**Association between the Minimum Wage and Children’s Mental Health**

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**Structured abstract**

**Introduction**

Children and adolescents in the U.S. are facing a mental health crisis.1–6 Mood and anxiety disorders are on the rise, with 3% of children aged 3–17 having depression and 9% having anxiety in 2016–2019.7 The COVID-19 pandemic has only compounded the crisis.8 Poor mental health lowers children’s quality of life and compromises their academic performance.9 It even has consequences lasting into adulthood, as adolescent depression has been associated with lower educational attainment, higher rates of unemployment, and earlier parenthood.10

Structural changes, such as raising the minimum wage, have the potential to improve children’s mental health.11 Children living in poverty are especially burdened by poor mental health, with twice the rate of depression and anxiety and three times the rate of behavioral disorders as children living above 400% FPL.12 Raising the minimum wage has been shown to improve children’s physical health, including birth weights,13 infant mortality,13,14 school absenteeism,15 and indexes of overall health,15 with heterogeneous results by demographic group.16,17 However, no studies have examined the effect of raising the minimum wage on children’s mental health.

Children’s mental health may be especially sensitive to changes in a family’s wage. For example, children’s emotional and behavioral problems rise with household economic stress.12,18 Meanwhile, when families’ incomes rise, they disproportionately dedicate those resources to their children.19 Consequently, raising the minimum wage could improve children’s mental health by several pathways, including reductions in household financial stress,18,20 meeting unmet needs for mental health care,12,21 or granting access to other resources that could improve mental health, such as higher-quality housing, time for exercise and leisure, or better education.22,23

In this study, we use two state-level representative samples of over one million children and adolescents, aged 3 to 18, in the U.S. from 2001 to 2020 to estimate the effect of raising the minimum wage on children’s mental health. We examine several outcomes, including diagnoses, symptoms, health care utilization, and impacts on school and social life. This study has important implications for the design of economic policy to improve the mental health of children, as well as the use of structural interventions to benefit vulnerable populations more generally.

**Materials and Methods**

***Study Populations***

We use two nationally representative surveys of children in the U.S.: the National Survey of Children’s Health (NSCH) and the Youth Risk Behavior Surveillance System (YRBSS). Each captures a different time period, population, and outcomes of interest; together, they allow us to broadly characterize the relationship between the minimum wage and children’s mental health.

We used the 2016 to 2020 waves of the NSCH, a yearly, national study of children’s physical and emotional well-being in the U.S. It samples households from two strata within each state: (1) those known to have a child based on Census data, and (2) those projected to have one based on demographic characteristics. Then, parents and guardians report on one of their children. As such, all analyses using the NSCH are clustered by sampling strata nested within states, then weighted to be representative by state. Consistent with surveillance studies that estimate the prevalence of mood disorders starting at age 3,7 our analyses included all children aged 3–17 whose parents provided information on at least one of our outcomes, for a sample of 141,427.

Next, we used the 2001 to 2019 waves of the state-level YRBSS, a set of every-other-year, state-level studies of mental health and risk behaviors in adolescents. As a school-based study, the YRBSS samples classrooms within randomly selected schools. Then, adolescents directly respond to the surveys. As such, all analyses using the YRBSS are clustered by each state’s sampling strata nested within primary sampling units, then weighted to be representative of all students in grades 9–12 in each state. Of note, not all states participate in all years. We include all adolescents who provided information on at least one of our outcomes, for a sample of 9XX,XXX. The demographic characteristics of respondents to both the NSCH and YRBSS are provided in **Table 1**.

**Table 1. Characteristics of children in the samples.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | |  | | |
|  | | **Unweighted**  N=150,834 | | | **Wt.** | |
| **National Survey of Children’s Health (2016–2020)** | |  | |  |  | |
| **Age**  Mean (SD) | | 10.7 (4.4) | |  |  | |
| **Sex**  Male  Female | | 77,872  72,962 | | 52%  48% | 51%  49% | |
| **Race/ethnicity**  White  Black  Hispanic/Latino  American Indian or Alaska Native  Asian, Native Hawaiian, or Pacific Islander  Other or mixed race | | 116,538  10,450  1,298  8,837  13,711 | | 77%  7%  1%  6%  9% | 67%  14%  1%  6%  12% | |
| **Highest education of any adult in household**  Less than high school  High school (including vocational or similar)  Some college or associate degree  College degree or higher | | 3,784  19,902  35,276  91,872 | | 3%)  13%  23%  61% | 10%  20%  22%  49% | |
| **Federal poverty level of household**  Less than 100%  100% to 199%  200% to 299%  300% to 399%  400% or greater | | 14,627  25,225  27,429  25,234  58,319 | | 10%  17%  18%  17%  39% | 17%  23%  18%  14%  28% | |
| **Youth Risk Behavior Surveillance System (2001–2019)** | |  | |  |  | |
|  | |  | |  |  | |

**Notes:** Based on author’s analysis of the National Survey of Children’s Health, 2016–2020.

***Exposure and Outcome Measures***

Our primary exposure is a state’s effective minimum wage per year in U.S. dollars. Based on wage data from the Bureau of Labor Statistics, we use the higher of a state’s minimum wage or the federal minimum wage. Descriptive statistics for the wages are provided in **Figure 1**. Our results are not sensitive to adjusting wages for inflation in 2020 dollars (see appendix).



**Figure 1. Effective minimum wages for each state from 2001 to 2020.**

**Notes:** We show the higher of a state’s minimum wage or the federal minimum wage, not adjusted for inflation, based on data from the Bureau of Labor Statistics. The range is $5.15 to $14.

We examine several mental health outcomes for children and adolescents, including self-reported diagnoses, symptoms, health care utilization, and impacts on school and life. Together, these outcomes capture the clinical, behavioral, and social facets of a child’s mental well-being.

For the NSCH, we evaluate whether a child (1) currently has depression diagnosed by a doctor or other health care provider; (2) currently has anxiety diagnosed by a provider; (3) currently has behavioral problems identified by a provider or educator; (4) has had frequent or chronic difficulty digesting food (including stomach or intestinal problems, constipation, or diarrhea) in the previous calendar year, which is a common manifestation of anxiety in children; (5) has missed 7 or more days of school in the previous calendar year, which can result if a child has debilitating mental health problems (although not exclusively mental health ones); and (6) has EMPLOYMENT????. Of note, all outcomes in the NSCH are reported by parents and guardians.

For the YRBSS, we evaluate whether an adolescent (1)

The exact wording and coding of all questions is provided in the appendix.

***Statistical Analyses***

We test the effect of raising a state’s minimum wage on mental health outcomes using two approaches: two-way fixed effects (TWFE) regressions and event studies. TWFE models capture the descriptive association between the minimum wage and children’s mental health, while the event studies estimate the causal effect of raising the minimum wage on mental health.

First, TWFE models estimate the association between a $1 increase in the minimum wage and the percentage-point change in the prevalence of each outcome. They are akin to a difference-in-differences model when the treatment variable is continuous, and they allow us to use all states and all years of available data. As such, they are the most generalizable approach to understanding how the minimum wage shapes children’s mental health. The TWFE models include state fixed effects to account for time-invariant statewide sociodemographic and policy characteristics, as well as year fixed effects to account for time-variant national economic and other trends.

We also adjust for competing time-variant state policies that might affect low-income families: (1) the state’s Medicaid income eligibility limits for children aged 1–5 and (2) 6–18; (3) whether the state has an earned-income tax credit (EITC); (4) the state’s EITC as a percent of the federal EITC, (5) whether the state’s EITC is refundable; and (6) the state’s maximum Temporary Assistance for Needy Families (TANF) benefits for a family of three. On the respondent level, the NSCH models are adjusted for each child’s age, sex, race/ethnicity, family structure, the highest level of educational attainment by any adult in the household, and family nativity. The YRBSS models have fewer available covariates and are adjusted for age-by-year (to account for generational differences in the longer study period), sex, race/ethnicity, and grade in school.

Of note, our main models include children of all income levels. This design is analogous to intention-to-treat, as a change in the minimum wage may affect any or all households in a state. Households earning near the minimum wage are mostly likely to see their take-home pay rise, but those earning above the minimum wage may experience spillover wage growth.29 Even so, we also estimate the associations for vulnerable sub-populations of children who are more likely to benefit: in the NSCH, (1) those in households earning less than 200% of the federal poverty level; (2) those whose adults have a high school education or less; (3) Black and Hispanic/Latino children; (4) first- or second-generation children; and (5) adolescents (age 13–17), many of whom work minimum wage jobs; and in the YRBSS, Black and Hispanic/Latino adolescents. To do so, we used interacted TWFE models, which interact the minimum wage variable with a dummy variable for the demographic group of interest. These analyses are all provided in the appendix.

We also examine the sensitivity of our results using models with (1) inflation-adjusted minimum wages (in 2020 dollars); (2) wages lagged by 1 year, in case gains in children’s mental health take time to manifest; (3) estimations by logistic regression, which provide the odds ratio for each outcome given a $1 increase in the minimum wage; and (4) the average minimum wage to which a child is exposed throughout their entire life. All are provided in the appendix.

Second, we use event studies to estimate the causal effect of raising the minimum wage on adolescents’ mental health. For these models, we code the 22 states that raised their minimum wage above the federal minimum wage between 2011 and 2019 as the treatment group, and the 11 states that remained at the federal minimum during that period as the control group. Then, we test how raising the minimum wage affects the YRBSS outcomes. Given the limited states and study period, the event studies are less generalizable than the TWFE models. However, since TWFE can be biased when policies are implemented at different times, event studies allow us to identify an unbiased, causal effect.30–32 A full description of the event studies is provided in the appendix.

All analyses use the NSCH or YRBSS weights to produce state-representative estimates and cluster standard errors consistent with each survey’s sampling design (see above). Estimates clustered only at the state level are provided in the appendix. We use the “lfe” and “did” packages in R to estimate our models. This study did not require institutional review board approval as it used public, de-identified data. All replication materials are available at XXXXXXX.

**Results**

***National Survey of Children’s Health***

Between 2016 and 2020, 141,427 households ages 3–17 were surveyed by the National Survey of Children’s Health (NSCH) and included in our analyses. Their demographic and socioeconomic characteristics are presented in **Table 1**; 11% were living below the poverty level.

In cross-sectional analyses, children’s mental health was worse in lower-income households (**Figure 2**). For example, 6% of children living in poverty had depression, compared to just 3% of those above 400% of the federal poverty level (FPL), after adjusting for children’s age, sex, race/ethnicity, family structure, the highest education of any adult in the household, nativity, state, and year. Similarly, an adjusted 9% of children in households in poverty had anxiety, compared to 5% of those above 400% FPL. All outcomes in the NSCH had stark inequities by income.

However, there was little evidence that rising minimum wages between 2016 and 2020 were associated with improvements in children’s mental health. During this period, the effective minimum wages ranged from $7.25 to $14 across states and D.C. (**Figure 1**). Even so, two-way fixed effects (TWFE) models retrieved precisely estimated nulls. For all outcomes except absenteeism, we could rule out an improvement of 1 percentage point (pp) or less per $1 increase in the minimum wage. For absenteeism, we could rule out an improvement greater than 1.5 pp.

Similarly, there was minimal evidence of an association when we examined several vulnerable sub-populations, including children in households living under 200% FPL, households whose adults have a high school education or less; Black and Hispanic/Latino children; first- or second-generation children; and adolescents (age 13–17) (see appendix). Nor was there evidence of an association with several alternative specifications (also provided in the appendix).

***Youth Risk Behavior Surveillance System (YRBSS)***

Given that the NSCH is limited to parent- and guardian-reported outcomes over a narrow set of years, we next turned to the Youth Risk Behavior Surveillance System (YRBSS). Adolescents have directly reported symptoms and behaviors to the YRBSS over many decades. Between 2001 and 2019, 900,000 adolescents were surveyed and included in our analyses (**Table 1**). During this period, effective minimum wages ranged from $5.15 to $14 across states and D.C., with the federal minimum wage raised between from $5.15 to $7.25 between 2008 and 2010(?).

Even

~~In cross-sectional analyses, children’s mental health outcomes were substantially worse in lower-income households (~~**~~Figure 2~~**~~). For example, 6% of children in households earning less than 100% of the FPL had active, diagnosed depression, compared to 3% in households above 400% FPL, after adjusting for child and household demographic characteristics, state, and year. Similarly, an adjusted 9% of children in households under 100% FPL had active anxiety, compared to 5% of those above 400%. There were similarly stark inequities in the rates of digestive issues during the past year, which are a common manifestation of anxiety in children, and having missed at least 7 days of school during the past year, a potential consequence of poor mental health.~~

~~Next, we evaluated whether increases in a state’s minimum wage improved children’s mental health. Between 2016 and 2020, the effective minimum wages ranged from $7.25 to $14 across states (plus the District of Columbia) (~~**~~Figure 1~~**~~). During that period, 24 states used the federal minimum of $7.25 for the entire time, while 26 states (plus D.C.) increased their minimum wage, with a range of $0.44 to $4.50. Examining the association between the minimum wage and children’s mental health returned precisely estimated nulls for all four outcomes (~~**~~Figure 3~~**~~; see~~ **~~Appendix Table 1~~** ~~for the models). A $1 increase in a state’s effective minimum wage did not improve the rate of active depression among children aged 3–17 (+0.3 percentage-points [pp]; 95% C.I., −0.0 to 0.7 pp; P=0.075), nor the rate of active anxiety (+0.4 pp, 95% C.I. −0.1 to 0.9 pp, P=0.078), digestive issues during the past year (+0.2 pp, 95% C.I. −0.3 to 0.6 pp, P=0.52), or for having missed at least 7 days of school in the past year (–0.4 pp; 95% C.I., −1.2 to 0.4 pp; P=0.32). For depression, anxiety, and digestive issues, we can rule out an improvement greater than one-third of a percentage point for every $1 increase in a state’s effective minimum wage.~~

~~Lastly, we examined whether children in low-income households — who were more likely to benefit from an increase in the minimum wage — were also more likely to experience improvements in their mental health. Yet even for households below 200% FPL, the effect of the minimum wage on all four mental health outcomes remained null and precisely specified (~~**~~Figure 3~~**~~; see~~ **~~Appendix Table 1~~** ~~for the models). A $1 increase in the minimum wage did not improve rates of depression (+0.3 pp; 95% C.I., −0.1 to 0.7 pp; P=0.12); anxiety (+0.1 pp; 95% C.I., −0.5 to 0.7 pp; P=0.80); digestive issues during the past year (+0.0 pp; 95% C.I., −0.4 to 0.5 pp; P=0.89); or having missed 7+ days of school in the past year (+0.5 pp; 95% C.I., −1.4 to 0.3 pp; P=0.22). For depression, anxiety, and digestive issues, we can rule out an improvement greater than one-half of a percentage point for every $1 increase in a state’s effective minimum wage.~~

~~ADD BRIEF DISCUSSION OF ADOLESCENTS + NON-WHITE + ROBUSTNESS~~

**Discussion**

~~Since mood and anxiety disorders are uncommonly diagnosed before age 6,~~33 ~~we show in robustness checks that our results are not sensitive to restricting the sample to ages 6–17 (see appendix).~~

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**~~Figure 2. Adjusted rates of mental health outcomes among children aged 3–17.~~**

**~~Notes:~~** ~~Each bar provides the rate of the indicated outcome by household federal poverty level (FPL), adjusted for child and household characteristics (i.e. child’s age, gender, race, and ethnicity, and the highest education of any adult in the household), plus state and year fixed effects in OLS models. Standard errors are clustered by sampling strata and state. 95% confidence intervals are provided. Based on author’s analysis of the National Survey of Children’s Health, 2016–2020.~~

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**~~Figure 3. Association between the minimum wage and children’s mental health outcomes.~~**

**~~Notes:~~** ~~Each line provides the association between a $1 increase in a state’s effective minimum wage and each outcome using two-way fixed effects models, i.e. models with state and year fixed effects. All models are also adjusted for a child’s age, gender, race, and ethnicity, and the highest education of any adult in the household, plus state and year fixed effect. Standard errors are clustered by sampling strata and state. 95% confidence intervals are provided. N=122,016 to 151,441. Based on author’s analysis of the National Survey of Children’s Health, 2016–2020.~~