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EFFECTS OF THE MINIMUM WAGE ON CHILD HEALTH

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ABSTRACT

Effects of the minimum wage on labor market outcomes have been extensively debated and analyzed. Less studied, however, are other consequences of the minimum wage that stem from changes in a household's income and labor supply. We examine the effects of the minimum wage on child health. We employ data from the National Survey of Children's Health in conjunction with a difference-in-differences research design. We estimate effects of changes in minimum wage throughout childhood. We find evidence that an increase in the minimum wage throughout childhood is associated with a large improvement in child health. A particularly interesting finding is that much of the benefits of a higher minimum wage are associated with the period between birth and aged 5.

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1. Introduction

The effects of the minimum wage on employment, wages, and income in the United States have been extensively investigated. While effects on employment have often taken center stage in the debate over the efficacy of the minimum wage, it is widely acknowledged that an increase in the minimum wage will substantially increase wages for many low-income workers (Belman, Wolfson, & Nawakitphaitoon, 2015). A recent analysis by the Congressional Budget Office (CBO) concluded that raising the federal minimum wage to $12 from its current level of $7.25 would decrease employment by about 0.3 million workers (0.2 percent) while raising wages for as many as 11 million workers and, on net, move 400,000 people out of poverty.[1] Raising the minimum wage to $15 would raise wages for 27 million workers, but also reduce employment by 1.3 million workers (0.8 percent).

By affecting a household's income and labor supply, changes in the minimum wage may have far-reaching consequences. One of the most important potential consequences is the effect of the minimum wage on child development. There is a well-documented income gradient in health, education and socio-emotional development of children (Case, Lee, & Paxson, 2008; Duncan, Magnuson, & Votruba-Drzal, 2014; Duncan, Ziol‐Guest, & Kalil, 2011; Fletcher & Wolfe, 2014). Thus, raising the minimum wage and, in turn, the wages of low-skilled workers may plausibly affect child development particularly in low-income

[1] The "new" minimum wage literature, comprising studies over the past two decades since Card and Krueger (1995), has mostly found small to no effects of moderate increases in the minimum wage on employment (though see Neumark and Wascher (2007) and Neumark (2019) for a critique of some of the methods underlying these conclusions). Belman and Wolfson (2014) provide a survey of this literature and a meta-analysis, with the median and modal employment elasticity ranging between 0 and -0.1. However, there may be larger dis-employment effects for certain groups and the potential for large increases in the minimum wage, or increases beyond some threshold, to lead to larger dis-employment effects (Gorry & Jackson, 2017).

households because it is parents in these families that are most likely to benefit from an increase in the minimum wage and the potential increase in income.

Some evidence of the potential for the minimum wage to affect child development comes from research on the effects of the minimum wage on birth weight. Results from studies by Komro, Livingston, Markowitz, and Wagenaar (2016) and Wehby, Dave, and Kaestner (2019) indicate that increases in the minimum wage had beneficial, although modest, effects on birth weight. Whether the beneficial effects of a higher minimum wage extend to post-birth, child health and development is unknown, however, as no prior research has investigated this question. In this study, we provide the first analysis of how minimum wage changes affect children's health using nationally representative data and quasi-experimental methods. An important contribution of our study is that we assess whether the effects of minimum wage changes differ by when such changes occur during the child's life. In other words, we investigate if there are certain periods of child development that are more or less sensitive to changes in household circumstances (e.g., income) associated with changes in minimum wages (Cunha & Heckman, 2007).

Our analysis uses data from three waves of the National Survey of Children's Health in conjunction with a continuous treatment difference-in-differences research design that compares the health of children in the same state "exposed" to different minimum wages over different periods of childhood. Results indicate that a higher minimum wage in childhood leads to significant improvements in general health. A $1 increase in the minimum wage over the child's life is associated with approximately a 10% increase in the probability that the child is in excellent health and a 25% to 40% decrease in missed school days due to illness or injury from an increase in minimum wage at different periods.

Notably, a larger share of the effect of the minimum wage is from changes in the minimum wage during the first five years of life, which suggest that resources during this period are particularly important to children's health and development.

2. Related Literature

2.a. Effects of the Minimum Wage on Employment and Earnings

There is a large literature examining the effects of the minimum wage on employment and earnings. We will not review that literature here, as there are many good reviews (Belman & Wolfson, 2014; Congressional Budget Office, 2014, 2019; Neumark, 2019). While debate on the issue continues, conclusions from almost all reviews of the evidence coalesce around a consensus that, on average, there seem to be small effects of the minimum wage on employment, and somewhat larger effects on those most likely to be affected. In contrast to the mixed evidence on the employment effects of the minimum wage, there is consistent evidence that a higher minimum wage raises wages (Aaronson, Agarwal, & French, 2012; Belman et al., 2015; David, Manning, & Smith, 2016; Dube, 2018). As previously noted, a recent Congressional Budget Office (2019) analysis concluded that an increase in the minimum wage to $12 would increase wages for as many as 11 million workers.

Overall, the evidence on the labor market effects of the minimum wage, at least over the range of increases occurring in the last 20 to 30 years, indicates that a higher minimum wage will raise wages and income among many low-skilled persons, though some of these gains may be partly offset by modest dis-employment effects.[2] The important implication of this literature for child development is that an increase in the minimum wage and, in turn,

[2] Schmitt (2013) provides a good discussion of other adjustment mechanisms that may absorb the effects of a higher minimum wage, thereby relieving the pressure on the employment margin. There also may be changes in the intensive margin of hours of work.

family income may have improved child health and development because of the well-documented income gradient in child developmental outcomes.

2.b. Previous Evidence of the Effects of the Minimum Wage on Child Health

Studies examining the relationship between the minimum wage and health are sparse, and the few studies that have been conducted have largely focused on the health of adults and workers. Here, we focus on studies related to children. Two recent studies explore how the minimum wage impacts infant health. Both Komro et al. (2016) and Wehby et al. (2019) find evidence that a higher minimum wage is associated with small increases in birth weight. And Wehby et al. (2019) show that the increase in birth weight is driven by an improvement in the fetal growth rate and gestational age, consistent with improved nutrition and maternal behaviors during pregnancy.

Averett, Smith, and Wang (2017) examine the effects of the minimum wage on working teenagers using the Current Population Surveys from 1996 to 2014. Analyses are stratified by race/ethnicity and gender. The authors report that the minimum wage is positively associated with self-reported health among white women and negatively related to self-rated health for Hispanic men. For other racial/ethnic and gender groups the minimum wage was not significantly associated with health.[3]

There have also been a few studies of the effect of the Earned Income Tax Credit (EITC), which, like the minimum wage also affects income and labor supply of low-income families. Results from these studies find positive effects of the EITC on infant health (Hoynes, Miller, & Simon, 2015) and children's educational attainment (Dahl & Lochner, 2012; Maxfield,

[3] The disparate set of findings in this study are difficult to reconcile with a behavioral model because almost all groups experienced an increase in earnings. To generate both negative and positive effects, minimum wage related increase in earnings must have had very different effects on behavior.

2013).[4] Greater EITC income during childhood has also been associated with improved general health reporting and reduction in obesity among young adults (Braga, Blavin, & Gangopadhyaya, 2019).

2.c. Contributions

The literature on the effects of the minimum wage on non-economic domains is still emerging, and the relatively little research that has assessed effects on health mostly pertains to adult populations. No study has examined how minimum wage changes impact child health. This is an important research question because of the known disadvantages in terms of health, education and socio-emotional development of children in low-income families who are most likely to gain from an increase in minimum wages. If the minimum wage has significant, positive effects on child health, then it would be an important, and currently unrecognized, benefit of a higher minimum wage and important evidence in support of such as a policy. We provide the first analysis of how minimum wage changes during childhood impact health outcomes for children.

3. Mechanisms Linking Minimum Wage to Child Development

As noted, there is substantial evidence that an increase in the minimum wage increases wages of low-skilled employed persons and has a small effect on employment (extensive margin). It is also apparent from prior evidence that the minimum wage increased income and had relatively little effect on the intensive margin of hours of work.[5]

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[4] See Dench and Joyce (2019) for countervailing evidence.

[5] Studies of the effect of minimum wage on hours of work (intensive margin) include: Stewart and Swaffield (2008); Metcalf (2008); Couch and Wittenburg (2001); Neumark and Wascher (2007); Neumark and Wascher (2008); Belman, Wolfson, and Nawakitphaitoon (2015); Neumark, Schweitzer, and Wascher (2004); Zavodny (2000); Skedinger (2015); Dolton, Bondibene, and Wadsworth (2010).

Thus, the primary effect of an increase in the minimum wage is to raise income, although there may be some changes in time allocation (e.g., employment and hours of work).

Greater family income can affect child development through multiple channels. The most direct pathway is the increase in consumption of goods and services, such as better nutrition and more use of health care that are beneficial to the child.[6] More income can also affect residential and employment stability because of a greater ability to smooth consumption through both savings and access to credit. Finally, greater earnings is likely to reduce financial stress, which may lead to improved mental health of all family members and reduce unhealthy behaviors that are caused by stress, for example, tobacco and alcohol use.

A second issue we want to highlight is the possibility that there may be periods in the child's life during which the (income) effects of the minimum wage are particularly important (Cunha and Heckman, 2007). To do so, we use a human capital model of child development and focus on the child development production function central to this model (Grossman, 1972; Todd & Wolpin, 2003). The production function relates child outcomes to the cumulative investments in child development. The production function embeds the effects of the minimum wage policy because one likely consequence of a higher minimum wage is greater income, which will increase investments in child development. The production function measures the effects of these investments.

One version of a child development (health, H) production function is the following, which we present for a child age seven, but that can be adapted to any age:

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[6] Alternatively, an increase in income may increase unhealthy consumption, but this would be primarily among adults (e.g. smoking, alcohol) and its link to child development would be second order.

$$(1)\ H_7 = H(1-\delta_0)\ldots(1-\delta_6) + \alpha_0 I_0(1-\delta_1)\ldots(1-\delta_6)+\ldots+\alpha_{(6)} I_6$$

In equation (1), the health of a child age seven (H_7) depends on her initial health (H) and all investments (*I)* in health from birth (age 0) to age seven. The productivity (effects) of investments are measured by the coefficients α_i. The depreciation of child's health is noted by δ_i . Depreciation is time-varying and, for children, may be quite small. Note that the productivity of investments will differ by age and this reflects the possibility that child development, in this case health, may be particularly affected by investments at certain ages. Consider the prenatal period. Investment in medical care and maternal nutrition may be particularly important because of the dramatic biological changes that occur during the 9-month prenatal period. Similarly, well-child visits during the first three years of life, which is a period of very rapid and continuous physical and neurodevelopmental growth, may be particularly important in identifying and remedying risks to child health and promoting development than later visits. We also note that, while we indicate only one type of investment (I) in equation (1), in reality there are many, such as nutrition, medical care, and exercise.

The minimum wage raises wages and income, and this increase in income is likely to increase investment (below, we show that MW is the only determinant of investment for simplicity; *I(MW)*).[7] If so, then the effect of the minimum wage on child development at age seven is given by:

$$(2)\ H_7 = H(1-\delta_0)\ldots(1-\delta_6) + \alpha_0 I_0(MW_0)(1-\delta_1)\ldots(1-\delta_6)+\ldots+\alpha_{(6)} I_6(MW_6)$$

$$(3)\ \frac{\partial H_7}{\partial MW} = \frac{\partial H}{\partial MW_{-1}}(1-\delta_0)\ldots(1-\delta_6) + \alpha_0\frac{\partial I_0}{\partial MW_0}(1-\delta_1)\ldots(1-\delta_6)+\ldots+\alpha_{(6)}\frac{\partial I_6}{\partial MW_6}$$

[7] There may be a decrease in time allocated to child development if the minimum wage causes some people to work more hours, but evidence (see footnote 5) suggests that this is unlikely to be significant.

As indicated in equation (3), minimum wages throughout the child's life (including prenatal period here indicated by age subscript -1 may affect health at a particular age, in this case age seven. It is also the case that a change in the minimum wage at different stages of a child's life may have different effects and not just because of the greater or less depreciation of the investments at that age, but because of differences in the productivity of investments at different ages ($\alpha_i \neq \alpha_j$). Finally, the minimum wage may have different effects at different stages of a child's life because it may have a different effect on the quantity of investments at different stages of life ($\frac{\partial I_t}{\partial MW_t} \neq \frac{\partial I_{(t-1)}}{\partial MW_{(t-1)}}$). For example, parents may focus more on nutritional investments during pregnancy and earlier in the child's life, but more on educational or physical activity investments later in childhood.

The last point merits elaboration. Equation (1) is a production function and not a behavioral model—it is best viewed as an accounting relationship. However, it embeds the choices of a behavioral model as manifested by the quantity of investment at each age. Like any economic model, the quantity of investment at each age will depend on the costs and benefits of the investment. The benefit of investment at any age will depend on the productivity of those investments (α_i) and the value (utility) of improved child health and development. This reasoning suggests that an increase in the minimum wage at ages when the productivity of investment is relatively high will result in a greater change in investment ($\frac{\partial I_t}{\partial MW_t}$) than when the productivity of investment is relatively lower. This complementarity between the quantity and productivity of investment underscores why there may be particular times in the child's life when the minimum wage will have particularly large effects. Holding constant the productivity of current investment, investment will also be higher when the value of additions to child health and development are relatively larger. The value of greater child health and development may differ because of differences in the level of health (i.e., diminishing marginal utility of child health), for example, because of a higher initial health or because of prior investments.

There are two insights for an empirical analysis of this discussion of the child development process (production function). The first is that analyses of the effect of the minimum wage on child health and development need to be concerned with the timing of minimum wage changes throughout the child's life. The minimum wage may not have the same effect at all ages. Second, the minimum wage may also have different effects on the quantity of investment at different ages, and because past investments affect the level of current investments through the stock of health, past minimum wages may affect current investments.[8] We return to these issues in the empirical methods section below.

3. Methods

3.a. Data

We employ data from the 2003, 2007, and 2011/12 waves of the National Survey of Child's Health (NSCH). The NSCH is in some ways well suited to study the effect of the minimum wage on child health. The NSCH has a relatively large sample size, includes detailed information on the family, and spans a sample period during which many state-level changes in the minimum wage occurred.

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[8] One possibility is that a higher minimum wage in one period that leads to a higher health stock at later ages may cause parents to invest less at older ages (for example due to diminishing marginal utility of health). Alternatively, a higher minimum wage in one period that leads to a higher health stock at later ages may cause parents to invest more at older ages if a higher prior health stock raises the returns to current investments (complementarity).

The NSCH is a nationally representative, cross-sectional telephone survey of children aged 0-17 years in the U.S. For each wave, a sample was selected by a random-digit-dial (RDD) of landline telephone numbers and cell phone numbers, from the 50 states and D.C. The NSCH sampled an equal number of children from each state for each wave. This ensures adequate state-specific sample sizes even for the smaller states. Weights reflecting the probability of selection and response are provided. The NSCH collected extensive information on children's health and development through parental or caregiver interviews.[9]

In order to focus on children most likely affected by the minimum wage, we select a sample of children in low-educated families. A family is defined as low-educated when the highest level of education attained by anyone in the household is high school or less. We limit the sample to children aged 6 to 17 years. We do so for two reasons. First, one of the outcomes we examine, missed school days due to illness/injury, is only measured for children age 6 and older. Second, there is a trend of health "worsening" by age until about age 6, which clearly does not reflect biological declines, but almost surely parents becoming more aware of children's health and development problems during early childhood (see Appendix Figure 1). [10]

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[9] The survey was initially conducted by the National Center for Health Statistics. Beginning in 2016, the NSCH became an annual survey conducted by the Census Bureau using a different sampling approach and weighting. The Census Bureau recommends against combining the earlier waves of the NSCH with the 2016 and later waves (U.S. Census Bureau, 2017). For this reason, we do not include the more recent data, currently available for 2016 and 2017.

[10] The objective is to measure child health and how the minimum wage affects health. The growth in the prevalence of illness in early childhood likely stems from the increasing probability of diagnosis with age. The minimum wage may affect this probability and therefore, the effects of the minimum wage would be measuring the effect on the probability of diagnosis and on health directly. We are interested in the latter effect. This issue is less likely at older ages but may persist somewhat.

We estimate effects separately for children aged 6-12, which is considered developmentally as the middle childhood phase (US Department of Health Human Services, 2010), and for adolescent children (aged 13-17). This is consistent with the theoretical production function approach we use and the conceptual model that effects of investments are age-specific. Sample sizes prevent more detailed stratification by age. We also limit the sample to children whose survey respondent was a parent (not another caregiver) to reduce measurement error (parents were respondents for 90% of surveyed children). In addition, we exclude children who are home-schooled since parents may learn about their children's health from school health assessments and teacher observation (1.8% of children are homeschooled). Combining the three waves of the NSCH, the sample includes over 45,000 children aged 6-17 years.

While the NSCH has many questions on health and health care use, most questions reflect a combination of both health status and use, or need, of health care services. For example, a series of questions asks whether the child needs or uses more health or educational services than usual for most peers due to health issues.[11] This is problematic for our research objective. Ideally, we would estimate equation (2), the health production function, and to do so we would use measures of the stock of health at a particular age. One limitation of the NSCH is that there are few such measures like this. In addition, there are substantial changes in the questionnaire across survey years that limits what information can be used. Also, several health indicators capture specific developmental problems that

[11] Another example is a question asking whether the respondent or a health professional thought that the child needed specialist services over the past 12 months, again conflating need with use of services and conditioning the answer on use of services.

may have a large genetic influence and unclear links to family investments and income changes (e.g., autism, ADHD).

After reviewing available information, we chose two measures of child health that we consider broad enough to capture the child's health stock. The first is the child's general health rated by the parent/caregiver on a five-category scale (excellent to poor), which we examine as an ordinal variable (from 1 to 5) and as two binary indicators, one for excellent or very good health versus less (good, fair, and poor), and another for poor or fair health versus better (good, very good, and excellent). The second outcome is the number of missed school days in the past 12 months due to illness or injury. The general health and missing school outcomes are moderately correlated.[12]

Similarly, we would also like to have measures of investment in health to assess how the minimum wage affects these quantities. But, again, there are few good measures and changes in survey questions makes them unusable. For example, in the 2003 and 2011/12 waves, there are two questions on health services use, the first asks about any medical services (treatments or checkups), while the second asks those answering yes to the first question about preventive services.[13] However, in the 2007 wave, there is a direct question about preventive services asked of every child.[14] The difference in questions leads to

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[12] The weighted mean of missed school days declines from 10.6 days among children with poor health to 3.1 days among children with excellent health, and the correlation coefficient between the five-category health status measure and missed school days is -0.20 ($p<0.01$).

[13] The first question is: "During the past 12 months/Since [his/her] birth], did child see a doctor, nurse, or other health care professional for any kind of medical care, including sick-child care, well-child check-ups, physical exams, and hospitalizations?" (Centers for Disease Control and Prevention, 2012). If the answer is yes, the follow-up question is "During the past 12 months/Since [his/her] birth], how many times did child see a doctor, nurse, or other health care provider for preventive medical care such as a physical exam or well-child checkup?"

[14] The question is: "During the past 12 months/Since [his/her] birth], how many times did child see a doctor, nurse, or other health care provider for preventive medical care such as a physical exam or well-child checkup?"

differences in frequency of preventive visits between the waves that cannot be explained other than the fact that survey questions changed.[15] Similarly, there is a direct question about seeing medical specialists in 2007 and 2011/12 waves, but not in 2003.

Information on the monthly minimum wage at the state and federal level were obtained from publicly available data by Vaghul and Zipperer (2016), compiled from multiple sources including state legislation and resolutions, the Bureau of Labor Statistics, and state agencies and labor departments. The effective minimum wage of a state is the higher of state legislated minimum wage or federal minimum wage.

3.b. Empirical Model

As discussed earlier, an increase in income over a child's lifetime, as a result of a higher minimum wage, may affect child health through changes in investments in health. And the timing of changes in minimum wage during childhood may matter. Changes in the minimum wage during pregnancy and in early childhood may have different effects than changes at later ages. Therefore, it is important to distinguish between effects of minimum wage changes early in life from more recent changes. We incorporate this notion into our empirical model.

Ideally, we would like to estimate equation (1), but investments in child health are not available in the data. Instead, we estimate the minimum wage effects on child health using a reduced-form specification separately for children aged 6-12 and adolescents 13-17. For ages 6-12 years, the specification is as follows:

[15] The rates of any preventive visit based on these questions is 71%, 85%, and 78% in 2003, 2007, and 2011/12 respectively. The rate is highest when everyone answers the question about preventive services (2007) rather than the two consecutive questions in 2003 and 2011/12.

$$(4)\ \mathrm{H_{iskt}} = \boldsymbol{\alpha_s} + \boldsymbol{\gamma_t} + \beta_1\,\mathrm{MW\_P_{iskt}} + \beta_2\overline{\mathrm{MW\_0\_5}}_{\mathrm{iskt}} + \beta_3\overline{\mathrm{MW\_6\_s}}_{\mathrm{iskt}} + \mathbf{E_{skt}}\boldsymbol{\gamma} + \mathbf{X_{iskt}}\boldsymbol{\Phi} + \boldsymbol{\mu_{iskt}}\ .$$

$\mathrm{H_{iskt}}$ denotes the health outcome of child *i*, at age *k*, in state *s* at survey year *t*. $\mathrm{MW\_P_{iskt}}$ is the real minimum wage (adjusted for inflation and converted to 2016 dollars) in the pregnancy year,[16] which we include as a separate period given the fundamentally different types of investments in pregnancy and their importance for child health, as well as prior evidence of effects of minimum wage during pregnancy on infant health (Wehby et al, 2019). $\overline{\mathrm{MW\_0\_5}}_{\mathrm{iskt}}$ is the real minimum wage (averaged over birth year and each year up to age 5, and computed as follows:

$$(5)\ \overline{MW\_0\_5} = \frac{1}{6}\sum_{k=0}^{5} MW_{sk}\ \ .$$

For each calendar year, the effective real minimum wage is averaged over 12 months before averaging across years. $\overline{\mathrm{MW\_6\_s}}_{iskt}$ is the real minimum wage at survey year t for children aged 6 years, or minimum wage averaged over the years from age 6 until child's age (k) at survey year for children older than 6 as follows:

[16] The NSCH does not provide data on the child's birth year and month (and it does not provide individual-level data on interview month), which generates measurement error in the pregnancy and birth year for some children and in the average minimum wage over specific ages. The 2003 NSCH survey was completed between January 2003 and July 2004 (87% in 2003 and 13% in 2004), the 2007 NSCH survey was completed between April 2007 and July 2008 (79% in 2007 and 21% in 2008), and the 2011/2012 survey was completed between June 2011 and February 2012 (interview rates by year are not available); therefore, we assign 2003, 2007 and 2011 as the survey year to all participants in each NSCH wave. The NSCH documentation provided information about the number of interviews by month in the 2003 and 2007 NSCH waves. By assuming a 9-month pregnancy and equal probability of birth in each month, we estimate that the pregnancy year and the birth year might be inaccurately assigned for 26% and 35% of children in the 2003 survey, respectively; similarly, pregnancy year and birth year might be inaccurately assigned for 17% and 31% of children in the 2007 survey, respectively. Proportions of interview by month and year were not reported in the documentation of the 2011 NSCH survey, and so we could not estimate these errors. Any such misclassification of the pregnancy year would attenuate the effect sizes; the degree of attenuation, however, is likely to be minimal because of: 1) lagged effects the minimum wage on birth outcomes (Wehby et al. 2019); and 2) high correlation in the minimum wage within states over time.

$$(6)\ \overline{\text{MW\_6\_s}} = \frac{\sum_{\text{k=Age 6}}^{\text{survey year}} \text{MW}_{\text{sk}}}{(\text{survey year}-\text{year at age 6})+1}\ .$$

In this model, β_1 captures the effects of minimum wage changes during pregnancy and β_2 captures effects of minimum wage changes after birth and during early childhood. In contrast, β_3 captures effects of minimum wage changes later in childhood. Note that the coefficients on MW variables in each period embed two effects: the effect of minimum wage on the quantity of investments (and thus health) in that period and the effect of the change in health stock in that period on future investment (i.e. at a later period). The second effect occurs because an increase in health stock at the earlier age raises the stock of health in future periods and, therefore, may affect the quantity and productivity of future investments.

Equation (4) can be thought of a reduced form model in which we have substituted for investments with the minimum wage. The model also includes state fixed effects ($\boldsymbol{\alpha}$), and birth year (cohort) fixed effects ($\boldsymbol{\gamma}$). Also included in **E** are three state-level time varying policy measures: state income eligibility thresholds for child coverage in Medicaid, state EITC credits as percent of federal EITC (including 0 if state has no EITC program), and cigarette taxes. These measures are calculated for each period and child's age and included in the model similar to the minimum wage measures. The variables in **X** are child demographic measures including race/ethnicity, gender, and dummies for child age (year by year).

Conditional on other covariates in the model, we assume the minimum wage is exogenous—uncorrelated with missing investments and initial health shown in equation (1). The exogeneity of the minimum wage is based on the difference-in-differences research design of equation (4) that compares children in the same state who were "exposed" to different minimum wages at specific periods of their childhood while accounting for state, birth cohort, and age at interview effects.[17]

The specification of the minimum wage variable in equation (4) represents one approach to allowing the effects of the minimum wage to differ across the child's life course. In this case, we allow there to be three periods when combining children aged 6 through 12. Our choice represents a compromise between estimating a fully unrestricted specification where we include the minimum wage in each year of the child's life for a given age and simply averaging the minimum wage over the child's life. The former approach is not practical because the minimum wage does not vary on an annual basis and is often constant for several years. This introduces a substantial collinearity problem. Also, it requires estimating separate models for each specific age which is impractical given available sample sizes. The latter approach restricts the effect of the minimum wage to be the same at each age, which is inconsistent with the possibilities highlighted by the conceptual model. In addition to estimating and testing the minimum wage effects in specific periods, we also calculate and test the significance of the sum of the minimum wage effects from all stages.

We also estimate models for adolescents ages 13-17 years. In this case, the model is specified as follows:

$$(7)\ \mathrm{H}_{\mathrm{iskt}} = \boldsymbol{\alpha}_{\mathbf{s}} + \boldsymbol{\gamma}_{\mathbf{t}} + \beta_1\, \mathrm{MW\_P}_{\mathrm{iskt}} + \beta_2 \overline{\mathrm{MW\_0\_5}}_{\mathrm{iskt}} + \beta_3 \overline{\mathrm{MW\_6\_12}}_{\mathrm{iskt}} + \beta_4 \overline{\mathrm{MW\_13\_s}}_{\mathrm{iskt}} + \mathbf{E}_{\mathbf{skt}}\boldsymbol{\gamma} + \mathbf{X}_{\mathbf{iskt}}\boldsymbol{\Phi} + \boldsymbol{\mu}_{\boldsymbol{iskt}}$$

$\overline{\mathrm{MW\_6\_12}}_{\mathrm{iskt}}$ is the real minimum wage averaged over ages 6 through 12 as follows:

[17] Because of the cross-sectional nature of the data, we do not observe the same child at different points of their life. However, based on the child's age at the survey, we are able to calculate an average minimum wage across years between pregnancy and survey year.

$$(8)\ \overline{MW\_6\_12} = \frac{\sum_{k=age\ 6}^{Age\ 12} MW_{sk}}{7}\ .$$

$\overline{\mathrm{MW\_13\_}}s_{iskt}$ is the real minimum wage at survey year t for children aged 13 years, or minimum wage averaged from age 13 until child's age (k) at survey year for children older than 13 as follows:

$$(9)\ \overline{\mathrm{MW\_13\_s}} = \frac{\sum_{\mathrm{k=Age\ 13}}^{\mathrm{survey\ year}} \mathrm{MW_{sk}}}{(\mathrm{survey\ year} - \mathrm{year\ at\ age\ 13}) + 1}.$$

As noted earlier, the NSCH sampled an equal number of children from each state for each wave. To address this issue, we estimate weighted regression models that use the NSCH sampling probability weights in order to approximate as best as possible the average partial treatment effect of the minimum wage. The NSCH only provides a final sampling weight that accounts for sample selection and nonresponse, which we use for our estimates. We estimate all models using OLS and construct standard errors allowing for non-independence of observations within state (i.e., robust-cluster standard errors).

5. Main Results

5.a. Variation in Minimum Wages over Child's Life

Before discussing estimates of the effects of a higher minimum wage on child health, we present descriptive information about the extent of minimum wage changes in our sample period. Specifically, for each measure of the minimum wage (pregnancy, ages 0 to 5, ages 6 to current age, ages 6 to 12, and ages 13 to current age), we calculated the residuals from regressions of each minimum wage measure on all covariates included in the regression models of children's health.

Figure 1 shows the distribution of these residuals by age group. There are two points to note about Figure 1. First, there is significant variation in minimum wages in the sample period. Changes in the (average) minimum wage of $0.5 to $1 are not atypical. Second, changes in minimum wages tend to be larger for the younger cohort and larger during later periods in the child's life. Both of these observations reflect the fact that there have been more state changes in minimum wages in the later years (e.g., post 2000).

5.b. Effects of Minimum Wage on Health of Children Aged 6-12

Table 1 reports the effects of the average minimum wage during pregnancy, ages 0-5, and 6 to current age for children between ages 6 and 12 on general health and missed school days due to illness or injury. Most estimates in Table 1 pertaining to the effect of the minimum wage during pregnancy are small and not statistically significant. The exception is for fair/poor health. For this outcome, a $1 increase in the minimum wage during pregnancy is associated with a 1.6 percentage point (24%) decrease in the likelihood of fair/poor health.

For minimum wages during age 0-5 years estimates indicate that a $1 increase in the minimum wage is associated with a 0.11 (2.7%) improvement in general health (on the five category scale) and 6.2 percentage point (8.7%) increase in the probability of very good or excellent health. An increase in the minimum wage at these ages is also associated with a 0.57 (15.6%) decrease in missed school days. Changes in the minimum wage between ages 6 and the child's current age are not significantly related to the outcomes in Table 1.

Finally, we calculated the sum of the coefficients on the minimum wage variables across all ages. These estimates are in the last column of Table 1. These estimates measure the effect of a $1 change in the minimum wage at each age: pregnancy, ages 0 to 5 and ages 6 to child's current age. In the case of general health, a higher ($1) minimum wage throughout a child's life is associated with a 4.4% improvement in health at ages 6 to 12. Analogously, a

$1 increase in the minimum wage throughout childhood is associated with a 7 percentage point (10%) increase in the probability of very good or excellent health. Finally, a $1 increase in the minimum wage throughout childhood is associated with 0.95 (26%) fewer missed school days. All of these estimates are statistically significant.

5.c. Effects of Minimum Wage on Health of Children Aged 13-17

In Table 2, we show estimates of the effect of the minimum wage for adolescents aged 13-17. Here we also find significant evidence of improvement in child health with increases in the minimum wage during childhood. Effects sizes are modest with one exception and, as with younger children, minimum wage changes during ages 0 to 5 contribute most to the improvements in health we observe at ages 13 to 17. A $1 increase in the minimum wage during age 0-5 is associated with: a 0.20 (4.8%) increase in general health; a 7.7 percentage point (10.7%) increase in very good/excellent health; a 6.4 percentage point (91.5%) decrease in risk of poor/fair health; and a 0.65 (16.5%) decrease in missed school days, although this estimate is not statistically significant.

All estimates of the effect of the minimum wage at other ages are not statistically significant. The last column of Table 2 presents the estimates of the effect of a $1 increase in minimum wages throughout childhood. These estimates indicate improvements in child health. Because much of the effects of the minimum wage on general health come from changes during ages 0 to 5, estimates in this column for this outcome are similar to estimates of the effect of an increase in the minimum wage at that age. For missed school days, there is a 41.6% decline with a one dollar increase in the minimum wage throughout childhood.

6. Sensitivity Analyses

6.a. Including Leads of Minimum Wage

We test the validity of the research design by adding 3-year and 6-year leads of the minimum wage to the models used to obtain estimates in Tables 2 and 3. The leads represent the minimum wage values in future years, specifically at 3 and 6 years from the survey year. If our research design is valid, estimates of the effects of the leads of minimum wages should be zero (statistically speaking) because future minimum wages should not affect past child health. We present estimates from these models in Tables 3 and 4 for children ages 6 to 12 and 13 to 17, respectively. As can be observed, none of the estimates associated with the lead variables are statistically significant and all are small in magnitude with the exception of those pertaining to poor health.[18] It is also the case that estimates of the effects of non-lead measures of minimum wages in Table 3 and 4 are similar to those in Tables 1 and 2. Overall, the statistical insignificance of the estimates associated with the lead measures of minimum wages and the lack of effect of the addition of these variables on the estimates of interest suggest that the research design is plausibly valid.

6.b. Adding Demographic and Maternal Health Control Variables

In the model used to obtain estimates in tables 1 and 2, we only include variables that are clearly exogenous. However, we assess the sensitivity of the estimates to adding several household demographic variables that are measured across all NSCH waves: an indicator that the highest household education is less than high school (versus high school), parental marital status, and number of children in the household. We also add indicators for maternal general health and mental health ratings (on five-category scales) to account for a

[18] For this relatively infrequent outcome there is less statistical power to detect reliably small effect sizes.

potential source of variation in reporting child health. We note that some of these variables may be affected by the minimum wage (e.g., maternal mental health) and therefore be mediators of the minimum wage effects reported in Tables 1 and 2. We report the results in Appendix Tables 2 and 3. As shown in those tables, estimates from the model that includes an extended set of covariates are very similar to those reported earlier.

6.c. Effects of Minimum Wage on Child Health in Two-Parent High-Educated Families

As another assessment of the validity of the research design, we examine the effect of the minimum wage on health of children in two-parent, higher-educated households. These are households where the highest attained education is greater than high school. The information in the NSCH related to educational attainment combines any education above high school in one category and reports highest attained education in the household (not separately for each parent). Therefore, it is not possible to only include college graduates and so we include households with a parent with educational attainment greater than high school. For this sample, the minimum wage should have smaller or no effects on children's health because these families are largely unaffected by the minimum wage.

Estimates of the effects of the minimum wage using this sample are presented in Tables 5 (ages 6-12) and 6 (ages 13-17). As expected, there are almost no statistically significant estimates in either table and the few estimates that are significant are much smaller than those found for families more likely to be affected. Even for the few instances when an estimate is statistically significant, there is also no consistent pattern across childhood, as was found in the analysis of more affected families. For example, a higher minimum wage during pregnancy is associated with an increase in the probability of being in poor/fair health at ages 13 to 17. However, all other estimates of the effects of the minimum wage during other periods of childhood on this outcome are negative (and very small).

7. Conclusions

Increases in the minimum wage have been shown to raise wages and income of low-skilled workers with only small, if any, negative effects on employment. While the effects of minimum wages on these outcomes continue to be a focus of interest surrounding the use of this policy, the minimum wage may have other consequences that are important. In this study, we have assessed the effect of the minimum wage on child health. Ours is the first paper to investigate this issue. We paid particular attention to the fact that child health is the result of investments throughout childhood and that minimum wages throughout childhood may have cumulative effects on child health.

Our findings are noteworthy because they suggest that higher minimum wages throughout childhood may have significant and relatively large effects on child health. If so, then the debate over the value of minimum wage increases needs to incorporate this evidence, and consider other potential effects that the minimum wage may have.

An interesting finding in this article is that much of the beneficial effects of the minimum wage are associated with minimum wage increases during ages 0 to 5. This finding is similar to a recent study for EITC, showing that the effect of EITC income during childhood on self-reported general health (reporting excellent or very good health) of young adults is largest for income during their first five years of life (Braga et al., 2019). . It is also the case that increases in the minimum wage during other periods are associated with improvements in health, but are mostly not statistically significant and smaller. However, when we calculate the cumulative effect of a $1 increase in the minimum wage throughout childhood, the beneficial effects of the minimum wage at other ages besides ages 0 to 5 are non-trivial, for example, accounting for 40% to 60% of the cumulative effect of the minimum wage on missed school days due to illness or injury.

Overall, our findings demonstrate that consequences beyond the labor market should be considered when assessing the use of the minimum wage to improve the welfare of low-skilled and low-income families. The increases in income associated with the minimum wage may have wide ranging and meaningful impacts particularly for children in low-income families. Additional research is needed to identify these potential consequences, for example, on school performance.

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Figure 1. Distribution of Residuals from Regressions of Minimum Wage Measures on Model Covariates

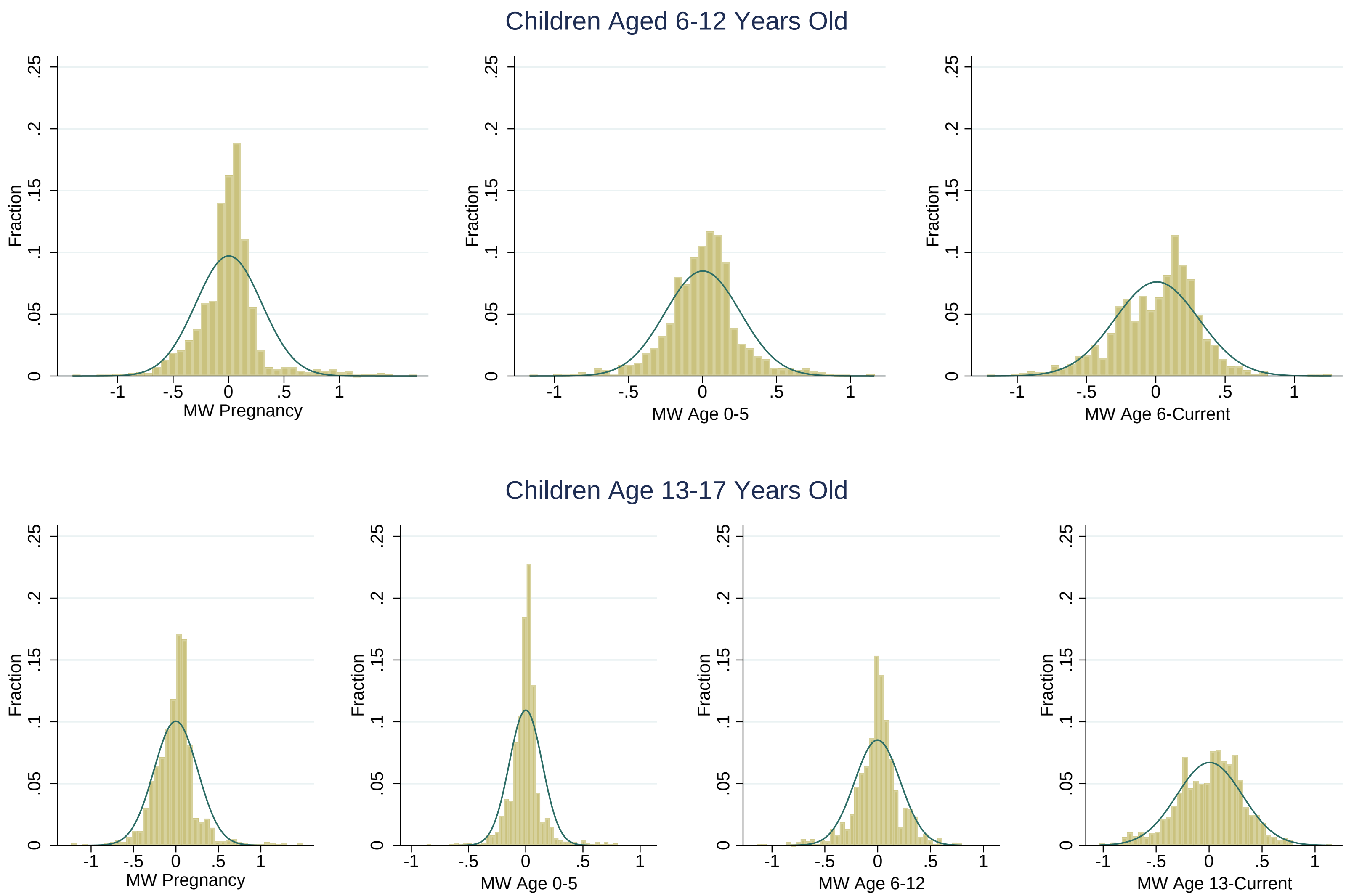


Table 1. Estimates of the Effects of the Minimum Wage on Health of Children Aged 6 to 12 Years

	Mean of dependent variable	Minimum wage during pregnancy	Minimum wage from age 0 to age 5	Minimum wage from age 6 to current age	Sum of minimum wage estimates across all ages
General health (1-5 scale poor to excellent)	4.09	0.03	0.11**	0.037	0.18**
		(0.03)	(0.05)	(0.05)	(0.07)
Excellent/very good health	0.713	-0.003	0.062***	0.011	0.070***
		(0.014)	(0.022)	(0.019)	(0.022)
Fair/poor health	0.067	-0.016**	-0.007	0.004	-0.019
		(0.008)	(0.008)	(0.008)	(0.012)
Number of missed school days in past 12 months due to illness or injury	3.68	-0.18	-0.57**	-0.20	-0.95**
		(0.14)	(0.25)	(0.25)	(0.47)

Notes: Estimates measure changes in general health measured by a five point Likert scale (poor, fair, good, very good and excellent) and the number of missed school days, and changes in likelihood of having excellent or very good health and having fair or poor health with a one dollar increase in average minimum wage in a given period (estimated using Equation 4 and OLS). Standard errors are adjusted for arbitrary correlation in the errors across observations within each state and reported in parentheses. All specifications include dummy variables for each year of child age; for gender; and for each race/ethnicity group. Other controls include state EITC credit as a percent of federal credit (including 0 for states that do not have ETIC), cigarette taxes, and Medicaid income eligibility thresholds (calculated similar to the minimum wage measures), year of birth fixed effects and state fixed effects. Estimates are weighted by the NSCH sampling weights. Sample size ranges from 21,090 to 21,292 with different outcomes.

*** p-value ≤ 0.01; ** 0.01 < p-value ≤ 0.05; * 0.05 < p-value ≤ 0.10.

Table 2. Estimates of the Effects of the Minimum Wage on Health of Children Aged 13 to 17 Years

	Mean of dependent variable	Minimum wage during pregnancy	Minimum wage from 0 to age 5	Minimum wage from age 6 to age 12	Minimum wage from age 13 to current age	Sum of minimum wage estimates across all ages
General health (1-5 scale poor to excellent)	4.10	0.04	0.20***	-0.07	0.03	0.20*
		(0.04)	(0.07)	(0.04)	(0.04)	(0.11)
Excellent/very good health	0.716	0.017	0.077***	-0.022	0.010	0.082*
		(0.018)	(0.022)	(0.020)	(0.016)	(0.046)
Fair/poor health	0.071	-0.020	-0.064***	0.032	0.000	-0.052
		(0.012)	(0.020)	(0.023)	(0.010)	(0.039)
Number of missed school days in past 12 months due to illness or injury	3.95	-0.31	-0.65	-0.41*	-0.28	-1.65**
		(0.30)	(0.46)	(0.23)	(0.21)	(0.79)

Notes: Estimates measure changes in general health measured by a five point Likert scale (poor, fair, good, very good and excellent) and the number of missed school days, and changes in likelihood of having excellent or very good health and having fair or poor health with a one dollar increase in average minimum wage in a given period (estimated using Equation 7 and OLS). Standard errors are adjusted for arbitrary correlation in the errors across observations within each state and reported in parentheses. All specifications include dummy variables for each year of child age; for gender; and for each race/ethnicity group. Other controls include state EITC credit as a percent of federal credit (including 0 for states that do not have ETIC), cigarette taxes, and Medicaid income eligibility thresholds (calculated similar to the minimum wage measures), year of birth fixed effects and state fixed effects. Estimates are weighted by the NSCH sampling weights. Sample size ranges from 17,836 to 18,087 with different outcomes.

*** p-value ≤ 0.01; ** 0.01 < p-value ≤ 0.05; * 0.05 < p-value ≤ 0.10.

Table 3. Estimates of the Effects of the Minimum Wage on Health of Children Aged 6 to 12 Years Controlling for Two Leads of Minimum Wage

	Mean of dependent variable	Minimum wage during pregnancy	Minimum wage from age 0 to age 5	Minimum wage from age 6 to current age	Minimum wage at 3 years from survey	Minimum wage at 6 years from survey	Sum of minimum wage estimates across all ages
General health (1-5 scale poor to excellent)	4.09	0.03	0.11**	-0.01	-0.05	-0.03	0.12*
		(0.03)	(0.05)	(0.05)	(0.05)	(0.03)	(0.07)
Excellent/very good health	0.713	0.001	0.064**	-0.005	-0.016	-0.017	0.060*
		(0.011)	(0.026)	(0.018)	(0.023)	(0.016)	(0.032)
Fair/poor health	0.067	-0.010	-0.001	0.015	0.015	-0.005	0.005
		(0.006)	(0.009)	(0.011)	(0.010)	(0.007)	(0.019)
Number of missed school days in past 12 months due to illness or injury	3.68	-0.18	-0.57**	-0.15	0.05	0.03	-0.90
		(0.17)	(0.28)	(0.36)	(0.23)	(0.19)	(0.64)

Notes: Estimates measure changes in general health measured by a five point Likert scale (poor, fair, good, very good and excellent) and the number of missed school days, and changes in likelihood of having excellent or very good health and having fair or poor health with a one dollar increase in average minimum wage in a given period (estimated using Equation 4 and OLS). Standard errors are adjusted for arbitrary correlation in the errors across observations within each state and reported in parentheses. All specifications include dummy variables for each year of child age; for gender; and for each race/ethnicity group. Other controls include state EITC credit as a percent of federal credit (including 0 for states that do not have ETIC), cigarette taxes, and Medicaid income eligibility thresholds (calculated similar to the minimum wage measures), year of birth fixed effects and state fixed effects. Estimates are weighted by the NSCH sampling weights. Sample size ranges from 21,090 to 21,292 with different outcomes.

*** p-value ≤ 0.01; ** 0.01 < p-value ≤ 0.05; * 0.05 < p-value ≤ 0.10.

Table 4. Estimates of the Effects of the Minimum Wage on Health of Children Aged 13 to 17 Years Controlling for Two Leads of Minimum Wage

	Mean of dependent variable	Minimum wage during pregnancy	Minimum wage from 0 to age 5	Minimum wage from age 6 to age 12	Minimum wage from age 13 to current age	Minimum wage at 3 years from survey	Minimum wage at 6 years from survey	Sum of minimum wage estimates across all ages
General health (1-5 scale poor to excellent)	4.10	0.04	0.17**	-0.06	0.06	0.03	0.04	0.22*
		(0.04)	(0.07)	(0.05)	(0.04)	(0.04)	(0.03)	(0.11)
Excellent/very good health	0.716	0.017	0.077***	-0.010	0.029	0.027	0.010	0.113*
		(0.017)	(0.024)	(0.031)	(0.021)	(0.025)	(0.015)	(0.067)
Fair/poor health	0.071	-0.023	-0.050	0.033	-0.016	-0.012	-0.024	-0.055
		(0.014)	(0.030)	(0.028)	(0.010)	(0.010)	(0.018)	(0.045)
Number of missed school days in past 12 months due to illness or injury	3.95	-0.31	-0.62	-0.42	-0.33	-0.05	-0.05	-1.68**
		(0.31)	(0.51)	(0.27)	(0.20)	(0.22)	(0.22)	(0.83)

Notes: Estimates measure changes in general health measured by a five point Likert scale (poor, fair, good, very good and excellent) and the number of missed school days, and changes in likelihood of having excellent or very good health and having fair or poor health with a one dollar increase in average minimum wage in a given period (estimated using Equation 7 and OLS). Standard errors are adjusted for arbitrary correlation in the errors across observations within each state and reported in parentheses. All specifications include dummy variables for each year of child age; for gender; and for each race/ethnicity group. Other controls include state EITC credit as a percent of federal credit (including 0 for states that do not have ETIC), cigarette taxes, and Medicaid income eligibility thresholds (calculated similar to the minimum wage measures), year of birth fixed effects and state fixed effects. Estimates are weighted by the NSCH sampling weights. Sample size ranges from 17,836 to 18,087 with different outcomes.

*** p-value ≤ 0.01; ** 0.01 < p-value ≤ 0.05; * 0.05 < p-value ≤ 0.10.

Table 5. Estimates of the Effects of the Minimum Wage on Health of Children Aged 6 to 12 Years
Sample of Married High-educated (Highest Education Above High School) Households

	Mean of dependent variable	Minimum wage during pregnancy	Minimum wage from age 0 to age 5	Minimum wage from age 6 to current age	Sum of minimum wage estimates across all ages
General health (1-5 scale poor to excellent)	4.59	-0.02	-0.01	-0.01	-0.04
		(0.01)	(0.02)	(0.02)	(0.03)
Excellent/very good health	0.911	-0.012	-0.004	-0.002	-0.017
		(0.007)	(0.007)	(0.008)	(0.012)
Fair/poor health	0.015	-0.001	0.007**	-0.000	0.005
		(0.003)	(0.003)	(0.003)	(0.005)
Number of missed school days in past 12 months due to illness or injury	3.46	-0.06	0.11	0.14	0.19
		(0.05)	(0.07)	(0.08)	(0.13)

Notes: Estimates measure changes in general health measured by a five point Likert scale (poor, fair, good, very good and excellent) and the number of missed school days, and changes in likelihood of having excellent or very good health and having fair or poor health with a one dollar increase in average minimum wage in a given period (estimated using Equation 4 and OLS). Standard errors are adjusted for arbitrary correlation in the errors across observations within each state and reported in parentheses. All specifications include dummy variables for each year of child age; for gender; and for each race/ethnicity group. Other controls include state EITC credit as a percent of federal credit (including 0 for states that do not have ETIC), cigarette taxes, and Medicaid income eligibility thresholds (calculated similar to the minimum wage measures), year of birth fixed effects and state fixed effects. Estimates are weighted by the NSCH sampling weights. Sample size ranges from 61,128 to 61,260 with different outcomes.

*** p-value ≤ 0.01; ** 0.01 < p-value ≤ 0.05; * 0.05 < p-value ≤ 0.10.

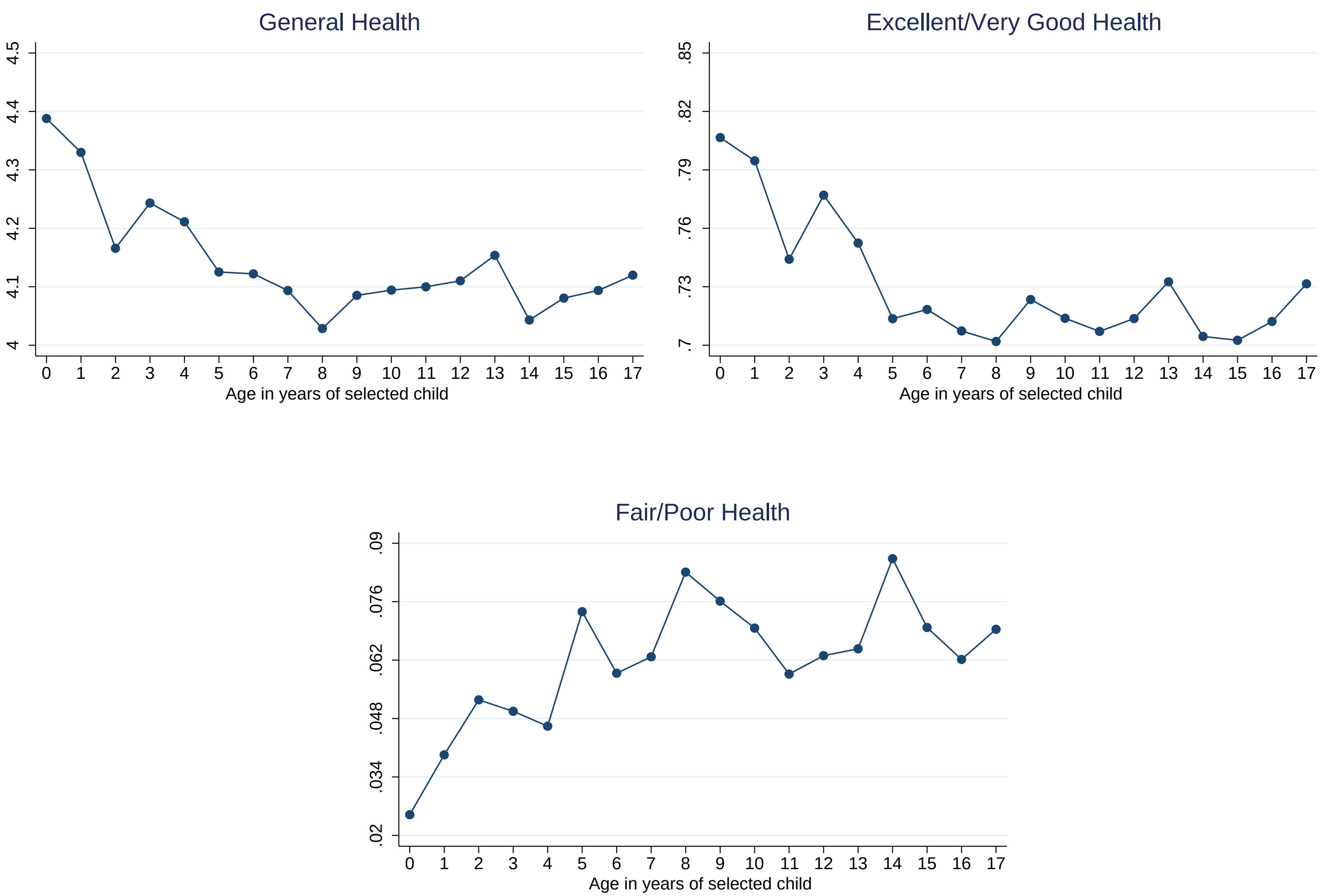
Table 6. Estimates of the Effects of the Minimum Wage on Health of Children Aged 13 to 17 Years
Sample of Married High-educated (Highest Education Above High School) Households

	Mean of dependent variable	Minimum wage during pregnancy	Minimum wage from 0 to age 5	Minimum wage from age 6 to age 12	Minimum wage from age 13 to current age in survey year	Sum of minimum wage estimates across all ages
General health (1-5 scale poor to excellent)	4.56	-0.01	0.02	0.03	0.05*	0.08
		(0.02)	(0.04)	(0.02)	(0.03)	(0.08)
Excellent/very good health	0.907	0.006	0.010	0.004	0.025**	0.044*
		(0.010)	(0.009)	(0.008)	(0.010)	(0.024)
Fair/poor health	0.018	0.019***	-0.003	-0.009	-0.013	-0.006
		(0.006)	(0.008)	(0.006)	(0.010)	(0.016)
Number of missed school days in past 12 months due to illness or injury	3.67	0.09	-0.14	-0.06	0.09	-0.02
		(0.10)	(0.28)	(0.19)	(0.17)	(0.48)

Notes: Estimates measure changes in general health measured by a five point Likert scale (poor, fair, good, very good and excellent) and the number of missed school days, and changes in likelihood of having excellent or very good health and having fair or poor health with a one dollar increase in average minimum wage in a given period (estimated using Equation 7 and OLS). Standard errors are adjusted for arbitrary correlation in the errors across observations within each state and reported in parentheses. All specifications include dummy variables for each year of child age; for gender; and for each race/ethnicity group. Other controls include state EITC credit as a percent of federal credit (including 0 for states that do not have ETIC), cigarette taxes, and Medicaid income eligibility thresholds (calculated similar to the minimum wage measures), year of birth fixed effects and state fixed effects. Estimates are weighted by the NSCH sampling weights. Sample size ranges from 51,557 to 51,784 with different outcomes.

*** p-value ≤ 0.01; ** 0.01 < p-value ≤ 0.05; * 0.05 < p-value ≤ 0.10.

Appendix Figure 1. Children's Health Outcomes by Age



Appendix Table 1. Summary Statistics

	Age 6-12	Age 13-17
Child health		
General health	4.09	4.09
Excellent/very good health	0.71	0.71
Fair/poor health	0.07	0.07
# of missed school days	3.68	3.94
Age	9.08	14.96
Gender		
Male	0.51	0.52
Female	0.49	0.48
Race/ethnicity		
Non-Hispanic white	0.40	0.45
Non-Hispanic black	0.16	0.17
Non-Hispanic others	0.06	0.06
Hispanic	0.38	0.32

Notes: The summary statistics were weighted by NSCH sampling weights.

Appendix Table 2. Estimates of the Effects of the Minimum Wage on Health of Children Aged 6 to 12 Years Adding Household Demographic and Maternal Health Variables

	Mean of dependent variable	Minimum wage during pregnancy	Minimum wage from age 0 to age 5	Minimum wage from age 6 to current age	Sum of minimum wage estimates across all ages
General health (1-5 scale poor to excellent)	4.08	0.05*	0.08**	0.02	0.15**
		(0.03)	(0.03)	(0.04)	(0.06)
Excellent/very good health	0.71	0.007	0.04***	0.004	0.05***
		(0.01)	(0.01)	(0.01)	(0.01)
Fair/poor health	0.07	-0.03**	0.002	0.004	-0.02*
		(0.01)	(0.008)	(0.006)	(0.01)
Number of missed school days in past 12 months due to illness or injury	3.70	-0.14	-0.70***	-0.11	-0.95*
		(0.15)	(0.24)	(0.26)	(0.51)

Notes: Estimates measure changes in general health measured by a five point Likert scale (poor, fair, good, very good and excellent) and the number of missed school days, and changes in likelihood of having excellent or very good health and having fair or poor health with a one dollar increase in average minimum wage in a given period (estimated using Equation 4 and OLS). Standard errors are adjusted for arbitrary correlation in the errors across observations within each state and reported in parentheses. All specifications include dummy variables for each year of child age; for gender; and for each race/ethnicity group. Other controls include state EITC credit as a percent of federal credit (including 0 for states that do not have ETIC), cigarette taxes, and Medicaid income eligibility thresholds (calculated similar to the minimum wage measures), year of birth fixed effects and state fixed effects. Estimates are weighted by the NSCH sampling weights. Sample size ranges from 19,938 to 20,126 with different outcomes.

*** p-value ≤ 0.01; ** 0.01 < p-value ≤ 0.05; * 0.05 < p-value ≤ 0.10.

Appendix Table 3. Estimates of the Effects of the Minimum Wage on Health of Children Aged 13 to 17 Years Adding Household Demographic and Maternal Health Variables

	Mean of dependent variable	Minimum wage during pregnancy	Minimum wage from 0 to age 5	Minimum wage from age 6 to age 12	Minimum wage from age 13 to current age	Sum of minimum wage estimates across all ages
General health (1-5 scale poor to excellent)	4.09	0.03	0.21***	-0.09**	0.01	0.17*
		(0.03)	(0.06)	(0.04)	(0.03)	(0.10)
Excellent/very good health	0.71	0.009	0.09***	-0.03	0.003	0.07
		(0.02)	(0.03)	(0.02)	(0.01)	(0.05)
Fair/poor health	0.07	-0.01	-0.08***	0.04*	0.004	-0.05
		(0.01)	(0.02)	(0.02)	(0.009)	(0.04)
Number of missed school days in past 12 months due to illness or injury	3.96	-0.19	-0.58	-0.49**	-0.34	-1.59*
		(0.26)	(0.50)	(0.23)	(0.22)	(0.83)

Notes: Estimates measure changes in general health measured by a five point Likert scale (poor, fair, good, very good and excellent) and the number of missed school days, and changes in likelihood of having excellent or very good health and having fair or poor health with a one dollar increase in average minimum wage in a given period (estimated using Equation 7 and OLS). Standard errors are adjusted for arbitrary correlation in the errors across observations within each state and reported in parentheses. All specifications include dummy variables for each year of child age; for gender; and for each race/ethnicity group. Other controls include state EITC credit as a percent of federal credit (including 0 for states that do not have ETIC), cigarette taxes, and Medicaid income eligibility thresholds (calculated similar to the minimum wage measures), year of birth fixed effects and state fixed effects. Estimates are weighted by the NSCH sampling weights. Sample size ranges from 17,836 to 18,087 with different outcomes.

*** p-value ≤ 0.01; ** 0.01 < p-value ≤ 0.05; * 0.05 < p-value ≤ 0.10.