



The minimum wage and parent time use

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Abstract

This study used a differences-in-differences strategy with national time diary data from 2003 to 2018 to examine the effects of minimum wage changes on parents' time with children and in child-related activities. Findings indicate that a \$1 increase in the minimum wage was associated with a small increase (2.6%) in the likelihood parents with one or more children under age 16 spent time actively caring for or helping children on weekends, and in more total time with children (a 2% increase in secondary child care time). In general, coefficients were larger for mothers' time use, particularly non-employed mothers, with potential implications for gender disparities in caregiving. Unmarried parents and parents of color showed increases in their time spent in activities related to children's health (~55% increase). Mothers showed an increase (8%) in the likelihood they spent any time in child education-related activities, and increases in child care time appeared concentrated among parents whose youngest child was 6–15 years of age. Findings suggest that increases in state minimum wages may lead to small increases in parents' time investments in children, with some variation among subgroups.

Keywords Time use · Minimum wage · Parent-child interactions · Health · Education

JEL Classifications I12 · J13 · J18

1 Introduction

Income gaps in health and achievement emerge early in life, influencing life-long economic trajectories and perpetuating lifelong social and economic inequalities

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(Kim & Durden, 2007; Reardon, 2011). Household production theory suggests low-income households lag behind their peers because they have fewer resources—both time and money – to invest in themselves and in their children (Becker, 1993). Indeed, a recent study estimates that more than two-thirds of all family expenditures on child development for children under age 12 come in the form of parental time investments, such as reading to children or helping with homework (Caucutt et al., 2020). Further, science and theory emphasize the developmental importance of household resources, parent-child time, and the activities and emotional valence during their time together (Duncan et al., 2010). What is less well understood, however, is how public policies that change household resources affect parent-child time use. For example, while the effects of minimum wage on employment and worker earnings has been studied extensively, with mixed findings (Card & Krueger, 2015; CBO, 2014; Cengiz et al., 2019; Neumark, 2018), a smaller but growing body of research suggests that increases in the minimum wage may improve several measures of adult and child health and well-being (Hill & Romich, 2018; Komro et al., 2016; Leigh, 2016; Leigh & Du, 2018; Lenhart, 2016, 2017; Wehby et al., 2020).

Improved resources, reduced stress, and changes in time use may be mechanisms underlying the benefits of a policy like minimum wage, but to date, little research has examined how the minimum wage affects non-employment time. One exception is Lenhart (2019), who used data from the American Time Use Survey (ATUS) to examine the effects of changes in effective state minimum wage rates on health-related time use from 2003 to 2017, finding increased leisure time, and that non-employed individuals living with children spent an additional 37 min in total time caring for children (Lenhart, 2019). However, the study examined only total child care time, while developmental theory and science emphasizes the importance of developmental or interactive time in enriching activities such as playing with or reading to children or helping with homework (Committee on Integrating the Science of Early Childhood Development Youth, and Families and Press, 2000; Kalil et al., 2012). A second exception is a recent study by Gearhart and colleagues (2022), who also used the ATUS and found that Black mothers with a high school degree or less exhibit large changes in their time spent in child care and in enriching activities following minimum wage increases (Gearhart et al., 2022). Notably, though, this study did not distinguish the time parents spend on activities important to children's health and education, nor did it examine the extensive margin of minimum wage on time use, or the likelihood of performing any child care, or specific forms, on a given day. Further, both studies lag state-level minimum wage changes by one year, despite the possibility that an increase in the minimum wage leads to an immediate change in the trade-off parents may make between work hours and other forms of time use, including time with children, as well as in employers' labor costs and potentially in the work shifts available to parents.

Given the importance of health, educated-related, and enriching activities such as reading to children for later outcomes (Caucutt et al., 2020; Price & Kalil, 2019), research that sheds more light on the effects of the minimum wage on parent-child engagement is needed. Using a differences-in-differences approach, this study addresses this gap by examining how changes in the federal and states' the effective minimum wage rates affect parents' time spent engaged in caring for or helping children and in activities related to children's education and health.

1.1 Literature review

Studies examining time use find socioeconomic (SES) gaps in both the quality and quantity of parental time spent interacting with children (Flood et al., 2022; Gershenson, 2013; Kalil et al., 2012). Gaps in parent-child time by family income or parental education may stem from differences in parents' work hours, family structure, and household production responsibilities (e.g., caring for other children or adults). More recent research suggests gaps by maternal education in parent-child time (Prickett & Augustine, 2021), educational resources and activities (Bassok et al., 2016), and in certain activities such as visiting libraries (Kalil et al., 2016) have narrowed, largely driven by increases in lower-educated mothers' time (Prickett & Augustine, 2021). Likewise, recent research indicates that the effects of time investments on children's outcomes does not vary with maternal educational attainment (Caucutt et al., 2020).

Despite this narrowing, however, evidence suggests that income gaps in young children's experiences – including in activities like reading to children, teaching them numbers, and other forms of parental engagement – persist (Bassok et al., 2016; Kalil et al., 2016). Further, there is a strong association between maternal education and increased total expenditures on child development, with expenditures inclusive of parental time, household goods, and market-based child care (Caucutt et al., 2020). The COVID-19 pandemic and the associated economic crisis may have widened pre-existing disparities in parent-child time use and engagement (Kalil et al., 2020; Lyttleton et al., 2022).

A growing body of research suggests that income disparities in children's early experiences and parent and child well-being are modifiable with changes in household resources. Indeed, a growing body of research suggests that policies and programs like the minimum wage and the Earned Income Tax Credit (EITC) contribute to improved outcomes (Spencer & Komro, 2017). For example, higher disbursements from EITC have been linked to improved birth outcomes (Braga et al., 2020; Hoynes et al., 2015) and child development outcomes (Hamad & Rehkopf, 2016). Studies link increased income to improvements in the home environment (Votruba-Drzal, 2003), food security (Jackowitz et al., 2015), academic outcomes (Dahl & Lochner, 2012; Duncan et al., 2015; Morrissey et al., 2014), and long-term educational attainment outcomes (Akee et al., 2010) among children. In contrast, a weak economy is associated with more risky behaviors and health-related time use among teenagers (Pabilonia, 2017). A recent study found that EITC expansions in the 1990s led to mothers' increased time working and decreased time in housework, personal care, and leisure; but mothers' "investment" time with children – including reading, playing, and providing medical care – was largely unaffected (Bastian & Lochner, 2020). This result is consistent with historical trends of mothers' increased time in paid work, with no corresponding decrease in active or engaged time with children (Bianchi, 2000).

Viewed by proponents as a means to reduce poverty and income inequality, and by opponents as increasing employers' labor costs and prices and decreasing employment, minimum wage has received increased policy attention. Several cities (e.g., Seattle and Washington, DC) recently increased their minimum wages to \$15 per hour or higher, and 21 states began 2020 with higher minimum wages compared to 2019 (NCSL, 2020). By contrast, the federal minimum wage, which serves as the "floor" for states and localities' minimum wages, has been stable for more than a

decade. A minimum wage of \$5.15 was set in 1997, which was increased in 2007, 2008, and again in 2009, where it has remained at \$7.25 per hour. The BLS reports that in 2015, an estimated 2.6 million workers earned the federal minimum wage or lower (3.3 percent of 78.2 million workers paid hourly rates), with two-thirds of those employed in service occupations (e.g., food preparation and hospitality jobs). Women and Black workers were more likely to earn the minimum wage relative to men and White, Asian, or Hispanic or Latino workers. Earnings varied with age, such that teenagers aged 16 to 19 were much more likely to earn the minimum wage compared to those 25 or older (11 percent vs. 2 percent). The likelihood of earning the minimum wage varies with education, such that in 2015, 6 percent of those without a high school diploma, 3 percent with a high school diploma and no college degree or an associate's degree, and 2 percent of college graduates with a four year degree or more earning the federal minimum wage (BLS, 2016).

International research links higher minimum wages to reductions in overall mortality (Lenhart, 2016) and improved self-reported health, reductions in health conditions, and in doctors' visits over the last year (Lenhart, 2017). Research in the U.S. has linked higher minimum wages to improved birth outcomes (Komro et al., 2016; Wehby et al., 2020), reductions in child maltreatment (Raissian & Bullinger, 2017; W. Schneider et al., 2021), and adolescent fertility (Bullinger, 2017).

Despite the growing evidence of its benefits, very few studies have investigated the effects of minimum wage on time use outside of employment. Recent exception finds that increases in the minimum wage may change leisure, health-related time, and overall time in child care (Lenhart, 2019) and in enriching child care activities, particularly by Black mothers (Gearhart et al., 2022). However, developmental science demonstrates that the level and type of activities that parents and children are engaged in matter to children's subsequent outcomes as well as the enjoyment parents derive (Caucutt et al., 2020; Price & Kalil, 2019), but the effects on specific types of parent-child engagement, or in activities related to children's development that are not spent together (e.g., arranging activities), are not understood. The benefits of increased minimum wage for health and well-being may operate via several mechanisms: more disposable income; more disposable time; and reduced stress.

In general, research suggests that an increase in the minimum wage leads to an increase in worker earnings (Belman et al., 2015; Card & Krueger, 2015; CBO, 2014; Dube, 2018; Jardim et al., 2018). Increased income can improve physical conditions like housing, food, health care, and educational materials, and may lead to more and higher-quality activities for children (e.g., enrichment activities). While an increased minimum wage may increase local labor costs, research has found minimal price effects (Allegretto & Reich, 2018). Notable for working parents, however, may be increases in the cost of child care resulting from a minimum wage increase, given that workers in the child care sector earn low wages (Thomason et al., 2018).

An increase in income resulting from minimum wage may also change how time is spent within a household, allowing for individuals to make purchases that reduce time spent in certain activities (e.g., purchasing a car to avoid public transit) or to outsource tasks, and spend that time engaged in more enjoyable activities. The minimum wage may also affect time use by changing labor force activity. The minimum wage may serve as a work incentive, as it makes each hour of work more lucrative to the worker, and thus, increased minimum wage floors may increase work

hours (e.g., Meyer & Rosenbaum, 2001). Alternatively, an increase in the minimum wage may lead employers to reduce the number of employees or their work hours due to higher labor costs (Jardim et al., 2018; Sabia et al., 2016). In projecting the effects of a federal increase to \$10.10 per hour, the Congressional Budget Office (CBO) predicted a small (3%) decrease in employment among those affected, although the effects of higher minimum wage on time spent working are not entirely clear. Some studies find little evidence that increases in the minimum wage affects employment or time spent working (Card & Krueger, 1994; Cengiz et al., 2019; Dube et al., 2010; Lenhart, 2019) with others finding job losses or reductions in hours (Jardim et al., 2018; Neumark, 2018; Sabia, 2008). While increased time spent working may come at the expense of time spent with children, research finds that despite mothers' dramatic increase in paid work hours over the last quarter-century, their time with children has remained surprisingly consistent (Bianchi, 2000; Sayer et al., 2004). Among parents—particularly mothers—minimum wage increases may lead to spend more time with children (Gearhart et al., 2022; Hill & Romich, 2018).

Finally, increased finances and more flexible time may reduce financial stress, and thereby improve the emotional valence of social interactions. Indeed, in the study of minimum wage in the U.K., there was evidence that the health improvements could be attributed to reduced financial stress, changes in health behaviors, and increased leisure activities (Lenhart, 2017). In turn, changes in stress can change time use. For example, during the COVID-19 pandemic, evidence suggests that parents who were very stressed showed decreased investment in enriching time with children (Kalil et al., 2020).

Several characteristics may affect if and how a change in the minimum wage affects one's time use. Women are more likely to earn minimum wage (BLS, 2018; Sawhill & Karpilow, 2014), and there are wide gender gaps in child caregiving and activities (Lyttleton et al., 2022; Milkie et al., 2010). In response to greater income, or greater incentives for work, one parent may specialize in earning income whereas the other may decrease work and increase the time spent with children. This may account for the pattern of increased child care time among non-employed adults found by Lenhart (2019). Further, never-married individuals and individuals of color are more likely to be minimum wage earners than their counterparts (Sawhill & Karpilow, 2014) and time use varies by marital and employment status (Kalil et al., 2014; Pepin et al., 2018). Finally, the age of children in the household is likely relevant, as caring for younger children is more time-intensive and nonparental care is more expensive (Bianchi, 2000; Chaudry et al., 2021; Kalil et al., 2012).

1.2 The current study

This study estimates the plausibly causal impacts of the minimum wage on time use using a quasi-experimental approach with daily time-diary data linked to monthly data on federal and state minimum wage rates. Focusing on a subsample of parents, I exploit state and time variation in minimum wage laws to examine the following research questions:

1. Does the minimum wage rate affect parents' time actively caring for children?
2. Does the minimum wage rate affect specific types of parents' time investments in activities related to children's education and health?

3. Do the [expected] effects of the minimum wage rate on parents' time use vary by parent gender, race, marital status, employment status, or child age?

Given previous research, I expect that increases in the minimum wage will be associated with increased time spent in parent-child time, particularly in education-related activities, and that these changes in time use will be stronger among mothers, unmarried parents, racial/ethnic minority parents, and for parents whose youngest child is under age 6.

2 Methods

2.1 Data and measures

This study uses data from several sources. First, the U.S. Bureau of Labor Statistics conducts the ATUS, a publicly available, nationally representative survey with time-use diaries, linked to the rich demographic, employment, education, and income information in the Current Population Survey (CPS). The cross-sectional ATUS collects a 24-h time diary from one individual, aged 15 or older per household, from a subsample of households included in the CPS. The CPS is a cross-sectional, nationally representative survey that provides information on all household members. ATUS-designate persons are preassigned a day of the week about which to report their activities, and interviews occur the day following the assigned day. ATUS respondents report their primary activity, and whom they were with; secondary activities, with the exception of child care, are not reported.¹ The ATUS-CPS data were extracted using IPUMS (Ruggles et al., 2022). The ATUS-CPS data were merged using state and year identifiers to a third data source, the University of Kentucky Center for Poverty Research (UKCPR) National Welfare database, containing annual state-level information, including federal and state minimum wage laws (UKCPR, 2018). Finally, information from the National Conference of State Legislatures (NCSL) was used to specify month-year changes in minimum wage levels. The analytic sample included 67,291 ATUS respondents from 2003 to 2018 aged 20 to 60 years residing with one or more of their own children under age 16.²

2.1.1 Effective state minimum wage

In the last quarter-century, the federal minimum wage has not changed often. Federal minimum wage was level from 1997 through 2006, then increased gradually in 2007, 2008, and 2009, and has remained consistent to date. With inflation, the federal minimum wage decreased in real dollars from 2003–2006, and again from 2009–2018. In contrast, state minimum wage laws have varied

¹ In supplemental analyses, I examine time spent in secondary child care, during which one or more child is in the parent's supervision but the parent is engaged in another task (e.g., preparing meals).

² I exclude parents whose youngest child was 16 or 17 because this age group's own employment and time use may be affected by changes in the minimum wage.

substantially (NCSL, 2020).³ Some states set their minimum wages lower than the federal minimum wage, in which case the federal minimum wage is used, whereas other states set their minimum wages higher than the federal wage. In the last decade, an increasing number of cities and counties have set minimum wages above their state levels.⁴

2.1.2 Parents' time investing in children

Three measures of parent-child time were used: (1) a BLS-generated measure of the total time a parent spent caring for and helping household children;⁵ (2) a measure of parent time spent in activities related to household children's education, inclusive of time spent with or without children; and (3) a measure of parent time spent in activities related to household children's health, which included caring for injured or ill children and taking children to and waiting for medical appointments. For each of these measures of time use, both continuous measures of minutes per day spent in the activity and a binary measure of whether the parent engaged in that activity at all that day were used to examine time use changes at the intensive and extensive margins.

2.1.3 Control variables

A number of respondent, household, and state level covariates that are associated with parent-child time were controlled: respondent age, gender, employment status, whether the respondent was in school, race/ethnicity, education, marital status; if present, whether a spouse was employed; whether the respondent owns his/her home; number of children under 18 in the home and age of youngest child; whether the household was located in a metropolitan area; state, year, and month of interview; state-specific time trends; and whether the state has a refundable EITC (as a measure of state policy generosity).

2.2 Analytic plan

Certain states at certain times may be more likely to increase the minimum wage over the federal minimum wage, for example, when more progressive politicians are in power or during periods when the economy is robust or labor interests are strong. It is also possible that respondents may move or work across state lines to earn higher wages in those states. However, there are no randomized controlled experiments for increases in state minimum wage. Because of these reasons, it is important to reduce potential bias from respondent and state characteristics using quasi-experimental

³ See Appendix Table 1 for a list of federal, state, and effective minimum wage from 2003 to 2018, reflecting the federal wage if the state minimum wage was lower. Appendix Figure 1 displays the inflation-adjusted effective minimum wage rate by state over time.

⁴ According to the Labor Center at the University of California-Berkeley, as of 2022, 55 counties and cities had their own minimum wage laws, but this was true for only 5 localities in 2012. For more information, see: <https://laborcenter.berkeley.edu/inventory-of-us-city-and-county-minimum-wage-ordinances/>.

⁵ Appendix Table 2 details the measures used in this study. See <https://www.atusdata.org/atus-action/categories/documentation?id=278420> for more information.

methods that control for state- and respondent- characteristics such as those listed above (e.g., age, gender, the presence of a state EITC) as well as state and year fixed effects and state-specific time trends to account for changing political, policy, economic, and respondent characteristics over time and place.

Specifically, I exploit state and time variation in effective minimum wage using a differences-in-differences (DD) approach (Angrist & Pischke, 2009). Specifically, I compare low-educated residents (those whose incomes and work hours most likely to be affected) in states where the minimum wage changed to their peers in states where it did not, reducing potential bias in the estimate of the policy change. Unlike Gearhart et al. (2022), I use having a bachelor's degree or not to distinguish between more- and less-educated parents rather than a high school diploma, as a considerable number of individuals with some college earn the minimum wage (297,000 in 2021).⁶ Indeed, among the sample of ATUS-CPS respondents who reported hourly wage information of less than \$100 per hour, 90 percent of those earning the state's effective minimum wage (or less) lacked a bachelor's degree, compared to 69 percent of those earning hourly wages higher than the state effective minimum wage but lower than \$100. Specifically, in Equation 1,

$$Y_{ist} = \beta_0 + \beta_1(MW_{st} \times NBA_i) + \beta_2MW_{st} + \beta_3NBA_i + \beta_4X_{ist} + \beta_5P_{st} + \alpha_s + \lambda_t + \Upsilon_t + \Upsilon_t \times \alpha_s + \mu_{ist}$$

Y represents a measure of parent-child time use for person i interviewed at time t in state s . The parameter of interest is β_1 , which represents the intent-to-treat (ITT) effect of the minimum wage increase on the time use among individuals lacking a bachelor's degree NBA represents a binary variable for whether respondent i had less than a bachelor's degree. MW represents the effective minimum wage⁷ (in 2018\$) for state s . X is a vector of respondent and household characteristics. P represents state-level policy factors that affect the income of low-earning households, specifically whether the state has a refundable EITC. α represents state fixed effects; λ represents month fixed effects; Υ represents year fixed effects; $\Upsilon \times \alpha$ represents state-specific time trends⁸; and u is idiosyncratic error. Linear probability models are used with binary dependent variables and Ordinary Least Squares (OLS) models for continuous dependent variables. Respondents with bachelor's degrees in states with effective federal minimum wages (those with state minimum wages equal to or less than the federal minimum wage) serve as the control group. The use of an ITT strategy limits endogeneity bias regarding selection into minimum wage jobs. I test for heterogeneity by respondent employment, gender, marital status, race, and age of youngest children by estimating separate DD models. I also estimate three analogous sensitivity models: first, I compare parents with a high school diploma or less to those with more education; second, I use respondent-reported occupation to compare individuals in occupations more likely pay an hourly or minimum wage to those

⁶ See the Bureau of Labor Statistics: <https://www.bls.gov/opub/reports/minimum-wage/2021/home.htm>.

⁷ Following Lenhart (2019) and Gearhart et al. (2022), I also examined a 12-month lagged effective minimum wage. Findings were substantively similar to the contemporaneous wage and discussed in the Results.

⁸ All models were re-run without state-specific time trends. Coefficients were very similar in direction, magnitude, and significance. Results are available upon request.

more likely to pay salaries or on tips or commission (e.g., child care workers vs. restaurant wait staff⁹); and third, a combination of these measures to represent low-educated individuals in low-wage occupations. All regression models cluster standard errors at the state level and ATUS weights were used in all analyses.

3 Results

Means, standard deviations, and frequencies are shown for the background and dependent variables in Table 1. The analytic sample of working-age parents living with one or more children under age 16 averaged 37 years of age. More than three-quarters were employed, and seven in ten owned their homes. Nearly 40% had a high school diploma or less, and 55 percent had less than a bachelor's degree. Nearly eight in 10 were married, and about two-thirds had spouses or partners who were themselves employed. Respondents averaged two children in the household, with the youngest child 6 years of age. About 37% of respondents lived in states with refundable EITCs.

The subsample means, standard deviations, and frequencies for the dependent variables and main DD results for the full analytic sample of parents, and then separately for weekday and weekend time, are shown in Table 2. Descriptive statistics indicate that 71% of parents with one or more child under age 16 spent any time on a given day engaged in care activities for household children, averaging about 1 h and 27 min doing so. Thirteen percent reported spending time in education-related activities with or for children (e.g., helping with homework, attending a PTA meeting) and a smaller proportion, 3.2%, reported spending time in health-related activities with or for children. On average, parents lacking a BA degree spent less time engaged in child caregiving than those with college degrees. Means and frequencies indicate that parents were less likely to, and spent less time, engaging in child care activities on weekends relative to weekdays. This is consistent with other research with the ATUS, showing that parents spend more time in primary child care, or in activities directly engaged with children, during the week, and more time in secondary child care on the weekends.¹⁰

The parameter of interest in the DD results show little evidence that increases in the effective minimum wage changed the intensive margin (number of minutes) of parents' time with children in Panel A of Table 2 (the full sample), but there was evidence for increases in the extensive margin (likelihood of the activity): parents showed a small increase their likelihood of spending any time caring for or helping

⁹ Using information the ATUS respondents reported in the CPS, among workers reporting being paid hourly wages, 55% of those who reported wages less than the effective minimum wage compared to 18% of those reporting higher hourly wages were employed in occupations likely to be minimum wage. Eighty-two percent of respondents in occupations more likely to pay the minimum wage lacked a bachelor's degree, compared to 67% of those in occupations less likely to pay minimum wage.

¹⁰ The sample averaged 303.0 min of time spend in secondary child care with any children, household and non-household (249.8 min during the week and 435.3 on weekends). Thus, parents spend more total time with children on weekends than during the week, but less time actively engaged with children on the weekends. For additional analyses of secondary child care with the ATUS data, see: <https://www.bls.gov/tus/charts/childcare.htm>.

Table 1 Weighted sample descriptive characteristics: independent variables ($N = 67,291$)

Independent variables	Total Sample Mean (SD) or %
Respondent age (years)	37.44 (8.21)
Respondent is male	44.6%
Respondent is employed	77.8%
Respondent is in school	6.0%
Respondent is White	81.2%
Respondent is Black	11.2%
Respondent is Hispanic	21.1%
Respondent owns home	70.30%
Respondent has less than BA degree	55.3%
Respondent has a high school degree or less	39.7%
Respondent is married	78.9%
Spouse/partner present and employed	65.1%
Number of children under 18 in the household	2.02 (1.01)
Age of youngest child in the household	5.98 (4.65)
Lives in a state with a refundable EITC	36.6%

their children (column 4; a 1.3% increase) and a marginally statistically significant increase in spending any time in child education-related activities (column 5).

Panel B of Table 2 suggests that changes in the minimum wage had no effects on parents' time with children on weekdays, but in Panel C, there was evidence that an increase in the minimum wage led to an increase in the likelihood parents lacking a BA spent any time engaged in child caring activities on weekends. The effect size was small (1.6 percentage points [pp]) relative to the gap between individuals with and without BA degrees, representing a 2.6% increase.

A series of analyses tested for heterogeneous effects by parent employment status, gender, marital status, race, and age of youngest child, and then subsets for unmarried females and non-employed females who may be most affected by the minimum wage. Results are displayed in Table 3 and show few effects on both the extensive and intensive margins, varying by subgroup. As shown in column 1, only females increased their total time caring for children (2.5 min; a 3% increase from the sample mean). In particular, mothers appeared to increase their likelihood of spending any time in activities related to children's education (column 5; an 8% increase). As shown in column 3, parents of color and unmarried parents, including unmarried females, spent more time in child health-related activities. Notably while these effects on time in child health-related activities were small (increases of about 1.2 min), they represent relatively large percentage increases over the sample average (~55%). Unlike Gearhart and colleagues (2022), I do not find that the increases in other measures of time are largest among parents of color, however.

Whereas mothers, parents of color, and unmarried parents showed these intensive changes in time with children in response to minimum wage increases, parents who were not employed, those who were married, and those with school-age children (6–15 years) increased their likelihood of spending any time caring for or helping children (column 4), including non-employed females. In general, fathers and parents

Table 2 Main effects of minimum wage on parent time use (2003–2018)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Time spent caring for children (min)	Time in child educated-related activities (min)	Time in child health-related activities (min)	Any time spent caring for children	Any time spent for education-related activities	Any time spent in child health-related activities
Panel A: Full sample						
Min. wage x Not BA	0.625 (0.773)	0.195 (0.253)	0.090 (0.179)	0.009* (0.004)	0.006+ (0.003)	-0.001 (0.001)
Min. wage	1.357 (3.589)	2.333 (1.411)	-0.295 (0.577)	-0.007 (0.019)	-0.001 (0.016)	0.006 (0.007)
Not BA	-20.27** (6.370)	-2.777 (1.945)	-0.979 (1.460)	-0.161*** (0.0313)	-0.0584* (0.0249)	0.00275 (0.0111)
Sample mean (SD) or frequency	86.73 (112.96)	7.59 (27.71)	2.22 (21.81)	71.13%	12.65%	3.15%
Observations	67,291	67,291	67,291	67,291	67,291	67,291
Panel B: Weekday						
Min. wage x Not BA	0.672 (1.114)	0.247 (0.338)	-0.0517 (0.194)	0.004 (0.006)	0.006 (0.004)	-0.002 (0.002)
Min. wage	1.855 (4.852)	3.187 (2.128)	-0.374 (0.733)	-0.037 (0.026)	0.0001 (0.024)	0.011 (0.010)
Not BA	-18.55* (8.889)	-2.927 (2.588)	0.229 (1.567)	-0.118** (0.043)	-0.060 (0.036)	0.009 (0.016)
Sample mean (SD) or frequency	89.50 (111.96)	9.52 (30.42)	2.55 (21.65)	74.79%	16.16%	3.72%
Observations	33,253	33,253	33,253	33,253	33,253	33,253
Panel C: Weekend						
Min. wage x Not BA	0.295 (1.387)	-0.248 (0.257)	0.523 (0.480)	0.016*** (0.004)	-0.0002 (0.003)	0.001 (0.002)
Min. wage	0.152 (5.180)	0.512 (0.565)	0.186 (0.392)	0.063+ (0.036)	-0.003 (0.0153)	-0.008 (0.009)
Not BA	-22.10+ (11.16)	0.243 (2.165)	-4.530 (3.843)	-0.222*** (0.036)	-0.014 (0.021)	-0.010 (0.013)
Sample mean (SD) or frequency	79.85 (115.13)	2.78 (18.54)	1.42 (22.18)	62.02%	3.40%	1.73%
Observations	34,038	34,038	34,038	34,038	34,038	34,038

Robust standard errors, clustered at the state level, are in parentheses. All models control for respondent, household, and state-level characteristics and include year, month, and state fixed effects and state-specific time trends. Regression estimates and descriptive statistics use ATUS weights

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

whose youngest child was under age 6 showed no significant changes in their time use when minimum wage increased.

A series of supplemental models were conducted. First, two different specifications of the main DD models were estimated to use a high school diploma or less and low-wage occupations, and a combination of education and occupation, as proxies for minimum wage work. Results (shown in Appendix Table 3) suggest that following an increase in the state minimum wage, surprisingly those with a high school diploma or less decreased their likelihood of spending any time in child health-related activities (0.4 percentage points) relative to those with more education. Minimum wage increases had no effects on parents' time with children among individuals in occupations likely to pay minimum wage, but parents with low education and who worked in those occupations showed increases in the likelihood of spending any time in child-education related activities (2.1 pp).

Second, to assess the effects of minimum wage on labor force participation, analogous models examined the effects of increased minimum wage on the likelihood of working on a given day and time spent working (see Appendix Table 4), and a multinomial logit model was run to predict the categorical measure of family household income¹¹ (Appendix Table 5). Results indicate that an increase in the minimum wage predicted a small decrease in the likelihood of working on a given day (0.8 pp, or 1.5%), and of time spent working on weekdays (a 1.7% decrease), in the full sample, but there were no significant effects among mothers (results not shown; available upon request); because weekend and mothers' time use drove the most of the effects of minimum wage on parents' time investments, it does not appear that the increase in parent-child time came at the expense of time working. Among the sample, an increase in the minimum wage predicted a lower likelihood having a family income in the two lowest income categories (less than \$5000 or between \$5000 and \$7500 per year) among respondents without a BA degree. Together, these results suggest a very small decrease in labor market activity with an increase in family income among the lowest earners.

Third, to better understand what activities decreased when parents' time with children increased, a series of models examined time in secondary child care and engaged in other activities, including in household activities¹² (e.g., housework), leisure, and social and civic activities (e.g., volunteering or participating in religious activities).¹³ Results (shown in Appendix Table 6) indicate that parents were more likely to, and spent more time, in secondary child care (an increase of 8.9 min, or 2%) and in social and civic activities (4.9 min increase; a 14%), particularly on the weekends, but overall spent less time in leisure all week. This increase in social and civic activities was small and represented just about 10% of the gap in the time spent in these types of activities between those with and without a BA degree. There were no effects on household activities or sleep. Thus, parents were not decreasing secondary or supervisory time for more direct engagement with their children, or decreasing their

¹¹ Unfortunately, the ATUS does not collect a continuous measure of household income, and because the data are cross-sectional, it represents a contemporaneous measure of income to time use.

¹² For more information about "bls_hhact", see: https://www.atusdata.org/atus-action/time_use_variables/5859.

¹³ For more information about "bls_social", see: https://www.atusdata.org/atus-action/time_use_variables/5905.

Table 3 Effects of minimum wage on parent time use (2003–2018): Heterogeneous effects

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	N
	Total time spent caring for children (min)	Time in child educated-related activities (min)	Time in child health-related activities (min)	Any time spent caring for children	Any time spent education-related activities	Any time spent in child health-related activities	
Panel A: Employment							
Employed	0.481 (1.063)	0.106 (0.300)	-0.075 (0.175)	0.005 (0.005)	0.006 (0.005)	-0.001 (0.002)	52,654
Not employed	-0.414 (1.812)	0.450 (1.062)	0.506 (0.855)	0.020** (0.006)	0.005 (0.010)	0.003 (0.005)	14,637
Panel B: Gender							
Female	2.453* (1.101)	0.673+ (0.372)	0.095 (0.240)	0.007 (0.005)	0.010* (0.004)	0.001 (0.002)	39,876
Male	-1.244 (1.249)	-0.382 (0.257)	0.154 (0.284)	0.008 (0.008)	-0.001 (0.004)	-0.002 (0.001)	27,415
Panel C: Marital status							
Married	0.864 (0.844)	0.226 (0.296)	-0.141 (0.244)	0.011* (0.005)	0.006 (0.004)	-0.003+ (0.002)	51,562
Unmarried	-1.901 (1.970)	0.0300 (0.500)	1.156** (0.339)	-0.0004 (0.007)	0.002 (0.007)	0.005 (0.004)	15,829
Panel D: Race							
Non-Hispanic white	0.559 (0.814)	0.170 (0.283)	-0.225 (0.159)	0.009+ (0.005)	0.004 (0.003)	-0.003+ (0.002)	55,963
People of color	-1.052 (1.764)	0.288 (0.499)	1.151* (0.505)	-0.005 (0.010)	0.015+ (0.008)	0.007+ (0.004)	11,328
Panel E: Age of youngest child							
0–5 years old	0.091 (1.241)	0.192 (0.279)	-0.028 (0.221)	0.003 (0.008)	0.003 (0.004)	-0.002 (0.002)	33,658
6–16 years old	0.509 (0.981)	0.240 (0.457)	0.146 (0.273)	0.015* (0.007)	0.009+ (0.005)	-0.001 (0.002)	33,633
Panel F							
Unmarried females	-0.878 (3.967)	-0.079 (0.641)	1.401** (0.502)	-0.003 (0.009)	0.004 (0.008)	0.008+ (0.004)	12,336
Non-employed females	2.296 (1.878)	0.512 (1.071)	0.0674 (0.835)	0.018* (0.007)	0.002 (0.009)	0.003 (0.006)	12,386

Robust standard errors, clustered at the state level, are in parentheses. All models control for respondent, household, and state-level characteristics and include year, month, and state fixed effects and state-specific time trends. Regression estimates and descriptive statistics use ATUS weights

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

sleep or leisure to spend more time with children. Third, following Lenhart (2019) and Gearhart et al. (2022), models using a 12-month lag in minimum wage were run. Effects were very similar to the contemporaneous models, although there were no effects on work time or activity (results available upon request). Finally, a model that replaced “having a BA or less” with an indicator for being high-income (a household with an income of \$75,000 or more), households whose resources would presumably not be as affected by a change in the minimum wage, was conducted as a falsification test, and found no evidence that minimum wage rates changed child care time among high-income parents (results available upon request).

4 Discussion

This study is one of the first to investigate the effects of a common and highly debated federal and state policy – the minimum wage – on a particularly meaningful form of time use, parents’ time caring for children and in activities related to children’s education and health, using a quasi-experimental method to provide plausibly causal estimates. These forms of time use are viewed as parental investments in children, and research has demonstrated they are consequential for children’s later outcomes (Bono et al., 2016; Caucutt et al., 2020; Del Boca et al., 2017; Price & Kalil, 2019). Results provide some evidence that changes in the minimum wage led to a few, relatively small changes in how parents use their time.

Findings suggest that a \$1 increase in the minimum wage leads to an overall 1.6 percentage point increase in parents’ time spent caring for or helping children on the weekends. This is a small effect, however, representing an increase of about 3%. Notably, non-employed parents, particularly non-employed mothers, married parents, and those whose youngest child is school-aged (6–15 years old) seemed to drive this effect. This finding is similar to Lenhart’s (2019) regarding overall child care time one year following a minimum wage change, and has implications for the already skewed gender balance in caregiving time and responsibilities (Milkie et al. 2010; Yavorsky et al., 2015), which was exacerbated during the pandemic (Lytelton et al., 2022). Notably, these time changes were more than substituting secondary or supervisory time with children for more engagement with children, but rather represent an increase of total time with children. The analyses in this study do not shed light on what activities were decreased when parents increased time with children, as sleep, leisure, and time in social or civic activities either did not change or increased following a minimum wage change. The one exception is a small decrease in the likelihood of work, and in time spent working on weekends across the sample, although this was not true for mothers, who drove the increases in time with children.

Importantly, too, unmarried parents increased their total time spent in child health-related activities, with the coefficient twice as high for unmarried mothers. Given that on average, parents spend 2.22 min a day in child health-related activities, the increases of 1.2, 1.2, and 1.4 min among unmarried parents, parents of color, and unmarried mothers, respectively, represent increases between 55% and 64%. As described earlier, previous research finds health benefits for young children from the minimum wage, and it is possible that more parent-child time spent on health

activities like visiting the doctor for well-child appointments or other necessary medical care contributes to these benefits. This may result from increased household resources leading to increases in access to children's health care, and supplemental analyses provide some evidence for increased family income following a minimum wage increase, particularly for the lowest-income households. Alternatively, increases in child health-related time may also reflect parents taking time off from work to care for ill children because their per-hour wage is higher. Indeed, supplemental analyses found about a 0.8 percentage point decrease in the likelihood a parent was working on a given day (but no overall changes in time spent working). This small effect corresponds with much of the extant literature on minimum wage in demonstrating that its overall effects on labor force participation – and other areas of worker and family life – are modest (Card & Krueger, 2015; Hill & Romich, 2018); however, among parents on a given day, it may reflect taking leave from a job. Paid sick and family leave is important for worker illness and caregiving responsibilities (D. Schneider, 2020), but low-wage and less-educated workers have less access to leave benefits (Boyens et al., 2022; Kaiser Family Foundation, 2020). The implications of minimum wage laws for workers' leave-taking and caregiving warrants additional research. Alternatively, it is possible that improvements in health lead to changes in time use, although given that declines in health are typically more likely to be associated with a greater need for health care receipt and health activities, this seems like the less plausible pathway, but more research using longitudinal data is needed to understand directionality.

In contrast to general and health-related caregiving time, however, there was little evidence that minimum wage changed the amount of time parents spent in activities related to children's education (e.g., helping with homework), although mothers showed an increase in the likelihood they spent any time in child education-related activities by 1 percentage point (an 8% increase). These results differed somewhat from Gearhart et al. (2022), who found that mothers with less than a high school education increased enriching time (a combination of education- and health-related activities with children) by nearly 10 min, possibly because of the different definitions of low education. In general, however, the lack of findings for changes in parent-child educational or enriching activities in the present study are similar to those found for the EITC (Bastian & Lochner, 2020), and suggests that parents maintain investments in these activities regardless of other potential changes.

In contrast to other research (Lenhart, 2019), this study suggests that an increase in the minimum wage led to a small, contemporaneous decrease in the likelihood of working on a given day of about 1.5%, with decrease concentrated on weekend work, with minimum wage measured contemporaneously, and no effects one year later. I also found some evidence that minimum wage increases led to a small decrease in leisure, but also an increase in social and civic activities on weekends, which may have implications for social connectedness and other community factors and warrants more research.

The study has several limitations. First, I do not observe individuals' wage rates, and thus use respondents' state of residence, educational attainment, and occupation as proxies. Second, the time period examined includes the Great Recession, an economic downturn that changed time use (Aguiar et al., 2013; Kalil & Ziol-Guest, 2013). Third, states implemented changes in minimum wage rates at different years,

and the use of a DD analysis weights the effects of those who have experienced the treatment for longer periods of time, and results should be interpreted with this in mind (Goodman-Bacon, 2021). While an event study would help to shed light on how effects change over time, changes in the effective minimum wage occur gradually, preventing a traditional pre-/post-treatment design. Notably, though, with minimum wage, the issue is there are many “treatments” of different sizes occurring at the same or at different times; inflation leads to gradual changes in the effective minimum wage, whereas local policy changes cause more dramatic, faster changes. Fourth, several cities within states, such as Seattle, have set their minimum wage levels to be higher than state levels, although much of this occurred toward the end of this study period.¹⁴ Fifth, the DD model focuses on the time use changes of low-educated parents (or those in low-wage occupations), compared to those with higher-educated (or those in different occupations), and by state of residence; this will generate conservative estimates, given that minimum wage changes are likely to affect the child care costs for all parents, particularly those with young children. Finally, due to ATUS limitations, the time diary only asks respondents over age 15 about their primary activity (with the exception of child care), and who was with them at that time, and the sub sample used here includes parents residing with one or more children and thus cannot be generalized to non-residential parents.

Findings have implications for future research. First, despite a growing interest in time use among developmental scientists (e.g., Price & Kalil, 2019), we lack a clear understanding of the causal links for how and when during development parent-child time most strongly influences children’s outcomes. Second, in the absence of federal action, states and localities have changed minimum wages, but these are less studied, often due to data limitations, but warrant greater investigation. Third, despite numerous sensitivity analyses, this study is unable to uncover what activities decreased when parents increased their time (primary and secondary time) with children. There is some evidence work time on the weekends decreased but not necessarily for mothers, who saw their time with children increase most. Finally, the mechanisms underlying time use changes are unclear. Whether parents are turning down extra shifts or taking time off from work on the weekends, outsourcing other tasks with increased household resources, or forgoing other types of activities to spend time with children remains unclear.

In sum, findings in this study suggest that increases in state minimum wages lead to small increases in parents’, particularly mothers’, time investments in children and overall increases in time spent with children, particularly on weekends. Among unmarried parents, particularly mothers, an increase in the minimum wage increased time spent in child health-related activities, which may serve as a pathway for the identified health benefits of minimum wage. Findings have implications for investigating and uncovering the full range of benefits from minimum wage changes.

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¹⁴ As noted in footnote 4, in 2012, only 5 counties or cities had minimum wage laws; in 2022, 55 localities did. Some laws applied only to businesses above a certain number of employees. For more information, see: <https://laborcenter.berkeley.edu/inventory-of-us-city-and-county-minimum-wage-ordinances/>.

Author contributions T.M. conceptualized and designed the study, analyzed the data, and wrote the manuscript.

Compliance with ethical standards

Conflict of interest The author declares no competing interests.

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