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Article

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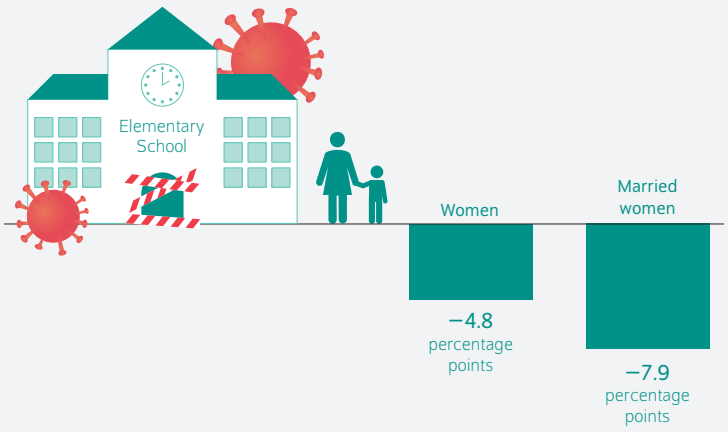
School restrictions during the COVID-19 pandemic reduced women's labor supply

By Blanka Imre, Markus M. Grabka, Oskar Breer, and Neil Murray

- Schools around the world were closed during the COVID-19 pandemic to curb the spread of the virus
- A new study examines the impact of school closures on the labor supply of working parents
- Parents whose children were only of elementary school age experienced particularly significant changes to their labor supply
- Without alternative childcare, mothers in particular reduced their hours, while fathers worked more
- Parents should be supported through more flexible work schedules, expanded childcare, and cost coverage

Women working full-time have significantly reduced their employment due to school closures caused by the coronavirus

Mothers with children exclusively in elementary school





Mothers with elementary school-aged children have reduced their employment. Fathers, on the other hand, have worked more

Sources: SOEPv41, Infas 360 Data Catalog/Corona Data; own calculations.

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FROM THE AUTHORS

"During the COVID-19 pandemic, working mothers reduced their work hours more than fathers did when schools were closed."

— Blanka Imre —

MEDIA

Audio Interview with Blanka Imre (in English)
www.diw.de/mediathek

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ABSTRACT

The COVID-19 pandemic provides a unique context for understanding how parents balance labor supply and childcare when schools close. Although school restrictions in Germany left most workers unaffected, households with children of elementary school age redistributed their labor: Full-time employment among mothers who had only children of elementary school age fell by four to five percentage points during periods of restricted school operations, while fathers' employment increased. Among married mothers working full-time, the decline was even more pronounced, at nearly eight percentage points. Ideally, all disadvantages faced by mothers in the labor market should be eliminated. Employers can actively address this by making it easier to balance full-time employment with childcare, for example through flexible work schedules, shift work, and working from home.

Six years after the outbreak of the coronavirus, policymakers and society are still grappling with the consequences of the containment measures implemented at the time; these included restrictions on contact and gatherings in private and public spaces, travel restrictions, mandatory mask-wearing, workplace restrictions, curfews, and social distancing rules. The education system was also severely affected: there were far-reaching restrictions in childcare and schools. The goal of these measures was to reduce contact between people in order to contain, or at least slow, the spread of the coronavirus. While there were exceptions for parents in so-called essential occupations, and classes were offered online or through a mix of in-person and online instruction, the vast majority of parents faced the challenge of balancing their jobs with caring for their children at home. Caring for and teaching elementary school-aged children places a significant time burden on working parents, which can generally lead to reduced employment and shorter working hours. In two-parent families, couples might respond by redistributing household chores and paid work between themselves.

To date, there have been only a few studies examining the causal effects of school closures on parents' employment in Germany. International studies on the impact of the coronavirus pandemic on the labor market reveal significant differences between countries. This is particularly evident in job losses: By early April 2020, 20 percent of workers in the United States had lost their jobs. In the United Kingdom, the figure was only slightly lower at 17 percent. In Germany, by contrast, only about five percent of jobs were lost.[1] When considering the total volume of work in Germany alone, school and daycare closures led to a decline in working hours of up to 1.1 percent. One explanation for this is that employers' flexibility regarding work schedules may have helped limit the impact of school closures on parents' labor supply.[2] The expansion of short-time work programs likely also helped mitigate the effects of school closures on the German labor market.

1 Abi Adams-Prassl et al. (2020): Inequality in the Impact of the Coronavirus Shock: Evidence from Real-Time Surveys. Journal of Public Economics, 189, 104245 (available online; accessed July 14, 2026. This applies to all online sources in this report, unless otherwise noted).

2 See Sebastian Dullien and Bettina Kohlrausch (2021): An analysis of the COVID-19 supply shock: What role did school closures play? IMK Working Paper No. 207 (available online).

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New Study Shows Effects of School Closures on Parents' Labor Supply

The causal effects of COVID-19-related school closures on parents' labor supply in Germany are examined using data from the Socio-economic Panel (SOEP)[3] as well as detailed data on school restrictions published by the infas Institute for Applied Social Sciences.[4] In Germany, responsibility for the education system lies with the individual federal states, leading to significant regional differences in education policy. During the COVID-19 pandemic, the authority to impose restrictions on daycare centers and schools was further decentralized to the county level and, in rare cases, to the school level. These differences—between counties[5] as well as over time—are used to examine how grade-specific restrictions on in-person instruction affected parents' labor supply.

To measure the extent of school closures, we use the proportion of school days per month and county on which in-person instruction was restricted. We distinguish between complete school closures and the option of hybrid instruction (in-person and online). The analysis covers individuals of working age, particularly parents of minor children.

To identify causal effects, a difference-in-differences approach is used, in which parents' labor force participation in counties with stricter school restrictions is compared with that in less affected counties—both before and after the restrictions took effect (box). Two estimation methods are used: the standard two-way fixed effects (TWFE) and the estimator proposed by de Chaisemartin and D'Haultfœuille (hereinafter dCDH).[6] The latter is better suited for situations in which school restrictions did not begin simultaneously everywhere and were repeated over time. The estimation is conducted separately for men and women.

Labor market policy measures alleviated the burden on parents during the COVID-19 pandemic

In March 2020, the federal government introduced various measures to provide financial support to businesses and safeguard jobs.[7] These included the "Corona emergency aid" —consisting of one-time, non-repayable grants of up to 15,000 euros for small businesses and sole proprietors to bridge acute liquidity shortfalls—as well as the Bridging Aid Programs I and II, which provided operating cost subsidies for small and medium-sized enterprises affected by pandemic-related closures or restrictions.

In addition, the eligibility requirements for short-time work benefits have been significantly relaxed and their scope has been greatly expanded.[8] Short-time work benefits compensate for the difference between the actual hours worked and

Box

Data and Methodology

The analysis is based on monthly employment histories from the Socio-Economic Panel (SOEP) for the period from January 2019 to December 2021. The SOEP surveys all adult household members individually; in the case of couples, each partner is therefore surveyed separately. The analysis examines full-time and part-time employment, short-time work, and unemployment.

The analysis focuses on parents of elementary school-aged children, as younger children are likely to require the most care during school closures. For comparison, parents of secondary school-aged children as well as childless adults are also examined. Data on childless adults, who are likely to remain largely unaffected by school closures, are used for placebo tests. Parents with children under the age of six are excluded to avoid distorting the effect of school and preschool closures.

The key explanatory (treatment) variable is the proportion of school days per month and county on which school operations were restricted due to the pandemic—whether through complete or partial closures. These data come from the infas Institute for Applied Social Sciences and vary by county and month.

The effects are estimated using difference-in-differences models with fixed effects for county and time. This method compares the labor market outcomes of parents in counties with more severe school closures to those in counties less affected by the restrictions. To isolate the effect of school restrictions from other pandemic measures, the models also take into account COVID-19 case counts (Robert Koch Institute) as well as a range of non-education-related restrictions such as contact restrictions, travel restrictions, and curfews.

The control variables used include age, gender, living with a partner, marital status, educational level, migration background, the number of household members, and the age of the youngest household member.

3 The SOEP is a representative annual panel survey of private households that has been conducted in West Germany since 1984 and in East Germany since 1990; see Jan Goebel et al. (2019): The German Socio-Economic Panel (SOEP). Journal of Economics and Statistics, 239(29), 345–360 (available online). The following data versions were used for this publication: SOEP-Core v41, EU Edition 2026 (available online), the IAB-SOEP migration sample (available online) , and the IAB-BAMF-SOEP survey of refugees (available online).

4 This report is based on a paper accepted by the Journal of Labor Economics, which will appear in the journal's special issue in October 2026. The authors acknowledge financial support from NIH Grant No. R01AG071649 and DFG Grant No. 458299140 (GaPRisk).

5 The most detailed level of data available was the county level.

6 Clément De Chaisemartin and Xavier d'Haultfoeuille (2026): Difference-in-differences estimators of intertemporal treatment effects. The Review of Economics and Statistics, 1–18 (available online).

7 See website of Federal Ministry for Economic Affairs and Energy: Information on federal COVID-19 aid (available online).

8 The Federal Government (2020): Easier Access to Short-Time Work Benefits. Announcement dated March 23, 2020 (available online). The regulation took effect retroactively as of March 1.

Table 1

Changes in parents' labor supply due to COVID-19 school restrictions
Change in the probability of employment in percentage points

	Women		Men	
	Full-time employees	Full-time and part-time employees	Full-time employees	Full-time and part-time employees
Panel I: Parents of children, including those of elementary school age				
Restrictions in elementary school	−1.97	1.78	0.58	2.49
Mean (percent)	22.0	71.6	75.1	81.7
Panel II: Parents of children in elementary school only				
Restrictions in elementary school	−4.84**	2.11	2.41	5.21**
Mean (percent)	27.9	75.4	77.2	84.3

Notes: The asterisks indicate the significance level, which reflects the statistical precision of the estimate. The more asterisks, the higher the precision: ***, **, and * indicate significance at the 1-, 5-, and 10-percent levels, respectively. Two-way fixed-effects estimates based on monthly data from January 2019 through December 2021. Standard errors clustered at the county level.

Panel I: N=1,211 women (21,330 observations) and N=1,031 men (18,243 observations); Panel II: N=533 women (8,834 observations) and N=419 men (6,907 observations).

Interpretation: For mothers whose children are exclusively of elementary school age, the probability of full-time employment decreases by 4.8 percentage points due to school restrictions.

Sources: SOEP v41; Infas 360 Data Catalog/COVID-19 Data; authors' own calculations.

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the contractual working hours, which already helped secure jobs during the financial crisis.[9] With the aim of preventing massive job losses, the German short-time work allowance program was amended in several respects in early 2020. The eligibility requirements for short-time work were relaxed: Instead of 33 percent, only 10 percent of the workforce now had to be affected by a significant loss of earnings. In addition, eligibility was expanded to include temporary agency workers. Furthermore, the government not only increased the reimbursed portion of the wage shortfall from 60 percent to 100 percent but also extended the maximum duration of short-time work benefits from 12 to 28 months.

These measures likely helped mitigate the negative effects of pandemic-related school closures on the employment situation of parents with school-age children.

Parents of elementary school children were particularly affected

Intuitively, one would expect parents of young children to have been most severely affected by school closures, since children of elementary school age still require supervision and guidance with their studies. If parents have older children in addition to those of elementary school age, the older children can take on some of the caregiving responsibilities for their younger siblings, so that little or no impact on the parents' labor force participation would be expected. In contrast, parents whose children were exclusively of elementary school age were likely to have been more severely affected by school closures, as it was less likely that older household members could step in and provide care. This study confirms these assumptions. The study population consists of mothers and fathers of school-age children (ages 6–16) and mothers and fathers of elementary school-age children (ages 6–9 in most federal states; ages 6–11 in Berlin and Brandenburg).

Estimates of the effects of elementary school closures on parents' labor supply are conducted separately for mothers and fathers (Table 1). The first and third columns include only parents who work exclusively full-time, while columns 2 and 4 also include parents who work part-time.

When all parents of children are considered, no statistically significant association between school restrictions and full-time employment can be identified.

However, the picture becomes much clearer when only parents whose children are exclusively of elementary school age are considered (Panel II)—that is, households without older siblings who could step in as informal caregivers. Here, school closures are associated with a statistically significant 4.8 percentage point decline in full-time employment among mothers, which corresponds to about one-sixth of the mothers who were previously employed full-time (mean: 27.9 percent). In contrast, there is no effect on overall employment—part-time and full-time combined. Mothers have thus reduced their working hours rather than leaving the workforce entirely. Among fathers, on the other hand, the probability of being employed full-time or part-time increases by 5.2 percentage points, which is statistically significant.

Overall, the results suggest that households consisting exclusively of elementary school-aged children divided work hours along gender lines: while schools were closed, mothers took on additional childcare responsibilities, while fathers increased their labor force participation—presumably to

9 Pierre Cahuc, Francis Kramarz, and Sandra Nevoux (2021): The heterogeneous impact of short-time work: From saved jobs to windfall effects. CEPR Discussion Paper, No. 16168, No. 2021-04, CEPR Press, Paris & London (available online). Giulia Giupponi and Camille Landais (2022): Subsidizing labor hoarding in recessions: The employment and welfare effects of short-time work. The Review of Economic Studies, 90(4), 1963–2005 (available online);. Daniel Kopp and Michael Siegenthaler (2021): Short-time work and unemployment in and after the Great Recession. Journal of the European Economic Association, 19(4), 2283–2321 (available online).

offset the household's loss of income.[10] Placebo tests involving childless adults and households with older children confirm that the results are not due to other factors.

To better account for regional differences in the severity of school closures and their recurring nature, the dCDH estimator is used. This method also allows us to examine the extent to which parents' labor force participation in different regions already differed from one another before the school closures.

The pattern is similar to the previous results. As school restrictions tighten, mothers' full-time employment declines significantly in the first two months. For fathers, the trend is the opposite: In both months following full or partial school closures, the effect is positive, though less clearly evident than for mothers (Figure). This supports the interpretation of gender-specific effects on labor supply.

Married mothers adjusted their employment particularly sharply

Next, we examine whether these effects differ depending on marital status, with the focus again on parents with children of elementary school age by marital status (Table 2). The results show a significant negative effect of -7.9 percentage points,[11] which is observed exclusively among married, full-time working mothers (Panel I, Column 1). No significant effect is observed among unmarried women (Panel II, Column 1). Similarly, no significant differences are observed between the two subgroups of fathers (Panels I and II, Columns 3 and 4).

Married mothers reduced their full-time work and devoted more time to caring for their children. This suggests that traditional gender roles may be influential in these households. At the same time, this suggests that married mothers may rely more heavily on financial support from their spouses: Their husbands might compensate for potential income losses by working more themselves, enabling the household to better absorb financial setbacks.

Figure

Change in full-time employment among mothers and fathers with children in elementary school
In percentage points



Note: The bars indicate a 95-percent confidence interval.

Sources: SOEP v41, Infas 360 Data Catalog/COVID-19 Data; authors' own calculations.

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Mothers with children of elementary school age significantly reduced their employment as a result of school closures, while fathers worked more.

Conclusion: Better work-life balance requires more childcare options and financial support

This study provides new causal evidence on how COVID-19-related school closures affected parents' labor supply. The transition from unrestricted in-person instruction to limited school operations led to a decline in full-time employment of nearly five percentage points among mothers whose children were exclusively in elementary school, and to an increase in employment of roughly the same magnitude among fathers. In the absence of alternative childcare options within the household (such as care provided by older siblings, relatives, or other household members), parents of young schoolchildren tended to revert to a more traditional division of roles: Married mothers reduced their labor supply—presumably to devote more time to childcare—while fathers increased their labor supply, likely to offset the household's loss of income.

In general, mothers face poorer opportunities in the labor market and a wider wage gap than women without children (child penalty[12]). If mothers also withdraw from the labor market, this is likely to hinder their career prospects and have a negative long-term impact on their retirement savings.

10 The analysis was alternatively calculated using gross labor income as the outcome variable. Here, the results are small and not statistically significant. However, since income is recorded annually rather than monthly, the data lacks the granularity and statistical power to make meaningful comparisons with our main results.

11 This corresponds to a relative effect of 25 percent, given an average full-time employment rate of 32 percent in the sample of married mothers whose children are still of elementary school age (N=265). Due to the small cell size, high external validity cannot be assumed.

12 Henrik Kleven et al. (2019): Child Penalties across Countries: Evidence and Explanations. AEA Papers and Proceedings, 109, 122–126 (available online).

Table 2

Effects of restrictions in elementary schools by marital status
Change in the probability of employment in percentage points

	Women		Men	
	Full-time employees	Full-time and part-time employees	Full-time employees	Full-time and part-time employees
Panel I: Married parents with children only in elementary school				
Restrictions in elementary school	–7.93**	0.86	0.25	4.11
Mean (percent)	32.0	83.1	84.4	88.5
Panel II: Unmarried parents of children in elementary school only				
Restrictions in elementary school	1.12	5.57	2.59	3.89
Mean (percent)	23.7	67.0	69.2	79.7

Notes: The asterisks indicate the significance level, which specifies the statistical precision of the estimate. The more asterisks, the greater the precision: ***, **, and * indicate significance at the 1-, 5-, and 10-percent levels, respectively. Standard errors clustered at the county level.

Panel I: N=265 women (4,444 observations) and N=218 men (3,668 observations); Panel II: N=273 women (4,448 observations) and N=203 men (3,251 observations).

Interpretation: For married women, the probability of full-time employment decreases by 7.9 percentage points. For married men and unmarried men, there are no significant changes.

Sources: SOEP v41; Infas 360 Data Catalog/COVID-19 Data; authors' own calculations.

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It is therefore advisable to reduce the general disadvantages faced by mothers in the labor market by further expanding and financially supporting labor market and education policies that specifically promote the work-life balance, particularly with regard to childcare.

First, more support from employers and the government is needed to help parents balance full-time employment with childcare, including flexible work schedules and work locations. Working from home and hybrid work arrangements, in which employees work from home for at least two days and on-site for the remaining days, have been shown to increase productivity, employee retention,[13] and opportunities for their children's extracurricular activities.[14]

Second, measures that distribute childcare more evenly between mothers and fathers of school-age children could reduce the gender gap described above. For couples in which both parents would like to work full-time but cannot perform their jobs remotely or in a hybrid work arrangement, publicly funded full-day schools could be a solution. In this regard, the large-scale expansion of full-day schools and the corresponding funding by the federal government are to be welcomed.[15] So far, there are still gaps in coverage in some federal states, especially in western Germany. In most states, parents must also pay for afternoon care themselves, which places a significant burden on households with low socioeconomic status. To improve the situation for working mothers in Germany, therefore, universal access to free afternoon care for elementary school children is needed.

13 Nicholas Bloom et al. (2015): Does Working from Home Work? Evidence from a Chinese Experiment. Quarterly Journal of Economics, 130 (1), 165–218 (available online); Nicholas Bloom, Ruobing Han, and James Liang (2024): Hybrid working from home improves retention without damaging performance. Nature, 630, 920–925 (available online).

14 The resulting longer afternoon break could also have a positive effect on productivity; see Pedro Bessone et al. (2021): The Economic Consequences of Increasing Sleep Among the Urban. Quarterly Journal of Economics, 136(3), 1887–1941 (available online).

15 With the administrative agreement on the "All-Day Expansion" investment program dated May 17, 2023, a legal entitlement to all-day care for elementary school children was introduced, effective in 2026. The federal government allocated 3.5 billion euros for investments in infrastructure and equipment, with the federal states covering 30 percent of the costs and providing ongoing funding of 1.3 billion euros per year starting in 2030. Federal Ministry of Education, Family, Senior Citizens, Women, and Youth (2023): Administrative Agreement on the "Expansion of Full-Day Programs" Investment Program Published, June 23, 2023 (available online).

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