Persistent Effects of COVID-19 Child Care Center Closures on Women's Labor Market Outcomes

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August 16, 2021

Abstract

The COVID-19 pandemic has had a dramatic effect on women's labor market outcomes. We assess the effects of state-level policies that mandated the closure of child care centers or imposed class size restrictions using a triple-differences approach that exploits variation across states, across time, and across women who did and did not have young children who could have been affected. The longitudinal structure of the Current Population Survey data we analyze also allows us to control for worker fixed effects. We find some evidence that closure and class size limit policies increase the unemployment rate of mothers of young children in the short-term. There are no long-term effects of class size limits. In contrast, the effects of mandated closures on unemployment become even larger and persist after states discontinue closures, consistent with a child care supply side effect. Negative effects are more pronounced for single and low-income mothers, indicating that permanent changes in childcare availability caused by stay-at-home orders may further exacerbate pre-pandemic inequalities.

JEL Codes: J2; J6.

Keywords: COVID-19; coronavirus; pandemic; child care availability; women's labor supply; women's employment

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1 Introduction

The economic downturn ushered in by the COVID-19 pandemic stands in stark contrast to previous recessions because it has disproportionately affected women. Alon et al. (2020b) show that for every recession between 1948 and 2009, men's unemployment rates have increased more than women's or the effects have been relatively equal. The 2020 recession is the first recession where the unemployment rate for women has risen significantly more than the unemployment rate for men.

Many have hypothesized that two primary factors are responsible for the dramatic effects on women's employment rates in the US: the concentration of women in sectors and occupations disproportionately impacted by the pandemic and changes in child care availability (Alon et al., 2020b; Dingel et al., 2020; Collins et al., 2020). There are a prior reasons to believe that changes in child care availability will disproportionately affect mothers. Alon et al. (2020a) use time-use data to show that mothers spend more time on childcare than fathers in two-parent households. They also point out using US Census Bureau data that single mother households are much more common than single father households (Alon et al., 2020a). Dingel et al. (2020) document that 32 percent of the US workforce has a child under age 14 and 9.4 percent have a child under age 6. They conclude, therefore, that child care center closures will affect women's employment much more than men's employment but do not directly quantify the extent to which child care availability drives employment effects.

Prior to the pandemic, 24% of children aged 5 and younger received center-based care from a day care center, preschool, prekindergarten or other early childhood program, and 60% participated at least one weekly in some type of non-parental care arrangement including home-based day cares or care arrangements with a relative (U.S. Department of Education, 2016). By mid-March and early April, 16 states had mandated the closure of child care centers, potentially limiting the ability of parents to access child care. Another 15 states imposed class size restrictions, typically allowing classes to contain no more than 10 children.

In this paper, we assess the effects of these mandatory child care center closures and class size limits on mothers' labor supply outcomes, including unemployment, detachment from the

labor force, shares of women who are employed but not working, and actual hours worked. We estimate both the immediate effects as well as longer-term effects up to thirteen months after closures or class size restrictions were first implemented.[1] Our triple-differences approach exploits variation across states, time, and motherhood status, and the panel structure of our data also allow us to control for worker fixed effects.

Ultimately, we find that state-level mandates that forced the closure of child care centers or imposed class size limits had important effects on unemployment rates of mothers of young children aged 0 to 5. In the short-term, we estimate class size restrictions increased unemployment rates of mothers of young children by 2.3 percentage points. We do not find a statistically significant effect of closures in the short-term, but our estimates are imprecise, and the confidence interval cannot rule out an unemployment effect as large as +4.9 percentage points. Post-closure, states that reopened child care centers but did not implement class size restrictions had unemployment rates of mothers of young children that were 3.2 percentage points higher, an effect which is statistically significant at the 1% level.

Though we lack data to directly test how child care availability changed by state, it's likely that early financial pressures directly caused by mandated closure or class size restrictions caused some centers to close their doors permanently. The Center for American Progress has estimated that meeting pandemic-related state guidelines would increase operating expenses for child care providers by 47%, on average (Jessen-Howard and Workman, 2020b). Most of these increased costs would take the form of personnel costs to comply with reduced class size requirements as well as increased sanitation costs (Jessen-Howard and Workman, 2020a).

Anecdotally, some centers also continued paying staff even when centers were closed, a costly choice at a time when revenues were at best reduced, or at worst, nonexistent. A November survey of 6,000 childcare workers by the National Association for the Education of Young Children found that 56% of childcare centers were losing money, and 42% of workers surveyed reported taking on debt for their programs on their own personal credit cards (National Association for the Education of Young Children, 2020a). Even if programs could

[1] An earlier short-term version of our analysis appears in Russell and Sun (2020).

meet budget shortfalls for a month or two, it's unlikely they could do so in the long-term, leading to permanent closures and a contraction in the supply of child care.

Another survey by the National Association for the Education of Young Children found that nationally, 18% of child care centers were closed in July 2020 as a result of the pandemic, even though all states had officially allowed child care centers to reopen by that time, which is consistent with this type of permanent supply side response (National Association for the Education of Young Children, 2020b). The survey also predicted that closures would become more widespread in the months that followed. Forty percent of respondents said they were certain that they would close permanently within the year without additional public assistance (National Association for the Education of Young Children, 2020b). Corroborating these predictions, Bureau of Labor Statistics data indicate that there were 166,800 fewer childcare workers in December 2020 compared to December 2019 (Mongeau, 2021).

All of this evidence suggests that as the pandemic stretched on, the supply of child care became more constrained. Our evidence indicates that this has had the notable downstream effect of increasing unemployment rates for women of young children.

2 Related Literature

A number of recent papers have investigated the impact of the COVID-19 pandemic on labor supply outcomes of parents. Estimating worker fixed effects models using US Current Population Survey data, Collins et al. (2020) show that mothers with children aged 13 or younger reduced their work hours by five times as much as father's between March and April 2020. However, it is not clear what portion of this decline is due to differences in the type of occupations chosen by mothers and fathers as opposed to child care responsibilities.

Heggeness (2020) provides some direct evidence on the short-run effects of changes in child care availability on mothers' labor market outcomes in the US during the pandemic. Using a differences-in-differences approach, she estimates effects of early public school closures and stay-at-home orders on women's unemployment, labor market attachment, and hours

worked. She finds that mothers in early closure states were significantly more likely to have a job but not be working as a result of early shutdowns but found no immediate impact on labor market detachment or unemployment.

A longer-term analysis by Prados and Zamarro (2021) uses double difference and triple differences models to assess the impacts of school closures and reopenings on parental labor market outcomes in the US.[2] They conclude that the lack of school reopenings in some areas made it harder for parental employment to recover in Fall of 2020 and that "transitions out of employment for mothers who were working before the onset of the pandemic seem to be more persistent than for fathers in similar conditions."

Like the previously mentioned papers, Furman et al. (2021) use CPS data to investigate the impacts of the pandemic on employment, but unlike Heggeness (2020) and Prados and Zamarro (2021) who investigate impacts only of K-12 school closures, they look both at parents of school-aged children and parents of children under 5. By looking at average employment rates by sex-age-education-parental status cells, they attempt to quantify what share of the overall decline in the female unemployment rate is due to childcare challenges specifically. They conclude that childcare challenges can explain very little of the aggregate decline in women's unemployment.

In this paper, we are not interested in what percent of the aggregate employment losses for women nationwide are due to childcare challenges. Instead, we are interested in whether state-specific policies that mandated childcare center closures or imposed class size limits impacted labor market outcomes for women of young children in these states. Nevertheless, our analysis indicates that childcare challenges are substantively important for women in states where childcare centers were forced to close or comply with class size restrictions.

While directly comparing and reconciling the aggregate results of Furman et al. (2021) with our micro-level results is beyond the scope of this paper, it is worth noting that the Furman et al. (2021) unemployment calculations are quite coarse. Their cell-specific unem-

[2]Beauregard et al. (2021) estimate impacts of school reopenings on labor market outcomes in parents in Canada and find that school reopenings increased employment rates of parents, especially single mothers and jobs that could not easily be done at home.

ployment rates reflect nationwide unemployment, not unemployment rates specific to each state. If women without children are overrepresented in states hit particularly hard by the pandemic, the "counterfactual" for mothers of young children will overstate counterfactual unemployment, and there will be downward bias in the share of aggregate unemployment attributable to childcare challenges.

All of the aforementioned papers fit within the larger and more long-standing literature on the effects of childcare availability on women's labor supply more generally. Other research has investigated whether pre-K and kindergarten availability makes women more likely to work. Exploiting birthday-based eligibility for universal pre-K, Fitzpatrick (2010) shows that universal pre-K availability has little effect on the labor supply of most women. Cascio (2009) finds that the introduction of kindergarten in the 1960s had no effect on labor supply of married mothers but single mothers with no younger children were induced to enter the labor force. Gelbach (2002) adopts a quarter of birth instrumental variables strategy and concludes that kindergarten enrollment of the youngest child in the 1980s increased labor supply for both single and married mothers. None of these papers look at the effect of a sudden and unanticipated cutoff in access to care. Mandatory child care center closures and increased regulations of centers implemented during the pandemic provide a unique opportunity to investigate the importance of childcare availability on female labor force participation and employment when care is suddenly, and then permanently, disrupted.

3 Mandatory Child Care Center Closures

The COVID-19 pandemic involved stay-at-home orders, some of which forced the closure of child care facilities. In March-April 2020, 16 states issued orders that forced child care businesses to close, though most included an exemption which allowed centers to stay open if they served the children of essential workers.

The other 34 states (plus DC) allowed childcare businesses to stay open. However, among these 34 states, 15 imposed class size limits designed to increase social distancing and reduce

the risk of COVID transmission without a classroom. For the purposes of our analysis, we classify a state as imposing class size limits if it required classes to consist of 15 or fewer students. Notably, many states imposed more restrictive requirements. Some required 10 or fewer even if the classrooms for the oldest age groups and/or included staff in the count.

Figure 1 identifies the states that ordered the closure of child care businesses, states that allowed child care centers to remain open without class size limits, and states that allowed child care centers to remain open but imposed class size limits. Even though Alabama initially ordered child care centers to close, this closure remained in effect only for one week between March 19, 2020 and March 27, 2020 at which point the state allowed centers to reopen with a class size limit of 11. Therefore, in our analysis we classify Alabama as a class size limit state rather than a mandated closure state.

Even in states that did not officially mandate stay-at-home orders or class size limits, child care centers were deeply affected. Some centers voluntarily closed their doors due to health concerns, and others voluntarily decreased class sizes in accordance with state recommendations to allow for more social distancing. Some parents decided not to send children to child care centers, even if centers were open in their area (Quinton, 2020). Therefore, even the states where childcare businesses technically had the ability to operate as normal during the early months of the pandemic, parents may have experienced decreased child care access.

Between March 21 and April 2020, the Bipartisan Policy Center and Morning Consult conducted a national survey of 800 parents with children under age 5. They found that 60% of child care programs were fully closed (Bipartisan Policy Center, 2020). Unfortunately, these aggregate data do not report data separately by state, so it is impossible to directly compare the share of child care centers closed in states that mandated closure versus those that did not during the earliest months of the pandemic.[3] The aggregate statistics reported by the the aforementioned National Association for the Education of Young Children survey,

[3]We did attempt to analyze state-level Occupational Employment and Wage Statistics from the Bureau of Labor Statistics that correspond to childcare workers to see if childcare worker employment fell more in states with mandatory closures. The analysis using data from May 2020 was too imprecise to be informative, and May 2021 data were not yet available as of the time of this writing.

which found that 18% of child care centers were closed in July 2020, suggests that some but not all of these centers had reopened once states relaxed their closure policies in April, May, and June.

Though mandates to close child care centers were sometimes part of a more general stay-at-home order, state-imposed child care center closures are not perfectly correlated with other types of closures such as public school closures (Heggeness, 2020). Some states that closed public schools explicitly allowed child care centers to remain open (Hunt Institute, 2020; Food Industry Association, 2020; Child Care Aware of America, 2020). In the analysis that follows, we investigate the independent effect of mandatory child care center closure policies and class size limit policies on the labor market outcomes of mothers of young children.

4 Data Description

We use three data sources for our analysis: state-level information on child care center closure policies, the Household Pulse Survey, and the Current Population Survey. Our data on child care center closure policies, including dates of announcement/implementation and dates of reopenings, come primarily from government press releases, but we also used information from the Hunt Institute (2020), Food Industry Association (2020), and Child Care Aware of America (2020) to cross-reference this information. The online data appendix reports specific language from these orders and a complete list of sources for each state.

The Household Pulse Survey, a survey launched in April 2020 specifically to shed light on COVID-19 related issues, is administered by the US Census Bureau. The short 20-minute survey consists of questions related to employment status, spending patterns, food security, housing, physical and mental health, access to health care, and educational disruptions (US Census Bureau, 2020; Centers for Disease Control and Prevention, 2020). The weekly survey provides a "near real-time snapshot" of COVID-19 experiences because there is only an 8 day lag between when respondents fill out the questionnaire and when the results are reported(Centers for Disease Control and Prevention, 2020). Although the survey has the

advantage of asking questions most relevant to effects of the COVID-19 pandemic, data were first collected only after state-level mandates for child care center closures. Therefore, we are unable to use the Pulse Survey data for our main triple-differences analysis. The data also fail to identify specific ages of children for respondents, so we cannot isolate reporting to parents of children aged 0 to 5, the population for whom child care is relevant.

Instead, we rely on the basic monthly files from the Current Population Survey, a monthly survey of about 60,000 households sponsored by the US Census Bureau and the US Bureau of Labor Statistics (Flood, Sarah and King, Miriam and Rodgers, Renae and Ruggles, Steven and Warren, J. Robert, 2020). Sampled households are in the survey for four consecutive months, are out for eight months, and then return for another four consecutive months before leaving the sample permanently. A new group of respondents starts in each calendar month at the same time another group completes its rotation.

Our microdata correspond to September 2019 to April 2021. We limit the sample to people aged 18-64, inclusive, to focus analysis on the working-age population. We drop anyone living in group quarters or working in the armed forces. We drop New York from our sample because New York City had a child care center closure policy while the rest of the state did not, so it is impossible to assign either treatment or control status to the state. We also drop any individuals whose reporting of age, sex, and race is inconsistent across the months where they report data to the CPS. Our primary triple-differences analysis uses the subset of data corresponding to women with children aged 0 to 5 and women without any children.

5 Aggregate Effects of the Pandemic on Women's Employment and the Importance of Child Care

Before presenting our analysis of the causal effects of state-level child care closure policies, we begin by presenting descriptive statistics on women's unemployment and the reported importance of child care access across all states during the pandemic period. Figure 2 uses

CPS data to show unemployment rates of men and women pre and post-pandemic. Prior to the pandemic, unemployment rates of both men and women aged 18-64 hovered around 3-4%. Then unemployment rates increased dramatically between February 2020 and April 2020, peaking at 15.4% for women and 13.1% for men. Consistent with Alon et al. (2020b)'s analysis, we find the increase is much larger for women – an 11.2 percentage point increase – compared to 8.5 percentage points for men between February and April. Unemployment rates for both men and women declined between April 2020 and October 2020, and the female unemployment rate remained above the male unemployment rate until October 2020.

5.1 Importance of Child Care Access

Figure 3 uses the Pulse data to investigate how many women are reporting that child care issues are a significant driver of their unemployment.[4] For this figure, we limit our sample to parents with children aged 18 and under because the data do not distinguish between the ages of children. Throughout the data collection period of April 23, 2020 to June 7, 2021, a significant number of parents are reporting that they are not working and that this is due to child care issues. The fraction of mothers reporting not working due to COVID-19 related child care issues is significantly higher than for fathers. For example, in the July 16-July 21 2020 survey, 11% of mothers versus only 3% of fathers were not working due to COVID-19 related child care issues. Interestingly, reports of child care issues have not decreased as states have relaxed closures and restrictions. In fact, the highest reported rates of child care issues are in May and June of 2021.

We also extend previous descriptive work by investigating differences by characteristics of these mothers. Appendix Figure A.1 reports the percent of single and married mothers not working who cited COVID-19 child care issues as the cause. In April and early May 2020, single mothers were more likely than married mothers to report not working due to COVID-19 related child care issues. By late May and June, single and married mothers were reporting similar rates. In July 2020 and beyond, married mothers have reported higher

[4]For more analysis of these data, see Heggeness and Fields (2020).

rates of not working due to COVID-19 related child care issues.

We also investigated heterogeneity in child care issues as a driver of unemployment by race/ethnicity. We find in Appendix Figure A.2 that race/ethnicity is not a strong and consistent predictor of which mothers report that they are not working due to child care issues.

6 Effects of Mandatory Child Care Center Closures

Though these descriptive statistics reveal that in the aggregate child care access is important for mothers' labor supply, it is not known whether state-level child care closures or class size restrictions, as opposed to voluntary closures of child care centers or loss of home-based care provided by acquaintances, friends, or relatives, had an independent impact on mothers' labor market outcomes.

6.1 Triple-Differences Empirical Strategy

To study the effects of state mandated child care center closures and class size restrictions on the employment of women during the pandemic, we use a triple-differences strategy.[5] Our empirical strategy uses three dimensions of variation: cross-state variation in which states implemented mandates, cross-time variation in when mandates were implemented, and cross-worker variation in whether a woman had young children who would potentially need child care.

One challenge in estimating the effect of child care center closures is the decision to close all child care centers may not be quasi-random. While we find evidence that women's employment was on parallel trends prior to the start of the pandemic for states that did and did not implement closures, it is possible that states that mandated the closure of child care centers were hit harder by the pandemic at the time the decision was made to close child care centers. Thus, women's employment could decline more in these states for reasons

[5] For a derivation of the triple-differences estimator and a complete discussion of its identifying assumptions, we refer readers to Olden and Møen (2020).

unrelated to child care availability. For example, prior work has shown that women tend to be over-represented in sectors and occupations that were impacted most severely by the pandemic (Alon et al., 2020a).

If these child care closure mandates are correlated with pandemic severity, a differences-in-differences analysis may conflate impacts of the pandemic on job availability with impacts through child care availability. Including women without children in the analysis allow us to isolate the child care availability effect. We omit women with only older children from the analysis because these mothers also experienced changing family obligations as many schools and universities were closed or switched to remote learning formats.

We start by estimating triple-differences event study models with leads and lags 6 months before and 13 months after closure and class size restrictions implementation:

$$y_{ipst} = \gamma_{st} + \theta_{pt} + \mu_{ps} + \sum_{j=-6}^{13} \beta_j Closure_{pst}^{j} + \sum_{j=-6}^{13} \Delta_j Restriction_{pst}^{j} + X_{ipst}\delta + \omega_i + \varepsilon_{ipst} \quad (1)$$

In this regression equation, y_{ipst} is a labor market outcome for woman i in state s and month t who either is or is not a parent (p) of a child aged 0 to 5. Recall that because we omit parents of older children from the analysis sample, any observation that is not a parent of a child aged 0 to 5 is a non-parent. We control for state-specific shocks that vary over time γ_{st} and include interactions for parent and time effects θ_{pt} and parent and state effects μ_{ps}. The matrix X_{ipst} includes a rich set of controls including age, marital status, education, industry fixed effects and a control for whether there is another adult in the household. The panel structure of the CPS also allows us to include person fixed effects (ω_i). We cluster standard errors at the state level.

The CPS survey is conducted on the 19th of each month and asks respondents questions about the previous week. Because all of our closure and restriction policies were effective after March 12, April 2020 is the first month where labor market outcomes in the CPS could have been directly affected by these mandates, absent any anticipatory effects. Accordingly,

for our event studies, the omitted month is March 2020, a month prior to when closures or restrictions could have first impacted labor market outcomes.

It is important to keep in mind that closures were rescinded after one month in Hawaii, North Carolina, West Virginia, and Wyoming, after two months in Illinois, Maryland, Michigan, Ohio, Oregon, Pennsylvania, Rhode Island, and Vermont, and after three months in Delaware, Kentucky, Massachusetts, and New Jersey. Therefore, no state between +4 and +13 months relative to policy implementation still had closures in effect, though we still plot these coefficients to investigate whether there were longer-term effects on labor market outcomes that persisted after policies were relaxed.

To account for potentially different effects in months where closures or class size restrictions were in effect vs. time periods where they had been relaxed, our triple-differences regression takes the following form:

$$\begin{gathered} y_{ipst} = \gamma_{st} + \theta_{pt} + \mu_{ps} + \beta ClosureInEffect_{pst} \\ + \Psi ClosureDiscontLimitImposed_{pst} + \Lambda ClosureDiscontNoLimit_{pst} \\ + \Delta LimitInEffect_{pst} + \Pi LimitDiscont_{pst} + \\ X_{ipst}\delta + \omega_i + \varepsilon_{ipst} \end{gathered} \tag{2}$$

Our set of five treatment indicators captures every possible treatment status in the post-policy period. $ClosureInEffect_{pst}$ equals 1 if person i was a parent of a young child in state s where child care center closures were mandated in month t. $ClosureDiscontLimitImposed_{pst}$ equals 1 for post-closure months once centers were allowed to reopen if class size limits were imposed at that time. $ClosureDiscontNoLimit_{pst}$ equals 1 in post-closure months once the closure policy was discontinued if no class size limits were imposed. Similarly, $LimitInEffect_{pst}$ equals 1 if person i was a parent of a young child in state s where child care centers were subject to class size limits in month t. $LimitDiscont_{pst}$ equals 1 in months after class size limits were discontinued.

The identifying assumption for our triple-differences estimator is that there is no contemporaneous shock that differentially affects the outcomes of the treatment group (mothers

with young children) compared to the control group (women without children) in the same state-months as state-mandated child care center closures or child care class size limits.

6.2 Results

Figures 4 and 5 show the results of the event study specification for four labor market outcomes: labor force detachment, unemployment, being employed but not working, and reducing hours worked last week. The plots show evidence of parallel trends, lending credence to the identifying assumption. There are no obvious effects of closures on labor force detachment, being employed but not working, or actual hours worked last week. By contrast, there is an obvious jump in unemployment after closures are implemented, and this effect persists in months four and beyond, the period after all closure policies were rescinded.

The results for class size limits in Figure 5 show a similar pattern. There are no discernible effects on labor force detachment, being employed but not working, or reducing hours worked last week, but there is a statistically significant increase in unemployment at the time class size limits go into effect. Unlike for closures, the negative employment effects seem to dissipate over time and are not statistically significant by three months after implementation.

Table 1 shows the triple-differences estimates. The first point estimate in column 2 indicates that closures increased unemployment rates of mothers with young children by 2.2 percentage points in months when a closure was actually in effect, but this effect is not statistically significant. The second point estimate indicates that in post-closure months where closures were discontinued but class size limits were imposed (later months of the pandemic), unemployment rates were 1.6 percentage points higher than they otherwise would have been, but again this effect is not statistically significant. The third point estimate indicates that in post-closure months where closures were discontinued and no class size limits were imposed, unemployment rates were 3.2 percentage points higher than they would have otherwise been, an effect that is statistically significant at the 1% level.

The estimates also show an effect of class size limits on unemployment rates of mothers

of young children: +2.3 percentage points in months where limits were in effect with this effect statistically significant at the 1% level. There is no statistically significant effect in post-class limit months once limits were discontinued, though the confidence interval cannot rule out effects as large as during months where the limits were actually in place.

6.3 Robustness

Because mothers of very young infants may have taken maternity leave and been unaffected by changes in child care center availability, we assessed the robustness of our results to defining mothers of young children as those with children aged 1-5 rather than 0 to 5. Table 2 shows that our results are robust to this change in the young mothers definition.

We would have liked to directly examine the number of women reporting that they are unemployed because of child care issues, but the CPS does not ask a question with response choices that would allow us to investigate this. The only reasons respondents can cite for being unemployed include (1) looking for first jobs, (2) re-entering after an extended work absence, (3) have left a job, (4) temporary job ended, (5) laid off, or (6) left job for another reason. None of these has a definitive link with child care issues. The Pulse survey is also poorly suited to investigating whether mothers of young children in states with closures or mandates were more likely to report being unemployed due to child care issues as the data cannot be disaggregated to include only mothers with young children.

Instead, we take advantage of a child care question asked on the March 2020 Annual Social and Economic Supplement (ASEC). Specifically, the question asked whether paid child care was needed for each child in the household. We define a mother as requiring paid child care for a child aged 0 to 5 if there is any child in her household aged 0 to 5 for whom "paid child care is needed." We have 4,550 mothers with a child aged 0 to 5 who responded to both the ASEC and appear in the March basic monthly file. Among those mothers, 34% have at least one child who needs child care which is consistent with estimates from the U.S. Department of Education (2016).

A challenge of using this question for our analysis is that it is only asked once per year. We

impute whether a mother needs child care in other months where she participates in the CPS panel by carrying this March response forward and backwards in time. Recall that sampled households are in the survey for four consecutive months, so if this household appeared in the CPS in February, March, April, and May, we use the March response and assign that same value to this household (mother) in February, April, and May. Then, we re-estimate our triple differences model, redefining the treatment group as mothers of children aged 0 to 5 who expressed a need for paid child care. The control group is the same as before - women without any children.

We would expect this analysis to be somewhat less informative than our preferred analysis previously presented. We are not able to look at effects of the closure and limitation policies past June 2020 because we do not have any treatment group coverage in August or September (more than four months after March). Moreover, though it is reasonable to assume that if a mother required paid child care in March, she also required it in other months, that assumption could be incorrect if there were changes in her outside options (availability of informal child care arrangements). We also have less statistical power due to smaller sample sizes. Nevertheless, if the results are truly driven by child care access, labor market effects of child care policies should be somewhat larger when estimating the triple differences specification on this sample.

In fact, this is generally what we find in Table 3. Though we lose statistical significance of some estimates due to larger standard errors, the point estimates, especially for the effects of class size limits, are larger than in the main specification. Interestingly, many of them are approximately three times as large, which is consistent with our finding that among the whole sample of women who have a child aged 0 to 5, about 1/3 report needing paid child care. These results are consistent with the effects we found for the full sample being driven by women who need paid child care in order to work.

6.4 Heterogeneity

Single mothers and low-income mothers may be particularly responsive to changes in childcare availability (Berger and Black, 1992; Bateman and Ross, 2020; Beauregard et al., 2021). Single mothers have less flexibility to adjust to lack of care because there is often no other adult who can share childcare responsibilities. For Table 4, we re-estimate our triple differences model with the treatment group consisting only of single mothers of young children. As before, the control group is non-mothers. Compared to the full sample of all mothers of young children, single mothers are more adversely affected by closures and class size limits. The point estimates are larger in magnitude, though estimates are less precise than for the full sample.

Low-income women may also be particularly susceptible to negative employment impacts from childcare center closures. Pre-pandemic, low-income communities had less child care center capacity relative to estimated demand than higher income communities (Malik et al., 2020). The Center for American Progress predicted that child care businesses in lower-income areas would have a much harder time reopening after pandemic closures and that the discrepancy in child care access would only be exacerbated by the pandemic (Malik et al., 2020).

Table 5 shows effects of childcare closures and class size limits using low-income mothers of young children and low-income non-mothers as the sample. We classify a woman as low-income if her household income is at or below the poverty line for her state and household size in any pre-pandemic period where she appears in the CPS. The effects of closure and class size limit policies are extremely large both in the short-term and long-term for low-income mothers. (Appendix Figures A.3 and A.4 present the analogous event studies. Event studies for other subsamples are available upon request.) A larger supply side contraction in communities where lower income women live could explain why effects of closure and class size limits are so much larger for women living at or below the poverty line. These results highlight yet one more mechanism through which the pandemic disproportionately impacted

members of already disadvantaged populations.[6]

One group of parents may have been more insulated from the short-term effects of closure and class size limits - parents working in healthcare. Many daycare centers gave priority to children of first responders and healthcare workers, and some states created emergency child care centers to serve essential workers or exempted centers from closure orders if they were serving children of essential workers (Mason, 2020; Kashen, 2020). Table 6 displays triple-differences estimates using only women in the healthcare sector pre-pandemic. We code a woman as working in healthcare sector if prior to the pandemic, she was employed in the office of a physician, dentist, chiropractor, optometrist, or other health practitioner, worked in an outpatient care center, nursing care facility, residential care facility, home health care, or other health care service, or worked in a general, surgical, specialty, psychiatric, or substance abuse hospital.

As expected, we find much smaller and not statistically significant effects of childcare center closures and class size limits on unemployment in the short-term for mothers who are healthcare workers. In months when class size limits were in effect, healthcare workers are less likely to be employed but not working or reduce hours worked, which could be because children of healthcare workers were prioritized when class sizes were limited. By contrast, we do also find a marginally significant effect on unemployment in the long term (once closures were discontinued and no class size limits were imposed), which is consistent with a child care supply contraction that affected workers in all industries.

7 Conclusion

In the aggregate, the COVID-19 pandemic has had a substantial effect on women's labor supply outcomes, especially relative to men's. In this paper, we examine whether state-level policies that forced the closure of child care centers or regulated class sizes specifically had a discernible impact on labor supply outcomes for mothers of young children. We find that

[6] Bacher-Hicks et al. (2021) show that residents of low-income areas were less able to adapt to the transition to online learning during school closures, and Alsan et al. (2021) find that racial minorities were disproportionately experienced excess mortality from COVID-19.

these policies did, in fact, increase unemployment rates of mothers of young children in these states. The effects are particularly pronounced for low-income mothers. Unfortunately, the negative effects did not dissipate once states allowed child care centers to reopen, consistent with permanent effects on child care supply in these states.

Some have hypothesized that the legacy of the pandemic may be to reduce gender inequality, as telecommuting becomes more widespread, and women experience greater job flexibility (Alon et al., 2021). However, work-from-home productivity gains will only be realized if women also have access to reliable childcare. Our results suggest that difficulty obtaining childcare may be a long-term countervailing effect of the pandemic. Thus, increasing child care availability will be critical to promote equitable labor market outcomes for men and women.

In the early months of the pandemic, support for the childcare sector was relatively limited. Less than 7% of childcare centers received a Paycheck Protection Program Loan (Smith et al., 2021), and the March Coronavirus Aid, Relief, and Economic Security (CARES) Act provided $3.5 billion in emergency funding for the child care sector, an industry with estimated revenues of $47 billion in 2019 (Schmit, 2020; Committee on Economic Development of The Conference Board, 2019). However, by December, recovery legislation provided another $10 billion (Smith and McHenry, 2021). The largest injection of funding came on April 15, 2021 when President Joe Biden announced that as part of the American Rescue Plan, $24 billion in Child Care Stabilization Grants and $15 billion in supplemental Child Care and Development Fund money would be made available (Administration for Children and Families, 2021). Time will tell whether this funding will be sufficient to keep the child care sector afloat. Even if this funding prevents additional child care centers from closing, unless new programs open, mothers of young children, especially single mothers and those residing in low income communities, may continue to experience persistent and permanent employment losses in the future.

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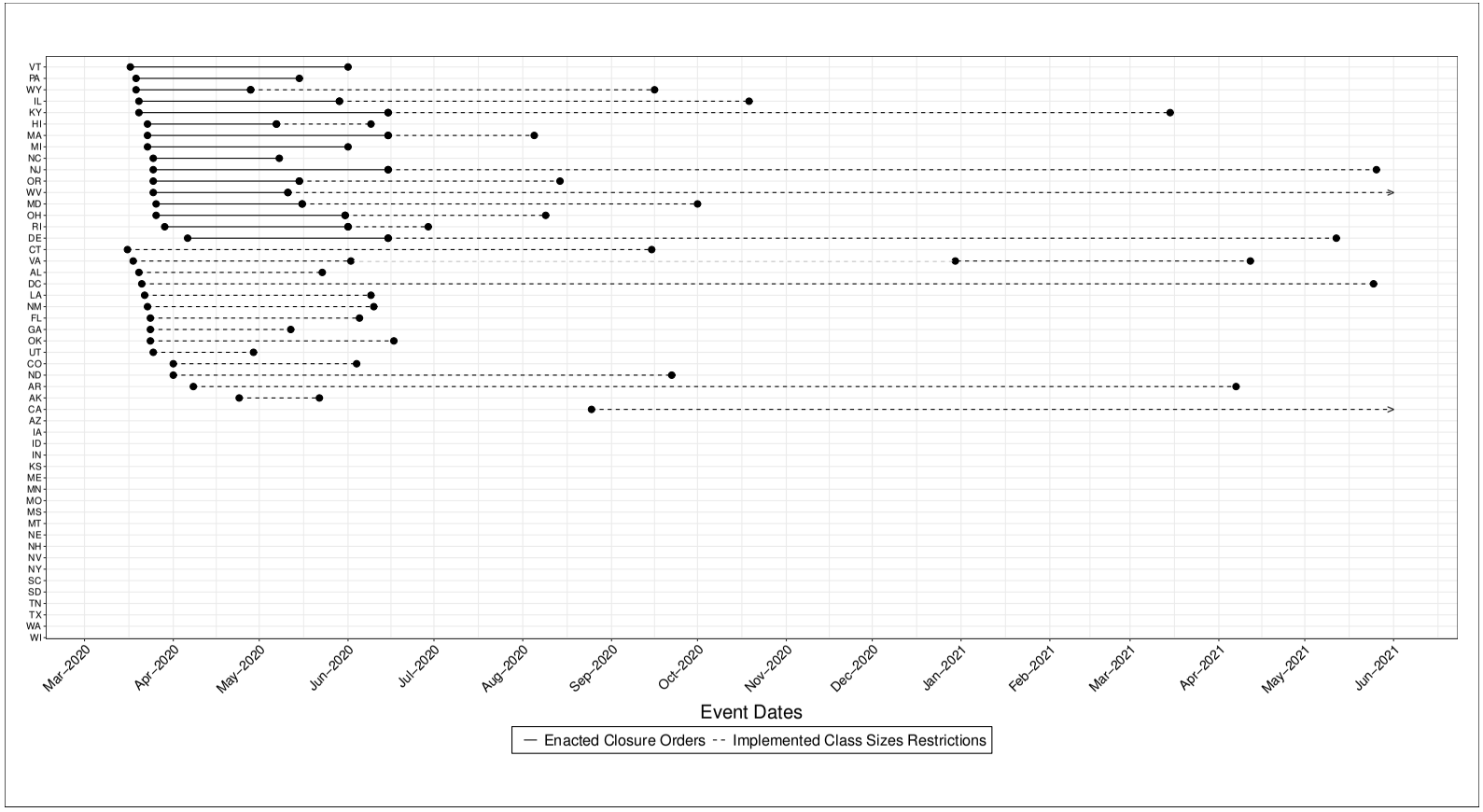
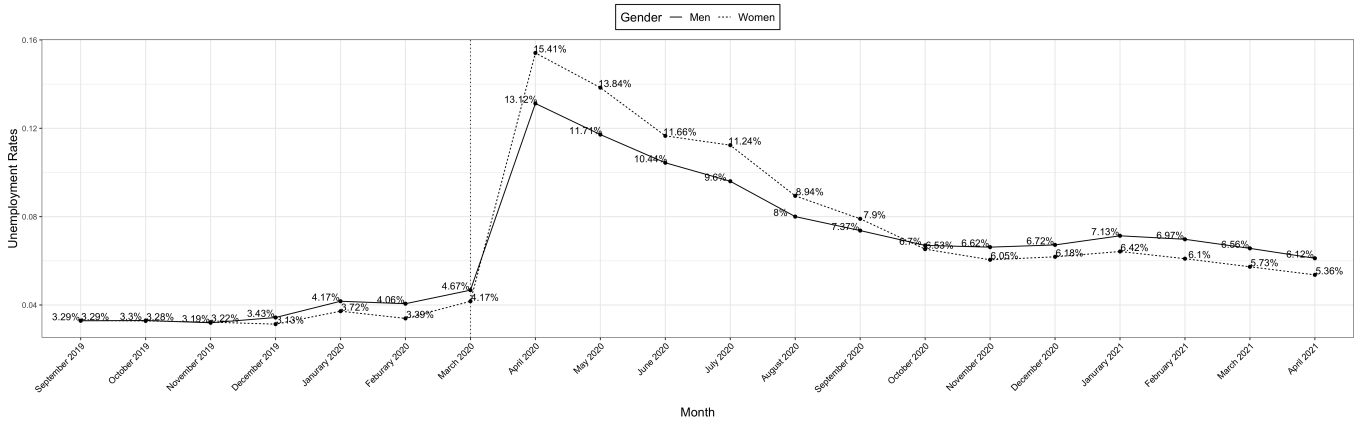
Figure 1: State Policy Timeline



Notes: Information comes from government press releases, the Hunt Institute (2020), the Food Industry Association (2020), and Child Care Aware of America (2020). For more details, see full data appendix.

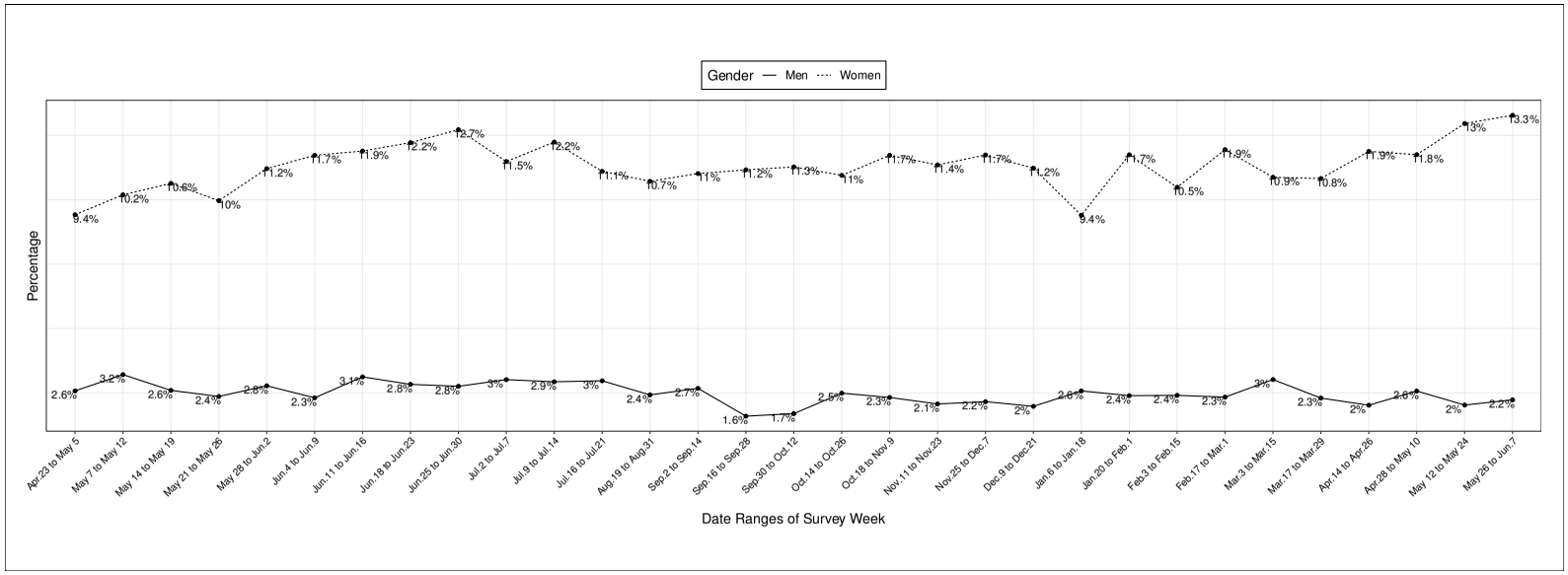
Figure 2: Men and Women's Unemployment Pre and Post COVID-19



Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Authors' tabulations. The sample consists of people aged 18-64 in the labor force.

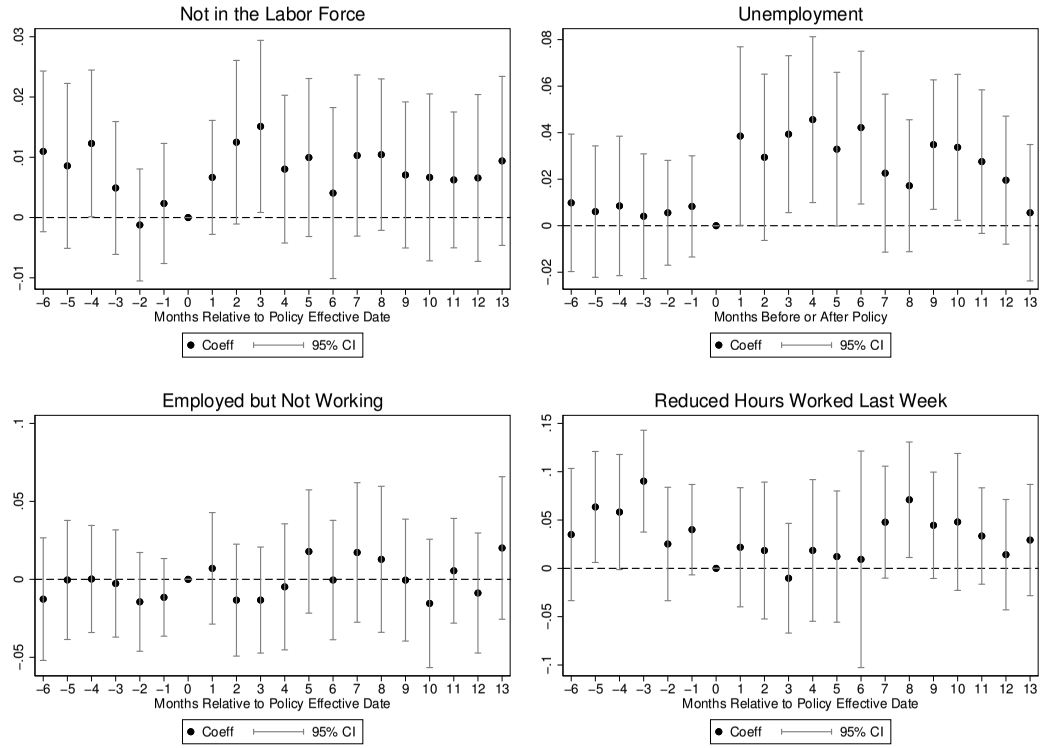
Figure 3: Percent of Parents Not Working Due to COVID-19 Related Child Care Issues



Source: Household Pulse Survey Public Use File, United States Census Bureau, www.census.gov/programs-surveys/household-pulse-survey/

Notes: Figure displays the percent of parents aged 18-64 who have at least one child under 18 and report they are not working due to COVID-19 related child care issues among all respondents to the Pulse Survey. Group quarter observations are dropped, and composite weights are used.

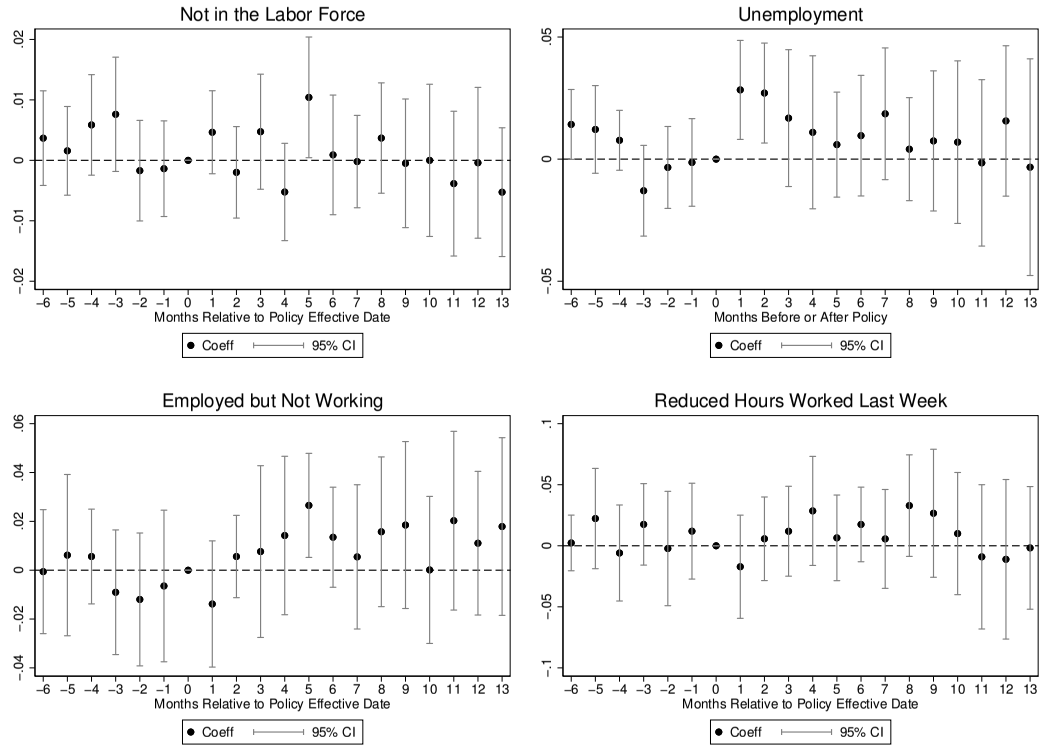
Figure 4: Triple-Differences Event Studies for Child Care Center Closure Policies



Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Results from estimating equation 1 as described in text and then plotting the coefficients on the closure policy time relative to implementation indicators: β_j.

Figure 5: Triple-Differences Event Studies for Class Size Limits



Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Results from estimating equation 1 as described in text and then plotting the coefficients on the class limit policy time relative to implementation indicators: Δ_j.

Table 1: Effect of Mandated Child Care Center Closures and Class Size Limits on Women's Labor Market Outcomes

	(1) Not In the Labor Force	(2) Unemployed	(3) Employed But Not Working	(4) Reduced Hours Worked Last Week
Post Closure with Closure in Effect x Mother of Child 0-5	0.006	0.022	0.010	0.013
	(0.004)	(0.014)	(0.013)	(0.022)
Post Closure with Closure Discontinued But Class Limits x Mother of Child 0-5	-0.001	0.016	0.005	0.011
	(0.004)	(0.010)	(0.012)	(0.021)
Post Closure with Closure Discontinued & No Limits x Mother of Child 0-5	0.004	0.032***	0.009	-0.020
	(0.002)	(0.011)	(0.011)	(0.015)
Post Class Size Limits with Limits in Effect x Mother of Child 0-5	0.002	0.023***	0.003	-0.001
	(0.003)	(0.006)	(0.009)	(0.010)
Post Class Size Limits x Limits Discontinued x Mother of Child 0-5	-0.002	0.005	0.017	0.001
	(0.002)	(0.011)	(0.009)	(0.012)
Number of Individuals	122400	90403	85733	81377
Number of Observations	422393	291702	273845	245765

Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Results from estimation of equation (2) as described in the text. All regressions include industry fixed effects, age fixed effects, marriage status fixed effects, control for at least one other adult in the household, person fixed effects, and all the double interactions (state by month fixed effects, mother of young child x month fixed effects, and state x mother of young child fixed effects). Standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Robustness Check Dropping Mothers of Infants

	(1) Not In the Labor Force	(2) Unemployed	(3) Employed But Not Working	(4) Reduced Hours Worked Last Week
Post Closure with Closure in Effect x Mother of Child 1-5	0.004 (0.004)	0.018 (0.016)	0.008 (0.015)	0.005 (0.020)
Post Closure with Closure Discontinued But Class Limits x Mother of Child 1-5	-0.003 (0.004)	0.021 (0.012)	0.011 (0.013)	-0.001 (0.019)
Post Closure with Closure Discontinued & No Limits x Mother of Child 1-5	0.004 (0.003)	0.030*** (0.011)	0.011 (0.011)	-0.030** (0.013)
Post Class Size Limits with Limits in Effect x Mother of Child 1-5	0.004 (0.003)	0.024*** (0.007)	-0.008 (0.006)	-0.010 (0.012)
Post Class Size Limits x Limits Discontinued x Mother of Child 1-5	-0.001 (0.003)	0.002 (0.012)	0.006 (0.008)	-0.004 (0.013)
Number of Individuals	119220	88175	83621	79539
Number of Observations	406619	281920	264644	238812

Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Results from estimation of equation (2) as described in the text except parents (mothers of young children) are defined as those with a child aged 1 to 5. All regressions include industry fixed effects, age fixed effects, marriage status fixed effects, control for at least one other adult in the household, person fixed effects, and all the double interactions (state by month fixed effects, mother of young child x month fixed effects, and state x mother of young child fixed effects). Standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Robustness Check With Mothers Who Need Paid Child Care as of March 2020

	(1) Not In the Labor Force	(2) Unemployed	(3) Employed But Not Working	(4) Reduced Hours Worked Last Week
Post Closure with Closure in Effect x Mother of Child 0-5	0.001	0.021	0.011	0.037
	(0.007)	(0.030)	(0.027)	(0.051)
Post Closure with Closure Discontinued But Class Limits x Mother of Child 0-5	0.033	0.053	-0.046*	-0.079
	(0.040)	(0.036)	(0.026)	(0.054)
Post Closure with Closure Discontinued & No Limits x Mother of Child 0-5	0.020	0.098	0.011	0.004
	(0.022)	(0.059)	(0.024)	(0.097)
Post Class Size Limits with Limits in Effect x Mother of Child 0-5	0.024*	0.061**	0.045**	0.033
	(0.013)	(0.028)	(0.020)	(0.038)
Post Class Size Limits x Limits Discontinued x Mother of Child 0-5	0.044	0.051	0.044	-0.001
	(0.032)	(0.044)	(0.034)	(0.071)
Number of Individuals	98187	73032	69316	66001
Number of Observations	337017	235256	220768	199301

Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Results from estimation of equation (2) as described in the text except parents (mothers of young children) are defined as those with a child aged 0 to 5 who needed paid child care in March 2020. All regressions include industry fixed effects, age fixed effects, marriage status fixed effects, control for at least one other adult in the household, person fixed effects, and all the double interactions (state by month fixed effects, mother of young child x month fixed effects, and state x mother of young child fixed effects). Standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Closure and Class Size Limit Effects for Single Mothers

	(1) Not In the Labor Force	(2) Unemployed	(3) Employed But Not Working	(4) Reduced Hours Worked Last Week
Post Closure with Closure in Effect x Mother of Child 0-5	0.009 (0.012)	0.056 (0.034)	0.024 (0.026)	0.024 (0.047)
Post Closure with Closure Discontinued But Class Limits x Mother of Child 0-5	0.005 (0.009)	0.036 (0.030)	0.007 (0.028)	-0.018 (0.049)
Post Closure with Closure Discontinued & No Limits x Mother of Child 0-5	0.008 (0.005)	0.054 (0.030)	0.030 (0.023)	-0.015 (0.025)
Post Class Size Limits with Limits in Effect x Mother of Child 0-5	0.006 (0.007)	0.056*** (0.019)	0.003 (0.015)	-0.044 (0.029)
Post Class Size Limits x Limits Discontinued x Mother of Child 0-5	-0.007 (0.005)	0.007 (0.031)	0.031* (0.017)	-0.005 (0.029)
Number of Individuals	67822	51183	47818	45325
Number of Observations	221513	155062	143021	128596

Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Results from estimation of equation (2) as described in the text, limiting the sample to non-mothers and single mothers. All regressions include industry fixed effects, age fixed effects, marriage status fixed effects, control for at least one other adult in the household, person fixed effects, and all the double interactions (state by month fixed effects, mother of young child x month fixed effects, and state x mother of young child fixed effects). Standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Closure and Class Size Limit Effects for Low-Income Mothers

	(1) Not In the Labor Force	(2) Unemployed	(3) Employed But Not Working	(4) Reduced Hours Worked Last Week
Post Closure	-0.004	0.180**	-0.045	-0.074
with Closure in Effect	(0.017)	(0.071)	(0.086)	(0.102)
x Mother of Child 0-5				
Post Closure	0.001	0.105*	-0.099**	0.089
with Closure Discontinued But Class Limits	(0.012)	(0.054)	(0.045)	(0.115)
x Mother of Child 0-5				
Post Closure	-0.005	0.107**	-0.074*	-0.063
with Closure Discontinued & No Limits	(0.011)	(0.045)	(0.041)	(0.050)
x Mother of Child 0-5				
Post Class Size Limits	-0.002	0.065**	-0.025	-0.086*
with Limits in Effect	(0.010)	(0.029)	(0.023)	(0.051)
x Mother of Child 0-5				
Post Class Size Limits	-0.011	0.105**	-0.005	0.048
x Limits Discontinued	(0.009)	(0.043)	(0.027)	(0.069)
x Mother of Child 0-5				
Number of Individuals	10048	5562	5018	4674
Number of Observations	37543	17227	15226	13251

Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Results from estimation of equation (2) as described in the text, limiting the sample to women at or below the poverty line. All regressions include industry fixed effects, age fixed effects, marriage status fixed effects, control for at least one other adult in the household, person fixed effects, and all the double interactions (state by month fixed effects, mother of young child x month fixed effects, and state x mother of young child fixed effects). Standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Closure and Class Size Limit Effects for Healthcare Workers

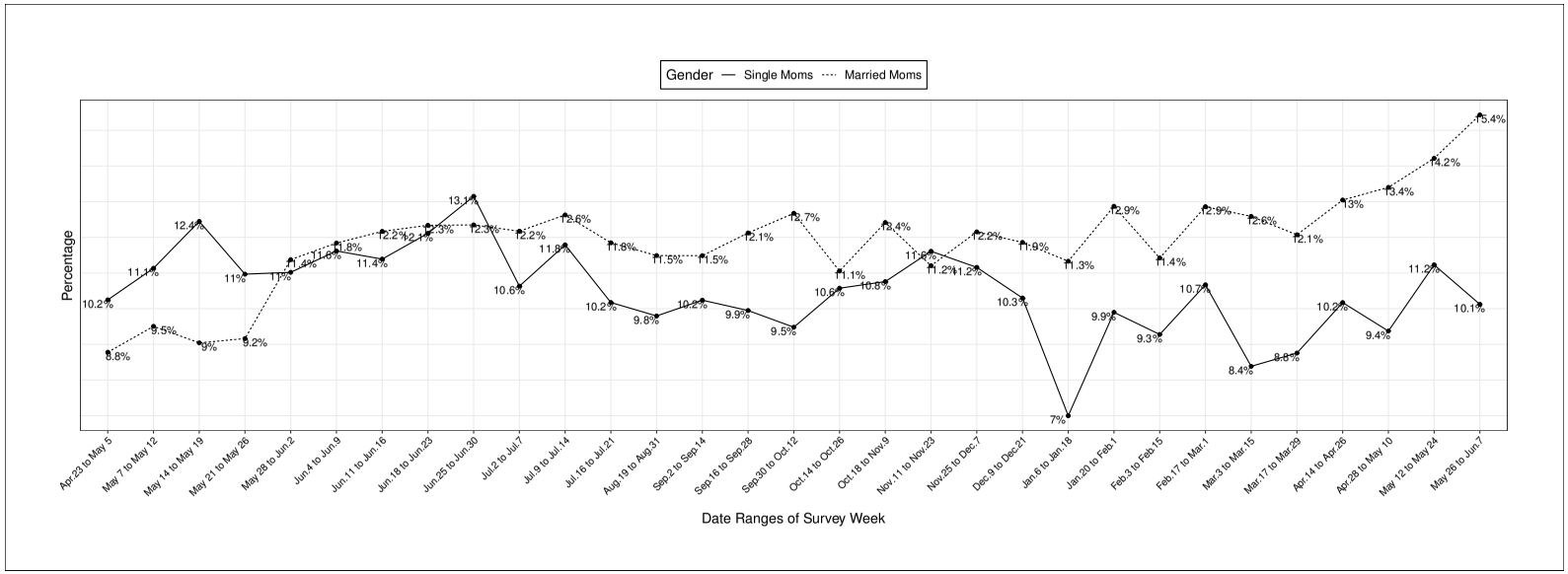
	(1) Not In the Labor Force	(2) Unemployed	(3) Employed But Not Working	(4) Reduced Hours Worked Last Week
Post Closure	0.004	0.000	0.025	0.043
with Closure in Effect	(0.016)	(0.043)	(0.038)	(0.056)
x Mother of Child 0-5				
Post Closure	0.008	0.008	-0.007	0.002
with Closure Discontinued But Class Limits	(0.014)	(0.018)	(0.037)	(0.050)
x Mother of Child 0-5				
Post Closure	0.023***	0.041*	-0.033	-0.049
with Closure Discontinued & No Limits	(0.008)	(0.024)	(0.026)	(0.032)
x Mother of Child 0-5				
Post Class Size Limits	0.004	-0.017	-0.062***	-0.063*
with Limits in Effect	(0.014)	(0.016)	(0.018)	(0.035)
x Mother of Child 0-5				
Post Class Size Limits	0.013*	-0.031*	-0.006	0.024
x Limits Discontinued	(0.007)	(0.018)	(0.023)	(0.033)
x Mother of Child 0-5				
Number of Individuals	7326	7258	7148	6888
Number of Observations	29940	28055	27256	24598

Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Results from estimation of equation (2) as described in the text using only the sample of women who report working in healthcare prior to the pandemic. All regressions include industry fixed effects, age fixed effects, marriage status fixed effects, control for at least one other adult in the household, person fixed effects, and all the double interactions (state by month fixed effects, mother of young child x month fixed effects, and state x mother of young child fixed effects). Standard errors are clustered at the state level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix Figures

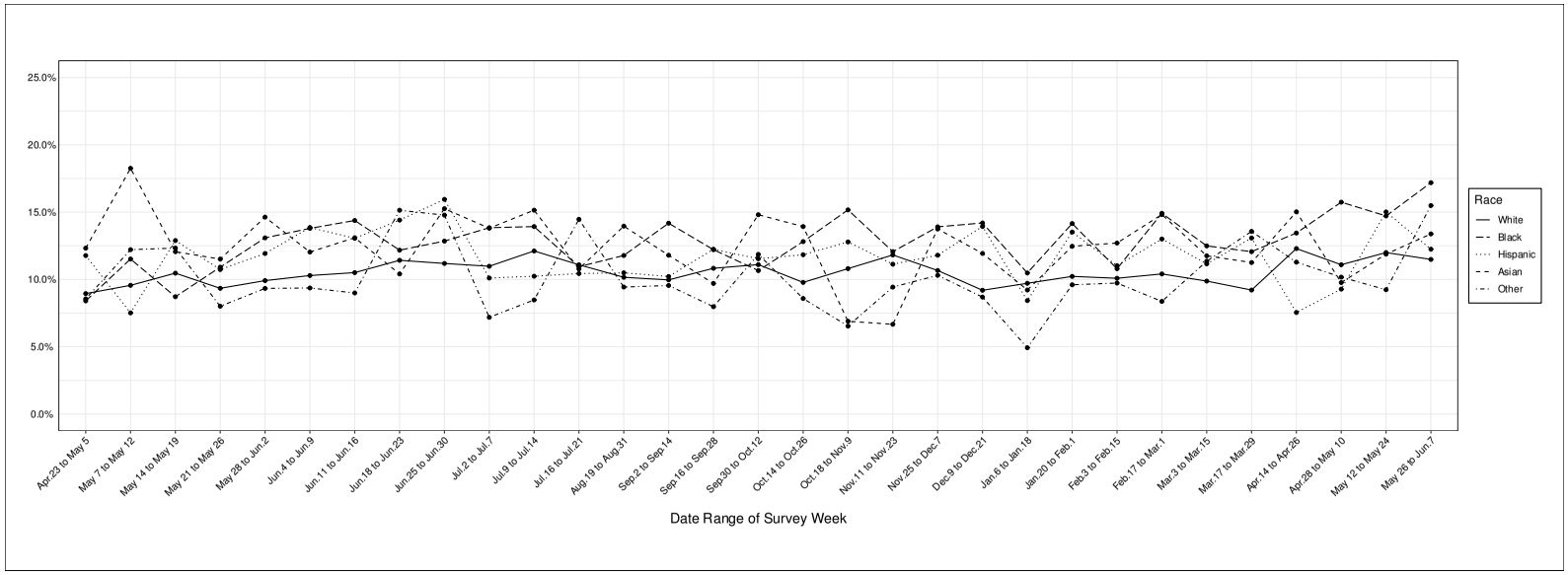
Figure A.1: Percent of Mothers Not Working Due to COVID-19 Related Child Care Issues



Source: Household Pulse Survey Public Use File, United States Census Bureau, www.census.gov/programs-surveys/household-pulse-survey/

Notes: Sample includes mothers who have at least one child under 18. Group quarter observations are dropped, and composite weights are used.

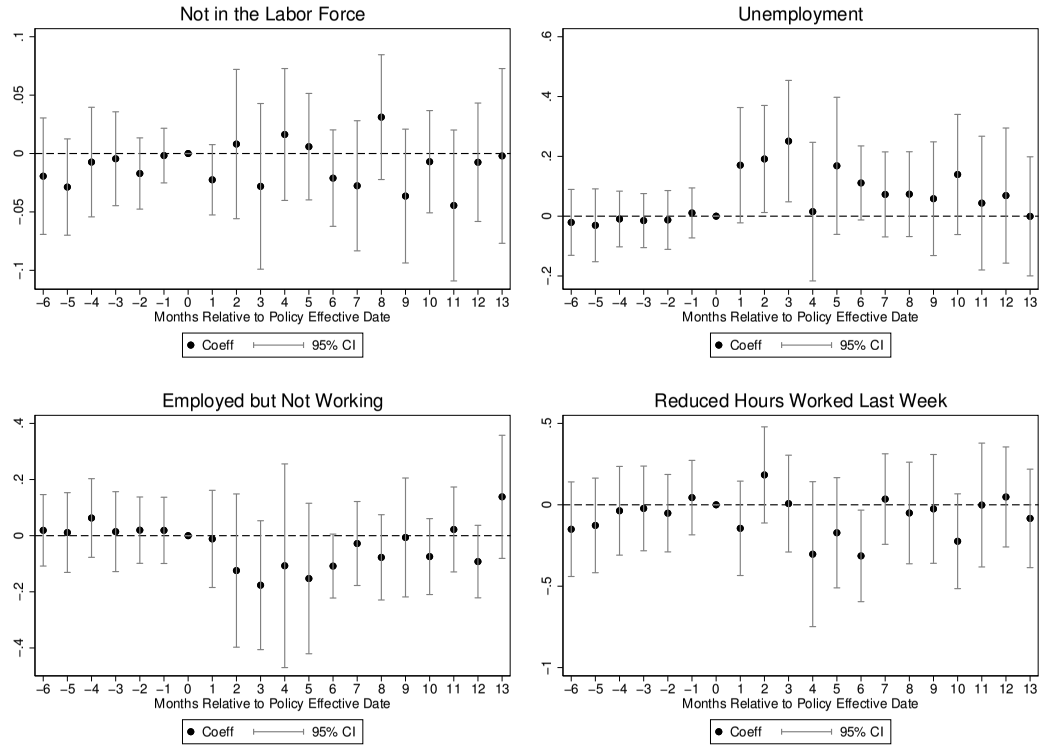
Figure A.2: Percent of Mothers Not Working Due to COVID-19 Related Child Care Issues



Source: Household Pulse Survey Public Use File, United States Census Bureau, www.census.gov/programs-surveys/household-pulse-survey/

Notes: Sample includes mothers who have at least one child under 18. Group quarter observations are dropped, and composite weights are used.

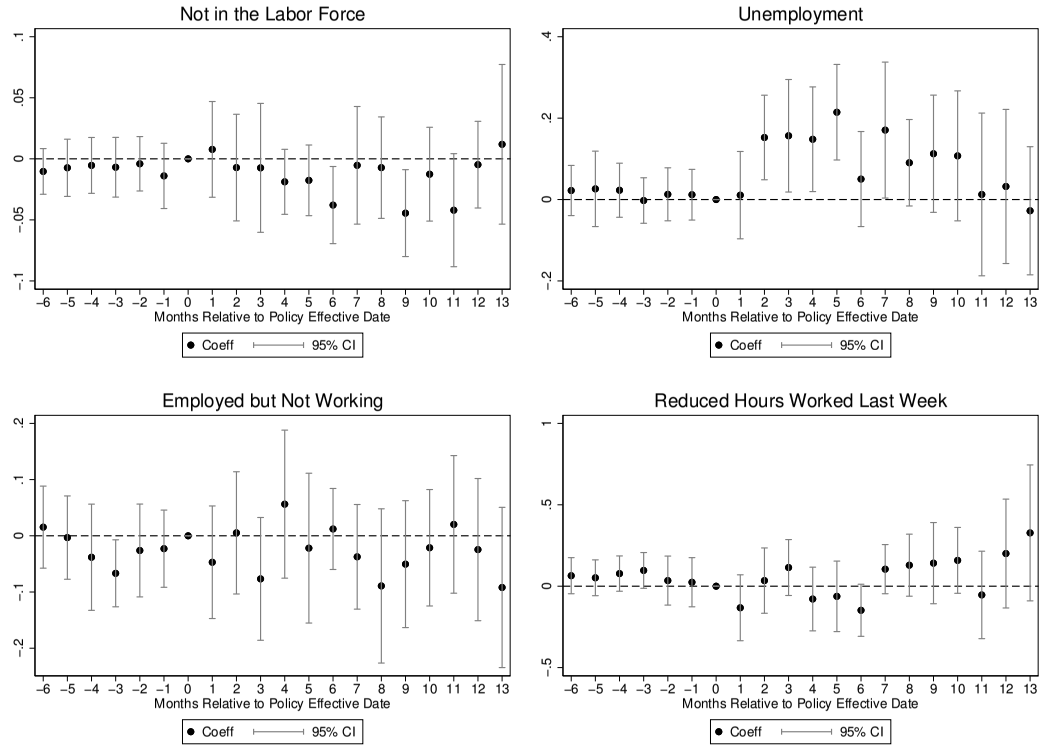
Figure A.3: Triple-Differences Event Studies for Child Care Center Closure Policies - Low-Income Women Sample



Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Sample is limited to women at or below the poverty line based on pre-pandemic household income. Results from estimating equation 1 as described in text and then plotting the coefficients on the closure policy time relative to implementation indicators: β_j.

Figure A.4: Triple-Differences Event Studies for Child Care Center Class Size Limit Policies - Low-Income Women Sample



Source: IPUMS-CPS, University of Minnesota, www.ipums.org

Notes: Sample is limited to women at or below the poverty line based on pre-pandemic household income. Results from estimating equation 1 as described in text and then plotting the coefficients on the closure policy time relative to implementation indicators: β_j.