How Does the Child Tax Credit Change the Time Allocation of Parents? Evidence from American Time Use Data

Tennecia Dacass Elif B. Dilden* Yang Jiao

Central Washington University Rockhurst University* Texas A&M University-Texarkana

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Motivation

- 73% of employees have caregiving responsibilities:
  - over two-thirds of them being working parents.
- To remain in the labor force:
  - parents need quality, affordable childcare services.
  - Problem: childcare is not affordable.

President Biden issued an executive order on April 18, 2023, aimed at enhancing access to and the affordability of daycare

- One way to reduce to cost of childcare is:
  - Child Tax Credit (CTC)

Child Tax Credit (CTC) and Changes Over Time

1997: Congress enacted the CTC

- initially provided a $400 per child non-refundable credit.
- largely targets middle and upper-middle-income families.

2001: The Economic Growth and Relief Reconciliation Act

- Raised the tax credit to $1000 per child,
  - partially refundable.

2017: Tax Cuts and Jobs Act (TCJA)

- doubled the maximum credit amount to $2,000 per qualifying child,
- reduce the earnings threshold,
- increased financial support to improve the well-being of children in low- and middle-income families.

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CTC: the Largest Federal Expenditures on Children

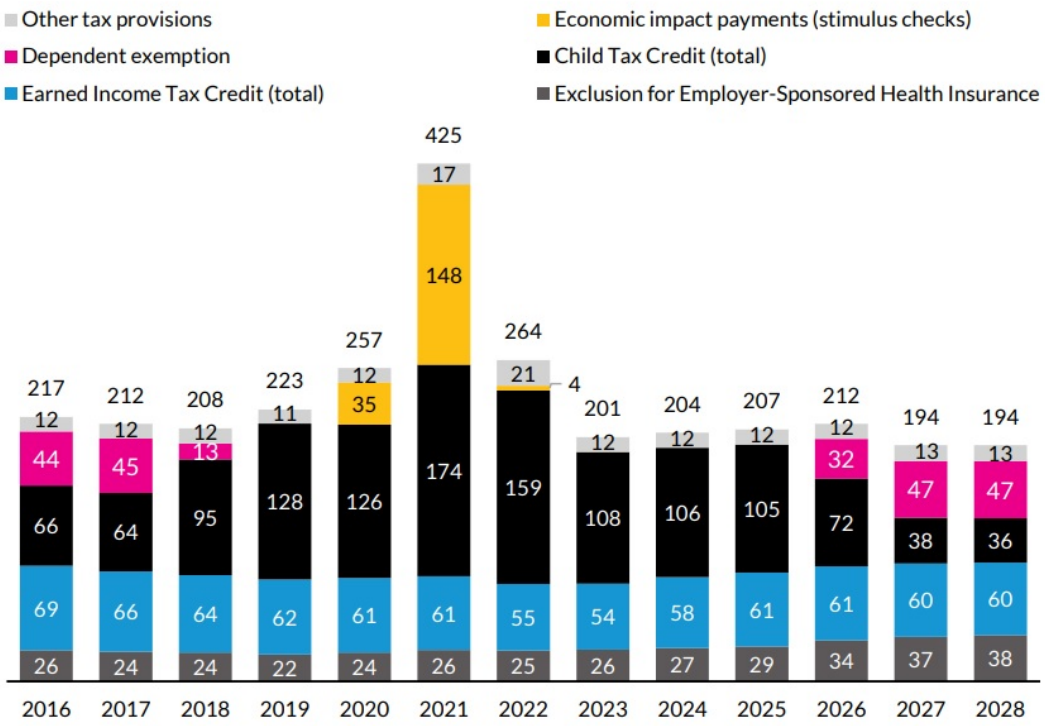

Figure: Federal Expenditures on Children through Tax Provisions
The estimates are based primarily on CBO (2023) and past years' releases of these reports (Lou et al. 2023)

Since the 2017 expansion, the Child Tax Credit has emerged as the largest federal expenditure on children.

Recent work in CTC

Policy implications of CTC by examining several outcomes:

- Employment (Enriquez et al., 2023; Goldin, Maag and Michelmore, 2022); parental mental health (Batra et al., 2023), child poverty (Han et. al., 2022).
- Mixed findings in parental labor supply (Feldman et al., 2016; Lippold, 2019; Ananat et al., 2022; Enriquez et al., 2023)

Parent-child interaction:

- Gender (Guryan et al., 2008), family structure (Sayer, Bianchi and Robinson, 2004), child age (Zick and Bryant, 1996), educational attainment (Guryan et al., 2008) and race (McLoyd, 1990)

Research Question & Main Contributions

How does the 2017 CTC expansion change the time allocation of parents?

- Allowing variation to the exposure of CTC, using a measurement called "intensity"
  - cost of childcare relative to median income
  - low vs. high exposure
- Use the policy as an exogenous income shock to examine:
  - time spend with children
  - gender disparities within the household $\rightarrow$ more or less leisure for mothers?
  - parental time with children

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Preview of Our Findings

- Our findings suggest that, following the CTC expansion, parents residing in areas with greater exposure to this policy change tend to:
  - $\downarrow$ childcare tasks, paid work, and household activities
  - $\uparrow$ leisure time.
    - This trend is particularly noticeable among mothers.
- CTC reform primarily
  - $\downarrow$ basic childcare responsibilities

Data

(1) Time Use Data from ATUS

- We focus on parents:
  - between 18 and 65 years old
  - with at least one child under 17
  - complete 24-hour diary
- Group time use based on five categories:
  - Work, Leisure, Childcare, Housework, Others (civic obligations, volunteering services etc.)
- Classify childcare based on activities:
  - Basic childcare (breastfeeding, putting a child to sleep, providing medical care)
  - Educational childcare (reading, helping for homework)
  - Recreational childcare (attending sports events, outdoor activities, etc.)

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Data

(2) Children and Income Data:

- Small Area Income and Poverty Estimates (SAIPE) Program
  - Median household income
- Childcare Costs
  - Women's Bureau National Database of Childcare Prices
  - County-level weekly full-time childcare price data for different types of center-based childcare

$\rightarrow$ We focus on years 2008-2021

$\rightarrow$ To match ATUS with the childcare cost data households with missing/unknown county codes are dropped

$\rightarrow$ 42,194 households, 15,782 living with one or more children under the age of 17.

Empirical Specification

To examine the policy's impact on time allocation of parents, we use DiD regression:

$$Y_{icdy} = \gamma Intensity_c \times Post_y + \theta X_{icdy} + Weekend_{icdy} + Month_{icdy} + \lambda_y + \lambda_c + \lambda_{sy} + \varepsilon_{icdy}. \quad (1)$$

Where:

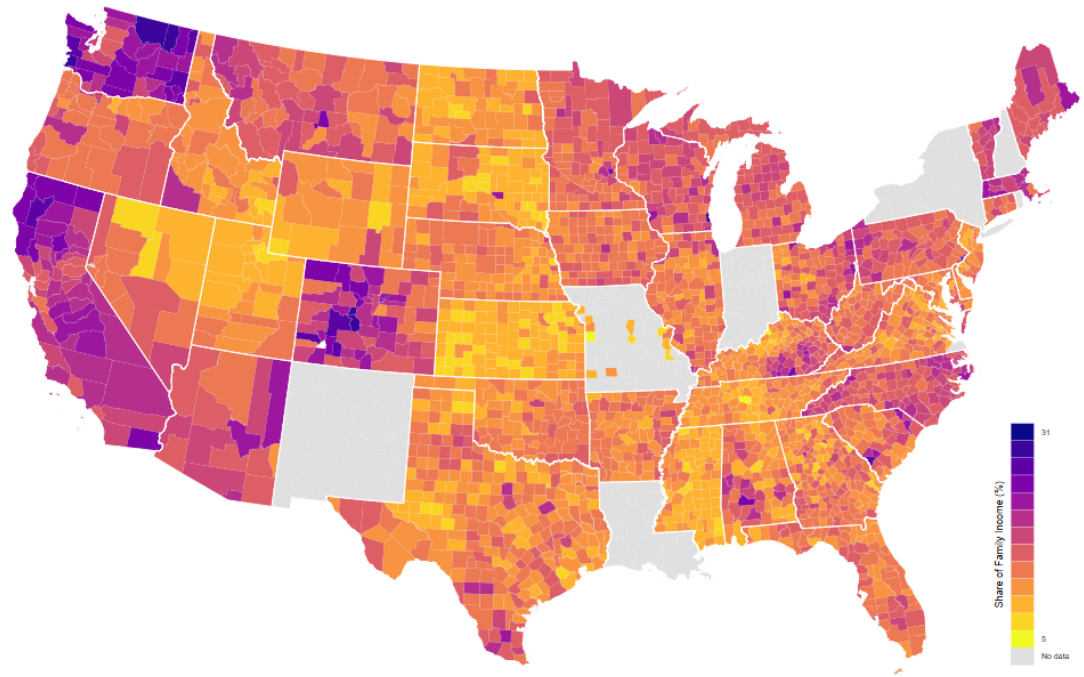
- Y_{icdy}: the likelihood (probability) or amount of time spent (in minutes) in an activity for individual i living in county c, on date d of year y.
- $Post_y$: equals 1 if an individual is surveyed after 2017.
- $Intensity_c$: continuous treatment indicating the exposure intensity to the CTC payments received by an individual residing in county c based on the share of its local childcare cost on the median household income.
- X_{icdy}: individual characteristics
- $Weekend_{icdy}$: dummy variable indicating if the respondent was surveyed during the weekend.
- $Month_{icdy}$:month fixed effects
- λ_y, λ_c: year and county-fixed effects
- λ_{sy}: state-year fixed effects
- ε_{icdy}: error term

Measuring the Varying Exposure to CTC (Treatment Intensity)

Intensity definition:

$$Intensity_c = 1 - \frac{[Childcare\ Cost\ per\ Household\ Income]_c}{max([Childcare\ Cost\ per\ Household\ Income]_c)} \tag{2}$$

- Inversely rank the relative childcare cost given its percentile position to the maximum childcare cost
- We assume that lower-cost, more affordable areas are more treated (these families can buy more hours than a family facing higher prices)
- Higher percentile, higher exposure



Source: National Database of Childcare Prices (2008-2017). Note: Grey areas indicate no data

Figure: Geographic Variation in the Exposure to CTC

Note: The exposure is measured by the percentage of childcare costs in family income. The intensity of the purple color indicates the extent to which the percentage of the median household income allocated to childcare expenses per child increases.

Lowest childcare spending as a proportion of household income (5% in Williamson, TN) vs. highest childcare spending as a proportion of income (25% in Denver, CO)

Testing the Common Trend Assumption

Using Granger (1963) leads and lags of the treatment, we use the following:

$$Y_{icdy} = \sum_{t=2008}^{2016} \gamma_t Intensity_c \times Lead_t + \sum_{t=2018}^{2021} \gamma_t Intensity_c \times Lag_t + \theta X_{icdy} + Weekend_{icdy} + Month_{icdy}$$

$$+ \lambda_y + \lambda_c + \lambda_{sy} + \varepsilon_{icdy} (3)$$

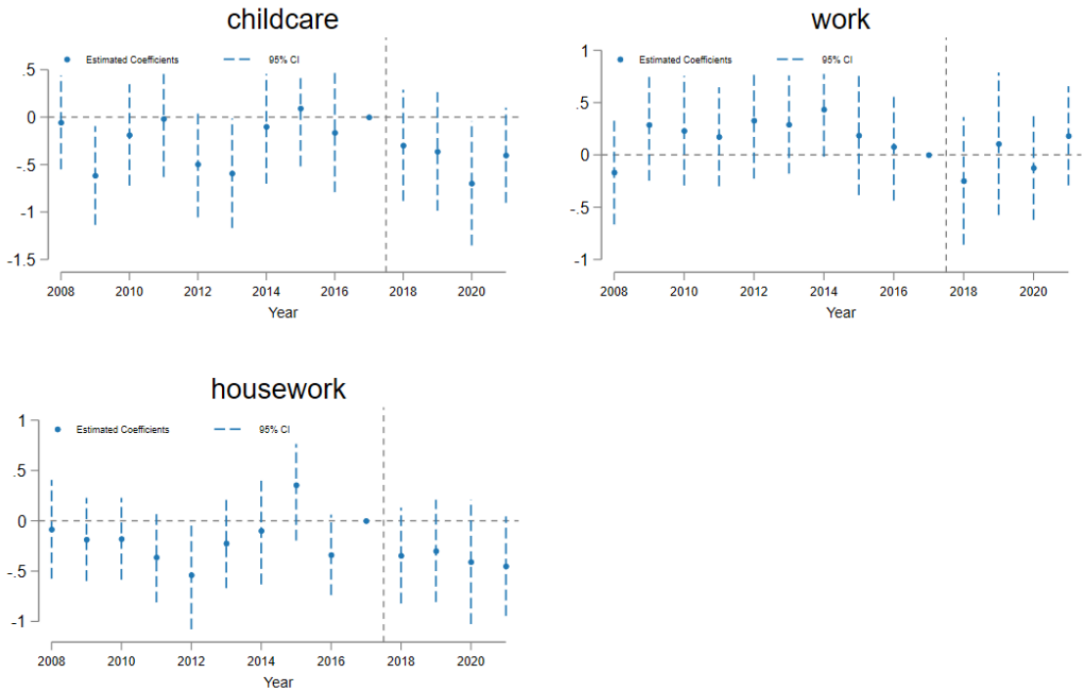


Figure 1. Event Study and Dynamic DD Results
Note: The dependent variables are the probability of engaging in childcare, home production, and work and related activities. We also report the 95% confidence interval.

Baseline Results

Table 1. CTC Expansion's Impact on Parental Time Allocation

	Probability					Minutes Per Day				
	Housework (1)	Leisure (2)	Work (3)	Childcare (4)	Others (5)	Housework (6)	Leisure (7)	Work (8)	Childcare (9)	Others (10)
Panel A: All Parents										
intensity × post	-0.2216*		-0.2178**	-0.2996**	0.1199	-65.228	76.657	-12.553	-18.140	19.264
	(0.1152)		(0.1065)	(0.1457)	(0.0946)	(43.885)	(54.591)	(75.472)	(31.667)	(13.343)
Observations	15,782	15,782	15,782	15,782	15,782	15,782	15,782	15,782	15,782	15,782
R-squared	0.1407		0.4608	0.2902	0.0865	0.236	0.304	0.440	0.280	0.077
Panel B: Fathers										
intensity × post	-0.294		-0.163	-0.103	0.066	-33.825	-9.340	54.515	-1.786	-9.565
	(0.219)		(0.138)	(0.214)	(0.141)	(76.307)	(95.640)	(107.599)	(54.187)	(11.579)
Observations	6,816	6,816	6,816	6,816	6,816	6,816	6,816	6,816	6,816	6,816
R-squared	0.170		0.457	0.306	0.167	0.227	0.377	0.451	0.238	0.127
Panel C: Mothers										
intensity × post	-0.132		-0.224	-0.397**	0.103	-123.907**	144.863**	-39.648	-10.876	29.567
	(0.090)		(0.157)	(0.185)	(0.160)	(58.367)	(71.929)	(87.725)	(40.765)	(32.091)
Observations	8,899	8,899	8,899	8,899	8,899	8,899	8,899	8,899	8,899	8,899
R-squared	0.117		0.485	0.310	0.134	0.247	0.337	0.449	0.341	0.122
Individual Controls	✓		✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓		✓	✓	✓	✓	✓	✓	✓	✓
Weekend FE	✓		✓	✓	✓	✓	✓	✓	✓	✓
Month FE	✓		✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓		✓	✓	✓	✓	✓	✓	✓	✓
State-Year FE	✓		✓	✓	✓	✓	✓	✓	✓	✓

Where did the time go?

Table 2. Impact of CTC Reform on Time Allocated to Different Leisure Activities

	Personal Care (1)	Eating and Drinking (2)	Socializing (3)	Sports and Exercise (4)	Shopping (5)	Religious Service (6)	Phone (7)
Panel A: All parents							
intensity × post	-42.3758	3.5385	94.6936*	8.6479	-11.5701	-0.0787	8.1071
	(41.2110)	(13.8091)	(54.6269)	(10.9420)	(11.8973)	(4.2399)	(7.1937)
Observations	15,782	15,782	15,782	15,782	15,782	15,782	15,782
R-squared	0.1841	0.1208	0.2317	0.0969	0.1155	0.0698	0.0969
Panel B: Fathers							
intensity × post	22.8691	3.4132	2.5686	20.9105	-1.9858	-1.1150	-0.7879
	(64.7606)	(25.5487)	(82.1851)	(19.2225)	(14.9374)	(11.1949)	(8.4713)
Observations	6,816	6,816	6,816	6,816	6,816	6,816	6,816
R-squared	0.1567	0.1492	0.1523	0.1226	0.1358	0.1179	0.1523
Panel C: Mothers							
intensity × post	-48.4622	-3.5973	271.7564***	12.1081	-16.3492	-3.4990	11.5262
	(53.4499)	(15.2015)	(75.4688)	(13.4897)	(18.3022)	(5.1793)	(8.2649)
Observations	8,899	8,899	8,899	8,899	8,899	8,899	8,899
R-squared	0.1312	0.1201	0.1315	0.1047	0.1126	0.1066	0.1383
Individual Controls	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓
Month FE	✓	✓	✓	✓	✓	✓	✓
Weekend FE	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓	✓	✓	✓

Results by childcare activities

Table 3. CTC Expansion's Impact on Parental Time With Children by Age of the Youngest Child

	Total Child Care (1)	Basic Child Care (2)	Educational Child Care (3)	Recreational Child Care (4)
Panel A: All Parents				
intensity × post	–0.2892**	-0.3366***	-0.0362	0.1882*
	(0.1449)	(0.1266)	(0.1293)	(0.1101)
Observations	15,782	15,782	15,782	15,782
R-squared	0.2930	0.2938	0.1679	0.2080
Panel B: Parents with at least one preschooler				
intensity × post	-0.1574	-0.2040	-0.1390	0.2002
	(0.1831)	(0.1789)	(0.2079)	(0.2071)
Observations	7,411	7,411	7,411	7,411
R-squared	0.2726	0.2989	0.2455	0.2131
Panel C: Parents with at least one Elementary Schooler				
intensity × post	–0.6058***	-0.6911***	-0.2420	-0.1061
	(0.2327)	(0.2349)	(0.2182)	(0.1738)
Observations	4,805	4,805	4,805	4,805
R-squared	0.3208	0.3190	0.2986	0.2027
Panel D: Parents with at least one Teenagers				
intensity × post	-0.1078	-0.0790	0.2478	0.0736
	(0.2757)	(0.2559)	(0.1616)	(0.1144)
Observations	3,366	3,366	3,366	3,366
R-squared	0.3701	0.3736	0.3145	0.2829
Individual Controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Month FE	✓	✓	✓	✓
Weekend FE	✓	✓	✓	✓
County FE	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓

Robustness Checks

1. We examine the reform's impact on individuals' decisions regarding fertility and marriage.
2. We examine whether the household physical structure at the county level remains unchanged after the CTC reform.
3. To ensure that our estimated effects are not influenced by the effect of school closure on parental time distribution, we exclude 2020 from our analysis.
4. We also tried an alternative intensity measurement using the share of child-related expenditure.

Fertility and marriage

Table 4. Impact of CTC Reform on Fertility and Marriage Decision

	Probability of Having Children			Number of Children			Probability of Getting Married		
	All	Men	Women	All	Men	Women	All	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: All Years									
intensity × post	0.0492	0.0854	-0.0073	0.1885	0.3653*	-0.0785	-0.0575	0.1002	-0.1487
	(0.0566)	(0.0779)	(0.0759)	(0.1618)	(0.2158)	(0.2264)	(0.0993)	(0.1405)	(0.1237)
Observations	32,939	15,666	17,240	32,939	15,666	17,240	32,939	15,666	17,240
R-squared	0.6774	0.6973	0.6937	0.5812	0.6116	0.6023	0.2711	0.3438	0.2615
Panel B: Excluding 2021 (Pandemic Baby)									
intensity × post	0.0106	0.0207	0.0058	-0.0045	0.1574	-0.1616	-0.0329	0.1574	-0.0832
	(0.0646)	(0.0952)	(0.0847)	(0.1647)	(0.2577)	(0.2120)	(0.1027)	(0.1362)	(0.1387)
Observations	31,038	14,737	16,267	31,038	14,737	16,267	31,038	14,737	16,267
R-squared	0.6753	0.6967	0.6912	0.5811	0.6137	0.6012	0.2707	0.3458	0.2599
Individual Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Weekend FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

- According to Kearney and Levine (2023) there was a surge in birth rates during the period between March and September 2021, resulting in approximately 30,000 more births than anticipated.
- We do not find evidence that the CTC reform influenced the composition of our sample due to changes in decisions regarding fertility and marriage.

Migration

Table 5. Impact of CTC Reform on Migration Decision

	Moving Within Same County			Moving Within Same State			Moving Across States		
	All	Fathers	Mothers	All	Fathers	Mothers	All	Fathers	Mothers
Panel A: All Years									
intensity × post	-0.0649	-0.1804***	0.0557	0.0049	0.0336*	-0.0183	0.0084	0.0062	-0.0091
	(0.0558)	(0.0691)	(0.0470)	(0.0160)	(0.0195)	(0.0284)	(0.0112)	(0.0154)	(0.0167)
Observations	15,782	6,816	8,899	15,782	6,816	8,899	15,782	6,816	8,899
R-squared	0.1427	0.2139	0.1860	0.0996	0.1630	0.1867	0.1054	0.1712	0.1608
Panel B: Excluding 2020 & 2021 (Pandemic Moving)									
intensity × post	-0.0821	-0.2216**	0.0407	0.0030	0.0425*	-0.0237	-0.0002	-0.0061	-0.0147
	(0.0782)	(0.0943)	(0.0658)	(0.0290)	(0.0240)	(0.0584)	(0.0110)	(0.0164)	(0.0147)
Observations	14,238	6,132	8,044	14,238	6,132	8,044	14,238	6,132	8,044
R-squared	0.1471	0.2181	0.1978	0.1080	0.1761	0.1987	0.1145	0.1769	0.1700
Individual controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Weekend FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

- Migration of individuals from regions with higher childcare costs to those with lower costs could undermine our estimations.
- CTC reform does not have a significant impact on the migration behavior of all individuals.

Excluding the impact of school closure

Table 6. CTC Expansion's Impact on Parental Time Allocation (Excluding 2020)

	Probability					Minutes Per Day				
	Housework (1)	Leisure (2)	Work (3)	Childcare (4)	Others (5)	Housework (6)	Leisure (7)	Work (8)	Childcare (9)	Others (10)
Panel A: All Parents										
intensity × post	-0.2429**		-0.1460	-0.2147	0.0784	-70.882	67.481	14.494	-15.938	4.844
	(0.1068)		(0.1096)	(0.1589)	(0.1132)	(44.814)	(64.011)	(76.608)	(30.768)	(9.588)
Observations	15,047		15,047	15,047	15,047	15,047	15,047	15,047	15,047	15,047
R-squared	0.1449		0.4956	0.2890	0.0870	0.253	0.326	0.488	0.284	0.063
Panel B: Fathers										
intensity × post	-0.454**		-0.031	-0.001	0.024	-106.060	-24.735	117.889	20.457	-7.550
	(0.196)		(0.159)	(0.218)	(0.155)	(74.419)	(109.868)	(125.621)	(58.595)	(11.255)
Observations	6,498	6,498	6,498	6,498	6,498	6,498	6,498	6,498	6,498	6,498
R-squared	0.173		0.460	0.304	0.170	0.230	0.380	0.453	0.240	0.132
Panel C: Mothers										
intensity × post	-0.067		-0.287*	-0.352*	0.073	-56.767	172.925**	-85.399	-33.314	2.554
	(0.101)		(0.163)	(0.202)	(0.137)	(58.394)	(80.740)	(89.331)	(43.650)	(17.944)
Observations	8,484	8,484	8,484	8,484	8,484	8,484	8,484	8,484	8,484	8,484
R-squared	0.116		0.488	0.308	0.130	0.245	0.342	0.453	0.339	0.088
Individual Controls	✓		✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓		✓	✓	✓	✓	✓	✓	✓	✓
Weekend FE	✓		✓	✓	✓	✓	✓	✓	✓	✓
Month FE	✓		✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓		✓	✓	✓	✓	✓	✓	✓	✓
State-Year FE	✓		✓	✓	✓	✓	✓	✓	✓	✓

- Table 6 indicates a decline in the probability of mothers engaging in both work and childcare duties → fathers reduce their involvement in household tasks.
- After excluding data from 2020 to isolate the effect of school closure on parental time, our findings are largely unchanged.

Alternative Measurement

- Not all families utilize center-based childcare services
- Find such measurement where it accounts for the expenses associated with raising children

We use the equation below:

$$Y_{isdy} = \gamma ChildExp_s \times Post_y + \theta X_{isdy} + Weekend_{isdy} + Month_{isdy} + \lambda_y + \lambda_s + \varepsilon_{isdy}$$

- $ChildExp_s$:a continuous treatment that captures childcare spending as a proportion of all childcare-related expenses (total expenditure) at the state level.

**To determine the percentage of expenditure allocated to childcare, we modify the overall spending figures from the Consumer Expenditure Survey (CES) spanning 2008 to 2016 by omitting expenses in categories unrelated to childcare, such as alcohol, tobacco, and personal care.

Alternative measurement

Table 7. Baseline results using an alternative intensity measurement

	Housework (1)	Leisure (2)	Work (3)	Childcare (4)	Others (5)
Panel A: All Parents					
intensity × post	-0.0202		-0.0532	0.0188	0.0127
	(0.0271)		(0.0383)	(0.0254)	(0.0278)
Observations	33,886	33,886	33,886	33,886	33,886
R-squared	0.0697		0.3433	0.2297	0.0273
Panel B: Fathers					
intensity × post	-0.0001		0.0411	0.0508	0.0010
	(0.0486)		(0.0812)	(0.0616)	(0.0301)
Observations	14,832	14,832	14,832	14,832	14,832
R-squared	0.0263		0.2553	0.1785	0.0317
Panel C: Mothers					
intensity × post	-0.0296*		-0.1251***	-0.0170	0.0261
	(0.0172)		(0.0268)	(0.0485)	(0.0302)
Observations	19,054	19,054	19,054	19,054	19,054
R-squared	0.0227		0.3654	0.2205	0.0276
Individual Controls	✓		✓	✓	✓
Year FE	✓		✓	✓	✓
Month FE	✓		✓	✓	✓
Weekend FE	✓		✓	✓	✓
State FE	✓		✓	✓	✓

Heterogeneity: Results by education

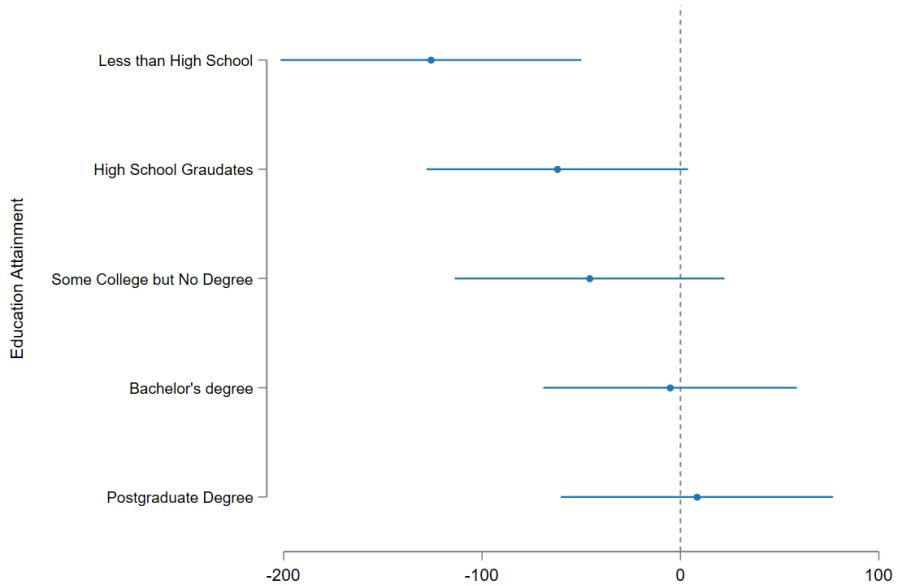


Figure: Impact of CTC on Time Allocated to Childcare by Parental Education

Note: The blue dots represent the regression coefficients from OLS regressions of time allocated to child care on our county-level CTC treatment variable by parental education.

- The reduction in childcare time was found to be statistically significant primarily among parents with lower levels of education, specifically those with a high school diploma or less

Heterogeneity: Results by race

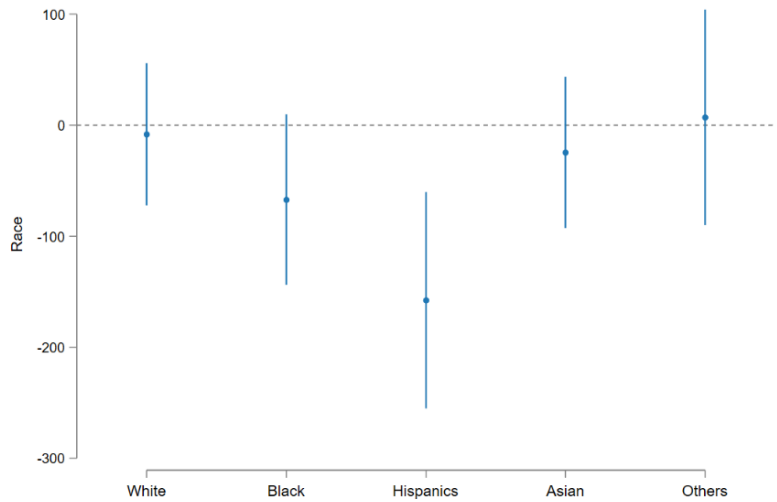


Figure: CTC's Impact on Time Allocated Childcare Activity by Race

Note: The blue dots represent the regression coefficients from OLS regressions of time allocated to child care on our county-level CTC treatment variable by the race of the parent

- There was a significant decrease in the amount of time Hispanic parents in regions with greater exposure to the reform dedicated to childcare-related tasks

Heterogeneity: Results by income

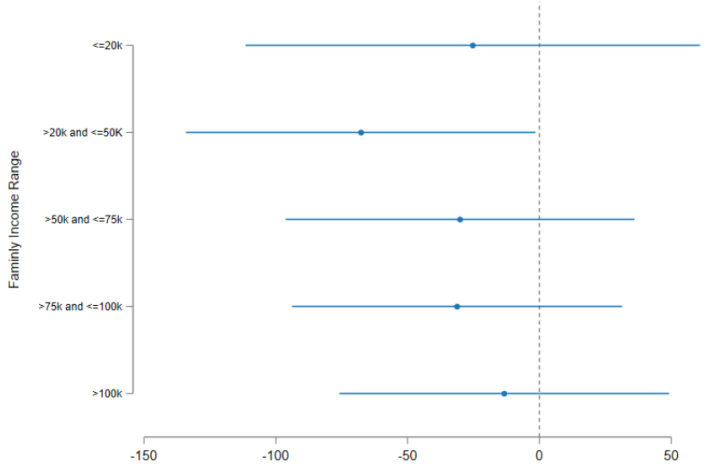


Figure: CTC's Impact on Time Allocated Childcare Activity by Family Income

Note: The blue dots represent the regression coefficients from OLS regressions of time allocated to child care on our county-level CTC treatment variable by annual family income.

- CTC expansion causes all parents to cut back on their total time with children.
- Notably, the estimated decline is strongest for the 20k to 50k income category

Conclusion

- Parents living in areas with high exposure to the policy change tend to be less involved in household, work, and childcare activities:
  - which gives them more time for leisure
  - Mothers spend more time for socializing
- Policy change leads to a decline in some types of childcare activities:
  - only in basic childcare
  - no impact on cognitive development
- Heterogeneity on childcare activities by race, gender and education level reveals that:
  - Hispanic parents
  - 20-50k
  - High school or less

$\rightarrow$ Tend to spend less time for childcare

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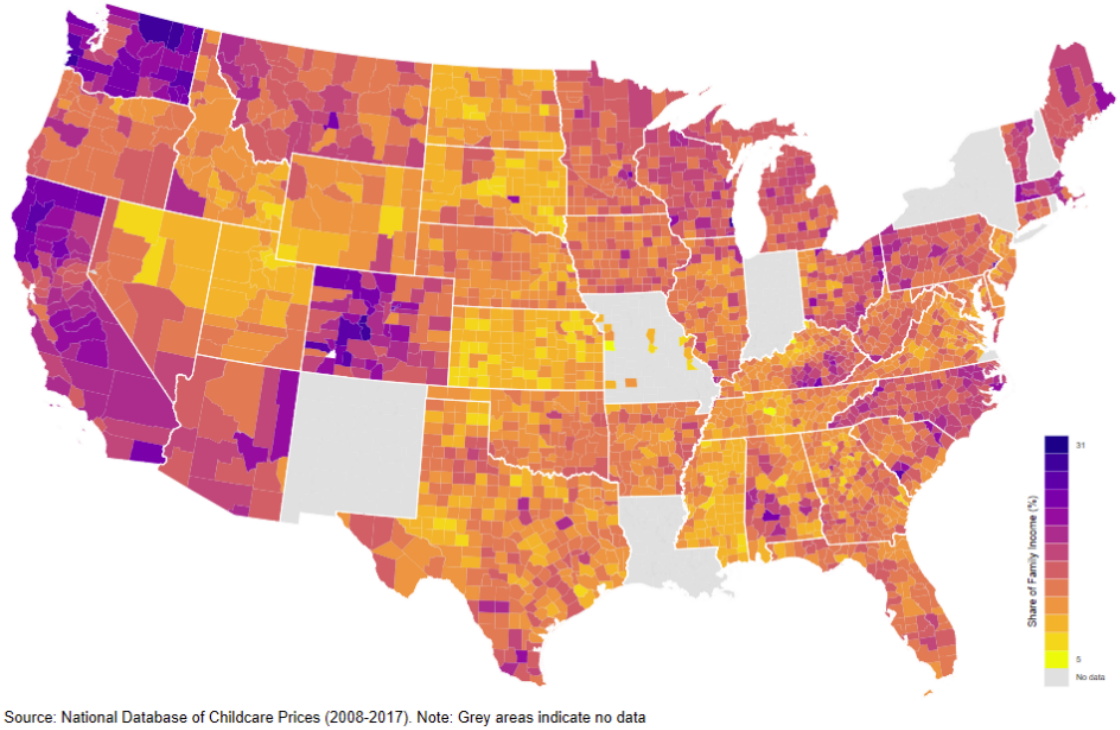
Thank you!

elif.dilden@rockhurst.edu

Appendix



Source: National Database of Childcare Prices (2008-2017). Note: Grey areas indicate no data

Figure A1. Percentage of Childcare Cost in Family Income