

## **The Minimum Wage and Children's Mental Health**

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## **Structured Abstract**

**Importance:** Mental health disorders are on the rise for children and adolescents in the U.S. Children living in poverty have 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, 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 surveys 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, an increase in the state-level minimum wage was not associated with significant improvements in the mental health of children and adolescents. Nor were there significant associations when stratifying by household income, parental education, race and ethnicity, nativity, or age. For all outcomes, 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.

## **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, higher rates of unemployment, and chronic diseases.<sup>10,11</sup>

Poverty places an additional burden on families and adversely affects their children’s well-being.<sup>12</sup> Children in poverty have higher rates of depression, anxiety, and other mental health disorders than children in 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 well 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. Children’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 changes in the minimum wage and mental health. We examine several outcomes, including diagnoses,

mood symptoms, health care utilization, school attendance, social life, and more. This study has implications for the design of economic policy to improve the well-being of children, as well as the use of structural interventions to benefit disadvantaged populations more generally.

## **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 time 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 are weighted to be representative of all U.S. children. Consistent with surveillance studies that track mood disorders starting at age 3,<sup>7</sup> we included all children aged 3–17 whose caregivers provided complete information for at least one outcome and all covariates (N=141,427) (**Table 1**).

Next, we 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 are 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 (N=1,246,623) (**Table 2**).

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

Our exposure is a state's 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 children's and adolescents' mental well-being.

For the NSCH, all outcomes were reported by parents or guardians. We evaluated whether a child had (1) depression diagnosed by a health care provider; (2) diagnosed anxiety; (3) diagnosed ADD or ADHD; (4) behavioral problems identified by a provider or educator; (5) chronic difficulty digesting food (e.g. stomach or intestinal 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 somatic or 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 health problems; or (9) participated in any formal or informal paid employment in the past year (ages 6–17), a potential mediator of economic policies on a household's 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, a diagnostic criterion for depression; (2) considered or (3) attempted suicide in the past year; (4) used alcohol or (5) marijuana in the past month; 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***

First, 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 compare the mental health of children with different household incomes but similar demographic profiles, states, and years. These models are fully described in the appendix (**Section A4**). The YRBSS does not inquire about household income, 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.<sup>26</sup> 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. We included state fixed effects 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, the highest level of education by 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 aged 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.<sup>16,18</sup>

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. Those earning near the minimum wage are mostly likely to see their take-home pay rise, but higher earners may experience spillover wage growth.<sup>35</sup> Nevertheless, we also subset our data and estimate the associations for several sub-populations of children more likely to benefit from rising wages: in the NSCH, (1) households earning less than 200% FPL; (2) households whose adults have a high school education or less; (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. not in the principal cities of metropolitan statistical areas (MSAs) or in any MSAs; in the YRBSS, Black and Hispanic/Latino adolescents.

We examined the sensitivity of our results using models with (1) corrections for multiple hypothesis testing; (2) inflation-adjusted minimum wages; (3) wages lagged by 1 year, in case gains in children's mental health take time to manifest; (4) estimations using logistic regression, which provide the odds ratio for each outcome given a \$1 increase in the minimum wage; and (5) the average minimum wage to which a child was likely exposed throughout their entire life, similar to previous work on the relationship between minimum wages and children's physical health.<sup>18</sup>

Finally, recent econometric evidence has shown that TWFE models can be biased when policies are implemented at different times.<sup>36–38</sup> As an additional robustness check, we used simple difference-in-differences models to estimate the unbiased associations within a subset of our data. Using the YRBSS waves from 2011–2019, we coded 10 states that raised their minimum wage above the federal minimum in 2014 or 2015 as the treatment group and 21 states that remained at the federal minimum during that period as controls. Because these models only consider states that experienced the treatment at a single time, they do not suffer from the potential biases of TWFE

models.<sup>36–38</sup> We describe these models in detail in the appendix (**Sections A9–A10**). We could only perform these analyses using the YRBSS given the limited available years of the NSCH.

All analyses used survey weights (described above) and clustered standard errors by state. Estimates using the survey’s nested clustered errors are provided in the appendix. We use the “lfe” package (v. 2.8) in R to estimate OLS models. Respondents missing information for a given outcome are dropped from those analyses. This study did not require institutional review board approval as it used public, de-identified data. All replication materials are available at XXXXX.

## **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 had active 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 to 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 an association when we examined children living in households under 200% FPL, households whose adults had a high school education or less; Black and Hispanic/Latino children; first- or second-generation children; adolescents aged 13–17; and children living in non-urban areas (**Figure A5**). Nor was there evidence of an association using the sensitivity analyses described above (**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. (**Figure A1**). Also, the federal minimum wage rose from \$5.15 to \$7.25 from 2008–2010. Nevertheless, rising wages during this period 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 in several sensitivity analyses (**Figures A4, A6, A8, A10, A12, A14**).

Finally, we used difference-in-differences models to estimate the unbiased association between raising the minimum wage and adolescents' mental health since the last federal raise, i.e. 2011–2019. For all 6 outcomes, we again saw little evidence of improvement, even up to 5 years after a raise, and even when treated children were exposed to a mean wage increase of \$3.63 over control children (**Appendix Sections A9–A10 and Figures A15–A19**).

## **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 generally focused on adults.<sup>21</sup> Rising minimum wages in the U.K. from 1994–2001 were shown to improve 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 from 1993–2014 were associated with improved mental health for less-

educated women but not men,<sup>24</sup> while another study identified null associations for less-educated adults.<sup>25</sup> Minimum wages in the U.S. from 2005–2014 were associated with fewer stressful life events for pregnant persons in the year before delivery.<sup>26</sup> Moreover, other economic policies, such as tax credits, have been shown to improve the psychological well-being of adults.<sup>39,40</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 our observed nulls resulted from countervailing forces. That is, rising wages might enable families to seek medical care for their children and get overdue diagnoses, resulting in higher reported rates of disorders even as their mental well-being improves with care. However, we find no evidence of improvements in any domain that we examine, including self-reported diagnoses, symptoms, health care utilization, school, or work. Instead, our results suggest that state-level increases in the minimum wage — importantly, within the range of recent wage changes in the U.S. — were insufficient to meaningfully improve children’s mental health. This is despite the strong relationship between poverty and children’s mental health.<sup>12,13,27</sup>

Moreover, these null findings are not for lack of children who might benefit from rising minimum wages. In 2022, 51.9 million people in the U.S., or one-third of the labor force, earned less than \$15 per hour.<sup>41</sup> Among them, 5.8 million were teenagers, and 11.2 million were single parents (or half of all single-parent households).<sup>41</sup> In previous years, the numbers were even higher.<sup>42</sup> Thus, millions of children could see their household incomes rise with the minimum wage, either because they or their caregivers earn low wages, or due to spillover wage growth.<sup>35</sup> That said, raises in the minimum wage can (but not always) lead to reductions in hours for low-wage workers.<sup>43–46</sup> And when wages rise, some low-wage workers face “benefits cliffs,” or parallel reductions in public benefits, which might blunt any health-promoting effects of a higher wage.<sup>45</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>47</sup> Evidence from some (but not all) cities has suggested that these policies impacted the economic well-being of residents.<sup>43,48,49</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>50</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>51</sup> Third, our study relies primarily 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. have not improved the mental health of children. 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.

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

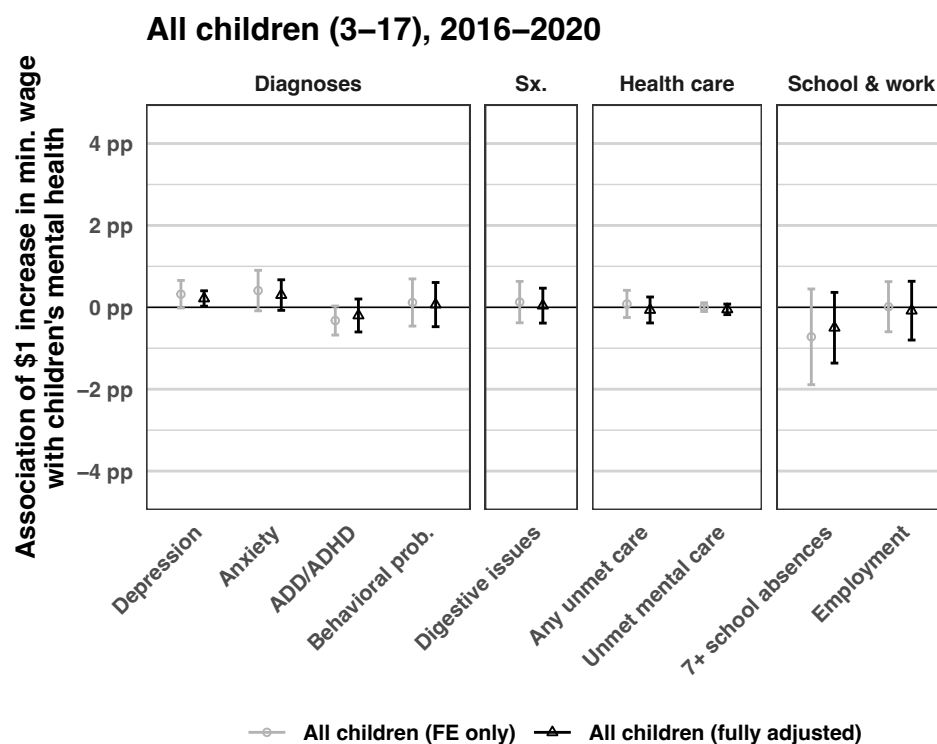
	Unweighted		Weighted
	N=141,427		
<b>Child's age*</b>			
Mean (SD)	11.7 (4.4)		11.1 (4.3)
Range	3–17		3–17
<b>Child's sex</b>			
Male	72,965	52%	51%
Female	68,462	48%	49%
<b>Child's race/ethnicity</b>			
White, non-Hispanic/Latino	98,521	70%	52%
Black, non-Hispanic/Latino	8,233	6%	12%
Hispanic/Latino	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%
<b>Family structure</b>			
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%
<b>Highest education of any adult in household</b>			
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%
<b>Household nativity</b>			
First-generation household	2,742	2%	3%
Second-generation household	22,770	16%	25%
Third-generation household or higher	115,915	82%	72%
<b>Federal poverty level of household</b>			
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.**

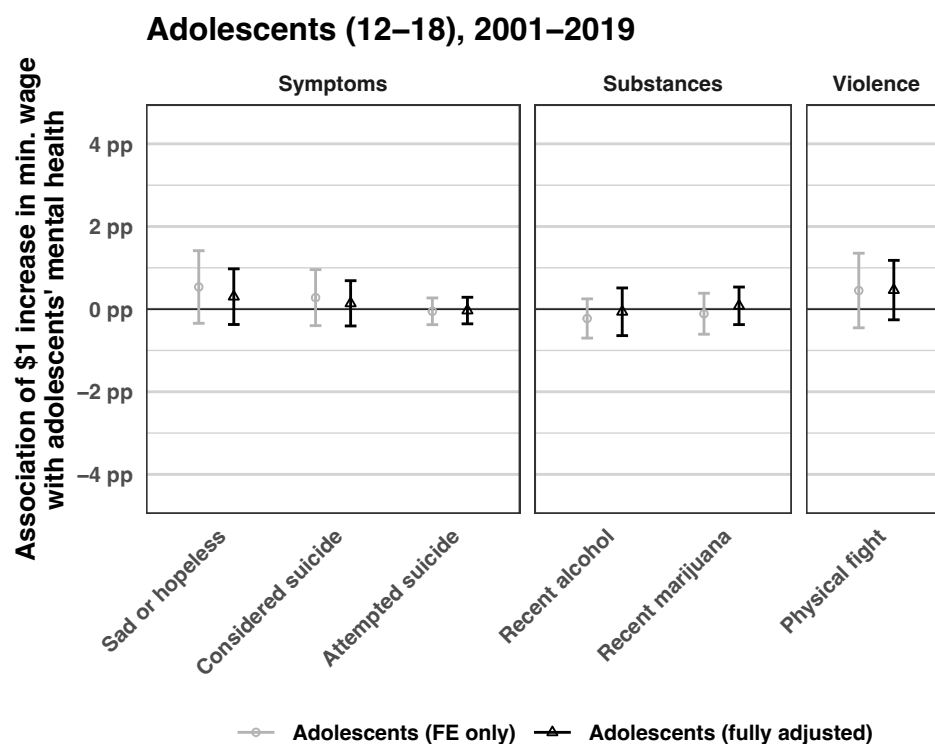
	Unweighted		Weighted
	N=1,246,623		
Adolescent's age			
12 years old or younger	3,068	<1%	<1%
13 years old	3,746	<1%	<1%
14 years old	168,397	14%	11%
15 years old	331,359	27%	26%
16 years old	330,158	26%	26%
17 years old	280,056	22%	23%
18 years old or older	129,839	10%	14%
Adolescent's sex			
Male	609,783	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 each mental health outcome. 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 each mental health outcome. 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**.