# The Minimum Wage and Children's Mental Health

Nolan M. Kavanagh, M.P.H., 1,2 Margaret McConnell, Ph.D., 3 Natalie Slopen, Sc.D. 3,4

<sup>1</sup> Interfaculty Initiative in Health Policy, Harvard University, Cambridge, Massachusetts

<sup>2</sup> Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania

<sup>3</sup> Harvard T.H. Chan School of Public Health, Boston, Massachusetts

<sup>4</sup> Center on the Developing Child, Harvard University, Cambridge, Massachusetts

Word count: est. 3,000

# **Corresponding author**

Nolan M. Kavanagh, M.P.H.

Interfaculty Initiative in Health Policy, Harvard University

14 Story Street, Cambridge, Mass. 02138

nolankavanagh@fas.harvard.edu

#### **Structured Abstract**

**Importance:** Mental health disorders are on the rise for children and adolescents in the U.S., with children living in poverty having especially high rates. More evidence is needed about the effects of economic policies, such as the minimum wage, on children's mental health.

**Objective:** To test the association between state minimum wages and children's mental health.

**Design:** Repeated cross-sectional study from 2001 to 2020.

**Setting:** Population-based study in the U.S.

**Participants:** Nationally representative, stratified random samples of children, aged 3–17, from the National Survey of Children's Health (N=141,427; 2016–2020) and adolescents, aged 12–18, from the Youth Risk Behavior Surveillance System (N=1,246,623; 2001–2019).

**Exposure:** State-level minimum wage policies in the U.S. from 2001 to 2020.

Main Outcomes and Measures: We evaluated 15 mental health outcomes reported by either parents/guardians or adolescents from survey data, including rates of depression, anxiety, ADD/ADHD, and behavioral disorders; mood symptoms; suicidality; health care utilization; substance use; violence; absenteeism; and employment. Individual-level covariates included age, sex, race and ethnicity, grade in school, family structure, parental education, and/or nativity, depending on the survey. State-level covariates included Medicaid income eligibility limits, earned income tax credit policies, and Temporary Assistance for Needy Families benefits. We estimated two-way fixed effects and difference-in-differences models with individual- and state-level controls.

**Results:** The analyses included 141,427 children aged 3–17 from 2016–2020, and 1,246,623 adolescents aged 12–18 from 2001–2019. For all 15 outcomes, increases in the state-level minimum wage were not associated with significant improvements in the mental health of children and adolescents. Nor were there significant associations when applying alternative modeling strategies or stratifying by household income, parental education, race and ethnicity, nativity, or age. For most analyses, the confidence intervals were sufficiently precise to exclude meaningful effect sizes.

Conclusions and Relevance: Changes in state-level minimum wage policies in the U.S. over the past two decades were not associated with improvements in the mental health of children and adolescents. More evidence is needed on policy approaches to improve the mental health of children and adolescents, particularly those in socioeconomically disadvantaged families.

# **Key Points**

**Question:** What is the association between state minimum wage policies and the mental health of children and adolescents in the U.S. over the past two decades?

**Findings:** In this repeated cross-sectional study using data on over 1.3 million children and adolescents from 2001 to 2020, we find no significant associations between changes in state-level minimum wages and 15 mental health outcomes, including reported diagnoses, symptoms, suicidality, substance use, health care utilization, and impacts on school and social life.

**Meaning:** Recent raises in the minimum wage in the U.S. have not been mirrored by improvements in children's mental health; more evidence is needed on economic policies that may improve the mental health of children and adolescents, especially in disadvantaged families.

# **Introduction**

Children and adolescents in the U.S. are facing a mental health crisis. <sup>1–6</sup> Mood and anxiety disorders are on the rise, with 3% of children aged 3–17 having depression and 9% having anxiety in 2016–2019. <sup>7</sup> The COVID-19 pandemic has only accelerated the crisis. <sup>8</sup> Poor mental health has pervasive impacts on a child's quality of life and academic performance. <sup>9</sup> Many of its consequences even last into adulthood, as adolescent depression has been associated with lower long-run educational attainment, lower employment, and more chronic diseases. <sup>10,11</sup>

Poverty places an additional burden on families,<sup>12</sup> with children in poverty having higher rates of mental health disorders than higher-income families.<sup>13</sup> Economic policies, such as raising the minimum wage, have the potential to improve children's mental health.<sup>14,15</sup> Evidence suggests that raising the minimum wage improves children's physical health, including birth weights,<sup>16</sup> infant mortality,<sup>16,17</sup> school absenteeism,<sup>18</sup> and indexes of overall health,<sup>18</sup> especially for certain demographic groups.<sup>19,20</sup> However, while the impact of the minimum wage on adults' mental health has been studied,<sup>21–26</sup> limited research has examined its impact on children's mental health.

Children's mental health may be especially responsive to rising minimum wages. A child's emotional and behavioral problems tend to worsen with household economic stress, <sup>13,27</sup> and rising wages may help alleviate it.<sup>28</sup> Meanwhile, higher incomes may allow parents to invest more time and resources into their children, <sup>29–31</sup> identify and address mental health needs, <sup>13,32</sup> and gain access to other health-promoting resources, such as better housing or schools. <sup>33,34</sup>

In this study, we use two national samples that together include 1.3 million children and adolescents, aged 3 to 18, in the U.S. from 2001–2020 to estimate the association between minimum wage policies and mental health. We examine 15 outcomes, including diagnoses, symptoms,

substance use, health care utilization, school, work, and more. This study has implications for the design of economic policy to improve the well-being of disadvantaged populations.

### **Materials and Methods**

## Study Populations

We used two national 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 period, target 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 2016–2020 waves of the NSCH, a yearly national study of children's physical and emotional well-being. It samples households known or projected to have a child based on Census data; then, parents or guardians report on one of their children. Analyses using the NSCH were weighted to be representative of all U.S. children. Consistent with surveillance studies that track mood disorders starting at age 3,7 we included all children aged 3–17 whose caregivers provided complete information for at least one outcome and all covariates (**Table 1**).

We also used the 2001–2019 waves of the YRBSS, a set of biennial, state-level surveys of adolescent mental health and risk behaviors. As a school-based study, it samples classrooms in randomly selected schools; then, adolescents directly respond to the surveys. Analyses using the YRBSS were weighted to be representative of all students in grades 9–12 in participating states and years. State participation is detailed in **Table A1**. We included all adolescents who provided complete information for at least one outcome and all covariates (**Table 2**).

#### **Exposure and Outcome Measures**

Our exposure is a state's nominal minimum wage in U.S. dollars. We used data from the Bureau of Labor Statistics and took the higher of a state's minimum wage or the federal minimum wage each year (**Figure A1**). As outcomes, we examined 15 measures of mental health that capture the clinical, behavioral, and social facets of mental well-being. Some, including symptoms and coping mechanisms, should be especially sensitive to changes in financial stress.<sup>13,27</sup>

For the NSCH, all outcomes were reported by parents or guardians. We evaluated whether a child had (1) depression identified by a health care provider; (2) anxiety; (3) ADD or ADHD; (4) behavioral problems identified by a provider or educator; (5) chronic difficulty digesting food (e.g. gastrointestinal problems, constipation, or diarrhea) in the past year, a common manifestation of anxiety in children; (6) not received necessary health care of any kind in the past year, as mental health disorders can have non-specific symptoms; (7) not received necessary mental health services, specifically, in the past year; (8) missed 7 or more days of school in the past year (for ages 6–17), a potential consequence of debilitating mental illness; or (9) participated in any paid employment in the past year (ages 6–17), a potential marker of household financial stress.

For the YRBSS, all outcomes were reported by adolescents. We evaluated whether an adolescent had (1) felt incapacitating sadness or hopelessness for two weeks or longer in the past year; (2) considered or (3) attempted suicide in the past year; (4) used alcohol or (5) marijuana in the past month, potential coping mechanisms for stress; or (6) been in a physical fight in the past year. The exact wording and coding of all survey questions are provided in **Table A2**.

#### Statistical Analyses

To contextualize the need for economic policies to improve children's mental health, we documented cross-sectional inequities in the NSCH outcomes by household federal poverty level

(FPL) using ordinary least squares (OLS) regressions. These models compared the mental health of children with different household incomes but similar demographic profiles, states, and years. These models are fully described in **Section A4** of the appendix. The YRBSS does not collect income data, so we could not repeat the same procedure with this dataset.

Next, we tested the relationship between the state minimum wage and children's mental health using OLS two-way fixed effects (TWFE) models, which estimate the association between a \$1 increase in the minimum wage and the percentage-point change in the prevalence of each outcome. These models are similar to a difference-in-differences when the treatment variable is continuous, and they allow us to use all states and years of data. They are also consistent with existing work on the minimum wage and children's health. He are also consistent to account for time-invariant social and policy characteristics of each state, and year fixed effects to account for time-variant national economic trends. The YRBSS models also included age-by-year fixed effects to account for distinct generational experiences over two decades of data.

On the respondent level, the NSCH models were adjusted for each child's age, sex, race/ethnicity, family structure, highest education of any adult in the household, and nativity. The YRBSS models had fewer available covariates and were adjusted for age, sex, race/ethnicity, and grade in high school. We also adjusted for other time-variant state policies that might affect low-income families: (1) each state's Medicaid income eligibility limits for children ages 1–5 and (2) 6–18; (3) whether the state had an earned income tax credit (EITC); (4) the state's EITC as a percent of the federal EITC, (5) whether the state's EITC was refundable; and (6) the state's maximum Temporary Assistance for Needy Families (TANF) benefits for a family of 3. 16,18

Notably, our main models included households of all incomes. This design is analogous to intention-to-treat, as a change in the minimum wage might affect any or all households in a state.

Workers earning near the minimum wage are most likely to see their take-home pay rise, but higher earners may experience spillover wage growth that affects their children's well-being.<sup>35</sup>

We also estimated the associations for several populations that are more likely to benefit from rising wages: in the NSCH, (1) households earning less than 200% FPL; (2) households whose adults have no more than a high school education; (3) Black and Hispanic/Latino children; (4) first- or second-generation children; (5) adolescents (ages 13–17), many of whom work minimum wage jobs; and (6) children living in non-urban areas, i.e. outside the principal cities of metropolitan statistical areas; in the YRBSS, Black and Hispanic/Latino adolescents.

One concern might be that the main TWFE models do not adequately capture the longer-run effects of rising wages or other economic influences. To address these concerns, we applied several alternative modeling strategies: (1) inflation-adjusted wages, to account for rising costs throughout the study period; (2) wages lagged by one year; and (3) the average minimum wage to which a child was likely exposed throughout their entire life. The lifetime wage models adopt a human capital approach for long-term investments in health, similar to previous work on the minimum wage and children's physical health (detailed in **Section A8** of the appendix). <sup>18</sup>

Another concern is that TWFE models can introduce bias if there are dynamic treatment effects of policies implemented at different times.<sup>36–38</sup> As a result, we applied yet another modeling strategy: difference-in-differences models and event studies. These analyses isolate wage variation in a group of treatment states that raised their minimum wages at the same time, relative to a group of control states whose wages did not vary. We used the 2011–2019 waves of the YRBSS, i.e. all waves after the last raise in the federal minimum wage, and estimated the unbiased effect of up to a \$3.63 raise in the minimum wage with 6 years of follow-up. These models not only estimate

longer-run effects but also overcome the potential biases of TWFE models with staggered treatment timing.<sup>36–38</sup> We detail these analyses in **Sections A10–A11** of the appendix.

Each modeling strategy has strengths that help overcome the weaknesses of others, with some taking advantage of all data and variation in minimum wages (i.e. the TWFE models), some estimating longer-run effects (i.e. the lagged wage, lifetime wage, and event studies), and some eliminating the potential biases of staggered treatment timing (i.e. the difference-in-differences). Similarly, the data sources complement one another, with one allowing rich subgroup analyses (i.e. the NSCH) and one evaluating policy changes over two decades (i.e. the YRBSS).

#### **Results**

## National Survey of Children's Health

From 2016–2020, our analyses included 141,427 children aged 3–17 in the NSCH (**Table 1**). A weighted 3% of them reported depression, 8% had anxiety, 9% had ADD/ADHD, and 7% had behavioral problems. In the past year, 8% had chronic digestive issues, 4% had not received necessary medical care of any kind, 1% had not received necessary mental health services, 10% had missed 7 or more days of school, and 22% had some form of employment.

Children in lower-income households had significantly worse rates of mental health disorders, symptoms, access to care, absenteeism, and economic opportunities. For example, the rate of depression was 2.6 percentage points (pp) higher (95% CI, 2.0 to 3.1, P<0.001) for children living in poverty than those above 400% FPL, after adjusting for demographic characteristics, state, and year. All NSCH outcomes showed meaningful differences by income (**Figure A2**).

From 2016–2020, the minimum wages ranged from \$7.25 to \$14 across states and Washington, D.C., with some states raising their minimum wages by as much as \$4.50 (**Figure A1**). Even so, rising minimum wages during this period were not associated with significant improvements in children's mental health for any outcome in the NSCH: depression (0.2 pp; 95% CI, 0.0 to 0.4; P=0.03), anxiety (0.3 pp; 95% CI, –0.1 to 0.7; P=0.12), ADD/ADHD (–0.2 pp; 95% CI, –0.6 to 0.2; P=0.34); behavioral problems (0.1 pp; 95% CI, –0.5 to 0.6; P=0.81); digestive issues (0.0 pp; 95% CI, –0.4 to 0.5; P=0.85); any unmet health care (–0.1 pp; 95% CI, –0.4 to 0.3; P=0.69); unmet mental health care (–0.1 pp; 95% CI, –0.2 to 0.1; P=0.45); being absent from 7+ days of school (–0.5 pp; 95% CI, –1.4 to 0.4; P=0.26), and being employed (–0.1 pp; 95% CI, –0.8 to 0.7 pp; P=0.82) (**Figure 1**). For all outcomes except absenteeism, our 95% confidence intervals excluded an improvement of 1.0 pp or less per \$1 increase in the minimum wage.

Similarly, there was minimal evidence of improvements when we examined children living in households under 200% FPL, households whose adults had no more than a high school education; Black and Hispanic/Latino children; first- or second-generation children; adolescents aged 13–17; and children living in non-urban areas (**Figure A5**). There was also little to no evidence of longer-run impacts using inflation-adjusted wages, lagged wages, or wages summed across a child's entire life, nor in several sensitivity analyses (**Figures A3, A7, A9, A11, A13**).

# Youth Risk Behavior Surveillance System

From 2001–2019, our analyses included 1,246,623 high school-aged adolescents in the YRBSS (**Table 2**). In the past year, a weighted 29% reported being sad or hopeless for 2 or more consecutive weeks, 16% considered suicide, 9% attempted suicide, and 27% had been in a physical fight. In the past month, 35% reported using alcohol and 20% reported using marijuana.

From 2001–2019, the minimum wages ranged from \$5.15 to \$14 across states and D.C., and the federal minimum wage rose from \$5.15 to \$7.25 in 2008–2010 (**Figure A1**). Nevertheless, rising wages were not associated with improvements in any adolescent mental health outcomes: being sad or hopeless (0.3 pp; 95% CI, –0.4 to 1.0; P=0.39), considering suicide (0.1 pp; 95% CI, –0.4 to 0.7; P=0.62), attempting suicide (0.0 pp; 95% CI, –0.4 to 0.3; P=0.83), using alcohol (–0.1 pp; 95% CI, –0.7 to 0.5; P=0.83), using marijuana (0.1 pp; 95% CI, –0.4 to 0.5; P=0.73), or being in a fight (0.5 pp; 95% CI, –0.3 to 1.2; P=0.22) (**Figure 2**). For all 6 outcomes, our TWFE models ruled out an improvement of 1.0 pp or less per \$1 increase in the minimum wage.

Similarly, there was minimal evidence of benefits for Black and Hispanic/Latino children, nor clear evidence of longer-run effects using inflation-adjusted wages, lagged wages, wages summed across a child's life, and difference-in-differences and event studies that captured raises of up to \$3.63 and 6 years of follow-up. There was also little to no evidence of benefits in several other sensitivity analyses (**Figures A4, A6, A8, A10, A12, A14–A19, Table A7**).

#### **Discussion**

In this national study, we found little to no evidence that state-level minimum wage increases over the past two decades in the U.S. were associated with improvements in the mental health of children and adolescents. We excluded meaningfully large associations using two

national surveys, 15 outcomes that capture multiple facets of mental well-being, and several modeling approaches. We also failed to find evidence of benefit for several socioeconomically disadvantaged subgroups, including lower-income, immigrant, and racially minoritized children.

Existing work on the minimum wage and mental health has focused on adults.<sup>21</sup> Rising minimum wages in Britain improved the mental health of lower-wage workers,<sup>22</sup> although these improvements may have been short-lived.<sup>23</sup> In the U.S., rising minimum wages have been associated with improved mental health for less-educated women<sup>24</sup> (but not all less-educated adults<sup>25</sup>), fewer stressful life events for pregnant persons,<sup>26</sup> and decreased suicides.<sup>39,40</sup> Other economic policies, such as tax credits, have been shown to improve the psychological well-being of adults.<sup>41,42</sup> Despite the evidence that rising minimum wages improve the mental health of adults, our study suggests that similar benefits have not accrued to children in the U.S. in recent decades.

One concern might be that the observed nulls reflect offsetting forces, especially for the diagnostic outcomes. For example, rising wages could reduce the "true" rate of depression while enabling families to seek medical care and get overdue diagnoses, thereby raising the "apparent" rate. However, there was no evidence of improvement at any stage of the pathway from wages to diagnoses, including employment (a potential marker of financial stress), symptoms, substance use (a potential coping mechanism), access to health care, social life, and school. Symptoms and coping mechanisms should be especially sensitive to changes in financial stress. 13,27

Moreover, these null findings are not for lack of children who might benefit from rising minimum wages, either because they or their caregivers earn low wages, or due to spillover wage growth.<sup>35</sup> In 2022, 52 million workers in the U.S. earned less than \$15 per hour, including 6 million teenagers and 11 million single parents.<sup>43</sup> In previous years, the numbers were even higher.<sup>44</sup> That said, raises in the minimum wage can (but not always) lead to reduced hours for low-wage

workers.<sup>45–48</sup> And when wages rise, some low-wage workers face "benefits cliffs," or parallel reductions in public benefits that might blunt the health-promoting effects of a higher wage.<sup>47</sup> Thus, it is important for policymakers to take into account other economic and government influences when raising the minimum wage to ensure that disadvantaged families see net benefits.

Our study has several limitations. First, we do not consider city- or county-level minimum wages, only state-level policies. Several localities, mostly urban, have passed minimum wages above and beyond their state's.<sup>49</sup> Evidence from some (but not all) cities has suggested that these policies impacted the economic well-being of residents.<sup>45,50,51</sup> It is possible that changes in local minimum wages during the past two decades produced meaningful improvements in children's mental health that we failed to capture at the state level. That said, when the economic effects of local minimum wages have been compared with those of state-level policies, the two estimates have tended to be similar.<sup>52</sup> And when we focused on children outside of major U.S. cities, who were unlikely to have experienced local policy changes, we still retrieved null estimates.

Second, our study is based on weighted survey data, which is vulnerable to sampling, response, and weighting biases. Even so, we got similar results using two national surveys with different sampling schemes and both caregiver- and adolescent-reported outcomes, all of which help to mitigate the risk of bias.<sup>53</sup> Third, our study relies partly on TWFE models, which may be biased when policies are implemented at staggered times.<sup>36–38</sup> Even so, we got similar results when applying an unbiased difference-in-differences approach to wage changes implemented at one point in time in a subset of our data. Finally, while many of our nulls are precisely estimated, we cannot exclude the possibility of more modest yet still positive associations, nor can we comment on the potential consequences of more ambitious raises in the minimum wage.

Taken together, our findings suggest that raises in the minimum wage over the past two decades in the U.S. did not meaningfully improve children's mental health. This is despite the strong relationship between poverty and children's mental health. 12,13,27 While there are many social, economic, and political reasons to raise the minimum wage, more evidence is needed on policies to improve the mental well-being of children, especially in disadvantaged families.

# **References**

- 1. Bitsko RH, Holbrook JR, Ghandour RM, et al. Epidemiology and Impact of Health Care Provider–Diagnosed Anxiety and Depression Among US Children. *J Dev Behav Pediatr*. 2018;39(5):395-403. doi:10.1097/DBP.000000000000571
- 2. Mojtabai R, Olfson M, Han B. National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults. *Pediatrics*. 2016;138(6):e20161878. doi:10.1542/peds.2016-1878
- 3. Twenge JM. The age of anxiety? The birth cohort change in anxiety and neuroticism, 1952–1993. *Journal of Personality and Social Psychology*. 2000;79:1007-1021. doi:10.1037/0022-3514.79.6.1007
- 4. Twenge JM, Gentile B, DeWall CN, Ma D, Lacefield K, Schurtz DR. Birth cohort increases in psychopathology among young Americans, 1938–2007: A cross-temporal meta-analysis of the MMPI. *Clinical Psychology Review*. 2010;30(2):145-154. doi:10.1016/j.cpr.2009.10.005
- 5. Keyes KM, Gary D, O'Malley PM, Hamilton A, Schulenberg J. Recent increases in depressive symptoms among US adolescents: trends from 1991 to 2018. *Soc Psychiatry Psychiatr Epidemiol*. 2019;54(8):987-996. doi:10.1007/s00127-019-01697-8
- 6. Bor W, Dean AJ, Najman J, Hayatbakhsh R. Are child and adolescent mental health problems increasing in the 21st century? A systematic review. *Aust N Z J Psychiatry*. 2014;48(7):606-616. doi:10.1177/0004867414533834
- 7. Bitsko RH, Claussen AH, Lichstein J, et al. Mental health surveillance among children— United States, 2013–2019. *MMWR supplements*. 2022;71(2):1.
- 8. Racine N, McArthur BA, Cooke JE, Eirich R, Zhu J, Madigan S. Global Prevalence of Depressive and Anxiety Symptoms in Children and Adolescents During COVID-19: A Metanalysis. *JAMA Pediatrics*. 2021;175(11):1142-1150. doi:10.1001/jamapediatrics.2021.2482
- 9. Suldo SM, Gormley MJ, DuPaul GJ, Anderson-Butcher D. The Impact of School Mental Health on Student and School-Level Academic Outcomes: Current Status of the Research and Future Directions. *School Mental Health*. 2014;6(2):84-98. doi:10.1007/s12310-013-9116-2
- Clayborne ZM, Varin M, Colman I. Systematic Review and Meta-Analysis: Adolescent Depression and Long-Term Psychosocial Outcomes. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2019;58(1):72-79. doi:10.1016/j.jaac.2018.07.896
- 11. Bourassa KJ, Moffitt TE, Ambler A, et al. Association of Treatable Health Conditions During Adolescence With Accelerated Aging at Midlife. *JAMA Pediatrics*. 2022;176(4):392-399. doi:10.1001/jamapediatrics.2021.6417

- 12. COUNCIL ON COMMUNITY PEDIATRICS, Gitterman BA, Flanagan PJ, et al. Poverty and Child Health in the United States. *Pediatrics*. 2016;137(4):e20160339. doi:10.1542/peds.2016-0339
- 13. Larson K, Halfon N. Family Income Gradients in the Health and Health Care Access of US Children. *Matern Child Health J.* 2010;14(3):332-342. doi:10.1007/s10995-009-0477-y
- 14. Ormel J, Cuijpers P, Jorm AF, Schoevers R. Prevention of depression will only succeed when it is structurally embedded and targets big determinants. *World Psychiatry*. 2019;18(1):111-112. doi:10.1002/wps.20580
- Gassman-Pines A, Ananat EO, Gibson-Davis CM. Effects of Statewide Job Losses on Adolescent Suicide-Related Behaviors. *Am J Public Health*. 2014;104(10):1964-1970. doi:10.2105/AJPH.2014.302081
- 16. Wehby GL, Dave DM, Kaestner R. Effects of the Minimum Wage on Infant Health. *Journal of Policy Analysis and Management*. 2020;39(2):411-443. doi:10.1002/pam.22174
- 17. Komro KA, Livingston MD, Markowitz S, Wagenaar AC. The Effect of an Increased Minimum Wage on Infant Mortality and Birth Weight. *Am J Public Health*. 2016;106(8):1514-1516. doi:10.2105/AJPH.2016.303268
- 18. Wehby GL, Kaestner R, Lyu W, Dave DM. Effects of the Minimum Wage on Child Health. *American Journal of Health Economics*. 2022;8(3):412-448. doi:10.1086/719364
- 19. Averett SL, Smith JK, Wang Y. Minimum wages and the health of immigrants' children. *Applied Economics Letters*. 2021;28(11):894-901. doi:10.1080/13504851.2020.1784832
- 20. Averett SL, Smith JK, Wang Y. The effects of minimum wages on the health of working teenagers. *Applied Economics Letters*. 2017;24(16):1127-1130. doi:10.1080/13504851.2016.1259737
- 21. Leigh JP, Leigh WA, Du J. Minimum wages and public health: A literature review. *Preventive Medicine*. 2019;118:122-134. doi:10.1016/j.ypmed.2018.10.005
- 22. Reeves A, McKee M, Mackenbach J, Whitehead M, Stuckler D. Introduction of a National Minimum Wage Reduced Depressive Symptoms in Low-Wage Workers: A Quasi-Natural Experiment in the UK. *Health Economics*. 2017;26(5):639-655. doi:10.1002/hec.3336
- 23. Kronenberg C, Jacobs R, Zucchelli E. The impact of the UK National Minimum Wage on mental health. SSM Population Health. 2017;3:749-755. doi:10.1016/j.ssmph.2017.08.007
- 24. Horn BP, Maclean JC, Strain MR. Do Minimum Wage Increases Influence Worker Health? *Economic Inquiry*. 2017;55(4):1986-2007. doi:10.1111/ecin.12453
- 25. Andreyeva E, Ukert B. The impact of the minimum wage on health. *Int J Health Econ Manag.* 2018;18(4):337-375. doi:10.1007/s10754-018-9237-0

- 26. Rokicki S, Reichman NE, McGovern ME. Association of Increasing the Minimum Wage in the US With Experiences of Maternal Stressful Life Events. *JAMA Network Open*. 2023;6(7):e2324018. doi:10.1001/jamanetworkopen.2023.24018
- 27. Takeuchi DT, Williams DR, Adair RK. Economic Stress in the Family and Children's Emotional and Behavioral Problems. *Journal of Marriage and Family*. 1991;53(4):1031-1041. doi:10.2307/353006
- 28. Stuckler D, Basu S, Suhrcke M, Coutts A, McKee M. The public health effect of economic crises and alternative policy responses in Europe: an empirical analysis. *The Lancet*. 2009;374(9686):315-323. doi:10.1016/S0140-6736(09)61124-7
- 29. Guryan J, Hurst E, Kearney M. Parental Education and Parental Time with Children. *Journal of Economic Perspectives*. 2008;22(3):23-46. doi:10.1257/jep.22.3.23
- 30. Akee RKQ, Copeland WE, Keeler G, Angold A, Costello EJ. Parents' Incomes and Children's Outcomes: A Quasi-experiment Using Transfer Payments from Casino Profits. *American Economic Journal: Applied Economics*. 2010;2(1):86-115. doi:10.1257/app.2.1.86
- 31. Kornrich S, Furstenberg F. Investing in Children: Changes in Parental Spending on Children, 1972–2007. *Demography*. 2012;50(1):1-23. doi:10.1007/s13524-012-0146-4
- 32. McCarrier KP, Zimmerman FJ, Ralston JD, Martin DP. Associations Between Minimum Wage Policy and Access to Health Care: Evidence From the Behavioral Risk Factor Surveillance System, 1996–2007. *Am J Public Health*. 2011;101(2):359-367. doi:10.2105/AJPH.2006.108928
- 33. Du J, Yagihashi T. Health capital investment and time spent on health-related activities. *Rev Econ Household*. 2017;15(4):1215-1248. doi:10.1007/s11150-017-9378-9
- 34. Smith AA. The minimum wage and teen educational attainment. *Labour Economics*. 2021;73:102061. doi:10.1016/j.labeco.2021.102061
- 35. Dittrich M, Knabe A, Leipold K. Spillover Effects of Minimum Wages in Experimental Wage Negotiations. *CESifo Economic Studies*. 2014;60(4):780-804. doi:10.1093/ce-sifo/ifu034
- 36. Goodman-Bacon A. Difference-in-differences with variation in treatment timing. *Journal of Econometrics*. 2021;225(2):254-277. doi:10.1016/j.jeconom.2021.03.014
- 37. Callaway B, Sant'Anna PHC. Difference-in-Differences with multiple time periods. *Journal of Econometrics*. 2021;225(2):200-230. doi:10.1016/j.jeconom.2020.12.001
- 38. Sun L, Abraham S. Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*. 2021;225(2):175-199. doi:10.1016/j.jeconom.2020.09.006

- 39. Gertner AK, Rotter JS, Shafer PR. Association Between State Minimum Wages and Suicide Rates in the U.S. *American Journal of Preventive Medicine*. 2019;56(5):648-654. doi:10.1016/j.amepre.2018.12.008
- 40. Kaufman JA, Salas-Hernández LK, Komro KA, Livingston MD. Effects of increased minimum wages by unemployment rate on suicide in the USA. *J Epidemiol Community Health*. 2020;74(3):219-224. doi:10.1136/jech-2019-212981
- 41. Batra A, Jackson K, Hamad R. Effects Of The 2021 Expanded Child Tax Credit On Adults' Mental Health: A Quasi-Experimental Study. *Health Affairs*. 2023;42(1):74-82. doi:10.1377/hlthaff.2022.00733
- 42. Shields-Zeeman L, Collin DF, Batra A, Hamad R. How does income affect mental health and health behaviours? A quasi-experimental study of the earned income tax credit. *J Epidemiol Community Health*. 2021;75(10):929-935. doi:10.1136/jech-2020-214841
- 43. Henderson K, Stapleton S. *The Crisis of Low Wages in the U.S.: Who Makes Less than \$15 an Hour in 2022?* Oxfam America; 2022. Accessed October 17, 2023. https://www.oxfamamerica.org/explore/research-publications/the-crisis-of-low-wages-in-the-us/
- 44. Economic Policy Institute. Few Rewards: An Agenda to Give America's Working Poor a Raise. Oxfam America; 2016. Accessed October 17, 2023. https://www.oxfamamerica.org/explore/research-publications/few-rewards/
- 45. Jardim E, Long MC, Plotnick R, van Inwegen E, Vigdor J, Wething H. Minimum-Wage Increases and Low-Wage Employment: Evidence from Seattle. *American Economic Journal: Economic Policy*. 2022;14(2):263-314. doi:10.1257/pol.20180578
- 46. Sabia JJ. The Effects of Minimum Wage Increases on Retail Employment and Hours: New Evidence from Monthly CPS Data. *J Labor Res.* 2009;30(1):75-97. doi:10.1007/s12122-008-9054-1
- 47. Ballentine K, Goodkind S, Shook J. How Low-Paid Parents Navigate The Complex Financial Landscape Of Benefits Cliffs And Disincentive Deserts. *Health Affairs*. 2022;41(12):1707-1714. doi:10.1377/hlthaff.2022.00742
- 48. Zavodny M. The effect of the minimum wage on employment and hours. *Labour Economics*. 2000;7(6):729-750. doi:10.1016/S0927-5371(00)00021-X
- 49. Desilver D. When it comes to raising the minimum wage, most of the action is in cities and states, not Congress. Pew Research Center. Published March 12, 2021. Accessed August 10, 2023. https://www.pewresearch.org/short-reads/2021/03/12/when-it-comes-to-raising-the-minimum-wage-most-of-the-action-is-in-cities-and-states-not-congress/
- 50. Dube A, Naidu S, Reich M. The Economic Effects of a Citywide Minimum Wage. *ILR Review*. 2007;60(4):522-543. doi:10.1177/001979390706000404

- 51. Allegretto S, Godoey A, Nadler C, Reich M. The new wave of local minimum wage policies: Evidence from six cities. *CWED Policy Report*. Published online 2018.
- 52. Dube A, Lindner A. City Limits: What Do Local-Area Minimum Wages Do? *Journal of Economic Perspectives*. 2021;35(1):27-50. doi:10.1257/jep.35.1.27
- 53. Holbrook JR, Bitsko RH, Danielson ML, Visser SN. Interpreting the Prevalence of Mental Disorders in Children: Tribulation and Triangulation. *Health Promot Pract*. 2017;18(1):5-7. doi:10.1177/1524839916677730

Table 1: Demographic characteristics of children in the National Survey of Children's Health from 2016–2020.

	_	Unweighted N=141,427		
Child's age*				
Mean (SD)	11.7 (4.4)		11.1 (4.3)	
Range	3–17		3–17	
Child's sex				
Male	72,965	52%	51%	
Female	68,462	48%	49%	
Child's race/ethnicity				
White, non-Hispanic/Latino	98,521	70%	52%	
Black, non-Hispanic/Latino	8,233	6%	12%	
Hispanic/Latino	16,601	12%	25%	
American Indian or Alaska Native	754	1%	<1%	
Asian, Native Hawaiian, or Pacific Islander	7,823	6%	5%	
Other or mixed race	9,495	7%	5%	
Family structure				
Two parents, married	104,553	74%	69%	
Two parents, not married	8,888	6%	8%	
Single parent	27,664	20%	23%	
Another family structure	322	<1%	<1%	
Highest education of any adult in household				
Less than high school	3,144	2%	9%	
High school (including vocational or similar)	17,225	12%	19%	
Some college or associate degree	32,379	23%	22%	
College degree or higher	88,679	63%	51%	
Household nativity				
First-generation household	2,742	2%	3%	
Second-generation household	22,770	16%	25%	
Third-generation household or higher	115,915	82%	72%	
Federal poverty level of household				
Less than 100%	12,976	9%	17%	
100% to 199%	22,763	16%	22%	
200% to 299%	25,217	18%	18%	
300% to 399%	23,606	17%	14%	
400% or greater	56,865	40%	30%	

**Notes:** Estimates with and without survey weights are provided. \*Age is presented as continuous but treated as categorical in all two-way fixed effects and difference-in-differences models.

Table 2: Demographic characteristics of adolescents in the Youth Risk Behavior Surveillance System from 2001–2019.

	Unweighted N=1,246,623		Weighted
Adolescent's age			
12 years old or younger	3,068	<1%	<1%
13 years old	3,746	<1%	<1%
14 years old	168,397	14%	11%
15 years old	331,359	27%	26%
16 years old	330,158	26%	26%
17 years old	280,056	22%	23%
18 years old or older	129,839	10%	14%
Adolescent's sex			
Male	609,783	49%	51%
Female	636,840	51%	49%
Adolescent's race/ethnicity			
White, non-Hispanic/Latino	709,581	57%	56%
Black, non-Hispanic/Latino	167,313	13%	17%
Hispanic/Latino	212,717	17%	29%
American Indian or Alaska Native	28,604	2%	1%
Asian, Native Hawaiian, or Pacific Islander	69,540	6%	4%
Other or mixed race	58,868	5%	2%
Adolescent's grade			
9th grade	355,005	28%	28%
10th grade	337,188	27%	26%
11th grade	304,791	24%	24%
12th grade	249,639	20%	22%

**Notes:** Estimates with and without survey weights are provided.

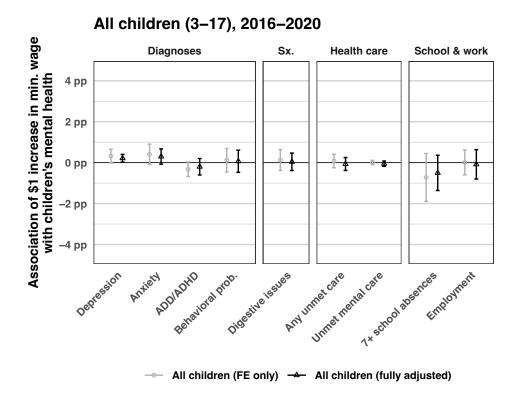


Figure 1: Association between state minimum wages and the mental health outcomes of children, aged 3–17, from 2016–2020.

**Notes:** The coefficients provide the percentage-point association between a \$1 increase in a state's effective minimum wage and the prevalence of each mental health outcome. Negative values represent improvements in the mental health of the population. Estimates are based on two-way fixed effects models with children aged 3–17 in the National Survey of Children's Health from 2016–2020 (except for absenteeism and employment, which were only asked of children aged 6–17). All models are adjusted for state and year fixed effects (FE). Fully adjusted models also control for each child's age, sex, race/ethnicity, family structure, parental education, and nativity, as well as state-level Medicaid income eligibility limits, several EITC policies, and TANF benefits for families of 3 (see methods for full details). Standard errors are clustered at the state level. 95% confidence intervals are provided. Full regression results are provided in **Table A4**. Sx. = symptoms.

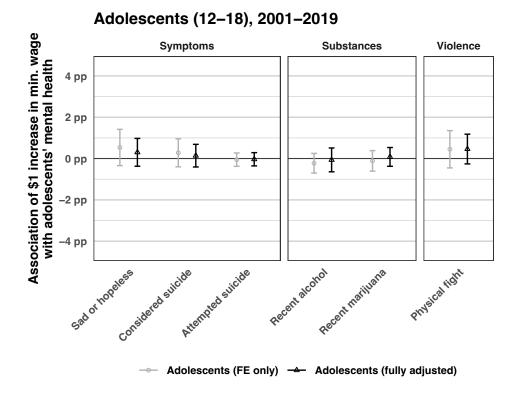


Figure 2: Association between state minimum wages and the mental health outcomes of adolescents, aged 12–18, from 2001–2019.

**Notes:** The coefficients provide the percentage-point association between a \$1 increase in a state's effective minimum wage and the prevalence of each mental health outcome. Negative values represent improvements in the mental health of the population. Estimates are based on two-way fixed effects models with adolescents aged ~12–18 in the Youth Risk Behavior Surveillance System from 2001–2019. All models are adjusted for state and age-by-year fixed effects (FE). Fully adjusted models also control for each adolescent's age, sex, race/ethnicity, and grade in high school, as well as state-level Medicaid income eligibility limits, several EITC policies, and TANF benefits for families of 3 (see methods for full details). Standard errors are clustered at the state level. 95% confidence intervals are provided. Full regression results are provided in **Table A5**.