SCHOOLS, JOB FLEXIBILITY, AND MARRIED WOMEN'S LABOR SUPPLY*

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Abstract

This study examines the employment effects of a large shock to mothers' childcare costs generated by the availability of in-person K-12 instruction during the COVID-19 pandemic. We proxy for school attendance using smartphone data from Safegraph. Using a difference-in-differences approach, we find K-12 reopenings are associated with increases in employment and hours among married women with school-aged children with no measurable effects on labor supply of childless women, custodial fathers, or unmarried women. Event-study analyses are consistent with a causal interpretation. Major activity responses show school reopenings reduced married women remaining out of the labor force to care for children

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1 Introduction

The dramatic increase in employment among married women in the United States is among the most striking and transformational labor market trends of the past century. Bolstered by social change, wage gains, time-saving advancements in household technology, increasing control over fertility, and steep increases in college attendance, married women entered the labor force in droves during the 20th century. While only 10% of married women were employed in 1930, by 1990, that rate was 68%.[1] However, over the past 30 years married women's employment and earnings have stagnated far short of equality with those of men (Blau and Kahn, 2007; Eckstein et al., 2019).

Many explanations have been put forth for the stagnation of married women's relative labor supply, including rising expenses associated with childcare, lack of policy support for working parents, and the inflexibility of traditional jobs (Goldin, 2021). Research has also documented the persistence of women's primary role in household labor and parenting tasks. Indeed, even highly educated women and women who outearn their spouses contribute more to housework and are more likely to scale back their careers after having children than their male counterparts (Bertrand et al., 2010, 2015). Meanwhile, the time costs of raising children have increased over time (Dotti Sani and Treas, 2016). There is evidence that motherhood induces lower labor force participation (Lundborg et al., 2017; Jacobsen et al., 1999) and better female labor market opportunities lead to lower fertility (Schaller, 2016), suggesting women still face a strong push-and-pull trade-off between family and career.

Though there is a great deal of interest in understanding the determinants of married

[1] Authors' calculations using 5% decennial census samples.

women's labor supply, it is difficult to identify causal effects in this literature, particularly of supply-side factors (i.e., changes in the opportunity cost of employment). The COVID-19 pandemic provides a unique opportunity to gain insight into the competing factors underlying observed trends in married women's labor supply. Married women were, of course, impacted by the same forces that caused widespread uncertainty, fear, and reduced economic activity and led to layoffs and furloughs among millions of American workers. However, the pandemic also had unprecedented effects on the demands on maternal time at home as childcare facilities, in-home care and services, and K-12 schools shut down nationwide in March 2020 and, for the most part, did not begin to resume until the fall. Recent research has documented the pandemic's disproportionate impacts on the labor supply of women in general, and in particular of married women and of women with school-aged children (Albanesi and Kim, 2021; Couch et al., 2022).[2]

Pandemic-related school closures have generated a rare chance to study a supply-side shock to married women's labor force participation and, more broadly, the labor market costs of changes in caregiving demands for mothers. Previous research has mostly examined changes in access to childcare, pre-K, and kindergarten, with some studies finding substantial effects on labor supply among married mothers of young children (Gelbach, 2002; Baker et al., 2008; Ilin et al., 2021) and others finding no effects (Cascio, 2009; Fitzpatrick, 2010).[3] During the pandemic, changes in in-person instruction resulted first in a dramatic increase (when schools closed) and then decrease (when schools reopened) in the opportunity cost of time

[2] Couch et al. (2022) attribute the disproportional decrease in labor supply among women of school-aged children to their additional childcare responsibilities. In this paper, we also show that their disproportional employment in the K-12 education sector was an important factor.

[3] Garcia and Cowan (2022) and Russell and Sun (2020) study the impacts of childcare closures during the COVID-19 pandemic and find effects on the labor supply mothers of young children.

in the labor market for mothers of older school-aged children. Tens of millions of American children were forced into remote schooling, putting them at risk of potential learning loss and mental health problems and placing unique demands on their parents. Rarely has there been an opportunity to study a near-universal, severe, and sudden shock to children's needs—changes at the *intensive margin* of parenthood—on mothers' labor force outcomes.

One challenge in using pandemic school closures to identify the effects of children's school attendance (and, more broadly, changes in caregiving demands) on maternal labor supply is that the March 2020 shutdown of schools was near-universal and coincided with economic shutdown and widespread fear about the pandemic.[4] While geographic and temporal variation in school reopenings is a more promising source of identifying variation, a lack of comparable data (across school districts and over time) for identifying in-person attendance makes it difficult to consistently identify the timing of school reopenings across the nation. The COVID-19 School Data Hub (CSDH) is an important source of administrative data. However it has incomplete coverage, as many states have not released data, and the data are not easily comparable across localities due to differences in the nature of the data collected and in levels of geographic and temporal aggregation. Furthermore, administrative data identify schools' reopening status over a limited time window and within three broad categories—remote, hybrid, and in person—that make it difficult to accurately determine how many students are attending school in person. In addition to these challenges in measuring school attendance, it is difficult to control for local economic activity and perceptions

[4]A common strategy for identification has been difference-in-differences. For example, Heggeness (2020) uses limited variation in the timing of school closures at the start of the pandemic to examine short-run effects on labor supply, finding increases in temporary employment leave among mothers only with no overall effects on employment. Heggeness and Suri (2021) study changes in custodial mothers' labor supply from before to after March 2020, relative to women with no children and custodial fathers, again finding a significant (relative) labor force withdrawal among mothers.

about the pandemic and the economy that are correlated with the timing of local school reopenings.

In this paper we use SafeGraph "point-of-interest" (POI) data documenting mobile phone foot traffic data at K-12 schools as a proxy for local school reopenings during the COVID-19 pandemic.[5] Our measure of high frequency (daily) changes in the presence of smartphones on K-12 school property better allows us to capture district reopening policies throughout the entire US and over multiple waves of the COVID-19 pandemic than administrative school reopening data. We construct a measure of relative foot traffic for K-12 schools in a set of localities (large counties, metropolitan areas, and rural areas) spanning the US, comparing monthly foot traffic to pre-pandemic levels. Our data span from September 2019 to October 2021, including three separate academic years affected by the pandemic. Rather than categorizing students discretely into remote learning, hybrid, and in-person learning, SafeGraph data allow us to roughly proxy for the *extent* of in-person instruction since our measure of reopening is continuous.

We confirm that our proxy for K-12 reopenings is positively correlated with predicted school attendance derived from the most comprehensive database of school reopening policies—the COVID-19 School Data Hub (see Halloran et al., 2021) for the states and years in which the two sources overlap. We also show that our proxy is associated with measurable increases in employment and work hours and substantial reductions in reported remote work within the K-12 education sector, using the Current Population Survey (CPS). Importantly, we document substantial geographic variation in the extent of K-12 reopenings, particularly during

[5]Other recent studies have used SafeGraph data to proxy for school reopenings to study the impacts of school attendance on disease spread and children's human capital accumulation (Bravata et al., 2021; Fuchs-Schündeln et al., 2021).

the 2020–2021 school year. We then link our measure of K-12 school reopenings to a set of (non-education sector) labor market measures for women with school-aged children from the CPS (Flood et al., 2021).

While all custodial parents were impacted by school closures, we focus our discussion and analysis on married women, separately estimating effects for unmarried mothers, with and without other working-aged adults in the household, and custodial fathers. We do this because married women's labor supply has historically been the most responsive to family factors and because their labor supply behavior has driven overall patterns in women's labor supply (Blau and Kahn, 2007; Goldin, 2021).[6] We employ difference-in-differences regressions, comparing the labor supply of married women with school-aged children within localities across periods of high and low school attendance during the pandemic, controlling for differential COVID-19 and macroeconomic shocks across jurisdictions. Importantly, we focus on employment in non-education sectors, as married women with children are especially likely to be employed in K-12 schools (Price and Wasserman, 2022).

Given our reopening proxy and the models that we estimate, concern about simultaneity and reverse causality—the possibility that increases in labor demand or other supply-side factors might be driving the increases in children's school attendance (holding administrative reopening status fixed)—are addressed in several ways. First, to account for geographic variation in attitudes about the pandemic and the degree of economic reopening that was occurring separately from schools, we control for continuous measures of relative foot traffic

[6] During the pandemic, Albanesi and Kim (2021) find that women accounted for two-thirds of the aggregate decline in employment in spring 2020, with especially large reductions in employment for married women with children, and Cortes and Forsythe (2020) find that these declines are not fully explained by gender differences in occupation or industry. Ultimately, the pandemic increased discrepancies in labor market outcomes and productivity both between women and men and between parents and non-parents (Adams-Prassl et al., 2020; Deryugina et al., 2021; **?**; Bansak et al., 2021).

at local restaurants.[7] Second, we estimate "placebo" effects on the non-education-sector employment of women in the same age group *without* school-aged children. If our effects were capturing reverse causality associated with increases in female labor supply, we would likely see effects for these women as well. We also estimate fully interacted triple-differences models, formally comparing the estimated effects of school reopenings for women in our treated group (married with school-aged children) to those for other women. Finally, we estimate event-study models, including those that account for heterogeneous and dynamic treatment effects, which reassuringly show that there are no differential pre-treatment trends in labor supply

Our results show that K-12 school reopenings positively affect the labor supply of married women with school-aged children at the extensive and intensive margin, increasing both employment and (conditional) work hours in non-education sectors. In particular, we find that an increase in relative school foot traffic roughly equivalent to a full in-person "reopening" is associated with an increase in non-education active employment of 4.2 percentage points and an increase in (conditional) weekly work hours of 0.87.[8] Other than responses within the education sector, we find *no* significant effects of school reopenings on the employment or hours of unmarried mothers or married custodial fathers. Reassuringly, we also find no effects for women without children, suggesting that it is not increases in labor demand or changes in women's preferences for work driving our results. Fully interacted triple-differences models confirm the magnitude and significance of our main effects. Together, our findings underscore

[7]Our results are also strongly robust to adding controls for foot traffic to bars and retail establishments.

[8]For the sake of comparison, Baker et al. (2008) find that the implementation of universal childcare in Quebec is associated with a 7.7 percentage point increase in the employment of women in two-parent families, while Gelbach (2002) finds that public school enrollment among 5 year olds is associated with a 4.8 percentage point increase in married mothers' employment.

the unique importance of schools for the labor supply of married mothers.

In addition to studying employment and work hours, we consider the effects of school reopenings on reported remote work using newly available data on job flexibility during COVID-19. Our ability to observe effects on remote work is important, as a long-standing argument for why women have been unable to balance work and family has been the inflexibility of traditional full-time in-person work arrangements, which do not lend themselves well to family-career balance.[9] Indeed, we find that school reopenings led to a substantial (3.9 percentage point) reduction in remote work among married mothers, with larger reductions among college-educated mothers.

Estimating our model separately by child age, we show that mothers whose oldest child is younger than 11 were more likely to switch away from remote work when schools. Meanwhile, mothers whose youngest child is 12 to 17 years old were slightly more likely to return to work when schools reopened. We hypothesize that this heterogeneity by child age may reflect more employment flexibility and remote work potential among mothers of younger children and parents' increased willingness to send older children to school.

Taken together, our results imply that there were substantial additional costs of pandemic school closures beyond children's learning losses (Halloran et al., 2021) and suggest that school reopenings played an important role in helping mothers return to work in person during the COVID-19 pandemic. Returning to broader patterns in married women's labor supply, the changes that we document in mothers' employment in response to pandemic school closures are further convincing evidence of the competing forces of career and care-

[9] Job flexibility has also historically played a large role in the type of education women pursue, their occupations, and the earnings penalties they face when having children (Flabbi and Moro, 2012; Goldin, 2014).

giving that women face every day, even with older children, and even outside of the pandemic environment. In particular, our findings confirm that unstable access to childcare is a major obstacle to married women's participation in the labor market. Our results complement the recent findings of Price and Wasserman (2022) who document large summer decreases in maternal labor supply and women's selection into flexible employment, attributing them to increased childcare costs during periods of school closure. Our study also underscores the potential role of job flexibility and remote work in helping women with children balance work and family going forward (Dettling, 2017).

2 Data and Methods

2.1 Labor Market Data

In order to generate locality-specific measures of employment, work hours, and remote work for married women with school-aged children and for comparison groups, we use monthly labor market data from the CPS, downloaded from IPUMS (Flood et al., 2021). We also use the CPS to construct measures of employment, work hours, and remote work in the education sector to validate our school reopening proxy. Due to limited sample sizes, the CPS masks county of residence for a large number of observations. We thus match geographic areas as follows. If a county identifier is available, we match labor market data to SafeGraph data based on county. If a county is unavailable but the Metropolitan Statistical Area (MSA) is identified, we match at that level. If neither county nor MSA is identified, we combine individuals into "unincorporated geographic areas" within each state and aggregate foot traffic for that region. This gives us a total of 313 areas for our analysis. As combining rural areas into broader groups may generate measurement error, our preferred specification includes only large counties and identifiable MSAs, and we estimate additional specifications that include unincorporated areas.

Our CPS sample includes men and women 25–54 years old. We focus on married women who have at least one child in the household and for whom either the youngest or oldest child is between the ages of 6 and 17.[10] We also construct a handful of comparison groups, including unmarried women with school-aged children, women with no children, and married men who live with their school-aged children. As measures of labor supply, we generate two indicator variables for employment ("employed, at work" and "employed", including not at work) and a variable that reflects reported actual hours worked last week at all jobs. All three measures include self-employed workers.

We capture employment flexibility with multiple variables. First, we identify remote work using a new CPS question asking whether a respondent worked from home for pay at any time during the past four weeks due to the COVID-19 pandemic. Our remote work variable, which we use as an outcome in our analysis, is available starting in May 2020 and ends in September 2021. In order to better understand differences in the responsiveness of employment and remote work to school reopenings across subgroups of our sample, we additionally construct an occupation-specific indicator of the feasibility of working from home, based on Dingel and Neiman (2020). We also follow Rho et al. (2020) in constructing an indicator for workers in "frontline" industries, which includes grocery store clerks, nurses, cleaners, warehouse workers, and bus drivers, among others.

[10] We cannot identify women who only have a school-aged middle child.

Finally, to support our main results, we use CPS variables to identify workers who report that they were "taking care of house and family" while not in the labor force (NILF) or working part time last week due to "child care problems". We also create a composite variable capturing multiple dimensions of non- and under-employment related to family obligations. In addition to the two variables described above, this includes people absent from work due to "childcare problems" and people who report that they are not looking for work because they "can't arrange childcare." We generate an indicator that is equal to one if the person responded yes to any of the four questions.

Summary statistics for our main treatment group and our three comparison groups, presented in Appendix Table A2 show that married women with school-aged children have a lower employment rate than any of our comparison groups—unmarried mothers, women with no children, and custodial fathers. One quarter of married mothers are not in the labor force and taking care of house and family, compared with only two percent of custodial fathers. Thirty percent of married mothers worked remotely during the pandemic and they worked in occupations with higher remote shares. Finally, married mothers are less likely to work in frontline industries than unmarried or childless women and are more likely to work in the K-12 education sector than any other group, with nine percent employed in that sector.

Figure 1 shows variation during the pandemic in aggregate employment rates and employment rates outside of the K-12 education sector for married women with school-aged children (in bold), as well as for our three comparison groups. Notably, the two panels are strikingly different from one another, suggesting that married women's disproportional employment in K-12 education contributed significantly to their prolonged reduction in employment during 2020. To our knowledge, we are the first to highlight this fact, which is important for understanding the disproportionate effects of the pandemic on women's employment.

Focusing on employment outside the K-12 education sector in Panel B, we see that married women with children did have a more-gradual return to the labor market than women without children or men with children from April to July 2020, but generally had similar rates of employment change after July. Meanwhile, single mothers of school-aged children experienced a much larger drop in initial employment and stagnated at a lower recovery level. Panel A of Figure 2 shows geographic variation in the relative employment rates of married women with school-aged children in fall 2020 compared with winter 2020, with counties grouped into metropolitan areas, and "unincorporated" areas based on CPS data availability. While the map shows a range in the relative employment measure, it is difficult to discern a clear geographic pattern in labor market reentry.

2.2 SafeGraph POI Data

Our proxy for in-person primary and secondary school attendance is a continuous monthly measure that spans the entire United States over more than two years. We construct this proxy using POI foot traffic data from SafeGraph, Inc. These data provide location-specific information collected from over 40 million anonymized smartphones that opted in to sharing geocoded data. Daily information is collected on mobile phone "pings" at over four million POIs in the United States and is aggregated by census block group and county. SafeGraph smartphone data have been used widely by economists studying mobility during the COVID-19 pandemic (see, e.g., Allcott et al. 2020; Cronin and Evans 2020; Dave et al. 2021; Goolsbee and Syverson 2021), including for studies focusing on schools (Bravata et al., 2021; Fuchs-

Schündeln et al., 2021).

We aggregate daily county K-12 foot traffic to the month-by-locality level from September 2019 to October 2021 using the North American Industry Classification System (NAICS) code 611110: Elementary and Secondary Schools. For each county, we calculate weekday K-12 school foot traffic relative to weekday averages for January and February 2020 (before the pandemic) so that a county-month K-12 foot traffic value of 80 in the post-pandemic period would indicate that school foot traffic has returned to 80% of its pre-pandemic level.

As shown in our summary statistics table—Table A2—the mean value of our relative foot traffic measure in our estimation sample is about 52, with college-educated and non-white women living in areas with lower reopening shares. For ease of interpretation in our regression tables, we re-scale our foot traffic variable so that a one-unit change reflects a move from the 5th to the 95th percentile of reopening, a change of around 58 points, to approximate the difference between a county where schools likely fully closed and a county where schools are likely fully reopened.

To ensure the patterns we observe are not merely capturing changes in foot traffic due to other state and local lockdown policies (i.e., stay-at-home advisories, nonessential business closures), local labor demand, or preferences of the local population (i.e., due to beliefs about contagion risk, severity of health consequences of contracting COVID-19), we use SafeGraph data to measure foot traffic at restaurants (NAICS code: 7225) and drinking places (NAICS code: 7224). Analogous to our K-12 measure, our restaurant foot traffic measures county-level foot traffic relative to winter 2020. As shown in Appendix Figure A1, while restaurant foot traffic and K-12 foot traffic are correlated, there is substantial independent variation across these measures.

It is worth noting that while the SafeGraph data allow us to pick up continuous variation in school visits, school foot traffic is intended to be a *proxy* for children's in-person school attendance. Many factors could affect foot traffic other than school closures and reopenings, and those will generate noise in our variable. For instance, while foot traffic drops on the weekends and during the summer, it does not drop to zero, potentially due to individuals passing by school grounds or families using school facilities for recreation when schools are not open for instruction. Moreover, even when schools were remote, staff were likely working on campus, and families may have stopped by to pick up lunches (which many districts still provided). In addition, there is some measurement error due to GPS drift.

In Panel B in Figure 2, we illustrate the full range of geographic variation in K-12 foot traffic in fall 2020 relative to pre-pandemic levels at the start of the 2020-21 school year. The map shows that a large share of counties in the South and Midwest returned in-person while counties in the West and the Northeast did not. In addition to these broad patterns, the map shows that school reopening rates varied significantly within regions and even within some states. Turning to time series variation, the top panel of Figure 3 shows trends in state-level weekday school foot traffic for three states that represent the minimum (California), median (Florida), and maximum (South Dakota) levels of fall 2020 school foot traffic relative to January–February 2020. At the onset of the COVID-19 pandemic in the US in mid-March 2020, schools across the country closed simultaneously and remained closed throughout the end of the school year and the subsequent summer. However, there is substantial variation in the degree of reopening in the 2020–21 academic year. Among the three states shown, K-12 schools in California largely remained closed in the fall, while Florida schools partially reopened and South Dakota schools reopened almost entirely. The middle panel of Figure

3 illustrates monthly variation in the share of localities with weekday foot traffic above 50 percent of the Jan/Feb 2020 average. There are increases in attendance in September and October 2020, followed by a reversal in November and December and then a steady increase for the remainder of the school year. The figure also shows that reopening was widespread by fall of 2021. The bottom panel of Figure 3 shows the 25th and 75th percentiles of relative foot traffic across the sample period, confirming that the widest variation across localities occurred during the 2020-21 school year.

Before turning to our regression analysis, we link our CPS employment data to the Safegraph data to provide suggestive evidence on whether school reopenings affected maternal labor supply. Figure 4 shows changes in (non-K12-education) employment rates for married mothers vs women without children in areas within the top and bottom terciles of Fall 2020 school reopening. Comparing the two figures, there is a much wider employment gap between reopening terciles for married mothers than for women with no children. In particular, we see that maternal employment recovered more slowly in places where schools remained closed in fall 2020, while employment rates recovered at a similar rate across terciles for women without children.

2.3 Methods

For our main analyses, we estimate panel data models that measure the association between changes in relative K-12 foot traffic and changes in maternal employment outcomes within geographic areas over time, controlling for individual demographics, area factors, and common regional shocks. Our model is represented by the following equation:

$$LS_{irdt} = \beta_r + \gamma * \text{Reopen}_{rdt} + \tau_{dt} + X'_{it}\delta + Z'_{rt}\Phi + u_{irdt}, \quad (1)$$

where LS_{irdt} is a labor supply measure for individual i in area r in census division d at time t, and Reopen_{rdt} is our proxy for school reopenings that varies at the area-year-month level. β_r represents local area fixed effects, which account for time-invariant differences across areas, and τ_{dt} represents division-specific time (year-by-month) effects, which account for regional shocks. X_{it} represents a set of individual demographic controls for age, race/ethnicity, and education, and Z_{rt} is a set of time-varying local area controls including foot traffic to restaurants (our proxy for "general" reopening policy and sentiment) and the cumulative COVID-19 death rate.[11] Our estimates are weighted using individual CPS sample weights, and we cluster our standard errors at the area (r) level.

Our main coefficient, γ, identifies the effects of local changes in relative school foot traffic on maternal labor supply. Our goal is to determine whether mothers in localities in which in-person school attendance increased most dramatically (e.g., in fall 2020) expanded their labor supply at a higher rate. Given that our treatment variable range is scaled to the base period at 100, an untransformed coefficient would indicate how a 1 percentage point change in school attendance affects employment. For ease of interpretation, we adjust our coefficients by a factor of 58.6—the difference between the relative foot traffic at the 5th and 95th percentiles—to capture the effect of fully opening schools versus fully closing them.

[11]These data are from the New York Times. Our results are robust to adding controls for cumulative case rates.

3 Results

3.1 First Stage

We begin by confirming that our foot traffic measure is correlated with other variables that should also pick up school reopenings—employment, work hours, remote work in the K-12 education sector in the CPS, and an alternative proxy constructed from the most extensive administrative database of school reopening policies, the COVID-19 School Data Hub—in our fixed effects model. Using the CSDH, we construct a predicted share of students attending school in person by identifying the stated learning model ("in person," "hybrid," or "virtual") for each set of grades, summing the number of students enrolled in grades reported to be in person plus 0.5 times the number in "hybrid" mode, and dividing by total enrollment.[12]

Table 1 presents the results demonstrating a "first-stage" association between our measure of reopenings and these other variables. The analysis focuses on all prime-aged individuals (ages 25 to 54) and prime-aged individuals with a college education. The table shows that our proxy is highly correlated with employment, hours, and remote work in the K-12 sector. In particular, an increase in the SafeGraph measure that is approximately equivalent to a full reopening is associated with a 1.4 percentage point increase in the likelihood that college-educated workers are employed in the K-12 sector and a 2.5-hour increase in weekly work hours, as well as an 19.5 percentage point decrease in remote work for college-educated workers within the K-12 sector. Our measure is also strongly and positively correlated with

[12]This measure is admittedly rough as the administrative data are only available for some states and the detail in the data as well as the frequency of data reporting varied widely across states. It is also impossible to determine the share of time spent on in person learning for students in hybrid formats.

the predicted share of students attending in person from the COVID-19 School Data Hub.[13] Scatter plots in Appendix Figure A2 show these correlations at the area level.[14]

3.2 Main Results

Our main results—from estimating Equation 1 on *non-education* employment—are presented in Table 2. Recall that our model controls for division-specific time effects and time-varying local factors including COVID-19 death rates and reopening policies. In Panel A, we present the estimated effects for women with school-aged children (ages 6 to 17) in large counties and metro areas. The first two columns contain estimates for employment, with the first reporting effects on "employed, at work" and the second reporting effects on "employed" (including not at work). Column 3 reports effects on weekly work hours (actual hours last week), and Columns 4 reports estimated effects on remote work shares.

Our results show that married women with school-aged children changed both *whether* and *how* they worked based on whether schools reopen in person. In particular, we find that school reopenings are associated with a 3.3 percentage point increase in employment outside the K-12 education sector for married women with school-aged kids. This effect reflects both changes from non-employment to employment (a 2.2 percentage point effect) and changes from from "not at work" to "at work". We also find a 0.76 increase in weekly (conditional) work hours outside of the education sector and a 3 percentage point reduction in reported

[13] Strikingly, the 54.8 percentage point increase in relative foot traffic is associated with a 52.3 percentage point increase in the predicted in-person share based on the CSDH.

[14] Use of data from the COVID-19 Data Hub or alternative data sources such as Burbio requires restriction of both time period and geographic coverage and also exploits less variation in in-person attendance than our measure. In Appendix Table A5, we replace our main proxy with our predicted attendance rate from the Data Hub. The resulting estimates are so imprecise that we cannot reject zero effects, even on outcomes within the K-12 sector.

remote work for married women with children.

In Panel B, we report effects for three comparison groups: unmarried women with school-aged children (a group affected by school reopenings that likely did not have as much flexibility to change their employment in response)[15], women without children, and married custodial fathers (again, a group affected by school reopenings but with a lower labor supply elasticity). Notably, *only* married women with school-aged children increased their employment and reduced remote work outside the K-12 education sector when schools reopen for in-person instruction.[16] In Table 3, we present estimates for fully interacted triple difference (DDD) models with married women with school-aged kids versus women with no kids. DDD models have been a standard approach used in the literature to study the labor market effects of the pandemic (see, e.g., **?**Heggeness and Suri (2021). Not surprisingly, given the null effects for the comparison groups in Table 2, the effects in the DDD are similar to our main difference-in-differences estimates. In fact, this is true regardless of the control group we use and even when we estimate a DDD for "treated" (married with school-aged kids) versus everyone else in the CPS sample.

In Table 4, we supplement our main results, exploring the association between school reopenings, measured by K-12 foot traffic, and non- or under-employment related to childcare. These results show that school reopening results in a decreased likelihood that mothers report being NILF, taking care of house or family and a slightly larger reduction in childcare

[15]We estimated our model separately for unmarried women living with and without other adults in the household and found similar effects for both groups. Results are shown in Appendix Table A3.

[16]In unreported results, available upon request, we find that the estimated effects on education employment (K-12 sector) are similar across groups—1.8 percentage points for married women with school-aged children, 1.3 percentage points for married men with school-aged kids, and 1.4 percentage points for women without children. Likewise, we consistently find that school reopenings are associated with large and precise drops in remote work for workers in the education sector across all of the subgroups.

related responses overall. The estimate in column 2 is only slightly smaller than the estimate in column 2 of Table 2, which suggests that most of the variation in employment at the extensive margin reflects married mothers shifting from primary child care (while out of the labor force) back into employment. We find no significant effect on part-time status due to childcare problems. Again, we find no significant effects of school reopening on these outcome variables for any of our comparison groups - unmarried mothers, women without children, or custodial fathers, which both validates our identification strategy and highlights the unique response that married mothers had to changes in schooling availability during the pandemic.

3.3 Heterogeneity

In Table 5, we focus exclusively on mothers of school-aged children and explore heterogeneity within that category. In Panel A of Table 5, we stratify by education. We find that in-person school reopenings generated similar increases in employment for women with and without a college degree (3.6 versus 3.5 percentage points) and that changes in hours are similar across education groups. Women with a college degree were more likely to reduce remote work, with a decrease of 4.5 percentage points.[17]

In Panel B of Table 5, we split our sample by child age, focusing separately on married mothers whose oldest child is between the ages of 6 and 11 versus those whose youngest child is between 12 and 17. We find that in-person school reopenings have a slightly larger effect on employment (4.5 percentage points versus 2.4 percentage points) for women with older

[17] We also found that within the education sector, there is an even larger decline in remote work among college-educated married women (23.9 percentage points) than for the full sample (Table 1), and those without a bachelor's degree show no decline in remote work with school reopenings. This is reassuring with regard to our proxy's validity as those without college degrees working in K-12 schools likely work in occupations where remote work is difficult or impossible (food service, transportation, etc.). These results are available upon request.

children, though the difference is not statistically significant. At the same time, it appears that nearly all of the decline in remote work is driven by women with younger children, who see a full 6.1 percentage point decline versus a near-zero effect for women with older school-aged kids.

Summary statistics and the time series graph in the middle panel of Appendix Figure A3 provide some insight into these differences by child age. First, mothers of younger children are six percentage points more likely to work remotely, which suggests they have more flexibility in their jobs. In the time series graph, we also see that mothers of young children did not have the same increase in labor supply in September 2020 that mothers of older children did. In fact, despite having similar initial drops at the start of the pandemic, the employment of mothers with young children did not recover to match that of mothers of older children during the 2020-21 school year. This suggests that mothers of younger children were either more reticent about sending their children back to school (which makes sense, given that vaccines were delayed for younger children) or that they remained out of the labor force even as children went back to school, perhaps due to uncertainty about whether school would remain open.

Finally, in Panel C of Table 5, we split by maternal race/ethnicity, comparing results for married non-White mothers (including Hispanic, Black, Asian, and other race designations) and married White mothers. We find that the employment effects and especially the reduction in remote work associated with school re-openings are concentrated among White mothers. These differences may reflect different average behavioral responses, either at the first-stage (whether to send children back to school in response to reopening) or at the second-stage (deciding whether to work). Summary statistics show that non-White mothers were less likely (and less able, based on occupation) to work remotely, and surveys reveal that Black, Hispanic, and Asian parents were more uncertain about sending their children back to school in person than White parents. Together, these two factors could help to explain why labor supply among non-White mothers was less responsive to school reopenings (Schwartz et al., 2021). Again turning to the time series graphs in Figure A3, we see an enormous gap in recovery between White, Non-Hispanic mothers and non-White mothers throughout the 2020-21 school year.

In summary, we find that in-person K-12 schooling is associated with gains in employment for married women with school-aged kids but not for any other group, including unmarried mothers and married custodial fathers. Interestingly, this pattern of findings contrasts with some of the earlier research on kindergarten and pre-K expansions, which finds larger effects for single and non-college-educated women (Gelbach, 2002; Sall, 2014) or no effects at all among married mothers (Fitzpatrick, 2010; Cascio, 2009). We also note that a contemporaneously-released NBER paper (Garcia and Cowan, 2022) finds little evidence that school reopenings affected married women's labor supply. While their study is well-executed, their null finding appears, at least in part, a result of having less identifying variation—they study only large counties over a shorter sample window from August 2020 to April 2021. In Appendix Table A6, we impose these additional restrictions on identification, and find that the effects that we estimate become very noisy and have large standard errors in the smaller sample that they study. How large are the labor supply impacts that we find? At the peak of the COVID-19 recession, married women with school-aged kids saw their employment drop by 15 percentage points. Therefore a 4.2 percentage point increase would represent 28% of the losses in employment seen by those women since the pandemic began. As an alternative point of comparison, Gelbach (2002) finds that a 5-year-old's kindergarten enrollment is associated with a 4.8 percentage point increase in labor supply among married mothers.

Some key questions emerge when considering our findings. Remote work appears to be a key source of job flexibility during the pandemic that mothers used when schools were taught remotely, and that effect is concentrated among mothers of young children, college-educated mothers, and white mothers. However, we find that the extensive margin labor force impacts are present and slightly larger for mothers of older children. This is possibly because parents were more likely to send their older children back to school when schools reopened, or because they were less likely to remain out of the labor force in case of schools closing again. Alternatively, the effects on women with older children may be larger because their children were in grades where worse academic performance could have more severe consequences with college shortly on the horizon (Halloran et al., 2021; Kofoed et al., 2021)? While children have shown some degree of resilience to educational interruptions (Pischke, 2007), women with older children may be rationally forecasting that their children will have less time to make up for disruptions to their human capital. We also show that women with younger children are employed in more flexible jobs, which they move out of as their children age, and employers may be less lenient with mothers of older children. Understanding the reasons for the differences in behavior by child age is a potential area for future research.

3.4 Extensions

In this section, we discuss extensions to our main empirical models. We investigate multiple event study approaches which provide evidence of the plausible exogeneity of the school reopenings, and support our main conclusions. We also investigate alternative models based on fully interacted triple difference models which provide similar estimates to our main estimates. Finally, we estimate the robustness of our main results to alternative specifications.

To explore the credibility of the parallel trends assumption underlying our difference-in-differences estimator, we present findings from two event study analyses. The first event studies use the full distribution of (relative) foot traffic at schools, accounting for the fact that the volume of school foot traffic varies over time both within and across states. This event study approach aligns with the continuous school foot traffic measure used in equation (1) and most resembles a distributed lag-type model. Following Schmidheiny and Siegloch (2019), we estimate

$$\gamma_{ist} = \gamma_0 + \sum_{j \neq -1} \gamma_j D^j_{ist} + X'_{ist}\alpha + \tau_t + \mu_s + \epsilon_{ist}, \tag{2}$$

where j denotes event time and D^j_{ist} is a set of variables that measure the change in area-specific school foot traffic that occurred j periods ago from time t. Each γ_j can be interpreted as an estimated effect of school foot traffic across event time relative to $j(i, s, t) = -1$. This event study approach has the advantage of not requiring treatment to be defined as an "all-absorbing" state. Rather, event study coefficients are identified from the continuous treatment measure as well as account for the fact that treated units may be treated multiple times at different magnitudes. Results from this approach are in Figure 5. These event studies provide evidence supporting the common trends assumption in our primary model.

The second event study approach focuses on prominent increases in school foot traffic (foot traffic that reaches at least 90% of what foot traffic levels were in January–February

2020) and uses the estimator developed by Callaway and Sant'Anna (2021) to account for heterogeneous and dynamic treatment effects (Goodman-Bacon, 2021). Sun and Abraham (2021) note that in the presence of heterogeneous treatment effects over time, event study coefficients generated from two-way fixed effects estimators may be biased.

In applying the Callaway and Sant'Anna estimator for our event studies, we restrict the counterfactuals in each period to jurisdictions that had not yet (or never) experienced a prominent increase in school foot traffic. This avoids potentially problematic comparisons of mothers' labor market outcomes in areas that were "later school openers" versus "earlier school openers." We also control for smaller increases in school foot traffic that could capture hybrid learning (50% to 89.9% of the foot traffic level in January–February 2020) and for prominent increases in restaurant and bar foot traffic (foot traffic at least 90% of its January–February 2020 levels).

Together, the event study approaches described above help us assess the credibility of parallel trends and ensure our estimated treatment effect is not contaminated by heterogeneous and dynamic treatment effects (Rees et al., 2021). Importantly, we note that the event study coefficients obtained from the Callaway and Sant'Anna approach are not directly comparable to the event study coefficients obtained from our continuous K-12 reopening event study (Schmidheiny and Siegloch, 2019) because the Callaway and Sant'Anna (2021) estimator requires treatment to be measured as an "all absorbing" treatment state (i.e., a school reopening is coded as turning on the first time a school reaches 90% of its January-February 2020 K-12 school foot traffic and remains turned on thereafter).[18] Thus, an advantage of

[18] We note also that other prominent alternative dynamic difference-in-difference estimators such as those developed by Sun and Abraham (2021) and Borusyak and Jaravel (2017) and the stacked difference-in-differences approach (Cengiz et al., 2019) similarly require all-absorbing dichotomous treatments. The event study approach suggested by Schmidheiny and Siegloch (2019) does allow for continuous policy shocks

the Callaway-Sant'Anna dynamic difference-in-differences estimator is that it excises bias that may arise from heterogeneous and dynamic treatment effects. However, a limitation of the estimator (at the time of this writing) is that does not permit estimation of the effects of continuous shocks, including multiple shocks of heterogeneous magnitudes to the same treated units, and requires treatment to be defined as an "all absorbing" state. The results from our event-study analysis using Callaway and Sant'Anna (2021) estimates are shown in Appendix Figure A3. They provide additional evidence in support of the common trends assumption as well as show a lagged increase in non-education employment among married women with school-aged children following a prominent K-12 school reopening.

In Appendix Table A4, we show the robustness of our results to four alternative specifications. First, rather than collapsing the data to the monthly level, we estimate a specification in which we use only foot traffic in the CPS reference week. This has the advantage of being more accurate in terms of time period, but also comes at the cost of potential measurement error from unobserved temporary local school closures (such as holidays and teacher prep days). The results from this specification are similar to our main results. Second, we estimate models which control for local cumulative COVID case rates in addition to cumulative death rates. Results are again similar. Third, we estimate models which remove in the unincorporated (rural) areas from our analysis. We do this because rural areas often spans large geographic areas and may lead to measurement error in our key variables, biasing our estimates downward. We do find that our effects get stronger in these specifications. Finally, we add relative foot traffic at retail establishments as an additional control.

(including multiple treatments by the same treated unit) with the limitation that it does not expunge bias due to heterogeneous and dynamic treatment effects.

4 Conclusions

In this paper, we provide evidence on the role of school reopenings during the COVID-19 pandemic in facilitating mothers' return to the labor market. Our use of SafeGraph data to proxy for school reopenings allows us better coverage across time and geography than administrative measures of school reopenings and allows us to exploit continuous variation in in-person attendance even within administrative categories of school policy. We find evidence that school foot traffic was associated with increased employment and work hours and reductions in remote work among married women with school-aged children.

While the nature of the school closures and reopenings that we study is unique to the COVID-19 pandemic, our results provide important insights into longer-run trends in married women's labor force participation and in particular into the stagnation of their labor market standing relative to single women and to men. The labor supply effects of school reopenings that we find for married women and the stark *lack* of any effects for other groups underscore the importance of caregiving in creating the gender-wage gap—a story recently highlighted by Goldin (2021).

Our findings imply that despite decades of labor market progress, married mothers still bear the brunt of shocks to the value of home production and thus are likely to also carry the burden of smaller, more common shocks such as those to children's health and mental health. Further, we show that the competing demands of career and parenting are not unique to mothers of young children and are perhaps even stronger for mothers of older school-aged children, who may have less job flexibility to accommodate any shocks. Finally, our remote work findings corroborate recent research by Dettling (2017), suggesting remote work may be a key component to facilitating work-family balance for married women in particular and that job flexibility likely mitigated employment losses for mothers during the pandemic.

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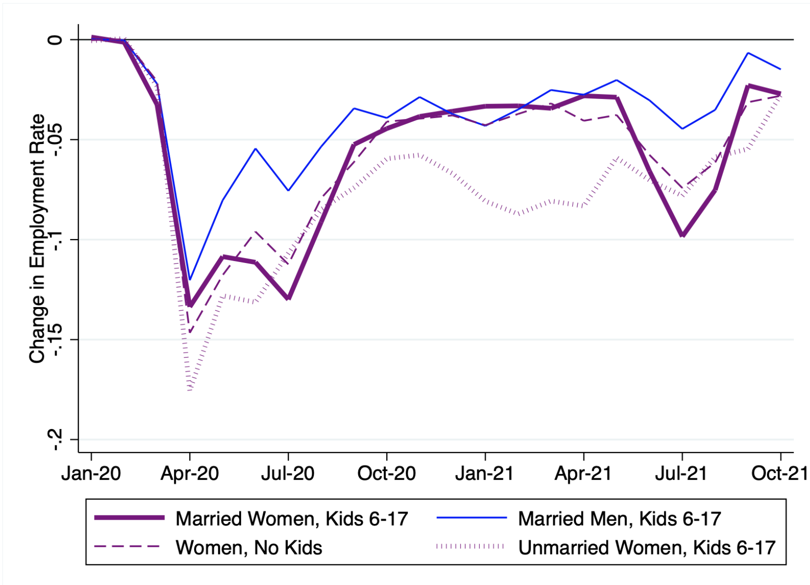
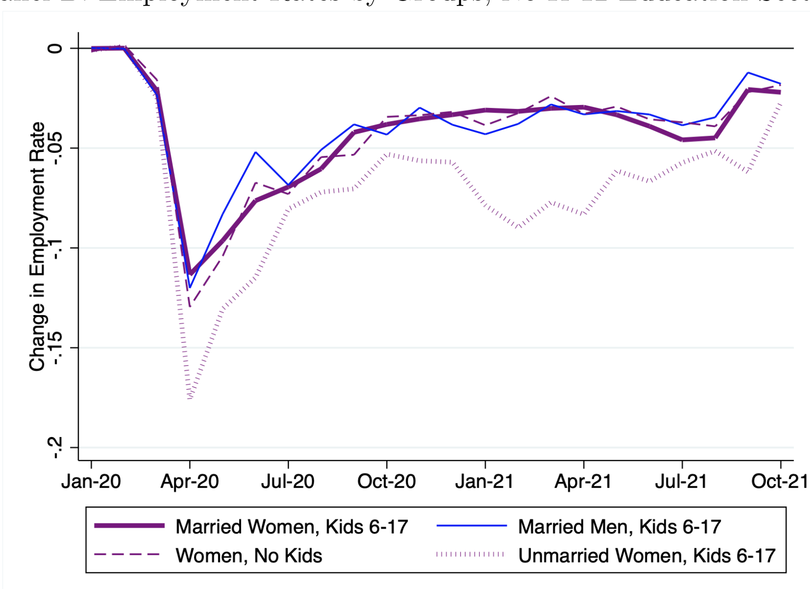
Figure 1: Employment Relative to January/February 2020

Panel A: Overall Employment Rates by Group



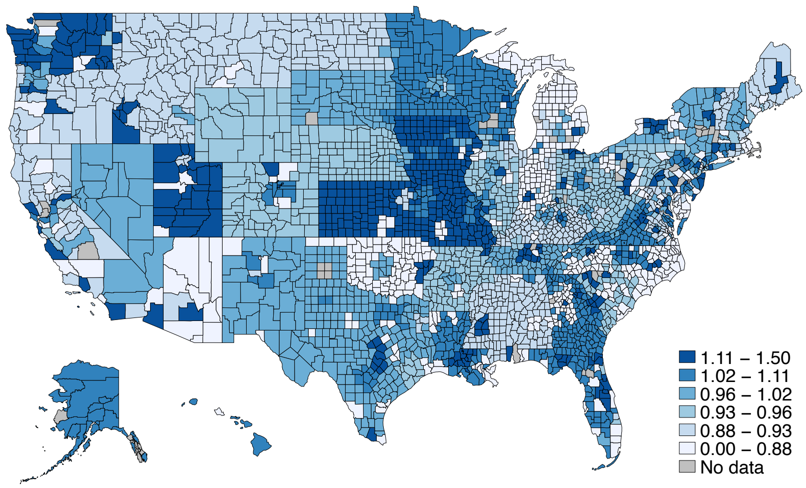
Panel B: Employment Rates by Groups, No K-12 Education Sector



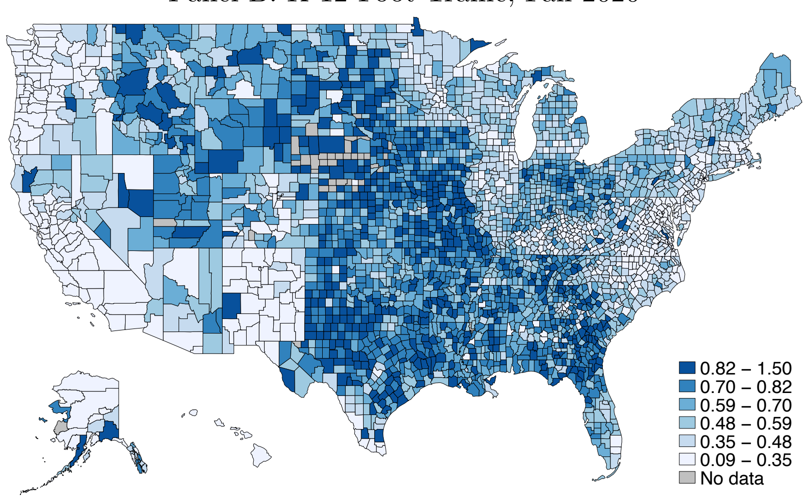
Notes: Data are from the Current Population Survey.

Figure 2: Geographic Variation in Treatment and Outcome Variables

Panel A: Married Women's Employment Rate, Fall 2020



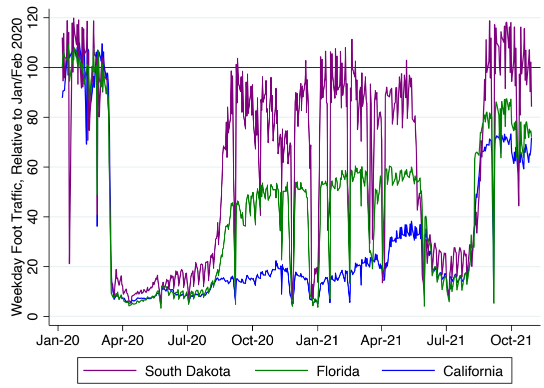
Panel B: K-12 Foot Traffic, Fall 2020



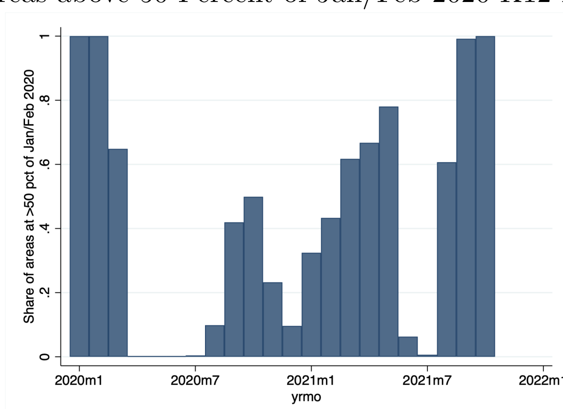
Notes: Data are from SafeGraph.

Figure 3: K-12 Foot Traffic Variation Over Time

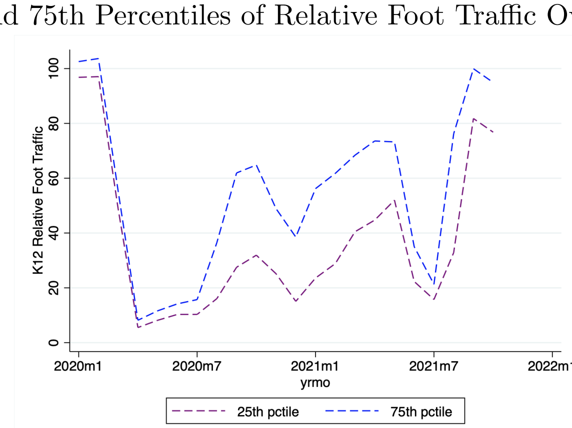
K-12 Foot Traffic, Min, Median, Max States



Share of Areas above 50 Percent of Jan/Feb 2020 K12 Foot Traffic



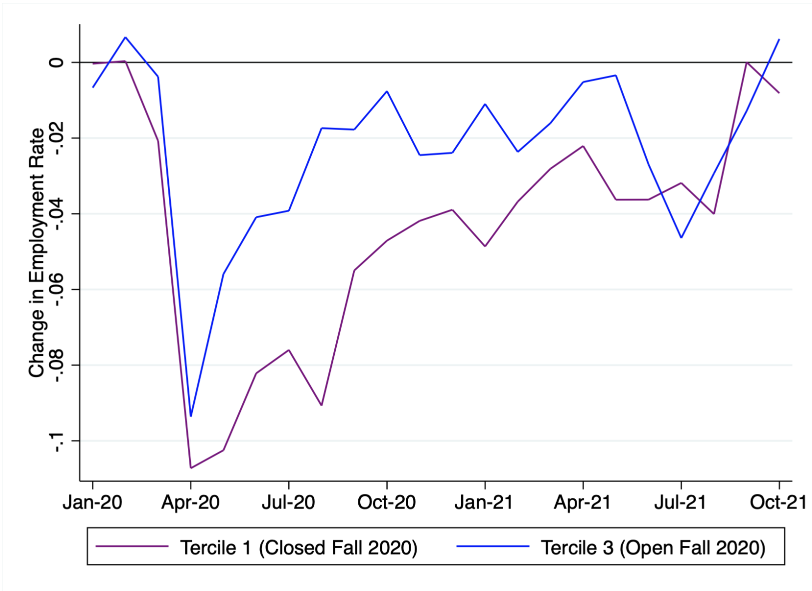
25th and 75th Percentiles of Relative Foot Traffic Over Time



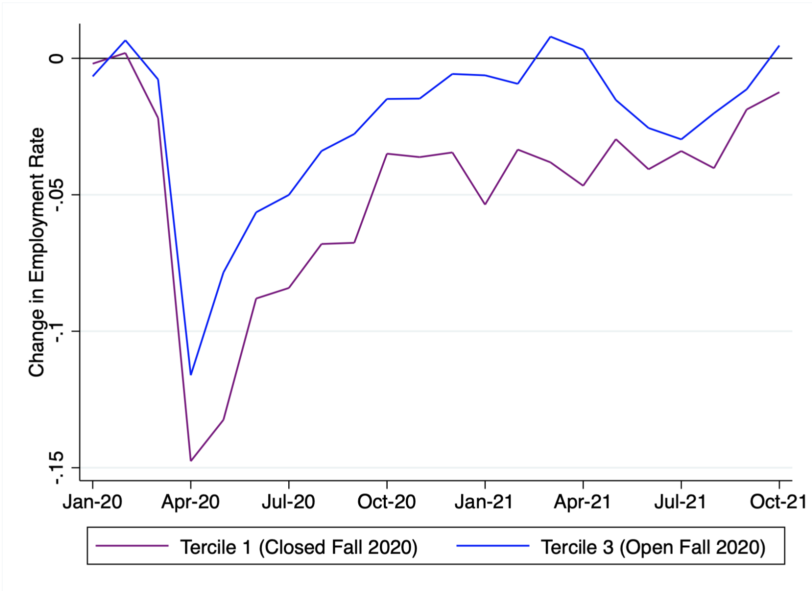
Notes: Data are from Safegraph and the Current Population Survey.

Figure 4: Non-Education Employment Relative to January/February 2020

Panel A: Married Women with Children



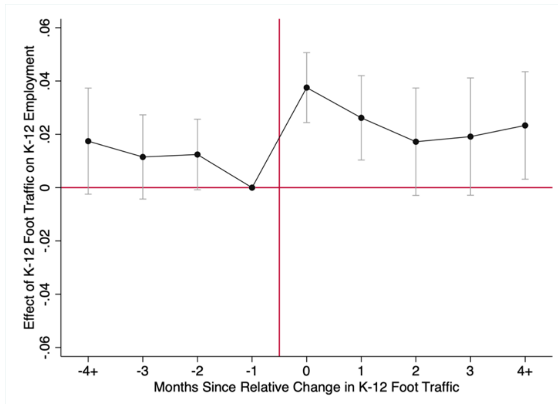
Panel B: Women with No Children



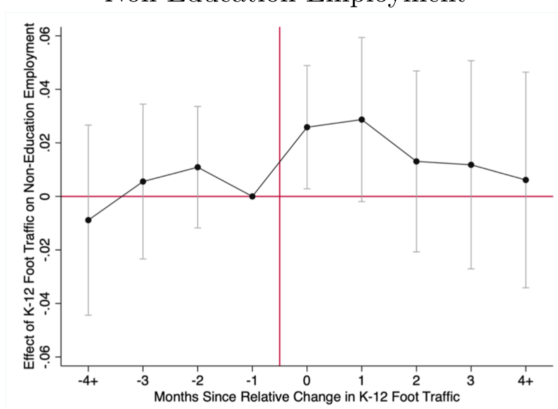
Notes: Data are from the Current Population Survey.

Figure 5: Dynamic Effects of K-12 School Reopenings on Labor Supply of Married Women with School-Aged Children: Event Study Estimates

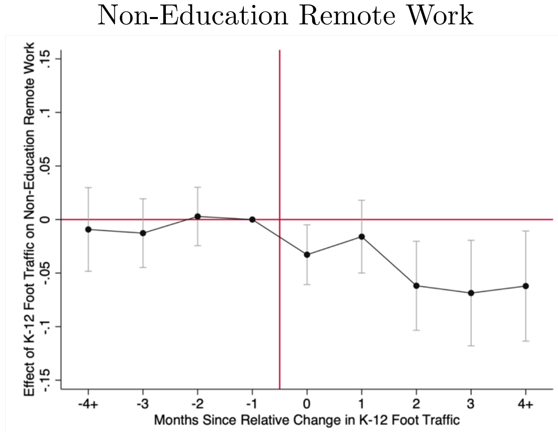
Education Employment



Non-Education Employment



Non-Education Remote Work



Notes: Vertical bars represent 95% confidence intervals around estimated treatment effects over time obtained from regression described in equation (2).

Table 1: Estimated Associations Between SafeGraph Data and Alternative School Reopening Proxies

	Employment, K-12 Sector		Hours, K-12 Sector		Remote Work, K-12 Sector		Predicted In-Person Share: CS Data Hub
	All	College-Educated	All	College-Educated	All	College-Educated	
K12 Foot Traffic	0.009***	0.014***	2.126***	2.507***	-0.185***	-0.195***	52.878***
	(0.002)	(0.003)	(0.524)	(0.549)	(0.019)	(0.020)	(3.385)

Notes: Individual-level data are from the Current Population Survey and include individuals aged 25–54. COVID-19 Data Hub prediction is constructed with administrative data from https://www.covidschooldatahub.com (see text). All regressions include area fixed effects and census division-specific year-month fixed effects. Individual control variables include age, race (fractions Black Non-Hispanic, other Non-Hispanic, and Hispanic), education (less than high school, high school graduate, some college, bachelor's degree, advanced degree), and marital status. COVID-19 controls include an indicator for positive cumulative deaths per capita and a continuous measure of cumulative deaths per capita. Observations are weighted using CPS individual sample weights. Robust standard errors, which allow for clustering at the area level, are shown in parentheses. Significance at 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

Table 2: Estimated Effects of K-12 Reopenings on Labor Market Outcomes

	Employed, At Work	Employed, Any	Hours Last Week	Remote Work
Panel A: Primary Treated Group				
Married Women with School-Aged Children				
K12 Foot Traffic	0.033***	0.022*	0.760**	-0.030**
	(0.012)	(0.012)	(0.369)	(0.014)
Panel B: Comparison Groups				
Unmarried Women with School-Aged Children				
K12 Foot Traffic	0.003	-0.002	-0.133	0.011
	(0.019)	(0.018)	(0.541)	(0.016)
Women without Children				
K12 Foot Traffic	0.008	0.004	-0.059	-0.001
	(0.009)	(0.009)	(0.236)	(0.011)
Men with Children Ages 6-17				
K12 Foot Traffic	0.001	-0.008	0.255	0.003
	(0.008)	(0.008)	(0.291)	(0.009)

Notes: Employment measures omit the K-12 sector. The treatment variable is K-12 weekday foot traffic relative to an area's average K-12 weekday foot traffic in Jan/Feb 2020. All coefficients are scaled up by 58.6—the difference between the 5th and 95th percentile of area reopening shares. All regressions include area fixed effects and census-division-specific year-month fixed effects. Individual control variables include age, race (Black Non-Hispanic, other Non-Hispanic, and Hispanic), education (less than high school, some college, bachelor's degree, advanced degree), and marital status. Area COVID-19 controls include an indicator for positive cumulative deaths per capita and a continuous measure of cumulative deaths per capita. Observations are weighted using CPS sample weights. Robust standard errors, which allow for clustering at the area level, are shown in parentheses. Significance at 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

Table 3: Triple-Differences (Fully Interacted) Model: Married Women with School-Aged Kids vs. Women with No Kids

	Employed, At Work	Employed, Any	Hours Last Week	Remote Work
K12 Foot Traffic	0.008	0.004	-0.059	-0.001
	(0.010)	(0.009)	(0.236)	(0.011)
K12 Traffic x Schoolkids	0.025*	0.017	0.820*	-0.029*
	(0.015)	(0.014)	(0.439)	(0.017)

Notes: The treatment variable is K-12 weekday foot traffic relative to an area's average K-12 weekday foot traffic in Jan/Feb 2020. All coefficients are scaled up by 58.6—the difference between the 5th and 95th percentile of area reopening shares. All regressions include area fixed effects and census division-specific year-month fixed effects. Individual control variables include age, race (fractions Black Non-Hispanic, other Non-Hispanic, and Hispanic), education (less than high school, high school graduate, some college, bachelor's degree, advanced degree), and marital status. COVID-19 controls include an indicator for positive cumulative deaths per capita and a continuous measure of cumulative deaths per capita. Observations are weighted using CPS individual sample weights. Robust standard errors, which allow for clustering at the area level, are shown in parentheses. Significance at 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

Table 4: Effects of K-12 Reopenings on Reported Labor Force Status (Family Reasons), Married Women with School-Aged Children

	Part-Time or Not Working, Family Reasons	NILF, Taking Care of House or Family	Part-Time, Child-Care Problems
	Panel A: Primary Treated Group		
	Married Women with School-Aged Children		
K12 Foot Traffic	-0.025**	-0.020**	-0.004
	(0.010)	(0.010)	(0.002)
	Panel B: Comparison Groups		
	Unmarried Women with School-Aged Children		
K12 Foot Traffic	-0.000	-0.003	0.004
	(0.014)	(0.013)	(0.006)
	Women without Children		
K12 Foot Traffic	0.002	0.002	0.000
	(0.005)	(0.005)	(0.001)
	Men with Children Ages 6-17		
K12 Foot Traffic	-0.003	-0.004	0.001
	(0.004)	(0.004)	(0.001)

Notes: Part-Time or Not Working, Family Reasons is an indicator the following: (1) Main reason not looking for work during last four weeks - "can't arrange childcare", (2) Major activity (NILF) - "taking care of house or family", (3) Reason for working part time last week - "childcare problems", or (4) Reason for absence from work - "childcare problems".

Table 5: Heterogeneity in the Estimated Effects of K-12 Reopenings on Married Women with School-Aged Children

	Employed, At Work	Hours Last Week	Remote Work	Employed, At Work	Hours Last Week	Remote Work
	Panel A: By Education, Married Women					
	Bachelor's or Adv. Deg.			No Bachelor's Degree		
K12 Foot Traffic	0.036**	0.840	-0.045*	0.035**	0.700	-0.010
	(0.017)	(0.625)	(0.023)	(0.016)	(0.478)	(0.017)
	Panel B: By Child Age, Married Women					
	Oldest Child Age 5-11			Youngest Child Age 12-17		
K12 Foot Traffic	0.024	0.668	-0.061**	0.045**	0.957*	0.001
	(0.021)	(0.626)	(0.024)	(0.020)	(0.519)	(0.026)
	Panel C: By Maternal Race/Ethnicity+					
	Black, Hispanic, or Other Race			White		
K12 Foot Traffic	0.016	0.569	-0.001	0.042***	0.918*	-0.039**
	(0.022)	(0.654)	(0.026)	(0.014)	(0.480)	(0.019)

Notes: Employment measures omit the K-12 sector. The treatment variable is K-12 weekday foot traffic relative to an area's average K-12 weekday foot traffic in Jan/Feb 2020. All coefficients are scaled up by 58.6—the difference between the 5th and 95th percentile of area reopening shares. All regressions include area fixed effects and census division-specific year-month fixed effects. Individual control variables include age, race (fractions Black Non-Hispanic, other Non-Hispanic, and Hispanic), education when applicable (less than high school, high school graduate, some college, bachelor's degree, advanced degree), and marital status. COVID-19 controls include an indicator for positive cumulative deaths per capita and a continuous measure of cumulative deaths per capita. Observations are weighted using CPS individual sample weights. Robust standard errors, which allow for clustering at the area level, are shown in parentheses. Significance at 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

+ We found no statistically or economically significant effects on any of the labor market outcomes for unmarried women in either race/ethnicity group (results available upon request).

A Additional Tables and Figures

Table A1: Sample Means - Main Samples

	Women			Men
	Married Kids 6-17	Unmarried Kids 6-17	No Kids	Kids 6-17
K12 Relative to Winter 2020	51.94	53.02	51.34	52.19
Restaurants Relative to Winter 2020	77.88	78.34	76.39	78.09
At Work, Non-K12-Sector	0.55	0.64	0.65	0.84
Hours Last Week, Non-K12-Sector	36.70	37.33	38.85	42.87
Worked Remotely, Non-K12-Sector	0.26	0.18	0.27	0.20
At Work, K-12 Education Sector	0.09	0.05	0.06	0.03
Hours Last Week, K-12 Education Sector	37.15	38.16	39.60	41.47
Worked Remotely, K-12 Education Sector	0.29	0.28	0.33	0.29
NILF, Family Reasons	0.25	0.13	0.08	0.02
Part Time, Childcare Reasons	0.02	0.02	0.00	0.00
Frontline Industry	0.19	0.26	0.21	0.12
Occupation Remote Share	0.45	0.38	0.42	0.40
White	0.59	0.42	0.59	0.57
Black	0.08	0.27	0.15	0.10
Other Race	0.11	0.05	0.10	0.09
Hispanic	0.22	0.26	0.17	0.24
Less the High School	0.08	0.12	0.06	0.11
High School Grad	0.20	0.30	0.23	0.27
Some College	0.24	0.34	0.26	0.24
Bachelor's Degree	0.29	0.15	0.30	0.23
Advanced Degree	0.20	0.08	0.16	0.15
Age	40.90	38.32	39.41	41.81
Observations	150016	63605	258233	163027

Notes: The CPS sample includes all individuals between the ages of 25 and 54. Observations are weighted using CPS individual sample weights. Hours and rates of remote work are estimated conditional on employment. K-12 and restaurant foot traffic are shown relative to a baseline value of 100 and can be interpreted as (proxies for) "percent reopen relative to pre-pandemic levels".

Table A2: Sample Means - Married Women with School-Aged Kids

	College	No College	Kids 6-11	Kids 12-17	White	Non-White
K12 Relative to Winter 2020	50.94	52.89	51.85	51.81	53.61	49.50
Restaurants Relative to Winter 2020	76.45	79.23	77.56	77.90	80.24	74.45
At Work, Non-K12-Sector	0.58	0.52	0.54	0.59	0.57	0.52
Hours Last Week, Non-K12-Sector	37.28	36.10	36.16	37.55	36.41	37.17
Worked Remotely, Non-K12-Sector	0.38	0.13	0.30	0.24	0.27	0.24
At Work, K-12 Education Sector	0.15	0.04	0.08	0.11	0.12	0.06
Hours Last Week, K-12 Education Sector	38.22	33.23	36.61	38.23	37.18	37.06
Worked Remotely, K-12 Education Sector	0.31	0.18	0.33	0.27	0.27	0.32
NILF, Family Reasons	0.19	0.32	0.28	0.19	0.21	0.31
Part Time, Childcare Reasons	0.02	0.02	0.03	0.01	0.02	0.02
Frontline Industry	0.18	0.19	0.18	0.19	0.18	0.19
Occupation Remote Share	0.50	0.38	0.45	0.45	0.47	0.42
White	0.68	0.51	0.62	0.61	1.00	0.00
Black	0.07	0.08	0.07	0.07	0.00	0.19
Other Race	0.15	0.08	0.13	0.11	0.00	0.28
Hispanic	0.10	0.32	0.18	0.20	0.00	0.53
Less the High School	0.00	0.16	0.05	0.08	0.03	0.16
High School Grad	0.00	0.38	0.17	0.20	0.16	0.25
Some College	0.00	0.46	0.23	0.25	0.26	0.21
Bachelor's Degree	0.59	0.00	0.32	0.28	0.33	0.22
Advanced Degree	0.41	0.00	0.23	0.19	0.22	0.16
Age	42.23	39.64	37.00	45.56	41.21	40.45
Observations	72570	77446	55221	50253	99227	50789

Notes: The CPS sample includes all individuals between the ages of 25 and 54. Observations are weighted using CPS individual sample weights. Hours and rates of remote work are estimated conditional on employment. K-12 and restaurant foot traffic are shown relative to a baseline value of 100 and can be interpreted as (proxies for) "percent reopen relative to pre-pandemic levels".

Table A3: Estimated Effects of K-12 Reopenings on Labor Market Outcomes, Single Mothers

	Employed, At Work	Hours Last Week	Remote Work
Panel A: One Working-Aged Adult in Household			
K12 Foot Traffic	0.002	-0.341	0.007
	(0.027)	(0.693)	(0.024)
Panel B: Two or More Working-Aged Adults in Household			
K12 Foot Traffic	-0.001	0.174	0.008
	(0.024)	(0.788)	(0.023)

Notes: The treatment variable is K-12 weekday foot traffic relative to an area's average K-12 weekday foot traffic in Jan/Feb 2020. All coefficients are scaled up by 58.6—the difference between the 5th and 95th percentile of area reopening shares. All regressions include area fixed effects and census-division-specific year-month fixed effects. Individual control variables include age, race (Black Non-Hispanic, other Non-Hispanic, and Hispanic), education (less than high school, some college, bachelor's degree, advanced degree), and marital status. Area COVID-19 controls include an indicator for positive cumulative deaths per capita and a continuous measure of cumulative deaths per capita. Observations are weighted using CPS sample weights. Robust standard errors, which allow for clustering at the area level, are shown in parentheses. Significance at 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

Table A4: Alternative Specifications and Robustness

	Employed, At Work			
	Married Women With Kids	Unmarried Women With Kids	Women No Kids	Men No Kids
	Using CPS Reference Week			
K12 Foot Traffic	0.030***	0.006	0.004	0.009
	(0.010)	(0.014)	(0.006)	(0.006)
	Controlling for COVID Cases			
K12 Foot Traffic	0.032***	0.003	0.004	0.001
	(0.012)	(0.019)	(0.008)	(0.008)
	Removing Unincorporated Areas			
K12 Foot Traffic	0.042***	0.009	0.006	-0.004
	(0.014)	(0.021)	(0.009)	(0.010)
	Controlling for Retail Foot Traffic			
K12 Foot Traffic	0.030**	0.003	0.003	-0.002
	(0.013)	(0.020)	(0.008)	(0.009)
	Remote Work			
	Married Women With Kids	Unmarried Women With Kids	Women No Kids	Men No Kids
	Using CPS Reference Week			
K12 Foot Traffic	-0.019	0.003	-0.005	0.002
	(0.012)	(0.014)	(0.006)	(0.008)
	Controlling for COVID Cases			
K12 Foot Traffic	-0.030**	0.011	-0.003	0.003
	(0.014)	(0.016)	(0.008)	(0.009)
	Removing Unincorporated Areas			
K12 Foot Traffic	-0.039**	0.026	-0.001	0.005
	(0.017)	(0.019)	(0.009)	(0.011)
	Controlling for Retail Foot Traffic			
K12 Foot Traffic	-0.026*	0.012	0.001	0.006
	(0.015)	(0.017)	(0.008)	(0.009)

Notes: Employment measures omit the K-12 sector. The treatment variable is K-12 weekday foot traffic relative to an area's average K-12 weekday foot traffic in Jan/Feb 2020. All coefficients are scaled up by 58.6—the difference between the 5th and 95th percentile of area reopening shares. All regressions include area fixed effects and census-division-specific year-month fixed effects. Individual control variables include age, race (Black Non-Hispanic, other Non-Hispanic, and Hispanic), education (less than high school, some college, bachelor's degree, advanced degree), and marital status. Area COVID-19 controls include an indicator for positive cumulative deaths per capita and a continuous measure of cumulative deaths per capita. Observations are weighted using CPS sample weights. Robust standard errors, which allow for clustering at the area level, are shown in parentheses. Significance at 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

Table A5: Regressions with the COVID-19 School Data Hub Measure, Married Women with School-Aged Children

	SafeGraph	Employment		Hours Last Week		Remote Work	
	K-12 Foot Traffic	K12	Other	K12	Other	K12	Other
	(Baseline=100)	Sector	Sectors	Sector	Sectors	Sector	Sectors
COVID-19 Hub Measure	0.201**	0.000	-0.000	0.033	-0.001	-0.002*	0.000
	(0.016)	(0.000)	(0.000)	(0.017)	(0.008)	(0.001)	(0.000)

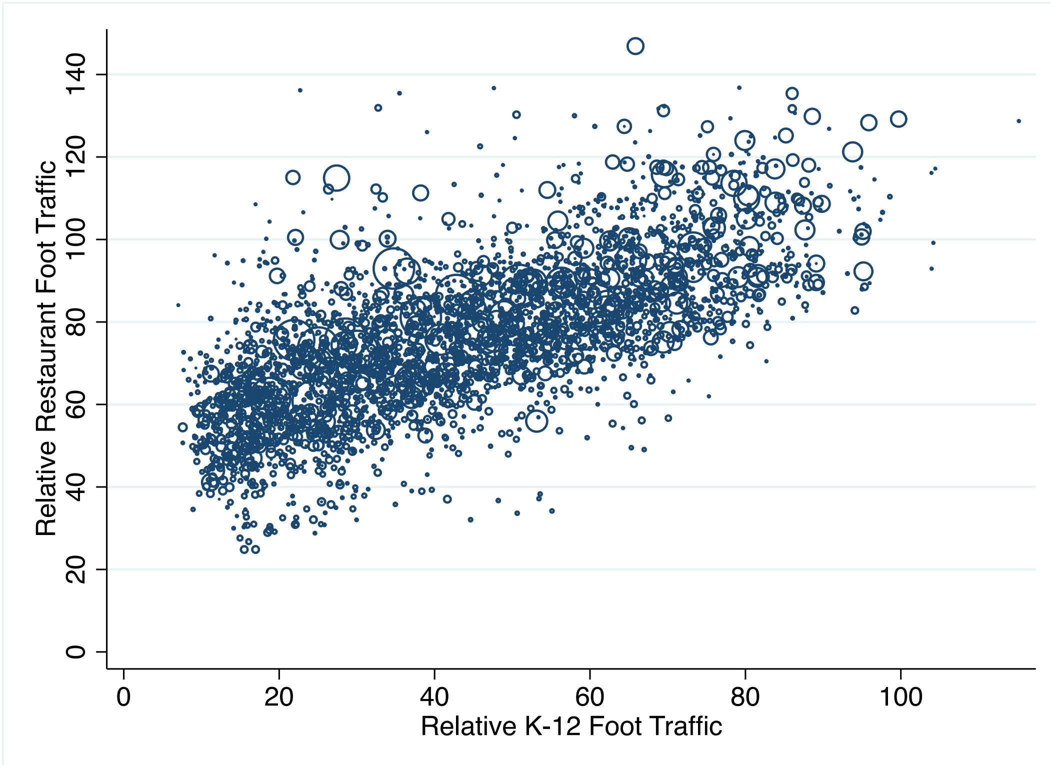
Notes: The data source is https://www.covidschooldatahub.com (see notes on Figure A1). All regressions include area fixed effects and census division-specific year-month fixed effects. Individual control variables include age, race (fractions Black Non-Hispanic, other Non-Hispanic, and Hispanic), education (less than high school, high school graduate, some college, bachelor's degree, advanced degree), and marital status. COVID-19 controls include an indicator for positive cumulative deaths per capita and a continuous measure of cumulative deaths per capita. Observations are weighted using CPS individual sample weights. Robust standard errors, which allow for clustering at the area level, are shown in parentheses. Significance at 1% and 5% levels are indicated by **, and *, respectively.

Table A6: Estimated Effects of K-12 Reopenings on Labor Market Outcomes, Smaller Samples and Shorter Time Periods

	Employed, At Work	Hours Last Week	Remote Work
Panel A: Married Women with School-Aged Children			
Large Counties Only			
K12 Foot Traffic	0.021	0.743	-0.052**
	(0.020)	(0.511)	(0.021)
August 2020 to April 2021 Only			
K12 Foot Traffic	0.019	2.190***	-0.044
	(0.025)	(0.818)	(0.028)
Large Counties Only, August 2020 to April 2021			
K12 Foot Traffic	-0.036	2.533**	-0.115**
	(0.037)	(1.266)	(0.047)
Panel B: Unmarried Women with School-Aged Children			
Large Counties Only			
K12 Foot Traffic	-0.007	0.257	0.019
	(0.028)	(0.831)	(0.026)
August 2020 to April 2021 Only			
K12 Foot Traffic	-0.027	0.389	0.017
	(0.034)	(1.058)	(0.029)
Large Counties Only, August 2020 to April 2021			
K12 Foot Traffic	-0.024	1.185	-0.012
	(0.051)	(1.885)	(0.049)

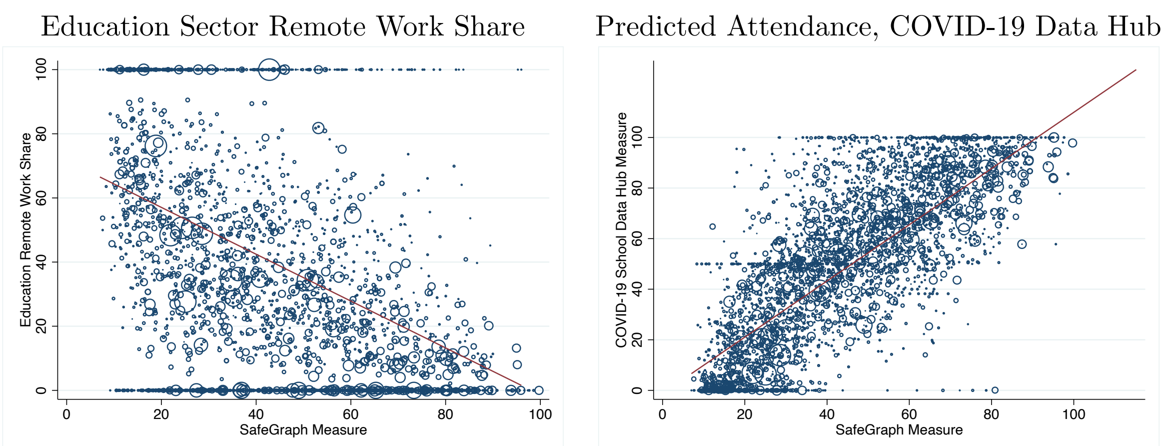
Notes: The treatment variable is K-12 weekday foot traffic relative to an area's average K-12 weekday foot traffic in Jan/Feb 2020. All coefficients are scaled up by 58.6—the difference between the 5th and 95th percentile of area reopening shares. All regressions include area fixed effects and census-division-specific year-month fixed effects. Individual control variables include age, race (Black Non-Hispanic, other Non-Hispanic, and Hispanic), education (less than high school, some college, bachelor's degree, advanced degree), and marital status. Area COVID-19 controls include an indicator for positive cumulative deaths per capita and a continuous measure of cumulative deaths per capita. Observations are weighted using CPS sample weights. Robust standard errors, which allow for clustering at the area level, are shown in parentheses. Significance at 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

Figure A1: Variation in Restaurant and School Foot Traffic



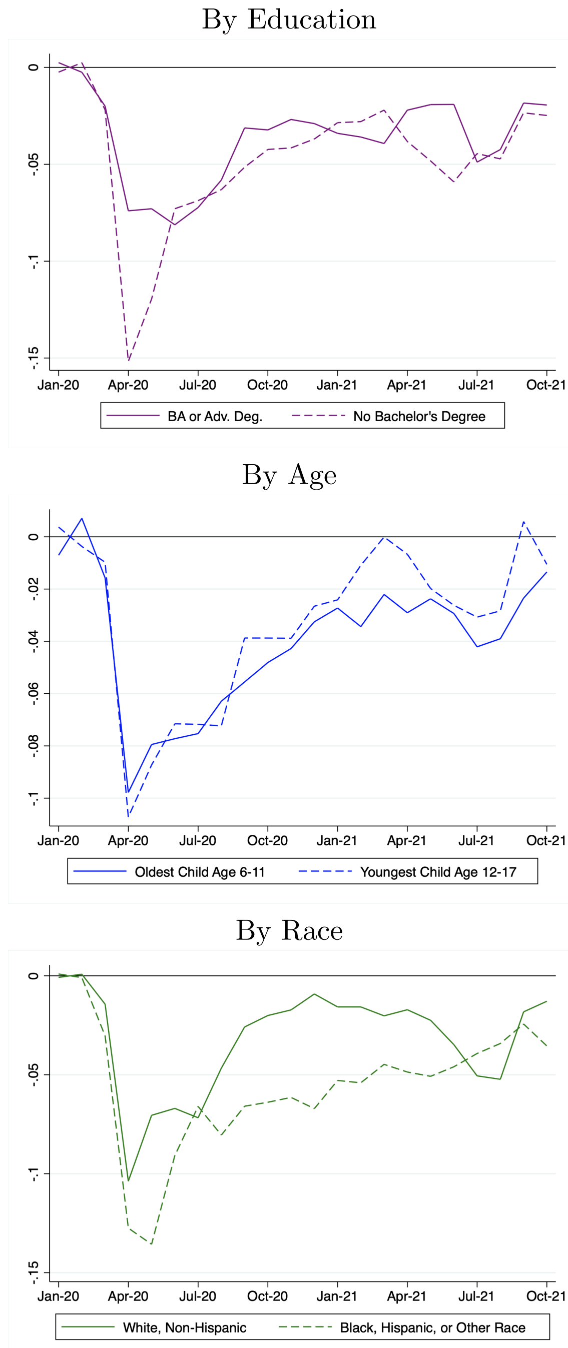
Notes: Data are from SafeGraph. The scatter plot shows variation in the pooled sample of area-month observations. Markers are weighted by area population.

Figure A2: Scatter Plots: SafeGraph School Reopenings vs. Other Reopenings Proxies



Notes: Data sources are SafeGraph, the Current Population Survey, and https://www.covidschooldatahub.com. The scatter plots show variation in the pooled sample of area-month observations. Markers are weighted by area population.

Figure A3: Non-Education Employment of Married Women with School-Aged Children Relative to Jan/Feb 2020, Subgroups

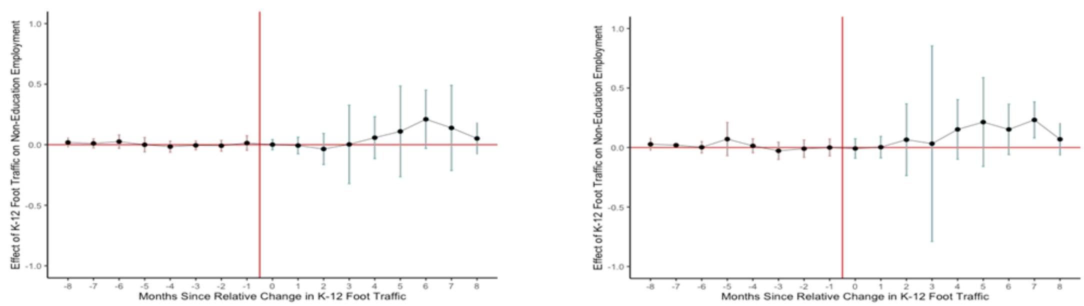


Notes: Data source is the Current Population Survey.

Figure A4: Dynamic Effects of Prominent Increase in K-12 School Foot Traffic: Event Studies Using Callaway-Sant'Anna Estimates

Employment for Mothers with Any School Aged Children

Employment for Mothers with Older School Aged Children



Notes: Vertical bars represent 95% confidence intervals from Callaway-Sant'Anna (2021) estimates. The treatment is defined as a jurisdiction attaining at least 90 percent of school foot traffic relative to the January/February 2020 period. Control jurisdictions are defined as those areas that had not yet (or never) attained the 90 percent threshold. Estimates include controls for school foot traffic of 50 to 89.9 percent relative to the January/February 2020 period and restaurant/bar foot traffic of at least 50 percent relative to the January/February 2020 period.