Effect of Raising the Minimum Wage on Children’s Mental Health

Nolan M. Kavanagh, M.P.H.1,2, Natalie Slopen, Sc.D., M.A.3

1 Program in Health Policy, Harvard University, Cambridge, Massachusetts

2 Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania

3 T.H. Chan School of Public Health, Harvard University, Boston, Massachusetts

**Introduction**

Mental health disorders, especially depression and anxiety, are on the rise for children and adolescents.1–6 In the United States, pre-pandemic surveillance data from 2016–2019 estimated that 3–4% of children and adolescents (aged 3–17) had current depression and 9–10% had current anxiety.7 However, COVID-19 appears to have accelerated the rise of mood and anxiety disorders in this population,8 and poor mental health threatens their long-term well-being and success. Lower social and emotional well-being compromises academic performance while in school,9 and in a meta-analysis of outcomes into adulthood, adolescent depression has been shown to predict lower educational attainment, higher rates of unemployment, and even earlier parenthood.10

Many social, economic, and political structures influence the mental health of children, and policy interventions on these structures stand to improve the well-being of this vulnerable population. For example, a household’s economic security shapes both the rate of mental health disorders and access to mental health care for its members, with children in lower-income households especially burdened by poor outcomes, even after adjusting for demographic characteristics.11 A family’s economic well-being is shaped, in turn, by government policies and programs. Mental health practitioners have called for structural solutions to improve mental health.12

Raising the minimum wage is one structural reform with the potential to improve a family’s mental health. There are several possible pathways. One is reduced financial stress, as economic stress in a household is associated with worse behavioral problems in children.13,14 Another is more resources to spend on health care; children in higher-income families have better access to mental health care, and increases in the minimum wage have been shown to reduce unmet medical needs, especially among more vulnerable populations.11,15 Lastly, a higher wage may grant households access to other resources that could improve mental health, such as higher-quality housing, time for exercise and leisure, and opportunities for higher educational attainment.16,17

The vast majority of existing research on the minimum wage and health outcomes has examined adults, with mixed results for mental health.18 For example, a longitudinal study in the United Kingdom from 1994 to 2001 identified substantial improvements in the mental health of lower-wage workers, relative to higher-wage ones.19 However, a subsequent study suggested that any improvements were short-lived.20 In the United States, a repeated cross-sectional study from 1993 to 2014 identified improvements in the mental health of less-educated women but not men.21 Meanwhile, another study in the U.S. identified null effects for less-educated adults.22

However, few studies have examined the effect of minimum wage increases on children’s health generally, and the effect on children’s mental health, specifically, is unexplored. For example, increases in the minimum wage have been associated with improvements in birth weight and infant mortality,23,24 school absenteeism, and indexes of overall health.25 Mixed results have been retrieved for the self-reported general health of working teens, with only some demographic groups seeing improvements,26 and null results for various outcomes for the children of immigrants.27 No studies appear to have tested the effects of raising the minimum wage on children’s mental health, yet children’s mental health might be especially sensitive to changes in a family’s economic well-being. When families’ income rise, they tend to dedicate those resources to their children, spending both higher absolute amounts and higher proportions of their income on their children.28 Given the strong association between economic stress and children’s mental health,11,14 even modest improvements in familial resources might improve a child’s mental well-being.

In this study, we use a nationally representative sample of over 150,000 children and adolescents, aged 3 to 17, in the United States between 2016 and 2020 to estimate the effect of raising the minimum wage on children’s mental health. We examine several outcomes, including rates of depression, anxiety, behavioral problems, digestive issues, and missed school. We hypothesize that raising the minimum wage will improve the mental health of children. 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 Population***

We used the 2016 to 2020 waves of the National Survey of Children’s Health (NSCH), a yearly, nationally representative study of the physical and emotional well-being of children in the United States. Using web and paper questionnaires, it surveys parents and guardians about one of their children. The NSCH uses a complex sampling design. Within each state, it draws from (1) households known to have a child under the age of 18 based on Census data and (2) households projected to have a child based on demographic and geographic characteristics. It also provides survey weights based on demographic characteristics and a child’s probability of selection.

Consistent with surveillance studies that estimate the prevalence of mood disorders starting at age 3,7 our analyses included all children aged 3 to 17 who reported at least one of the mental health outcomes described below, for a total sample of 150,833. The demographic and socioeconomic characteristics of the children and their households are provided in **Table 1**.

***Exposure and Outcome Measures***

In cross-sectional analyses, our independent variable of interest is a household’s income, relative to the federal poverty level (FPL), which we categorized as less than 100% FPL, 100% to 199%, 200% to 299%, 300% to 399%, and 400% or greater. In time-variant analyses, we focus on a state’s effective minimum wage per year in U.S. dollars. We use wage data from the Bureau of Labor Statistics, which provides the higher of a state’s minimum wage or the federal minimum wage, which has been $7.25 since 2009. 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).

Our dependent variables of interest are several mental health outcomes for children, as reported by parents or guardians. We evaluated 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; and (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).

***Statistical Analyses***

First, we examine the association between a household’s FPL, divided into five categories, and adverse children’s mental health outcomes using ordinary least squares (OLS) regressions. Then, we test the effect of raising a state’s minimum wage on mental health outcomes using OLS regressions; these models estimate the percentage-point change in the rate of children with each mental health outcome due to raising the minimum wage by $1. All models are adjusted for a child’s age, sex, race, and ethnicity; the highest level of educational attainment by any adult in the household; and the household’s FPL. All models also 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. Thus, we have:

where *Yist* is the mental health outcome for individual *i* in state *s* in year *t*; *(min. wage)st* is the effective minimum wage in a state-year, *Xist* is a vector of individual-level controls; *Δs* is the time-invariant state fixed effect; *τt* is the year fixed effect; and *εist* is the error term.

To account for the NSCH’s complex sampling design, we used the “survey” package in R, which can accommodate nested cluster-robust standard errors. Clusters were defined as sampling strata nested within states, consistent with the NSCH’s design. We also applied the NSCH’s survey weights so that all analyses, including descriptive statistics, were nationally representative.

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 households earning above the minimum wage may experience spillover wage growth.30 Even so, we also estimate the effects for children most likely to benefit: (1) those in households earning less than 200% of the federal poverty level; (2) non-white children; and (3) adolescents (age 13–17), many of whom work minimum wage jobs. To do so, we estimated interaction models, which interact the minimum wage term with a dummy variable for the demographic of interest.

To examine the sensitivity of our results, we also specify 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; and (3) estimations by logistic regression, which provides the odds ratio for each mental health outcome given a $1 increase in the minimum wage (see appendix). This study did not require institutional review board approval as it used public, deidentified data. All analyses were conducted in R. All replication materials are available at XXXXXXX.

**Results**

Between 2016 and 2020, 150,833 children ages 3–17 were surveyed by the National Survey of Children’s Health and included in our analyses (**Table 1**). A weighted 51% were males and 49% females. About two-thirds were white, 14% Black, and 19% of another race or mixed race, with 25% identifying as Hispanic or Latino. Nearly half (49%) of the households included an adult who had graduated college, while in 30% of households, the highest educational attainment was high school or less. Meanwhile, 40% of the sample was living under 200% of the FPL.

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,~~~~29~~ ~~we show in robustness checks that our results are not sensitive to restricting the sample to ages 6–17 (see appendix).~~

**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.0000000000000571

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 Meta-analysis. *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

10. 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. 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

12. 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

13. 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

14. 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

15. 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

16. 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

17. Smith AA. The minimum wage and teen educational attainment. *Labour Economics*. 2021;73:102061. doi:10.1016/j.labeco.2021.102061

18. 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

19. 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

20. Kronenberg C, Jacobs R, Zucchelli E. The impact of a wage increase on mental health: Evidence from the UK minimum wage. *Health, Econometrics and Data Group Working Paper*. 2015;15(08).

21. 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

22. 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

23. 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

24. 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

25. 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

26. 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

27. 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

28. 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

29. Dalsgaard S, Thorsteinsson E, Trabjerg BB, et al. Incidence Rates and Cumulative Incidences of the Full Spectrum of Diagnosed Mental Disorders in Childhood and Adolescence. *JAMA Psychiatry*. 2020;77(2):155-164. doi:10.1001/jamapsychiatry.2019.3523

30. 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/cesifo/ifu034

**Table 1. Characteristics of children aged 3–17 in the sample.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Unweighted**  N=150,834 | | **Weighted**  N=146,050 | |
| **Age**  Mean (SD) | 10.7 | (4.4) | 10.1 | 4.3 |
| **Sex**  Male  Female | 77,872  72,962 | (52%)  (48%) | 74,613  71,437 | (51%)  (49%) |
| **Race**  White  Black  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%) | 97,418  20,859  2,041  8,789  16,942 | (67%)  (14%)  (1%)  (6%)  (12%) |
| **Ethnicity**  Hispanic/Latino  Not Hispanic/Latino | 18,010  132,824 | (12%)  (88%) | 37,238  108,812 | (25%)  (75%) |
| **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%) | 14,326  28,874  32,002  70,848 | (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%) | 25,533  34,271  25,772  19,846  40,628 | (17%)  (23%)  (18%)  (14%)  (28%) |

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



**Figure 1. State minimum wages from 2016 to 2020.**

Notes: Based on author’s analysis of wage data from the Bureau of Labor Statistics.



**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.

****

**Figure 3. Effect of minimum wage on mental health outcomes among children aged 3–17.**

**Notes:** Each line provides the effect of a $1 increase in a state’s effective minimum wage on each outcome using the indicated OLS specification: (1) all children with no sociodemographic adjustments, only state and year fixed effects; (2) all children with full sociodemographic adjustments and fixed effects; (3) children in households earning less than 200% of the federal poverty level; (4) non-white children; (5) adolescents, aged 13–17; (6) all children using inflation-adjusted minimum wages (in 2020 dollars); and (7) all children using the minimum wage lagged by one year. All models except the first are 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.