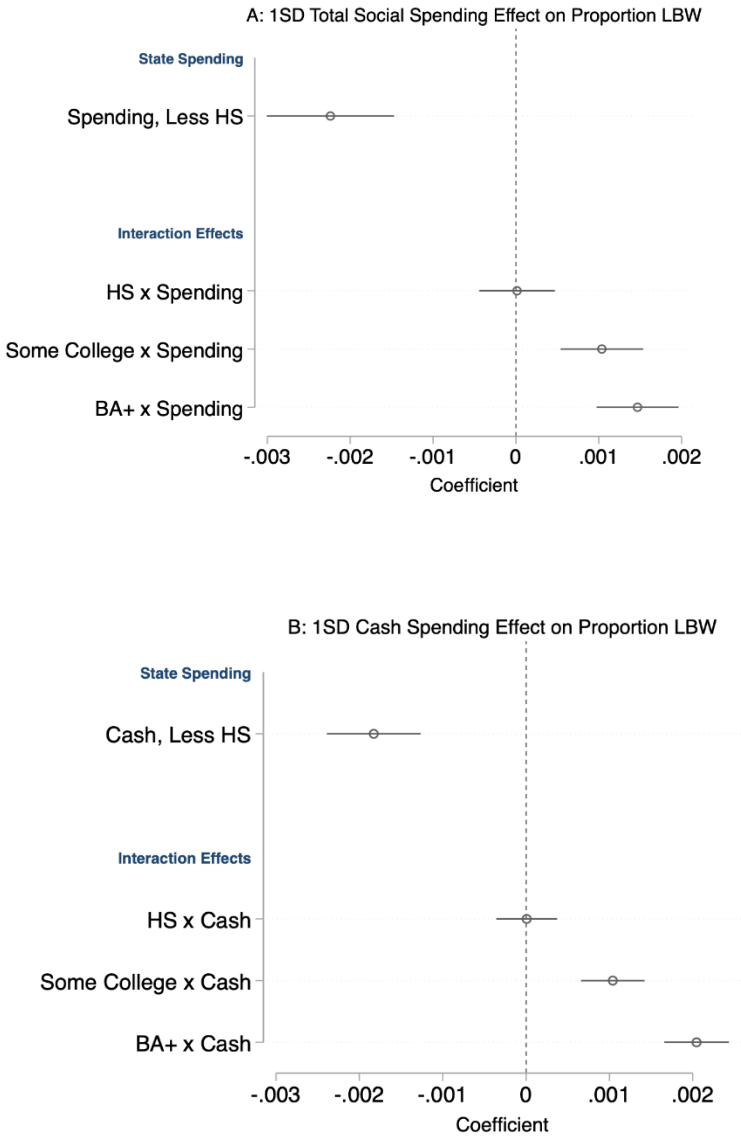
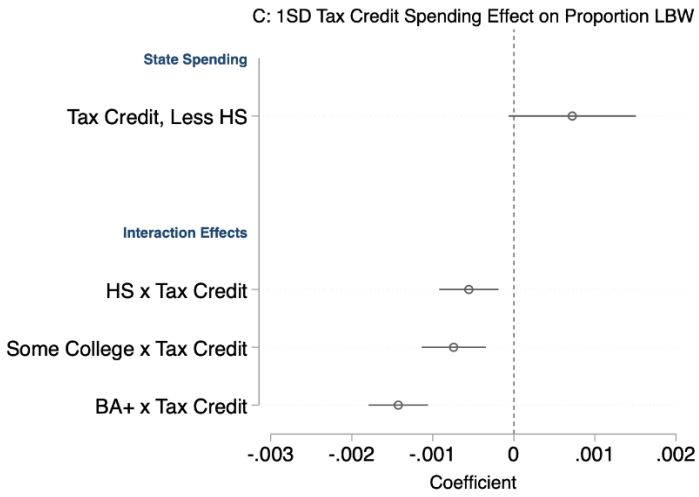
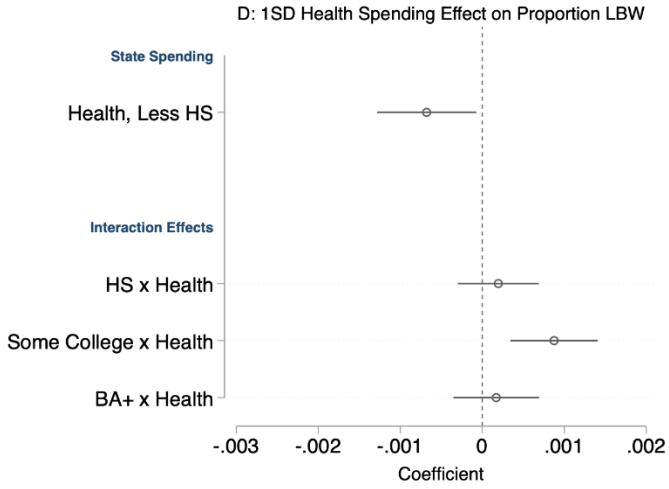


Figure 3: Estimates of Effect of 1 SD Increase in Social Spending on Low Birth Weight, 1998-2017 (Note: coefficients are from Model 2 in Table 3)




C: 1SD Tax Credit Spending Effect on Proportion LBW
State Spending
Tax Credit, Less HS
Interaction Effects
HS x Tax Credit
Some College x Tax Credit
BA+ x Tax Credit
-.003
-.002
-.001
0
.001
.002
Coefficient


D: 1SD Health Spending Effect on Proportion LBW
State Spending
Health, Less HS
Interaction Effects
HS x Health
Some College x Health
BA+ x Health
-.003
-.002
-.001
0
.001
.002
Coefficient

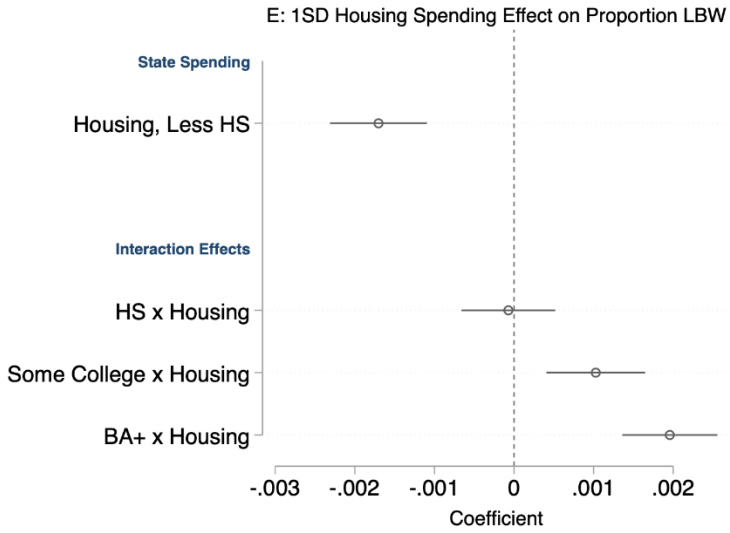
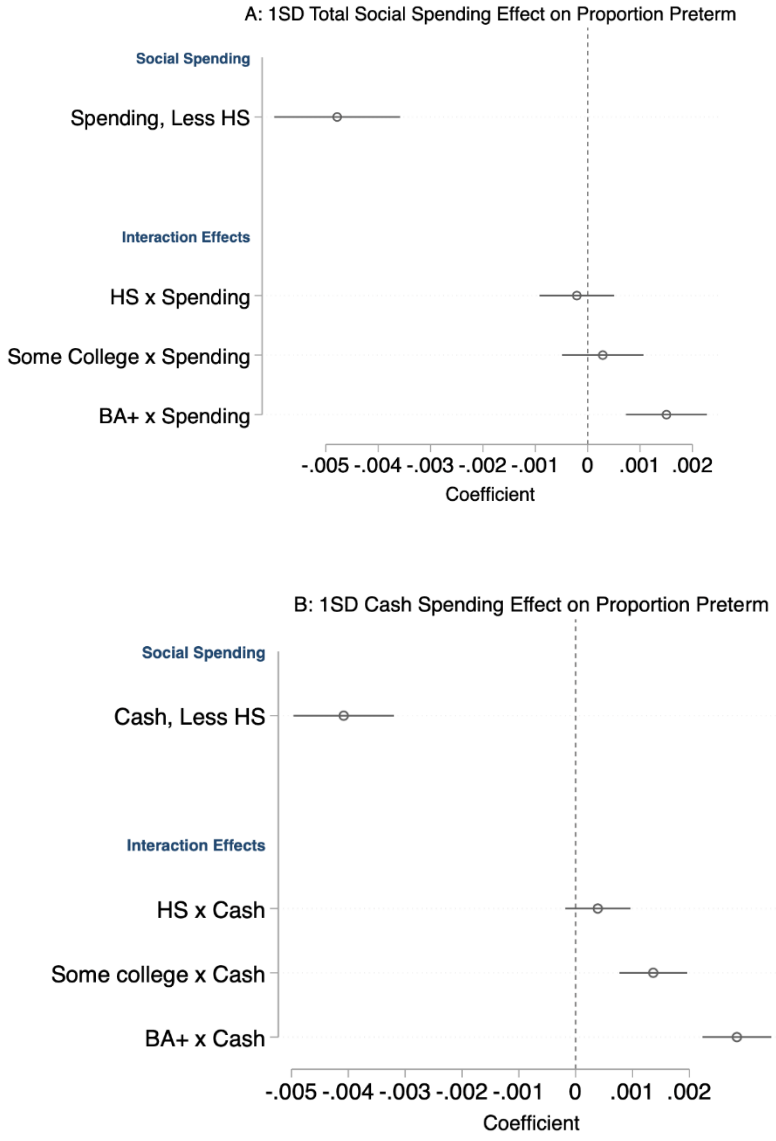
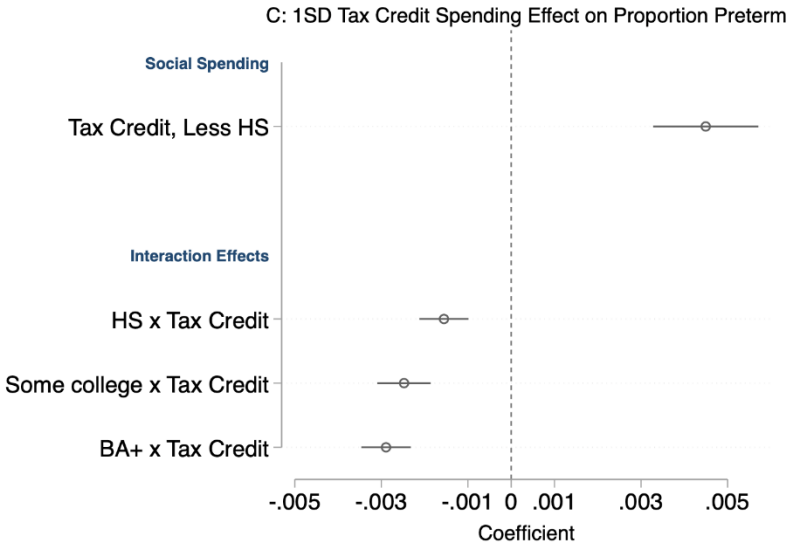
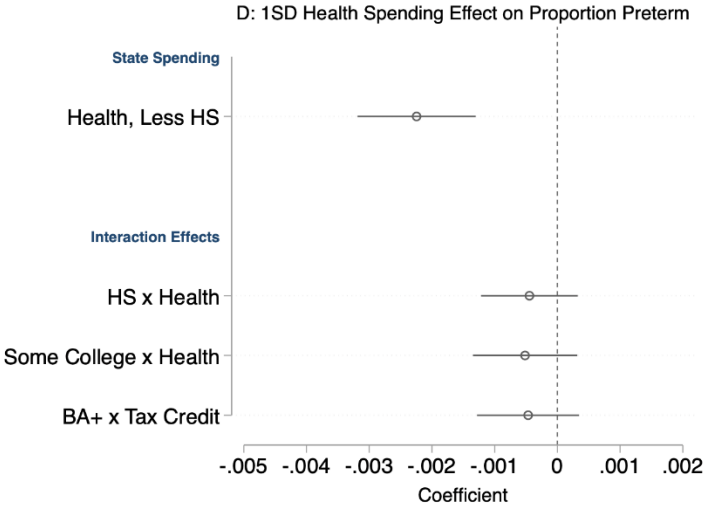

E: 1SD Housing Spending Effect on Proportion LBW
State Spending
Housing, Less HS
Interaction Effects
HS x Housing
Some College x Housing
BA+ x Housing
-.003
-.002
-.001
0
.001
.002
Coefficient

Figure 4: Estimates of Effect of 1 SD Increase in Social Spending on Preterm Birth, 1998-2017 (Note: coefficients are from Model 2 in Table 4)




C: 1SD Tax Credit Spending Effect on Proportion Preterm
Social Spending
Tax Credit, Less HS
Interaction Effects
HS x Tax Credit
Some college x Tax Credit
BA+ x Tax Credit
-.005
-.003
-.001
0
.001
.003
.005
Coefficient


D: 1SD Health Spending Effect on Proportion Preterm
State Spending
Health, Less HS
Interaction Effects
HS x Health
Some College x Health
BA+ x Tax Credit
-.005
-.004
-.003
-.002
-.001
0
.001
.002
Coefficient

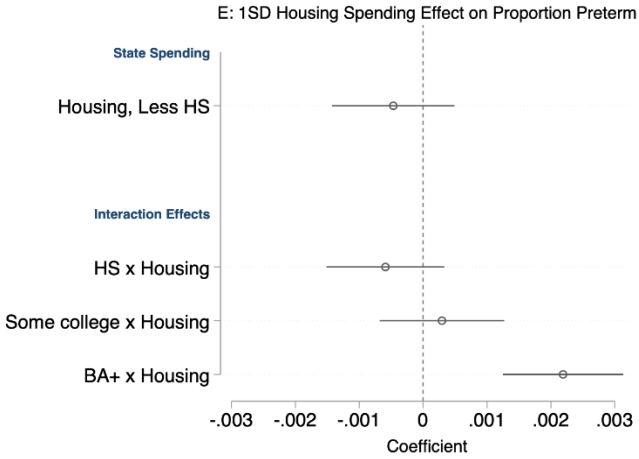
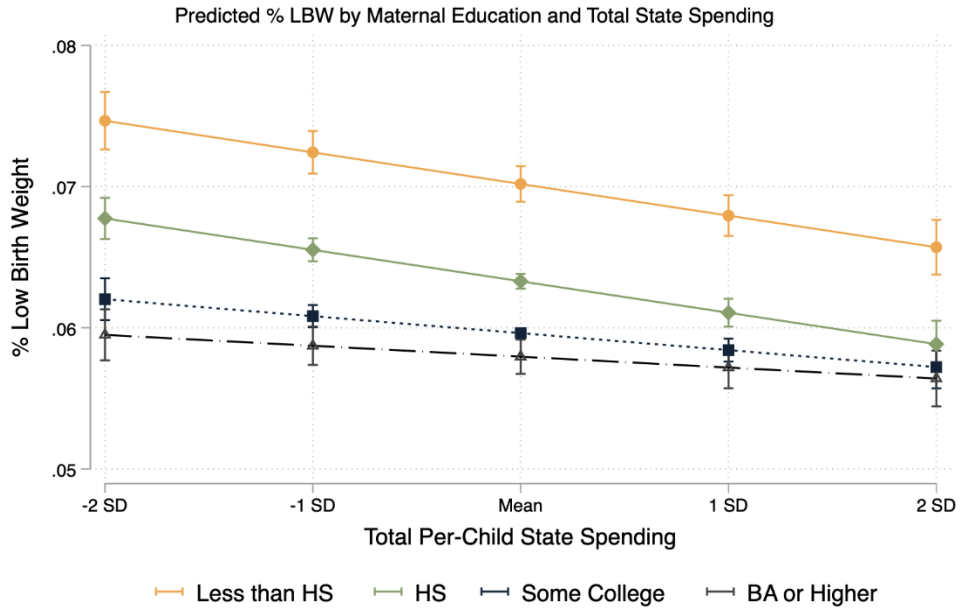
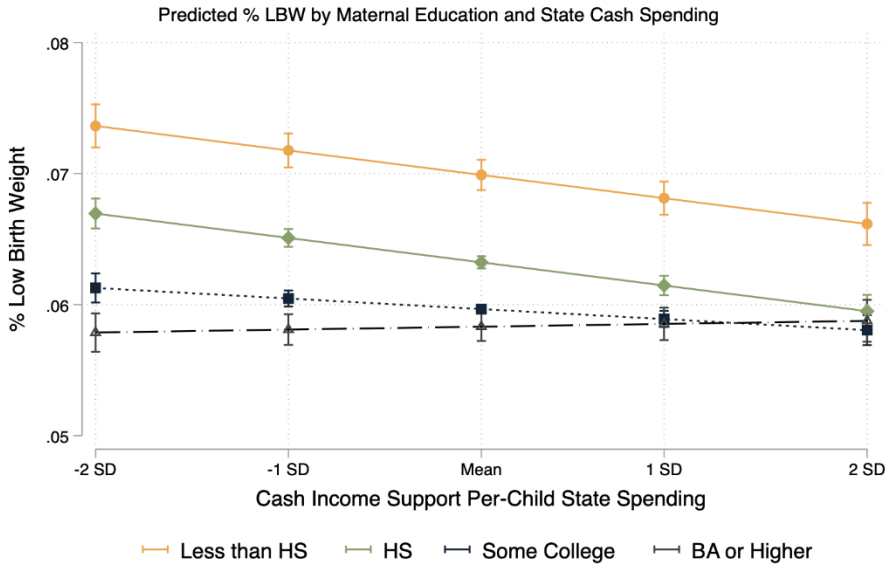

E: 1SD Housing Spending Effect on Proportion Preterm
State Spending
Housing, Less HS
Interaction Effects
HS x Housing
Some college x Housing
BA+ x Housing
-.003
-.002
-.001
0
.001
.002
.003
Coefficient

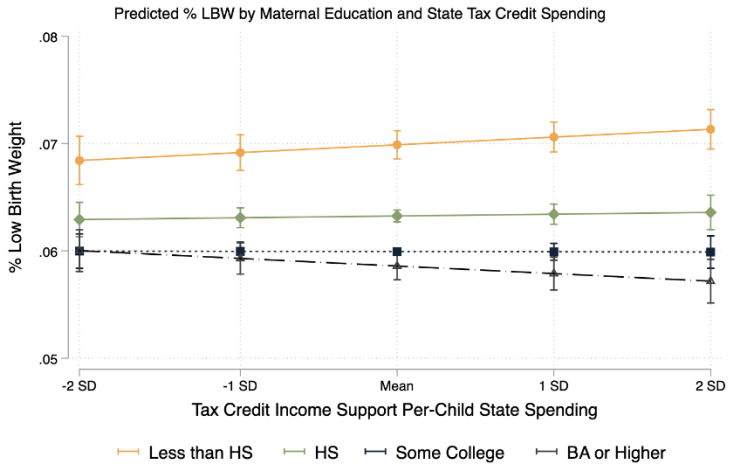
Figure 5: Predicted % Low Birth Weight by Social Spending and Maternal Education, 1998-2017

A: Total

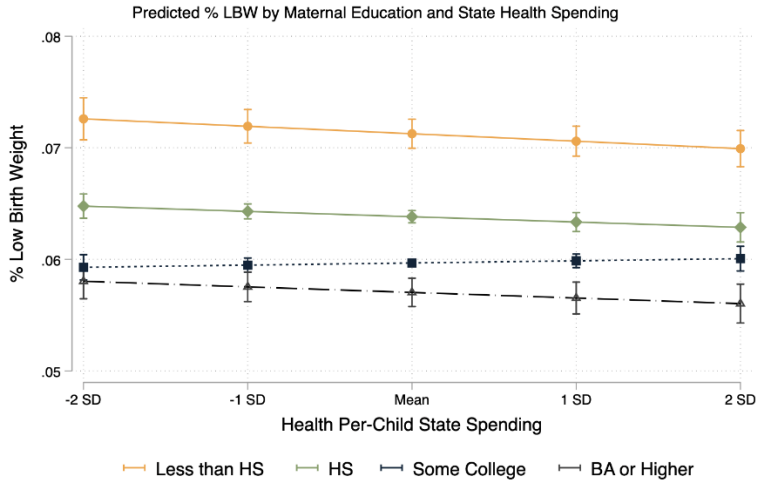




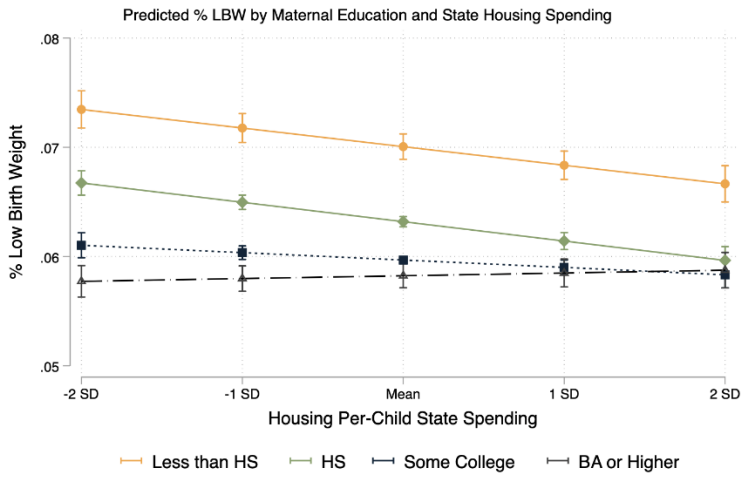
C: Tax Credits



C: Health



D: Housing



Appendix Tables

Table A1: State-Year Rates of Missing Information from NVSS Birth Data

Variable	Mean	Std. Dev.	Min	Max
% Missing Birth Weight	0.03	0.14	0.00	2.83
% Missing Low Birth Weight	0.03	0.14	0.00	2.83
% Missing Very Low Birth Weight	0.03	0.14	0.00	2.83
% Missing Gestational Length	0.11	0.60	0.00	10.39
% Missing Preterm Birth	0.11	0.60	0.00	10.39
% Missing Maternal Race	0.00	0.00	0.00	0.00
% Missing Maternal Education	8.24	24.63	0.03	99.90
N State-Years	1,020			

NVSS Birth data 1998-2017.

Table A2: Regression of Low Birth Weight/Preterm Birth on EITC/CTC Spending and Maternal Education: NVSS, 1998-2017

	EITC		CTC	
	Model 1	Model 2	Model 1	Model 2
	LBW	Preterm	LBW	Preterm
State Spending	-0.000244	0.0290***	0.00448**a	-0.00208a
	(0.00135)	(0.00207)	(0.00146)	(0.00227)
Less than HS	*Reference*			
HS	-0.00510***	-0.00701***	-0.00580***	-0.0134***
	(0.000814)	(0.00125)	(0.000732)	(0.00114)
Some College	-0.00787***	-0.00981***	-0.00881***	-0.0187***
	(0.00112)	(0.00172)	(0.00106)	(0.00166)
BA or Higher	-0.00792***	-0.0199***	-0.00867***	-0.0282***
	(0.00145)	(0.00222)	(0.00145)	(0.00226)
Interactions				
HS X Spending	-0.00185*	-0.00690***	-0.00243**	-0.00251
	(0.000766)	(0.00117)	(0.000876)	(0.00137)
Some College X Spending	-0.00257**	-0.0105***	-0.00334***	-0.00625***
	(0.000812)	(0.00124)	(0.000953)	(0.00149)
BA or higher X Spending	-0.00437***	-0.00992***	-0.00670***	-0.0113***
	(0.000765)	(0.00117)	(0.000929)	(0.00145)
Constant	0.129***	0.109***	0.131***	0.138***
	(0.00338)	(0.00518)	(0.00332)	(0.00519)
N	4076	4076	4076	4076

Notes: Standard errors in parentheses. Includes all controls listed in Tables 3 and 4.
a Indicates that the coefficient differs significantly from EITC spending.
***p<.01, **p<0.05, *p<.1

Table A3: Mediation Analyses for Income Support Spending
Panel A: Predicted Relationship between Potential Mediators and Income Support Spending

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
Total Spending	0.005***	-0.014	0.113***	0.239***	-0.010**	-0.141***	-0.424***	-1.292***	-0.111*
	(0.001)	(0.012)	(0.014)	(0.026)	(0.003)	(0.022)	(0.098)	(0.202)	(0.053)
Maternal Educ - HS	0.014***	0.080*	0.613***	0.995***	-0.059***	0.006	-1.544***	0.063	1.274***
	(0.001)	(0.032)	(0.037)	(0.069)	(0.008)	(0.047)	(0.263)	(0.440)	(0.141)
Maternal Educ - Some College	0.020***	0.086	0.783***	1.218***	-0.094***	0.009	-1.718***	0.132	2.038***
	(0.002)	(0.045)	(0.052)	(0.096)	(0.011)	(0.073)	(0.367)	(0.682)	(0.198)
Maternal Educ - BA	0.025***	0.129*	0.903***	1.261***	-0.121***	0.013	-2.146***	0.167	3.371***
	(0.003)	(0.061)	(0.069)	(0.129)	(0.015)	(0.100)	(0.491)	(0.933)	(0.266)
Total Spending * HS	-0.002***	-0.009	-0.073***	-0.135***	0.002	0.009	0.032	0.093	0.012
	(0.000)	(0.008)	(0.009)	(0.017)	(0.002)	(0.012)	(0.064)	(0.109)	(0.034)
Total Spending * Some Coll	-0.003***	-0.008	-0.085***	-0.143***	0.002	0.009	-0.162*	0.092	0.081*
	(0.000)	(0.008)	(0.010)	(0.017)	(0.002)	(0.013)	(0.067)	(0.120)	(0.036)
Total Spending * BA	-0.003***	-0.014	-0.107***	-0.204***	-0.003	0.014	-0.331***	0.129	0.063
	(0.000)	(0.008)	(0.010)	(0.018)	(0.002)	(0.013)	(0.069)	(0.126)	(0.037)
N	4076	4076	3672	4076	4064	1835	3672	1836	4076

Standard errors are in parentheses
**** p<.001, ** p<.01, * p<.05*

Panel B: Mediation Analyses Predicting Proportion of Low Birth Weight Infants

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
% of Income Support Spending Effect Mediated									
<HS	3.05	-3.82	-0.43	22.10	-0.70	3.10	19.20	2.88	0.65
HS	1.35	-0.56	-0.16	5.57	-1.25	-0.74	2.23	-0.65	0.57
Some College	2.24	-1.05	-0.68	5.45	4.74	6.76	5.58	6.41	-0.15
BA	-1.32	0.31	19.70	1.22	1.21	-5.55	2.86	-6.05	12.50
Error Correlation Required for 0 Mediation									
<HS	-0.14	-0.07	-0.10	-0.26	-0.04	0.00	0.04	0.00	-0.02
HS	-0.05	-0.04	-0.04	-0.19	-0.02	0.00	0.02	0.00	-0.02
Some College	0.02	-0.08	-0.05	-0.21	-0.12	0.01	-0.07	0.01	-0.08
BA	-0.02	-0.03	-0.12	-0.15	-0.15	0.00	-0.10	0.00	0.02
% Residual Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	14.14	7.07	10.00	26.46	4.47	0.00	4.47	0.00	3.16
HS	5.48	3.16	4.47	18.71	0.00	0.00	3.16	0.00	0.00
Some College	3.16	8.37	5.48	20.98	12.25	0.00	7.07	0.00	7.75
BA	3.16	3.16	12.25	14.83	14.83	0.00	10.00	0.00	3.16
% Total Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	5.48	3.16	3.16	8.94	0.00	0.00	0.00	0.00	0.00
HS	0.00	0.00	0.00	5.48	0.00	0.00	0.00	0.00	0.00
Some College	0.00	3.16	0.00	6.32	4.47	0.00	3.16	0.00	3.16
BA	0.00	0.00	3.16	5.48	6.32	0.00	5.48	0.00	0.00

Estimates calculated using medeff and medsens packages in Stata (Hicks and Tingley 2011).

Panel C: Mediation Analyses Predicting Proportion of Preterm Infants

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
% of Income Support Spending Effect Mediated									
<HS	9.26	-3.45	-0.40	6.71	-1.86	11.00	10.80	10.50	0.49
HS	-0.70	-2.37	0.95	1.93	-2.76	12.00	7.03	12.10	0.28
Some College	-2.06	-6.53	0.70	2.04	-8.27	6.79	3.82	6.57	0.33
BA	-3.15	-3.02	-9.63	-0.20	-1.77	5.64	4.04	8.96	-20.40
Error Correlation Required for 0 Mediation									
<HS	-0.11	-0.04	0.04	-0.14	-0.07	0.02	0.08	0.03	0.03
HS	-0.02	-0.06	0.00	-0.16	-0.04	0.02	-0.01	0.02	-0.06
Some College	0.11	-0.07	0.05	-0.17	-0.07	0.02	-0.01	0.02	0.02
BA	-0.07	-0.05	-0.05	-0.14	-0.15	0.01	-0.06	0.01	-0.05
% Residual Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	10.49	4.47	4.47	13.42	7.07	3.16	8.37	3.16	3.16
HS	3.16	6.32	0.00	16.12	4.47	0.00	0.00	3.16	6.32
Some College	10.49	7.75	4.47	17.32	7.07	3.16	0.00	3.16	0.00
BA	6.32	4.47	5.48	14.49	15.49	0.00	5.48	0.00	4.47
% Total Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	4.47	0.00	0.00	4.47	3.16	0.00	3.16	0.00	0.00
HS	0.00	0.00	0.00	4.47	0.00	0.00	0.00	0.00	3.16
Some College	3.16	3.16	0.00	5.48	0.00	0.00	0.00	0.00	0.00
BA	3.16	0.00	0.00	4.47	5.48	0.00	3.16	0.00	0.00

Estimates calculated using medeff and medsens packages in Stata (Hicks and Tingley 2011).

Table A4: Mediation Analyses for Health Spending
Panel A: Predicted Relationship between Potential Mediators and Health Spending

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
Total Spending	0.001	0.088***	0.112***	0.063*	-0.022***	0.021	-0.561***	0.209	-0.389***
	(0.001)	(0.014)	(0.016)	(0.030)	(0.003)	(0.025)	(0.109)	(0.235)	(0.059)
Maternal Educ - HS	0.013***	0.078*	0.404***	0.788***	-0.091***	0.049	-1.629***	0.544	1.207***
	(0.002)	(0.039)	(0.046)	(0.085)	(0.010)	(0.053)	(0.318)	(0.497)	(0.171)
Maternal Educ - Some College	0.018***	0.097	0.502***	0.877***	-0.161***	0.057	-1.699***	0.668	1.722***
	(0.002)	(0.056)	(0.065)	(0.121)	(0.014)	(0.079)	(0.451)	(0.739)	(0.242)
Maternal Educ - BA	0.023***	0.138	0.602***	0.876***	-0.211***	0.080	-2.082***	0.829	2.719***
	(0.003)	(0.072)	(0.084)	(0.156)	(0.018)	(0.104)	(0.582)	(0.970)	(0.312)
Total Spending * HS	-0.002***	-0.014	-0.018	-0.082***	0.014***	-0.002	0.041	-0.043	0.082
	(0.000)	(0.011)	(0.013)	(0.024)	(0.003)	(0.017)	(0.090)	(0.159)	(0.049)
Total Spending * Some Coll	-0.002***	-0.018	-0.020	-0.044	0.024***	0.000	-0.266**	-0.015	0.284***
	(0.001)	(0.012)	(0.014)	(0.026)	(0.003)	(0.019)	(0.097)	(0.173)	(0.052)
Total Spending * BA	-0.001	-0.023*	-0.054***	-0.090***	0.024***	0.000	-0.543***	0.011	0.445***
	(0.000)	(0.012)	(0.014)	(0.026)	(0.003)	(0.019)	(0.095)	(0.176)	(0.051)
N	4076	4076	3672	4076	4064	1835	3672	1836	4076

Standard errors are in parentheses
**** p<.001, ** p<.01, * p<.05*

Panel B: Mediation Analyses Predicting Proportion of Low Birth Weight Infants

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
% of Health Spending Effect Mediated									
<HS	1.41	15.30	15.40	11.50	0.26	-1.63	11.30	-1.55	0.47
HS	-2.91	11.50	-6.34	3.84	2.10	-0.03	12.90	-0.03	-3.30
Some College	-4.23	12.00	-1.36	0.89	0.82	0.98	13.40	0.92	-1.00
BA	0.40	-5.29	-0.28	-1.68	2.34	-1.42	-1.01	-2.07	-10.70
Error Correlation Required for 0 Mediation									
<HS	-0.15	-0.07	-0.10	-0.27	-0.04	0.00	0.04	0.00	-0.03
HS	-0.07	-0.03	-0.04	-0.19	-0.02	0.00	0.02	0.00	-0.02
Some College	0.02	-0.08	-0.06	-0.21	-0.12	0.01	-0.07	0.01	-0.08
BA	-0.02	-0.03	-0.12	-0.15	-0.15	0.00	-0.10	0.00	0.03
% Residual Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	14.49	6.32	9.49	26.46	4.47	0.00	4.47	0.00	3.16
HS	6.32	3.16	4.47	19.49	0.00	0.00	0.00	0.00	0.00
Some College	0.00	8.37	5.48	21.21	11.83	0.00	6.32	0.00	8.37
BA	3.16	3.16	12.25	15.17	14.49	0.00	10.00	0.00	3.16
% Total Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	5.48	3.16	3.16	8.94	0.00	0.00	0.00	0.00	0.00
HS	0.00	0.00	0.00	5.48	0.00	0.00	0.00	0.00	0.00
Some College	0.00	3.16	0.00	7.07	3.16	0.00	3.16	0.00	3.16
BA	0.00	0.00	3.16	5.48	6.32	0.00	5.48	0.00	0.00

Estimates calculated using medeff and medsens packages in Stata (Hicks and Tingley 2011).

Panel C: Mediation Analyses Predicting Proportion of Preterm Infants

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
% of Health Spending Effect Mediated									
<HS	5.30	25.00	34.90	8.12	0.70	15.80	16.30	15.40	0.83
HS	0.26	25.80	12.20	0.99	2.29	-0.30	20.40	-0.31	-0.54
Some College	2.04	30.30	1.07	0.41	0.13	2.05	5.57	1.95	-0.04
BA	3.43	14.50	0.21	0.81	-2.52	-2.26	-1.73	-4.63	10.80
Error Correlation Required for 0 Mediation									
<HS	-0.11	-0.04	0.04	-0.14	-0.07	0.02	0.09	0.03	0.03
HS	-0.03	-0.06	0.00	-0.17	-0.04	0.02	-0.02	0.03	-0.07
Some College	0.10	-0.07	0.05	-0.17	-0.07	0.03	-0.01	0.03	0.01
BA	-0.07	-0.05	-0.05	-0.15	-0.15	0.01	-0.06	0.02	-0.05
% Residual Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	11.40	3.16	4.47	13.78	7.07	3.16	8.37	3.16	3.16
HS	3.16	5.48	0.00	16.43	4.47	3.16	0.00	3.16	6.32
Some College	10.00	7.07	4.47	17.32	6.32	3.16	0.00	3.16	0.00
BA	6.32	4.47	5.48	14.49	15.17	0.00	5.48	0.00	4.47
% Total Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	4.47	0.00	0.00	4.47	3.16	0.00	3.16	0.00	0.00
HS	0.00	0.00	0.00	5.48	0.00	0.00	0.00	0.00	3.16
Some College	3.16	0.00	0.00	5.48	0.00	0.00	0.00	0.00	0.00
BA	3.16	0.00	0.00	4.47	5.48	0.00	3.16	0.00	0.00

Estimates calculated using medeff and medsens packages in Stata (Hicks and Tingley 2011).

Table A5: Mediation Analyses for Housing Spending
Panel A: Predicted Relationship between Potential Mediators and Housing Spending

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
Total Spending	0.010***	0.078**	0.244***	0.532***	-0.017*	-0.092	-0.387	-0.822	0.105
	(0.001)	(0.030)	(0.035)	(0.065)	(0.008)	(0.073)	(0.250)	(0.679)	(0.131)
Maternal Educ - HS	0.010***	0.066*	0.470***	0.788***	-0.059***	0.030	-1.580***	0.298	1.147***
	(0.001)	(0.026)	(0.030)	(0.056)	(0.007)	(0.042)	(0.214)	(0.396)	(0.113)
Maternal Educ - Some College	0.015***	0.081*	0.600***	0.948***	-0.105***	0.044	-2.264***	0.473	1.850***
	(0.002)	(0.039)	(0.045)	(0.084)	(0.010)	(0.068)	(0.321)	(0.638)	(0.170)
Maternal Educ - BA	0.019***	0.116*	0.676***	0.875***	-0.141***	0.055	-3.085***	0.553	3.217***
	(0.002)	(0.057)	(0.065)	(0.121)	(0.014)	(0.096)	(0.462)	(0.898)	(0.246)
Total Spending * HS	-0.007***	-0.030	-0.173***	-0.411***	0.011	0.044	0.219	0.422	0.245
	(0.001)	(0.029)	(0.034)	(0.062)	(0.007)	(0.054)	(0.242)	(0.509)	(0.126)
Total Spending * Some Coll	-0.007***	-0.047	-0.209***	-0.389***	0.032***	0.041	0.078	0.370	0.704***
	(0.001)	(0.030)	(0.036)	(0.065)	(0.008)	(0.060)	(0.255)	(0.560)	(0.133)
Total Spending * BA	-0.008***	-0.077*	-0.295***	-0.539***	0.025***	0.079	0.057	0.685	0.436***
	(0.001)	(0.030)	(0.035)	(0.064)	(0.008)	(0.062)	(0.251)	(0.583)	(0.131)
N	4076	4076	3672	4076	4064	1835	3672	1836	4076

Standard errors are in parentheses
*** *p<.001, ** p<.01, * p<.05*

Panel B: Mediation Analyses Predicting Proportion of Low Birth Weight Infants

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
% of Total Spending Effect Mediated									
<HS	3.89	2.07	10.70	15.00	0.48	-1.47	17.80	-1.45	1.31
HS	3.25	3.31	-1.20	6.17	1.58	-0.05	4.56	-0.07	3.80
Some College	3.44	1.09	-0.25	-1.71	3.28	2.20	12.20	1.87	0.96
BA	0.32	1.46	6.92	0.53	0.87	0.71	-0.41	1.78	11.90
Error Correlation Required for 0 Mediation									
<HS	-0.15	-0.07	-0.10	-0.27	-0.04	0.00	0.04	0.00	-0.03
HS	-0.06	-0.03	-0.05	-0.20	-0.02	0.00	0.02	0.00	-0.02
Some College	0.02	-0.08	-0.05	-0.21	-0.12	0.01	-0.07	0.01	-0.08
BA	-0.03	-0.03	-0.12	-0.15	-0.15	0.00	-0.10	0.00	0.03
% Residual Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	14.83	7.07	9.49	27.02	4.47	0.00	4.47	0.00	3.16
HS	6.32	3.16	4.47	19.75	0.00	0.00	3.16	0.00	0.00
Some College	0.00	8.37	5.48	21.21	12.25	0.00	6.32	0.00	8.37
BA	3.16	3.16	12.25	15.17	15.17	0.00	10.00	0.00	3.16
% Total Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	5.48	3.16	3.16	9.49	0.00	0.00	0.00	0.00	0.00
HS	0.00	0.00	0.00	5.48	0.00	0.00	0.00	0.00	0.00
Some College	0.00	3.16	0.00	7.07	4.47	0.00	3.16	0.00	3.16
BA	0.00	0.00	3.16	5.48	6.32	0.00	5.48	0.00	0.00

Estimates calculated using medeff and medsens packages in Stata (Hicks and Tingley 2011).

Panel C: Mediation Analyses Predicting Proportion of Preterm Infants

	Any Prenatal Care	1st Trimester Prenatal Care	Length of Prenatal Care	Prenatal Visits	Tobacco Use	Alcohol Use	Daily Cigarettes	Weekly Drinks	Weight Gain
% of Total Spending Effect Mediated									
<HS	18.20	3.73	19.00	11.10	0.52	-9.92	20.80	-9.98	1.74
HS	-0.21	20.70	7.12	4.33	5.00	-0.98	12.90	-1.24	1.92
Some College	2.00	-3.74	-0.34	0.28	3.32	5.11	-7.33	4.43	-1.40
BA	1.46	-12.70	-12.60	-0.87	-2.85	1.09	-1.91	4.12	-34.60
Error Correlation Required for 0 Mediation									
<HS	-0.12	-0.04	0.04	-0.15	-0.07	0.02	0.08	0.03	0.03
HS	-0.03	-0.06	0.00	-0.17	-0.04	0.02	-0.02	0.03	-0.06
Some College	0.10	-0.07	0.04	-0.17	-0.07	0.03	-0.01	0.03	0.01
BA	-0.08	-0.05	-0.05	-0.15	-0.16	0.01	-0.06	0.02	-0.04
% Residual Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	11.83	4.47	4.47	14.49	7.07	3.16	8.37	3.16	3.16
HS	3.16	6.32	0.00	16.73	4.47	3.16	0.00	3.16	6.32
Some College	10.00	7.07	4.47	17.32	7.07	3.16	0.00	3.16	0.00
BA	7.75	4.47	5.48	14.83	15.81	0.00	5.48	0.00	4.47
% Total Variance Omitted Confounder Must Explain for 0 Mediation									
<HS	4.47	0.00	0.00	4.47	3.16	0.00	3.16	0.00	0.00
HS	0.00	0.00	0.00	5.48	0.00	0.00	0.00	0.00	3.16
Some College	3.16	3.16	0.00	5.48	0.00	0.00	0.00	0.00	0.00
BA	3.16	0.00	0.00	4.47	5.48	0.00	3.16	0.00	0.00

Estimates calculated using medeff and medsens packages in Stata (Hicks and Tingley 2011).

Table A6. Regression of LBW and Preterm Birth on Other State Spending

	Low Birth Weight		**Preterm Birth**	
	Utilities	Natural Resources	Utilities	Natural Resources
State Spending Type				
Total Utilities	-0.005		-0.004	
	(0.004)		(0.004)	
Natural Resources		0.006		0.007
		(0.014)		(0.18)
Maternal Education				
Less than HS				
HS	-0.017***	-0.018***	-0.034***	-0.036***
	(0.002)	(0.002)	(0.003)	(0.002)
Some college	-0.033***	-0.031***	-0.065***	-0.065***
	(0.003)	(0.003)	(0.004)	(0.003)
College degree	-0.046***	-0.045***	-0.108***	-0.11***
	(0.004)	(0.005)	(0.006)	(0.006)
Interactions				
High school x spending	-0.0014	-.034	0.0016	-.028
	(0.002)	(0.03)	(0.002)	(0032)
Some college x spending	0.0037	-.033	0.0027	-0.041
	(0.003)	(0.03)	(0.002)	(0.03)
College degree x spending	-0.0019	-0.056	-0.007	-0.043
	(0.002)	(0.02)	(0.004)	(0.03)

Standard errors are in parentheses
**** p<.001, ** p<.01, * p<.05*
Note: State Spending data from Census SLGF. Models control for all variables in Table 3.