Primary school reopenings and parental work

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**Abstract.** In this paper, we exploit the geographical pattern of primary school reopenings during the COVID-19 pandemic in Canada to estimate the impact of school reopenings on parental employment and work hours. We use a triple-difference approach, in which we first compare parents of primary-school children in regions where schools reopened to similar parents in regions where schools remained closed and add parents of older, secondary-school children as an additional control group. We estimate the impact of school reopenings separately for mothers and fathers, and for single parents and parents living in dual-parent households. We find a positive impact of school reopenings on employment and on actual hours worked. The effects tend to be stronger for single mothers, but are also present for mothers and fathers in dual-parent households in the spring of 2020. Overall, single mothers experienced an 18 percentage point increase in their employment at work rate following school reopenings. We also split our sample according to whether the job can be done from home, and find stronger impacts for those whose jobs cannot easily be done from home.

**Résumé. La réouverture des écoles primaires et le travail des parents.** Dans cet article, nous exploitons la dispersion géographique des réouvertures d’écoles primaires durant la pandémie de COVID-19 au Canada afin d’estimer l’impact des réouvertures d’écoles sur l’emploi des parents et leurs heures de travail. Nous utilisons une approche de triple différence, dans laquelle nous comparons tout d’abord les parents d’enfants à l’école primaire dans les régions où les écoles ont réouvert aux parents similaires dans les régions

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où les écoles sont restées fermées, puis nous ajoutons les parents d’enfants plus âgés, à l’école secondaire, comme groupe de contrôle additionnel. Nous estimons l’impact des réouvertures d’écoles séparément pour les mères et les pères, et pour les parents monoparentaux et ceux dans les ménages à deux parents. Nous trouvons un impact positif des réouvertures d’écoles sur l’emploi et les heures effectivement travaillées. Les effets tendent à être plus marqués pour les mères monoparentales, mais sont aussi présents pour les mères et les pères dans les ménages à deux parents au printemps 2020. En tout, les mères monoparentales ont connu une hausse de 18 points de pourcentage de leur taux d’emploi (au travail) suite aux réouvertures d’écoles. Nous séparons aussi notre échantillon selon que l’emploi puisse être fait de la maison et trouvons des impacts plus forts pour ceux dont l’emploi ne peut facilement être fait de la maison.

JEL classification: I24, I28, J21, J22

1. Introduction

In response to the COVID-19 pandemic and in order to limit infections, childcare services, primary schools and secondary schools closed down across Canada in March of 2020. Most schools did not reopen and remained closed through to the end of the school year. Children were home schooled, with varying levels of support from teachers through online schooling, and varying levels of access to online materials (Frenette et al. 2020). Home schooling and caring for young children at home put pressure on parents’ capacity to work, whether it be from home or not. While lockdown measures have affected everyone’s ability to work, it can be expected that the employment and hours of work of parents of school-aged children were affected above and beyond those of childless workers (Alon et al. 2020a).

Our contribution is to estimate the specific impact of primary school reopenings on parental employment status and work hours. Because 30.2% of Canadian workers have young children (aged 12 and below),¹ and K-12 education has a vital role in the economy (Green et al. 2021), understanding the impact of this specific measure is essential given that school closures likely affects the ability of parents to work, which could have an impact on our ability to deliver essential services during a pandemic. Recent work has documented the labour market situation of parents during the pandemic, essentially showing a decrease in work hours (Qian and Fuller 2020). We go further by exploiting geographical differences in school reopening patterns to identify the causal effect of reopening schools on parental work.

Schools and childcare facilities closed across Canada within a few days between March 13 and March 20, 2020. School closures were also done in combination with a host of other lockdown measures, which triggered important impacts on the labour force across the country (Lemieux et al. 2020a). It is therefore not possible to exploit variation across time and space to capture the initial

¹ Source: Authors’ calculations from Statistics Canada’s Labour Force Survey, average for the year 2019, January to December.
impact of school closures. Instead, we investigate the impact of primary school reopenings—the flip side of the closures—because these reopenings varied across time and space.\(^2\) Primary school reopenings were indeed not uniform across the country. Schools first reopened in May 2020 in Quebec outside of Montreal, were then opened across the country in the fall of 2020 and finally, in January 2021, they were open everywhere except in Southern Ontario. These variations across time and space are used in a quasi-experimental design to gain insights into the impact of school reopenings on parental employment and work hours. Because the decision to reopen schools may have been combined with other changes within the geographical unit, we use a triple-difference approach to estimate the impact of school reopenings on parental labour market outcomes. Specifically, we first compare parents of primary-school children in regions where schools reopened to similar parents in regions where schools remained closed and add parents of older, secondary-school children as an additional control group.

Related literature suggests that prolonged school closures may slow down or reverse the gains towards gender equality in the labour market. Qian and Fuller (2020) find that the gender gap in employment probability widened by 6.5 percentage points between February and May 2020 in Canada for parents whose youngest child was of primary-school age. Adams-Prassl et al. (2020) show that in April 2020, women spent significantly more time home schooling their children than men did in Germany and the United Kingdom—on top of the one-hour differential in time spent on other child care tasks on a “typical” work day. We therefore estimate the impact of school reopenings for mothers and fathers separately, and also document the effect on single parents, as well as those living in dual-parent households. Heggeness (2020) measures the immediate impact of school closures by exploiting variations in the timing of school closures in the US and finds that mothers initially took a week of leave and fathers reduced their hours worked.

We find that primary school reopenings have a positive impact on labour force indicators for mothers and fathers. More specifically, our results from the triple-difference approach suggest that school reopenings in May 2020 increased the probability that mothers and fathers are employed and at work in dual-parent households by 9.0 percentage points (pp) and 9.8 pp, respectively. For single mothers we also find a large increase of 21.8 pp, highlighting a clear impact of school reopenings on parents’ ability to work. Additionally, the actual number of hours worked increased by 8.4 hours per week for single mothers and by 3.2 hours per week for fathers in dual-parent households, with limited impact on mothers in dual-parent households. Finally, the pandemic had a larger negative impact on mothers’ labour force measures relative to the measures for fathers, and mothers’ labour activity recovered only partially.

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\(^2\) Our microempirical approach is in line with the work of Alon et al. (2020b), who investigate the impact of school reopenings on gender inequality in the United States using a quantitative macroeconomic model.
once schools reopened, whereas fathers’ labour activity recovered almost completely. The pandemic, combined with school closures, has therefore directly contributed to an exacerbation of the gender gap. Reopening schools should be seen as an opportunity to mitigate the negative effects of the pandemic on gender and socioeconomic inequalities.

The outline of the paper is as follows. Section 2 briefly reviews the related literature. Sections 4 and 5 present the data and empirical strategy. The results are presented in section 6. Section 7 concludes.

2. Literature

The literature on school closures and parental labour market outcomes is extremely limited and does not directly compare to the current situation. Jaume and Willén (2018) estimate the impact of teachers’ strikes on parental labour force participation. They find strong evidence that temporary school closures in Argentina had negative impacts on maternal labour force participation, which translated into a loss of earnings for mothers. On average, they did not find an impact on fathers, except when fathers were not the main breadwinner. In Jaume and Willén (2018), companies were not laying off thousands of workers at the same time as schools were closing, so the impact of school closures in that context, while informative of parental preferences, may be very different from the impacts generated during the pandemic.

A related paper, though not on school closures per se, looks at school schedules and the gender pay gap. Duchini and Van Effenterre (2020) estimate the effect of introducing instruction time on Wednesdays in France, thus going from a four-day week to a five-day week. They find that mothers increased their hours worked and shifted from part-time to full-time employment. Fathers did not respond to the new school schedules, so the combined result is a closing of the gender gap, both in terms of employment and of pay. Most of the literature related to this topic actually comes from childcare research. Studies on the Quebec childcare reform have provided strong evidence that low-fee childcare contributes to a rise in maternal labour force participation in the short and long term (see for example Lefebvre and Merrigan 2008, Baker et al. 2008, Haeck et al. 2015). While this literature reveals that mothers’ labour force participation is tightly linked to the availability and affordability of childcare, and fathers’ labour force participation seldom depends on it, it provides limited evidence on the impact of school closures in the context of a pandemic.

Recent work by Lemieux et al. (2020a) documents the impact of the COVID-19 pandemic on the Canadian labour market. The authors find that weekly hours worked decreased by 32% between February 2020 and April 2020 among workers aged 20 to 64 in Canada. At the same time, employment rates decreased by 15%, and this decline was concentrated among workers at the bottom of the earnings distribution (in the bottom quartile). They find similar employment declines for men and women. In a study tightly linked to our own, Qian and Fuller (2020) investigate the gender gap in employment
status in Canada in the wake of the COVID-19 pandemic. They segment their sample by age of the youngest child and find the strongest effects for parents whose youngest child was between six and 12 years old. This is especially true for low-educated parents. Thus, while everyone was affected by the pandemic to various degrees, we can expect parents of primary-school children to have faced an additional constraint because of school closures (all else being equal).

Multiple studies raise the point that, contrary to some affirmations that the coronavirus pandemic may be the great leveller, current inequalities may in fact increase in the wake of the pandemic (Blundell et al. 2020, Wright et al. 2020, Adams-Prassl et al. 2020). Gender differences are a particularly interesting case. Large shocks, such as the birth of a child, tend to have disproportionate effects on women compared with men, contributing to a substantial part of the gender gap (Kleven et al. 2019a;b, Connolly et al. 2020). Adams-Prassl et al. (2020) document that women in the United States and the United Kingdom were more likely to lose their job following the pandemic than men. Collins et al. (2021) show that the gender gap in work hours has widened by 20% to 50%, part of which they argue is a direct consequence of school closures. Yet, the rapid rise in working from home and more flexible work arrangements, as well as fathers’ increased involvement in child responsibilities, may, in the longer term, benefit women (Alon et al. 2020b). Recent evidence from the epicentre of the crisis in Canada also shows that women were more likely to get infected by SARS-CoV-2 and suffer emotional challenges (Lemieux et al. 2020b, Springmann et al. 2020).

There are a limited number of studies that document the impact of school closures during the pandemic on children’s learning using representative and reliable data sources. Maldonado and De Witte (2020) and Engzell et al. (2021) use administrative data from Belgium and the Netherlands, respectively, and show that school closures during the pandemic had a negative impact on the academic achievement of children. They further show that this impact was stronger among vulnerable children. The interruption they documented lasted eight weeks, while in Canada, schools were closed for over 16 weeks in most of the country. Haeck and Lefebvre (2020) show that academic inequalities by socioeconomic status are large and comparable across Canadian provinces and that they may have increased by as much as 30% as a result of school closures during the pandemic.

There is also a small literature on the impact of school interruptions that exploits various identification strategies, using summer interruptions, teachers’ strikes, previous pandemics and age at entry regulations (e.g. Davies and Aurini 2013, Jaume and Willén 2019, Meyers and Thomasson 2020, Frenette 2008). This literature suggests that school closures have unequal impacts across children and have long-lasting consequences. While average learning losses are limited over the summer, it appears that this overall effect masks heterogeneous impacts among children (Cooper et al. 1996). A few studies suggest that children in favourable family environments seem to gain over the summer or during a teachers’ strike, or at least not lose, while
children in less favourable environments experience a net loss in their academic abilities (Atteberry and McEachin 2021, Belot and Webbink 2010). A study on the polio pandemic at the beginning of the 20th century suggests that a few weeks of school interruption at the beginning of the year can have long-term effects on the probability of completing high school (Meyers and Thomasson 2020). Finally, Jaume and Willén (2019) show that children who suffered school interruptions due to teachers’ strikes have lower labour earnings later in life (by 3.2% and 1.9% for males and females, respectively).

The effects of the current pandemic on children’s ability and perseverance cannot yet be measured in Canada and may be hard to measure, given that Canada is no longer periodically collecting reliable and representative data on children and youth. While parents may not know the extent to which school interruptions can affect their children, they are bound to factor this into their decision on how to best allocate their time between work, housework, leisure and home schooling. The literature suggests that children in high socio-economic status families are less likely to be negatively affected. This may be because high socioeconomic status parents tend to spend more time with their children to begin with (Guryan et al. 2008, Ramey and Ramey 2010), may allocate more time to their children or may have access to external resources to help them more effectively, in response to the pandemic. Bacher-Hicks et al. (2021) indeed find that parents in areas with higher income and better internet access increased their searches for both school- and parent-centred online learning resources during the pandemic.

In summary, parental employment rates will reflect both their adjustment in response to school closures and the labour market adjustments within their occupation because some sectors were affected more than others by the economic slowdown (Lemieux et al. 2020a). We come back to this point in sections 5 and 6 when we describe our empirical strategy and results.

3. Context

In Canada, high schools and primary schools were first shut down in Quebec effective March 13, 2020. Schools were closed in Ontario as of March 14, and within a few days, all schools across the country were closed. While high schools remained closed across the country through the end of the school year, primary schools were reopened in some provinces before the end of the school year. Quebec was the first province to reopen its primary schools, starting May 11 outside of the Greater Montreal Area (GMA) (Quebec Government 2020a, b). These schools were open full time until the third week of June 2020. In Montreal and its surroundings (in the GMA), all schools remained closed until the end of the school year, except for a very small number of schools for kids with special needs. While primary schools remained closed in May outside of Quebec, some provinces started reopening schools on a part-time basis in June. For example, in Manitoba, Prince Edward Island and British Columbia, primary schools reopened on June 1, but mainly on a part-time basis.
Unfortunately, the documentation on where and when schools were open in June is rather incomplete. Also, summer school breaks vary across the country and typically start in the third to fourth week of June. As a result, we exclude the summer months (June, July and August) from our analysis, unless stated otherwise.

In the fall, primary schools reopened full time and in person across the country, as of September. High school students also went back to school but often on a part-time basis. In Ontario, parents were given the choice to return their child in person or continue with virtual schooling. Furthermore, in January 2021, primary schools remained closed in Southern Ontario in response to the second wave (Ontario Government 2021). Elsewhere in the country, primary schools were open by the third week of January, and high schools continued with a mix of virtual and in-person learning (for example, Quebec Government 2021, Alberta Government 2021). Our empirical strategy exploits variations in primary school reopenings across the country in May 2020 and January 2021. Table 1 provides a summary of the school closure and school opening situation in each of the Canadian provinces from the start of the COVID-19 pandemic until January 2021.

Clearly, the opening of primary schools may also be done in conjunction with easing of other lockdown measures. For instance, in Quebec in May 2020, reopenings of different sectors, businesses, and services were mandated by the provincial government and applied across the entire province (albeit following a slightly different schedule). School reopenings, however, were implemented only outside the GMA, leading to geographical variations in school reopenings.

### Table 1
Primary-school closures and openings by province since March 2020

| Province                      | Reference week – LFS |
|-------------------------------|----------------------|
|                              | 2020                 | 2021                 |
|                              | Mar. | Apr. | May | Sept. | Oct. | Nov. | Dec. | Jan. |
| Alberta                       | C    | C    | C   | C     | O    | O    | O    | O    |
| British Columbia              | C    | C    | C   | C     | O    | O    | O    | O    |
| Manitoba                      | C    | C    | C   | C     | O    | O    | O    | O    |
| New Brunswick                 | C    | C    | C   | O     | O    | O    | O    | O    |
| Newfoundland and Labrador     | C    | C    | C   | O     | O    | O    | O    | O    |
| Nova Scotia                   | C    | C    | C   | O     | O    | O    | O    | O    |
| Ontario                       | C    | C    | C   | O     | O    | O    | O    | C    |
| — Southern Ontario            | C    | C    | C   | O     | O    | O    | O    | O    |
| — Northern Ontario            | C    | C    | C   | O     | O    | O    | O    | O    |
| Prince Edward Island          | C    | C    | C   | O     | O    | O    | O    | O    |
| Quebec                        | C    | C    | C   | O     | O    | O    | O    | O    |
| — Greater Montreal Area       | C    | C    | C   | O     | O    | O    | O    | O    |
| — Outside Greater             | C    | C    | O   | O     | O    | O    | O    | O    |
| Montreal Area                 | C    | C    | C   | O     | O    | O    | O    | O    |
| Saskatchewan                  | C    | C    | C   | O     | O    | O    | O    | O    |

**NOTE:** Shaded cells marked “C” represent areas (province or subarea) where primary schools were closed and “O” denotes that primary schools were open during the LFS reference week of the given month.
in Quebec. Other provinces in which schools and childcare services remained closed also eased many of their lockdown measures. In January 2021, many lockdown measures were in place across the country. In both time periods, the variation to identify the effect of school openings on parental labour supply stems from schools being open in one part of a province (Quebec in May 2020 and Ontario in January 2021), but not the other.

Finally, the labour force participation and employment of parents with preschoolers also depends on the availability of childcare spaces. Between March and May 2020, childcare facilities were mandated to close in all provinces except British Columbia. Some services for essential workers were kept open. The reopening of childcare facilities was gradual and uneven across the country, as of May 2020 with relatively low take-up rates: 5% of parents in Ontario and Quebec reported that their children were attending childcare during the spring (Statistics Canada 2020). Unfortunately, the only reliable source of information on the supply of childcare spaces is a one-time survey taken the last week of April (Friendly et al. 2020). The information to exploit variations across time and space is therefore not available. In the fall, childcare facilities were reopened across the country. We further discuss the implications of having preschoolers in the household below.

4. Data

Our main data source is the confidential microdata from Statistics Canada’s Labour Force Survey (LFS) between January 2017 to January 2021 (Statistics Canada 2021). The LFS is a monthly survey that captures the current state of the Canadian labour market. It is the official source of microdata to measure monthly unemployment rates in the 58 Employment Insurance Regions (EIRs) of Canada. The survey is typically conducted during the third week of the month, through personal interviews, telephone interviews, and electronic questionnaires. Participation in the survey is mandatory and regulated under the Statistics Act. The LFS is designed to provide representative measures of labour market conditions across all EIRs. The target population for the LFS includes all non-institutionalized individuals aged 15 and older.

In this study, we use a household-level framework, where a unit of observation is one household, and we estimate the impact on mothers separately from the impact on fathers. We rely on confidential microdata obtained from Statistics Canada to have information on the age of each child present in the household, which is not available in the public-use LFS (the public-use files contain only the age of the youngest child in the household). The use of confidential microdata allows us to identify families directly affected by primary school closures, and also allows us to control for the presence and age of other children, thereby improving the analysis in Qian and Fuller (2020).

In our main sample, we keep families with either with primary-school children, aged six to 12, or high-school children, aged 13 to 17; we exclude
all other households, including households with both primary- and high-
school children. Households with both types of children can be affected
differently because older siblings may take care of the younger ones. In
section 6, we test the robustness of our results to their inclusion. We also
exclude households without children or with children above 17 years of
age because adults in these households are less representative of the popu-
lation of parents of primary-school children. In the population of parents
of primary-school children, we keep families with preschool children
because more than 40% of these families have younger children. We test
the robustness of our main results to their exclusion in section 6. Reassur-
ingly, our main results are extremely similar to the results we obtained
when excluding families with preschoolers. Finally, we restrict our atten-
tion to parents aged 20 to 55 to include prime-aged workers and to avoid
including households in which the child is taken care of by a grandparent.
All calculations and estimations are weighted using the sampling weights
provided by Statistics Canada.

Individuals in our data are assigned to one of the 94 non-overlapping
regions \( r \) defined using the geographical variables of the LFS. Specifically, we
identify 83 Census Metropolitan Areas (CMAs) and 11 rural areas outside of
the CMAs, one for each province, but two for Ontario (Northern and
Southern Ontario). CMAs are well-defined units of economic activity in which
included areas must have tight economic links with the CMA’s core city. Out
of the 94 regions, 16 reopened schools in May 2020, all located in Quebec out-
side of the GMA. In the fall, primary schools reopened in all 94 regions and
generally remained opened throughout the fall and winter. Classes were indi-
vidually closed, for periods of two weeks at a time in response to COVID-19
cases within the class, but very few schools were completely closed. In
January, during the week of the LFS, primary schools were open in Canada,
except in Southern Ontario (22 regions), where primary schools were closed in
an effort to contain the second wave. These schools were reopened at the end
of January.

Table 2 presents the descriptive statistics of our main sample, between
January 2017 to January 2021 (inclusively). It shows that the vast majority
of fathers and mothers (around 90% and 80%, respectively) live in dual-
parent households and that, for households with primary-school children,
5.1% of fathers are single parents, compared with 16.4% of mothers (in fami-
lies with high-school children, the percentages are 7.9% and 21.5%, respec-
tively). The table also shows that most parents have at least some
postsecondary education; parents of primary-school children are slightly
more educated than parents of high-school children, and they are also youn-
ger by about seven years on average, consistent with their children being
younger. With respect to location of residence, around 11% of our sample
lives in Quebec outside of the Greater Montreal Area (GMA) and 38% live
in Southern Ontario. Similar percentages are observed for parents of high-school children.³

We focus our attention on three labour market outcomes. The first one indicates if the parent is employed and actually at work. The second one indicates if the parent is employed and is either at work or is absent from work. Finally, we also look at actual hours worked in the main job during the reference week.

Table 2 shows that the vast majority of parents of children aged six to 12 or 13 to 17 are employed (around 91% for fathers and 81% for mothers). We note that being employed does not necessarily mean being present at work: one can be employed but absent from work, for reasons such as one’s own illness, caring for children or older relatives, maternity leave, or vacation. Therefore we also look at the employment status of parents defined as being employed and at work (either working from home or working in person). On average, between January 2017 and February 2020 (excluding the summer months), about four percent of employed parents were in fact absent from work. During the spring (March to May), this number spiked to more than 15% for mothers and 10% for fathers.⁴ The distinction between the two types of employment rates (including workers that are absent from work or not) will be maintained throughout our analysis, and will bring additional insight into the mechanisms that shape parental employment in response to school reopenings. Actual work hours among all parents (those employed and those not employed, thus including zeroes) are around 35 hours for fathers and 25 hours for mothers. Conditional on being employed, fathers work an average of 40 to 41 hours per week, and mothers work on average 33 to 34 hours per week.

Figures 1 and 2 show the fraction of parents employed and actually working for Quebec outside of the GMA, Southern Ontario and the rest of Canada.⁵ The seasonally adjusted monthly employment rate is presented from January 2017 to January 2021. Here, summer months (June, July and August) are also included. The overall employment rate is lower than what we observed in table 2 because summer months are included in the figures and the employment rate is seasonally adjusted over 12 months. The markers are hollow when schools are open and full when schools are closed (during the

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³ In the appendix, tables A1 and A2 provide information on the distribution of industries and occupations of parents. Fathers of primary-school children mainly work in the construction and manufacturing sectors (13.8% and 13.3%, respectively) and mothers in the health care and social assistance sector and the educational services sector (25.2% and 13.9%, respectively).

⁴ Source: Authors’ calculations from Statistics Canada’s Labour Force Survey, 2017 to 2021 (January to May).

⁵ Figures A1 an A2 on the fraction of parents employed and either at work or absent from work are presented in the appendix. Figures for hours at work are extremely similar and can be obtained from the authors on request.
summer or because of the pandemic). May 2020 and January 2021 are marked by arrows and reported in red given our source of identification comes from these months.

Figures 1 and 2 show a sharp decline in employment (at work) in April 2020 for both parents of primary-school and high-school children, but the decline is steepest among single mothers. With respect to existing evidence, Lemieux et al. (2020a) do not find a difference in employment declines between men and women when studying workers aged 20 to 64 in Canada, which is in line with our results on parents in dual-parent households.

### TABLE 2

Descriptive statistics

| Characteristics     | Children 6–12 in the household | Children 13–17 in the household |
|---------------------|---------------------------------|---------------------------------|
|                     | Fathers                      | Mothers                          | Fathers                      | Mothers                          |
| Age                 | 40.721 ± 5.859               | 38.328 ± 5.889                  | 47.577 ± 4.968               | 45.887 ± 5.284                  |
| Number of children  |                                |                                 |                                |                                 |
| Aged 6 to 12        | 1.502 ± 0.639                | 1.482 ± 0.634                   | –                            | –                                |
| Aged 13 to 17       | –                              | –                                | 1.317 ± 0.522                | 1.294 ± 0.507                   |
| Family structure    |                                |                                 |                                |                                 |
| Dual parent         | 0.949 ± 0.051                | 0.836 ± 0.051                   | 0.921 ± 0.079                | 0.785 ± 0.215                   |
| Single parent       | 0.051 ± 0.051                | 0.164 ± 0.051                   | 0.079 ± 0.051                | 0.215 ± 0.051                   |
| Education           |                                |                                 |                                |                                 |
| Some secondary      | 0.062 ± 0.062                | 0.051 ± 0.133                   | 0.076 ± 0.180                | 0.058 ± 0.165                   |
| Secondary completed | 0.155 ± 0.391                | 0.133 ± 0.373                   | 0.180 ± 0.408                | 0.165 ± 0.408                   |
| Some postsecondary  | 0.391 ± 0.391                | 0.373 ± 0.399                   | 0.399 ± 0.345                | 0.408 ± 0.369                   |
| Postsecondary completed | 0.391 ± 0.391 | 0.443 ± 0.345                   | 0.345 ± 0.395                | 0.369 ± 0.369                   |
| Region              |                                |                                 |                                |                                 |
| Quebec (excl. GMA)  | 0.110 ± 0.110                | 0.106 ± 0.051                   | 0.107 ± 0.051                | 0.101 ± 0.110                   |
| Southern Ontario    | 0.368 ± 0.368                | 0.373 ± 0.388                   | 0.388 ± 0.393                | 0.393 ± 0.408                   |
| Rest of Canada      | 0.522 ± 0.522                | 0.521 ± 0.505                   | 0.505 ± 0.506                | 0.506 ± 0.506                   |
| Labour market outcomes |                                |                                 |                                |                                 |
| Employed            | 0.91 ± 0.91                  | 0.80 ± 0.91                     | 0.91 ± 0.82                  | 0.82 ± 0.91                     |
| Employed and working| 0.86 ± 0.86                  | 0.75 ± 0.86                     | 0.86 ± 0.76                  | 0.76 ± 0.86                     |
| Actual hours worked | 34.58 ± 34.58                | 24.94 ± 24.94                   | 34.99 ± 34.99                | 26.00 ± 26.00                   |
| Actual hours worked if employed | 40.02 ± 40.02 | 33.31 ± 33.31                   | 40.83 ± 40.83                | 34.09 ± 34.09                   |

**NOTES:** The variable employed equals 1 for all individuals employed and at work or employed but absent from work, while the variable employed and working equals 1 only for individuals employed and at work (working from home or working at the office). Quebec excludes individuals from the Greater Montreal Area (GMA). The rest of Canada includes all individuals except those living in Southern Ontario and in Quebec outside of the GMA. Includes individuals living in household (HH) with either with primary-school children, age 6 to 12, or high-school children, age 13 to 17. HH with primary-school children and pre-school children are included. HH with both primary- and high-school children are excluded. Standard deviations in parentheses.

**SOURCE:** Authors’ calculations using the Labour Force Survey from January 2017 to January 2021 but excluding the summer months (June, July and August)
The fraction of fathers employed and at work in dual-parent households declined from around 75% to 55%, while that of mothers declined from around 65% to 50%. In single-parent households, the fraction employed fell around 40% in April 2020. In May 2020, when primary schools reopened in Quebec outside of the GMA (hollow red diamond, figure 1), both mothers and fathers of primary-school children returned to work, while their participation barely changed in the rest of the country. By the fall, the employment (at work) rate was back to its pre-pandemic levels. In January, when schools remained closed in Southern Ontario, only single mothers of primary-school children seemed to have suffered a loss in employment (at work).

Figures 1 and 2 further show the gender employment gap. Pre-pandemic, mothers were indeed less likely to be employed and working than fathers, except in Quebec. Qian and Fuller (2020) document the rising gender employment gaps among parents during the spring of 2020. Figure 1 clearly shows that single mothers saw their employment rate fall below that of parents in dual-parental households, especially in Southern Ontario, where their
seasonally adjusted employment rate fell to 30% in April 2020. Because there are more female single parents than male single parents, the pandemic temporarily exacerbated the gender gap in employment.

5. Empirical strategy

To estimate the impact of reopening primary schools on our three labour market outcomes, we rely on a quasi-experimental design and estimate a triple-difference (DDD) model. We first compare parents of primary-school children in areas where schools reopened full time and in person with parents of primary-school children in areas in which schools did not reopen, before and after the start of the pandemic. To address any remaining concerns about school reopenings being done in conjunction with other easing of confinement measures, we use parents of high-school children as an additional control group. This group also allows us to control differentially for the strength of the economic downturn and the recovery that followed within each region. The triple-difference model of school reopenings is the following:

FIGURE 2  Fraction of parents with high-school children employed at work by region over time

NOTES: Y-axis shows the monthly fraction of mothers employed (at work). All parents are included, not just those active on the labour market. Summer months are exceptionally included, and employment rate is seasonally adjusted over 12 months. Parents employed but absent from work are set to 0. The markers are hollow when schools are open and full when schools are closed (during the summer or because of the pandemic). Vertical bars denote 95% confidence intervals. Arrows and red dots indicate observations in May 2020 and January 2021. ROC = Rest of Canada. SOURCE: Authors’ calculations using the Labour Force Survey. [Color figure can be viewed at wileyonlinelibrary.com]
\[ Y_{irt} = \alpha + \phi_r + \theta_t + \omega P_i + \tau_{1,t}\theta_t P_i + \tau_{2,t}\theta_t S_{1,r} + \tau_{3} P_i S_{1,r} + \tau_{4,t}\theta_t S_{2,r} + \tau_5 P_i S_{2,r} + \beta_{\text{DDD May}} M_{\text{ay}_l} P_i S_{1,r} + \beta_{\text{DDD Jan}} J_{\text{an}_t} P_i (S_{1,r} + S_{2,r}) + \Phi X_{it} + \delta_d + \tau_o + \epsilon_{it}, \]

where \( Y_{irt} \) is the labour market outcome of individual \( i \) in time period \( t \) in region \( r \). To account for regional and temporal differences, we first include region fixed effects \( \phi_r \) and year–month fixed effects \( \theta_t \). Parents of primary-school children \( (P_i = 1) \) are compared with parents of high-school children \( (P_i = 0) \). \( S_{1,r} \) is a dummy variable equal to 1 for parents living in regions in which primary schools reopened in person full time in May 2020 (Quebec outside of the GMA). \( S_{2,r} \) is a dummy variable equal to 1 for parents living in regions in which primary schools reopened full time in person only in September 2020 and remained open in January 2021 (all of Canada, excluding Southern Ontario and Quebec outside of the GMA), such that \( S_{1,r} + S_{2,r} \) defines Canada outside of Southern Ontario. The term \( May_l \) equals 1 in May 2020 and 0 otherwise, while the term \( Jan_t \) equals 1 in January 2021 and 0 otherwise. The term \( X_{it} \) is a vector of socioeconomic control variables: parental age dummies (in years), partner’s age dummies (in years) in dual-parent households, partner’s industry fixed effects in dual-parent households and a dummy if the reference week is a four-day week when \( Y_{irt} \) is the number of hours worked per week. To account for the composition of the family’s children, we also include dummies indicating the presence of at least one child by age groups. We also include industry fixed effects \( \delta_d \) and occupation fixed effects \( \tau_o \). \( \epsilon_{irt} \) is an error term. Our DDD estimates account for LFS survey weights and standard errors are clustered at the region level. With 94 clusters, we have enough groups to properly account for the possibility of intraclass serial correlation.6 This problem is highlighted in, for example, Bertrand et al. (2004) and Kezdi (2004).

Finally, we also estimate the average effect of opening schools \( (\beta_{\text{DDD May,Jan}}) \) using the following specification:

\[ Y_{irt} = \alpha + \phi_r + \theta_t + \omega P_i + \tau_{1,t}\theta_t P_i + \tau_{2,t}\theta_t S_{1,r} + \tau_{3} P_i S_{1,r} + \tau_{4,t}\theta_t S_{2,r} + \tau_5 P_i S_{2,r} + \beta_{\text{DDD May,Jan}} (May_l P_i S_{1,r} + Jan_t P_i (S_{1,r} + S_{2,r})) + \Phi X_{it} + \delta_d + \tau_o + \epsilon_{it}. \]

There are households in which some children are in high school and others attend primary school. We exclude these households from our main analysis. This represents around 20% of households with children aged six to 17 only. Households in which older children are present may not be affected as much by primary school closures because older siblings may be able to care for younger ones. In our robustness checks, we include these households in the

6 Cameron and Miller (2015) mention that more than 50 clusters appear enough when using state–year panel data.
treatment group and indeed find that the estimated impacts on parental employment are smaller in January 2021 but similar in May 2020.

Our empirical strategy relies on two critical assumptions. First, the common trend assumption states that in the absence of school reopenings, the labour market trends of parents living in $S_1$, $S_2$ or Southern Ontario would have evolved in parallel. In other words, the break in the year-over-year changes and month-to-month changes in May 2020 and January 2021 labour force participation would have been parallel in the absence of treatment. Second, individuals could not self-select into or out of the treatment group (no selection based on province-specific transitory shocks or parental group). Clearly, households could not self-select into being a parent of younger or older children with such short notice. Also, in the context of the pandemic, borders between provinces were closed during the spring, which almost made it impossible to relocate during that period. In the fall, schools were firmly reopened across the country as of September, which greatly reduces the threat of parents moving to ensure the proper schooling of their children. Finally, the epidemiological situation kept evolving during the pandemic across the country, making it almost impossible to predict where in the country schooling was less likely to be uninterrupted.

To provide evidence of the common trend assumption, we first look at the trends among parents of primary-school children, and look at fathers and mothers separately (figure 1). In figure 1, we observe that, during the three years prior to the pandemic, the employment rates of parents in dual-parent households were fairly stable across all three regions but somewhat higher for mothers of primary-school children in Quebec. For single-parent households, there is more noise given the smaller sample size, especially for single fathers, but the confidence intervals tend to overlap throughout the period, up until March 2020. Between January 2017 and February 2020, a similar portrait is observed among parents of high-school children as well. Together, these figures suggest that the common trend assumption is likely to be met. Similar findings are observed for parents of high-school children (figure 2), but it also shows that month-to-month variations in the spring of 2020, before the treatment, were comparable within regions. If we focus, for example, on Quebec, we observe that the drop in employment is stronger than elsewhere, both for parents of high-school children and parents of primary-school children. The addition of the high-school group allows us to control for differences in month-to-month variations within regions.

We also formally test the common trend assumption for our outcome variable being employed (at work or not) (table 3). We test the parallel trends between January 2017 and February 2020 (columns 1, 2, 5 and 6), using data from the last 12 months pre-pandemic (columns 3, 4, 7 and 8). Time $t$ is measured monthly and set to 1 in January 2017, 2 in February 2017 and so on until February 2020. The term $S_1$ identifies Quebec outside of the GMA and $S_2$ identifies Southern Ontario. The parameters of interest here are the coefficients on the triple interactions, $S_1 \times P \times t$ and
TABLE 3
Testing the common trend assumption for the triple-differences model

|                          | Fathers |                          | Mothers |                          |                      |                      |
|--------------------------|---------|--------------------------|---------|--------------------------|----------------------|----------------------|
|                          | All months pre-pandemic | Last 12 months | All months pre-pandemic | Last 12 months |                      |                      |
|                          | Dual parent (1)  | Single parent (2) | Dual parent (3)  | Single parent (4) | Dual parent (5)  | Single parent (6) |
| $S_1 \times P \times t$  | -0.0006  | 0.0112                  | 0.0006  | -0.0144                  | -0.0011  | 0.0028*                |
|                          | (0.0006) | (0.0025)                | (0.0018) | (0.0148)                  | (0.0008) | (0.0014)                |
| $S_3 \times P \times t$  | -0.0001  | -0.0051*                | -0.0035 | 0.0022                    | -0.0003  | -0.0004                |
|                          | (0.0005) | (0.0027)                | (0.0032) | (0.0134)                  | (0.0009) | (0.0024)                |
| $P \times t$             | -0.0006* | -0.0004                 | -0.0024 | -0.0076                  | 0.0002   | -0.0006                |
|                          | (0.0004) | (0.0021)                | (0.0015) | (0.0065)                  | (0.0003) | (0.0010)                |
| $S_1 \times P$           | 0.0293   | 0.0222                  | -0.0138 | 0.5000                    | 0.0678*** | 0.00625                |
|                          | (0.0195) | (0.0555)                | (0.0577) | (0.4900)                  | (0.0197) | (0.0372)                |
| $S_3 \times P$           | 0.0104   | 0.1470***               | 0.1220  | -0.0629                  | 0.0087   | 0.0676*                |
|                          | (0.0128) | (0.0581)                | (0.0986) | (0.4260)                  | (0.0243) | (0.0345)                |
| $S_1 \times t$           | 0.0005   | -0.0026                 | -0.0010 | 0.0150                    | 0.0000   | -0.0007                |
|                          | (0.0008) | (0.0019)                | (0.0017) | (0.0130)                  | (0.0005) | (0.0009)                |
| $S_3 \times t$           | -0.0002  | 0.0033                  | 0.0027  | 0.0136*                   | 0.0000   | 0.0004                 |
|                          | (0.0006) | (0.0021)                | (0.0021) | (0.0072)                  | (0.0006) | (0.0012)                |
| $P$                      | 0.0078   | -0.0219                 | 0.0639  | 0.2150                    | -0.0856*** | -0.0765***            |
|                          | (0.0110) | (0.0441)                | (0.0476) | (0.1930)                  | (0.0120) | (0.0203)                |
| $S_1$                    | -0.0089  | 0.0665**                | 0.0399  | -0.4810                   | 0.0633*** | 0.0725***              |
|                          | (0.0247) | (0.0280)                | (0.0523) | (0.4640)                  | (0.0107) | (0.0157)                |
| $S_3$                    | 0.0000   | -0.0726                 | -0.0946 | -0.4206*                  | -0.0178  | -0.0880***             |
|                          | (0.0145) | (0.0477)                | (0.0625) | (0.2310)                  | (0.0113) | (0.0254)                |
| $t$                      | 0.0000   | 0.0005                  | -0.0044*** | -0.0082*            | -0.0002  | 0.0007                 |
|                          | (0.0005) | (0.0009)                | (0.0014) | (0.0046)                  | (0.0003) | (0.0008)                |

(continued)
|            | Fathers |                               | Mothers |                               |               |                               |               |                               |
|------------|---------|--------------------------------|---------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|
|            | All months pre-pandemic | Last 12 months pre-pandemic | All months pre-pandemic | Last 12 months pre-pandemic |               |                               |               |                               |
|            | Dual parent | Single parent | Dual parent | Single parent | Dual parent | Single parent | Dual parent | Single parent |
| Constant   | 0.9160*** | 0.8500*** | 1.0570*** | 1.1340*** | 0.8340*** | 0.7930*** | 0.9170*** | 1.0740*** |
|           | (0.0130) | (0.0229) | (0.0422) | (0.157) | (0.00849) | (0.0142) | (0.0689) | (0.0938) |
| $R^2$      | 0.001   | 0.006   | 0.007   | 0.017   | 0.014   | 0.015   | 0.016   | 0.023   |
| $N$        | 193,280 | 13,912  | 63,792  | 4,724   | 205,645 | 50,990  | 68,077  | 16,532  |

**NOTES:** Dependent variable is being employed. Each column reports the estimates from a separate regression. Columns (1), (2), (5) and (6) (all months pre-pandemic) include monthly data from January 2017 to February 2020, while the last 12 months pre-pandemic refer to March 2019 to February 2020, including the summer months. Standard errors clustered at the region level in parentheses. ***: p-value < 0.01; **: p-value < 0.05; *: p-value < 0.1.

**SOURCE:** Authors’ calculations using the Labour Force Survey
Because the coefficients on the triple-interaction terms with time \( t \) are essentially 0 (table 3), we do not reject the null hypothesis of parallel trends.\(^7\)

We are therefore confident that our DDD model identifies the impact of school reopenings on parental labour outcomes. Note that the labour market outcomes that we consider reflect combined effects on both labour supply and labour demand. However, we have no real reason to think that labour demand varied differently for parents of primary-school and of high-school children, so we see our DDD findings as representative of labour supply responses.

6. Results

In order to assess whether these descriptive figures lead to a significant impact on parents, we now turn to our DDD estimates. Table 4 presents the results for our three outcome variables: (i) whether the parent is employed and actually working (dummy variable, panels A1 and A2), (ii) whether the parent is employed and at work or is employed but absent from work (dummy variable, panels B1 and B2) and (iii) the number of actual hours worked at the main job (panels C1 and C2). Note that the actual number of hours worked can be equal to 0 if the parent is employed but absent from work. The top panels (A1, B1 and C1) present estimates from equation (1) for each of the three outcomes, while the bottom panels (A2, B2 and C2) present estimates from equation (2). There are four columns, one for each group: mothers in dual-parent households (column 1), single mothers (column 2), fathers in dual-parent households (column 3), and single fathers (column 4).\(^8\) We present only the coefficient(s) of interest \( (\beta_{DDD}) \), but in all specifications, we include all control variables specified in equations (1) and (2). As mentioned above, in dual-parent families, we additionally control for the occupation and age of the partner using occupation and age fixed effects, and in the case of panels C1 and C2 (in which the outcome variable is number of hours worked), we also control for the number of statutory holidays in the reference week.

From table 4, we observe that primary school reopenings had a positive impact on the employment of mothers and fathers in May 2020 \((\beta_{May}^{DDD})\): parents are more likely to be employed and at work when schools are open. Following school reopenings, mothers and fathers in dual-parent

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\(^7\) Results, not presented here, show that the common trend assumption also holds for our other two outcomes variables: employed (at work) and actual hours worked.

\(^8\) Note that single fathers are not as numerous as other categories \((N = 11,699\) over three years), so the results are not as reliable or precisely estimated, especially once we start looking into different subgroups.
TABLE 4
Triple-difference model

|                      | Mothers | Fathers |
|----------------------|---------|---------|
|                      | Dual (1) | Single (2) | Dual (3) | Single (4) |
| **Panel A1: Employed (at work)** |         |         |
| $\beta_{DDD}^{May}$   | 0.090*** | 0.218** | 0.098*** | 0.072 |
| $\beta_{DDD}^{Jan}$   | -0.074* | 0.166*** | -0.061 | -0.005 |
| $R^2$                | 0.143 | 0.132 | 0.059 | 0.144 |
| **Panel B1: Employed (at work or absent from work)** |         |         |
| $\beta_{DDD}^{May}$   | 0.051*** | 0.076 | 0.020 | 0.122 |
| $\beta_{DDD}^{Jan}$   | -0.035 | 0.165*** | -0.040 | -0.024 |
| $R^2$                | 0.058 | 0.086 | 0.058 | 0.146 |
| **Panel C1: Actual main hours** |         |         |
| $\beta_{DDD}^{May}$   | 1.745 | 8.420** | 3.222*** | 2.800 |
| $\beta_{DDD}^{Jan}$   | -1.953 | 7.291*** | -1.336 | 3.555 |
| $R^2$                | 0.147 | 0.140 | 0.075 | 0.148 |
| **Panel A2: Employed (at work)** |         |         |
| $\beta_{DDD}^{May,Jan}$ | -0.024 | 0.181*** | -0.011 | 0.037 |
| $\beta_{DDD}$        | (0.042) | (0.043)* | (0.038) | (0.086) |
| $R^2$                | 0.143 | 0.132 | 0.059 | 0.144 |
| **Panel B2: Employed (at work or absent from work)** |         |         |
| $\beta_{DDD}^{May,Jan}$ | -0.009 | 0.139*** | -0.021 | 0.055 |
| $\beta_{DDD}$        | (0.021) | (0.035)* | (0.017) | (0.067) |
| $R^2$                | 0.057 | 0.086 | 0.058 | 0.146 |
| **Panel C2: Actual main hours** |         |         |
| $\beta_{DDD}^{May,Jan}$ | -0.828 | 7.623*** | 0.098 | 3.149 |
| $\beta_{DDD}$        | (1.442) | (1.775)* | (1.342) | (3.066) |
| $R^2$                | 0.147 | 0.140 | 0.075 | 0.148 |
| $N$                  | 155,686 | 39,166 | 148,898 | 11,669 |

NOTES: Each panel and each row present the DDD coefficient(s) from a separate regression. The top panels (A1, B1 and C1) present estimates from equation (1) and the bottom panels (A2, B2 and C2) present estimates from equation (2). Data from January 2017 to January 2021 are included, but summer months are excluded (June, July and August). All regressions also include region, year-month, industry and occupation fixed effects as well as individual-level socioeconomic control variables. Standard errors clustered at the region level in parentheses. ***: p-value < 0.01; **: p-value < 0.05; *: p-value < 0.1, where p-values are corrected for multiple outcomes following Simes (1986). Superscript * marks a statistical difference between $\beta_{DDD}$ for mothers living in dual- vs. single-parent households at p-value < 0.01. None of the coefficients are statistically different for fathers. SOURCES: Authors’ calculations using the Labour Force Survey.
by 7.2 pp.\textsuperscript{9} Note that our results are likely to be lower bounds, given that even where schools reopened in May 2020, attendance was not mandatory and parents were allowed to keep their children at home. In practice, around 80% of eligible children were planning to return to school, but official statistics are not available.

In January, the impact is not as clear. Single mothers outside of Southern Ontario benefited from living in areas where schools remained open, as evidenced by their employment at work rate being higher by 16.6 pp. Parents in dual-parent households, however, did not seem to be negatively affected by schools closures in Southern Ontario.\textsuperscript{10} These closures were temporary in nature, which may have allowed parents in dual-parent households to adjust their work schedules to accommodate work and caring for young children.

The average effect across May and January reveals that single mothers were the main beneficiary of school reopenings with an average increase in employment (at work) rate of 18.1 pp, whereas the effect for other parents is virtually 0.\textsuperscript{11}

If we look at the employment status of parents (whether they are actually present at work or not), the effect is also positive but more modest. In May, we observe a gain of 5.1 pp and 2.0 pp for mothers and fathers, respectively, in dual-parent households and 7.6 pp and 12.2 pp for mothers and fathers, respectively, in single-parent households. However, only the impact on mothers in dual-parent households is significant. In May, it is highly possible that parents did not have the time to re-apply for jobs if they were permanently laid off only a few weeks before. Even if they did apply, hiring processes generally take more than just a few weeks. In January 2021, school reopenings seem to positively affect the employment rate of only single mothers (+16.5 pp). The average effect ($\beta_{May,Jan}^{DDD}$) also suggests that single mothers benefited most from school reopenings (+13.9 pp), while the impact was closer to 0 for other parents.

Looking at actual hours of work, we observe positive and statistically significant estimates of $\beta_{May}^{DDD}$ for single mothers and fathers in dual-parent households, of 8.4 hours for mothers and 3.2 hours for fathers. In January ($\beta_{Jan}^{DDD}$), only single mothers benefited from school reopenings; other parents appear to have been able to juggle both activities.

\textsuperscript{9} The $p$-value of testing the difference between the effect on mothers living in dual-parent versus single-parent households is 0.1047, suggesting that the difference is not significantly different from 0 at the usual 10% level but would be at the (unconventional) 11% level.

\textsuperscript{10} The $p$-value of testing the difference between the effect on mothers living in dual-parent versus single-parent households is lower than 0.01, suggesting that the difference is significantly different from 0 at any conventional significance level.

\textsuperscript{11} Again, the $p$-value of the difference between the effects on each family type suggests that the difference is significant.
In table 5, we test the robustness of our main results. First, to avoid confounding effects of changes in the labour supply of parents due to changes in the supply of childcare spaces during the pandemic, we also validate that our main results continue to hold if we exclude households with preschoolers (columns 3 and 4). Second, we test the robustness of our results to the inclusion of households with both primary-school and high-school children along with the primary school group (columns 5 and 6). (Note that columns 1 and 2 just reproduce results presented in table 4.)

Reassuringly, excluding households with preschoolers does not change our main results. At the same time, and as expected, including households with both primary-school and high-school children along with other parents of primary-school children does change our results. The impact is smaller in May 2020 in dual-parent households (but similar in single-parent households) and smaller in January 2021 in single-parent households. The presence of teenagers appears to have helped parents during the pandemic. Mothers in single-parent households may have been reluctant to return to work and have their teenager(s) in charge in May 2020 when school closures were expected to last until the fall, but more open to the idea when schools were closed only temporarily in January 2021.

Parents’ ability to work when schools are closed likely depends on whether their job allows them to work from home and whether they are considered essential workers.\textsuperscript{12} Whether the occupation can be performed from home or not is directly identified in the LFS in April, May and June 2020. Specifically, respondents were asked, in a series of pandemic-related questions, whether they usually work from home and whether they worked from home last week. From this last question, we calculated the weighted share of workers typically working from home for each occupation at the four-digit level and flagged occupations as “work from home possible – LFS classification” if the given occupation’s weighted share is above the median share. We also imported the Dingel and Neiman (2020) classification of occupations that allow work from home. Specifically, we imported the roughly 1,000 O*NET SOC codes and the corresponding indicator variable of working from home\textsuperscript{13} and calculated the

\textsuperscript{12} As shown in table A2, parental occupation is segregated by gender. We observe that women constitute a large fraction of essential workers, in line with Blau et al. (2020). We do not have enough observations in, for example, May 2020 outside of the GMA in Quebec for mothers in a given occupation to identify the impact of reopening schools by occupation. Excluding occupation fixed effects does not change our results.

\textsuperscript{13} The data are available from https://bfi.uchicago.edu/working-paper/how-many-jobs-can-be-done-at-home/. The Standard Occupational Classification (SOC) codes, used in Dingel and Neiman (2020) and in the United States in general, are mapped to the Canadian National Occupational Classification (NOC) codes following a crosswalk developed by Marc Frenette at Statistics Canada.
TABLE 5
Robustness checks to the triple-difference model

|                | Benchmark | Excluding households with preschoolers | Including households with both primary and high-school kids but no preschoolers |
|----------------|-----------|-----------------------------------------|--------------------------------------------------------------------------------|
|                | Dual (1)  | Single (2)                              | Dual (3)                                                                       | Single (4)                                                                 | Dual (5)                      | Single (6)                              |
| **Panel A: Mothers** |           |                                          |                                                                            |                                                                              |                             |                                        |
| Employed (at work)  |           |                                          |                                                                            |                                                                              |                             |                                        |
| $\beta_{DDD}^{May}$ | 0.090***  | 0.218**                                 | 0.103*                                                                     | 0.219***                                                                    | 0.062                       | 0.250***                                |
| ($0.034$)          | ($0.089$) | ($0.055$)                                | ($0.081$)                                                                  | ($0.040$)                                                                   | ($0.071$)                    |                                        |
| $\beta_{Jan}^{DDD}$ | $-0.074^*$           | 0.166***                               | $-0.080^*$                                                                 | 0.121*                                                                      | $-0.052$                    | 0.061                                    |
| ($0.037$)          | ($0.046$) | ($0.053$)                                | ($0.062$)                                                                  | ($0.045$)                                                                   | ($0.048$)                    |                                        |
| $R^2$             | 0.143     | 0.132                                   | 0.068                                                                      | 0.089                                                                       | 0.067                       | 0.088                                    |
| Employed (at work or absent from work) |           |                                          |                                                                            |                                                                              |                             |                                        |
| $\beta_{DDD}^{May}$ | 0.051***  | 0.076                                   | 0.060*                                                                     | 0.088                                                                       | 0.030                       | 0.112**                                  |
| ($0.018$)          | ($0.058$) | ($0.032$)                                | ($0.060$)                                                                  | ($0.027$)                                                                   | ($0.049$)                    |                                        |
| $\beta_{Jan}^{DDD}$ | $-0.035$          | 0.165***                               | $-0.038$                                                                   | 0.124**                                                                     | $-0.025$                    | 0.070                                    |
| ($0.021$)          | ($0.051$) | ($0.030$)                                | ($0.049$)                                                                  | ($0.027$)                                                                   | ($0.046$)                    |                                        |
| $R^2$             | 0.058     | 0.086                                   | 0.057                                                                      | 0.083                                                                       | 0.055                       | 0.084                                    |
| Actual main hours  |           |                                          |                                                                            |                                                                              |                             |                                        |
| $\beta_{DDD}^{May}$ | 1.745     | 8.420**                                 | 2.037                                                                      | 7.894***                                                                    | 3.918**                     | 5.541**                                  |
| ($1.116$)          | ($3.709$) | ($1.614$)                                | ($3.483$)                                                                  | ($1.771$)                                                                   | ($2.196$)                    |                                        |
| $\beta_{Jan}^{DDD}$ | $-1.953$          | 7.291***                               | $-2.201$                                                                   | 5.016**                                                                     | $-0.918$                    | 4.735                                    |
| ($1.660$)          | ($2.097$) | ($2.293$)                                | ($2.399$)                                                                  | ($1.993$)                                                                   | ($4.220$)                    |                                        |
| $R^2$             | 0.147     | 0.140                                   | 0.104                                                                      | 0.112                                                                       | 0.105                       | 0.114                                    |
| $N$               | 155,686   | 39,166                                  | 116,207                                                                    | 34,067                                                                      | 153,713                     | 41,929                                   |
| **Panel B: Fathers** |           |                                          |                                                                            |                                                                              |                             |                                        |
| Employed (at work)  |           |                                          |                                                                            |                                                                              |                             |                                        |
| $\beta_{DDD}^{May}$ | 0.098***  | 0.072                                   | 0.073***                                                                   | 0.052                                                                       | 0.023                       | 0.006                                    |
| ($0.025$)          | ($0.101$) | ($0.025$)                                | ($0.111$)                                                                  | ($0.024$)                                                                   | ($0.094$)                    |                                        |
| $\beta_{Jan}^{DDD}$ | $-0.0611$           | $-0.005$                               | $-0.0750^*$                                                                | $-0.0458$                                                                   | $-0.066^*$                   | $-0.022$                                  |
| ($0.039$)          | ($0.106$) | ($0.039$)                                | ($0.116$)                                                                  | ($0.033$)                                                                   | ($0.107$)                    |                                        |
| $R^2$             | 0.059     | 0.144                                   | 0.057                                                                      | 0.153                                                                       | 0.055                       | 0.139                                    |
| Employed (at work or absent from work) |           |                                          |                                                                            |                                                                              |                             |                                        |
| $\beta_{DDD}^{May}$ | 0.020     | 0.122                                   | $-0.004$                                                                   | 0.105                                                                       | $-0.013$                    | 0.035                                    |
| ($0.027$)          | ($0.106$) | ($0.029$)                                | ($0.110$)                                                                  | ($0.023$)                                                                   | ($0.098$)                    |                                        |
| $\beta_{Jan}^{DDD}$ | $-0.040$          | $-0.024$                               | $-0.024$                                                                   | $-0.053$                                                                    | $-0.043^*$                   | $-0.020$                                 |
| ($0.017$)          | ($0.063$) | ($0.024$)                                | ($0.067$)                                                                  | ($0.018$)                                                                   | ($0.062$)                    |                                        |
| $R^2$             | 0.058     | 0.146                                   | 0.053                                                                      | 0.153                                                                       | 0.050                       | 0.139                                    |
| Actual main hours  |           |                                          |                                                                            |                                                                              |                             |                                        |
| $\beta_{DDD}^{May}$ | 3.222***  | 2.800                                   | 1.697                                                                      | 2.453                                                                       | 0.704                       | 0.334                                    |
| ($1.010$)          | ($3.641$) | ($1.494$)                                | ($4.024$)                                                                  | ($0.865$)                                                                   | ($3.164$)                    |                                        |
| $\beta_{Jan}^{DDD}$ | $-1.336$          | 3.555                                  | $-2.657$                                                                   | 6.607                                                                       | $-2.905^*$                   | 1.902                                    |
| ($1.493$)          | ($5.913$) | ($1.660$)                                | ($6.867$)                                                                  | ($1.425$)                                                                   | ($7.298$)                    |                                        |
| $R^2$             | 0.075     | 0.148                                   | 0.073                                                                      | 0.155                                                                       | 0.075                       | 0.141                                    |
| $N$               | 148,898   | 11,669                                  | 109,597                                                                    | 10,539                                                                      | 146,056                     | 12,695                                   |

**NOTES:** Dependent variable is being employed (at work), employed (at work or absent from work) and actual main hours worked. Benchmark refers to results in table 4. Regressions also include region, year–month, industry and occupation fixed effects as well as individual-level socioeconomic control variables. Standard errors clustered at the region level in parentheses. ***: $p$-value < 0.01; **: $p$-value < 0.05; *: $p$-value < 0.1, where $p$-values are corrected for multiple outcomes following Simes (1986).

**SOURCE:** Authors’ calculations using the Labour Force Survey.
weighted share of workers in occupations working from home for each occupation at the four-digit level. We flagged occupations as “work from home possible – Dingel and Neiman classification” if the given occupation’s weighted share is above the median share. The correlation coefficient between the two measures, at the four-digit occupation level, is 0.5793.

Table 6 presents these results for the DDD model while dividing parents according to their ability to work from home using the Dingel and Neiman classification or the LFS classification. First, if we focus on May 2020, we find that, generally, parents holding jobs that could be done from home did

|                         | Mothers |                  | Fathers |                  |
|-------------------------|---------|------------------|---------|------------------|
|                         | Dual    | Single           | Dual    | Single           |
| **Panel A: Work from home possible – LFS classification** |         |                  |         |                  |
| $\beta_{DDD \text{ May}}$ | 0.044   | 0.206            | -0.034  | 0.015            |
| $\beta_{DDD \text{ Jan}}$ | -0.105** | 0.104          | -0.073** | -0.168*          |
| N                       | 64,600  | 13,466           | 43,747  | 2,967            |
| $R^2$                   | 0.014   | 0.124            | 0.061   | 0.256            |
| **Panel B: Work from home possible – Dingel and Neiman** |         |                  |         |                  |
| $\beta_{DDD \text{ May}}$ | 0.046   | 0.248            | 0.065*  | 0.156            |
| $\beta_{DDD \text{ Jan}}$ | -0.135*** | 0.116          | -0.020  | -0.157*          |
| N                       | 79,799  | 17,443           | 50,835  | 3,648            |
| $R^2$                   | 0.014   | 0.135            | 0.056   | 0.209            |
| **Panel C: Work from home NOT possible – LFS classification** |         |                  |         |                  |
| $\beta_{DDD \text{ May}}$ | 0.123*** | 0.194*           | 0.159*** | 0.0458           |
| $\beta_{DDD \text{ Jan}}$ | -0.018  | 0.228***         | -0.045  | 0.039            |
| N                       | 90,951  | 25,668           | 104,895 | 8,688            |
| $R^2$                   | 0.016   | 0.162            | 0.067   | 0.164            |
| **Panel D: Work from home NOT possible – Dingel and Neiman** |         |                  |         |                  |
| $\beta_{DDD \text{ May}}$ | 0.141*** | 0.177           | 0.128*** | 0.053            |
| $\beta_{DDD \text{ Jan}}$ | 0.057   | 0.216**          | -0.089  | 0.108            |
| N                       | 71,632  | 21,103           | 96,683  | 7,926            |
| $R^2$                   | 0.015   | 0.156            | 0.069   | 0.170            |

**NOTES:** Dependent variable is being employed (at work). LFS classification refers to a binary measure computed using the May LFS supplementary COVID-19 variables (see text for details). Dingel and Neiman classification refers to the measure based on O*NET computed in Dingel and Neiman (2020). Regressions also include region, year–month, industry and occupation fixed effects as well as individual-level socioeconomic control variables. Standard errors clustered at the region level in parentheses. ***, p-value < 0.01; **, p-value < 0.05; *, p-value < 0.1, where p-values are corrected for multiple outcomes following Simes (1986).

**SOURCE:** Authors’ calculations using the Labour Force Survey
not benefit from school reopenings: $\beta^{DDD}_{May}$ is generally not statistically different from 0. However, parents holding jobs that could not be done from home appear to have benefited. Mothers and fathers in dual-parent households holding a job that could not be performed from home experienced increases in their employment rates because of school reopenings of 12.3 pp to 14.1 pp and 12.8 pp to 15.9 pp, respectively. The effect on single mothers is significant only using the LFS measure and suggests a 19.4 pp increase in employment rate. The number of observations in single-parent households is smaller to start with, and even more so when we subdivide by occupation type, leading to large standard errors. It is therefore difficult to infer the impact by type of job for these households.

Estimates using January 2021, presented in table 6, are somewhat surprising. For parents in dual-parent households able to work from home, $\beta^{DDD}_{Jan}$ is negative and significant. This suggest that parents in Southern Ontario were able to raise their employment-at-work rates in January relative to parents elsewhere in the country despite the fact that primary schools were closed. For parents unable to work from home, the coefficient is generally not statistically different from 0, except, again, for single mothers. Single mothers of primary-school children unable to work from home seem to have been able to work more in parts of the country where schools were open (21.6 pp to 22.8 pp).

In summary, we find that school reopenings in May 2020 helped parents return to work. Many parents stopped being employed and at work during the pandemic, some remained employed but absent from work, while others became unemployed. School reopenings helped parents regain their employment status and/or return to work. In January 2021, the main beneficiaries of schools being open were single mothers. The impact of school reopenings is largest on single mothers, yet, because they were more severely affected to start with, they still have not fully recovered (see figure 1).

7. Conclusion

Our goal was to understand the role of school reopenings on labour market outcomes for parents, and indirectly understand the impact of school closures on parental work. Using a triple-difference model, we find that school reopenings clearly contributed to parents’ return to work, especially in May 2020. Our main result is that reopening schools helped single mothers return to work and regain some of the losses experienced during the pandemic. But it also helped parents in dual-parent households in the spring of 2020.

More specifically, our results show that more parents were employed and working once schools reopened in May 2020, and their hours of work also increased. The share of single mothers being employed and at work increased by 21.8 pp in May 2020, while it increased by 9.0 pp and 9.8 pp, respectively, for mothers and fathers in dual-parent households. We found limited evidence that school reopenings in May helped change parental employment status (irrespective of whether the person was at work or absent from work), but
schools had been reopened for only a month in May 2020. While returning to work for parents who were absent from work is fairly simple and can be achieved within the first month of school reopenings, finding a new job for parents who lost their job and did not know when schools would reliably reopen may take more time. Figure A1 indeed shows that, by the fall, when primary schools were open everywhere, parental employment had almost returned to pre-pandemic levels. In January 2021, regions that maintained schools opened helped single mothers stay employed (+16.5 pp) and increase their hours of work (+7.3 hours per week).

School reopenings should not be based solely on the impact they have on parents’ ability to work and to secure their family’s financial situation. When thinking about whether to keep schools open, we need to factor in the well-being of parents and children, and also the well-being of adults in the school system. As mentioned above, the literature suggests that school closures are likely to have important consequences on the perseverance and academic achievements of students. Two recent studies using administrative data clearly show that school closures during the pandemic increased inequalities in academic achievement (Maldonado and De Witte 2020, Engzell et al. 2021). Many have also argued that school closures likely had an impact on the physical and mental well-being of vulnerable children (Nemer et al. 2020).

Accounting for the risk of transmission when reopening schools is also important. While studies across many countries show that pre-pubescent children are less likely to suffer complications from the illness and may be less likely to transmit the virus relative to adults, evidence on the latter is still limited and may change as the virus mutates (Nemer et al. 2020, Merckx et al. 2020). Reopening schools may have also increased the transmission between adults because adults started to interact more with other adults through the course of their day, at work or in public transport. While these risks need to be accounted for, they are not singularly different from the risks faced by many other workers who kept working in order to maintain essential services. Finally, social distancing measures, wearing a mask, washing hands and other public health measures can help reduce the risks of transmission and help maintain schools open.

During our observation period, it has become clear that reopening schools is not entirely without risk, but keeping schools closed is not risk free either. Our results show that keeping schools open for in-person learning is essential to parents’ labour force participation, while others, cited above, have shown that school closures negatively affect the academic achievement of children and their long-term labour market outcomes, and this is especially true for vulnerable children. Given these results, it appears that schools should be considered an essential service for children and their parents.
FIGURE A1 Fraction of parents with primary-school children employed by region over time

NOTES: Y-axis shows the monthly fraction of parents employed (at work or absent from work). All parents are included, not just those active on the labour market. Summer months are exceptionally included, and employment rates are seasonally adjusted over 12 months. The markers are hollow when schools are open and full when schools are closed (during the summer or because of the pandemic). Vertical bars denote 95% confidence intervals. Arrows and red dots indicate observations in May 2020 and January 2021. ROC = Rest of Canada.

SOURCE: Authors’ calculations using the Labour Force Survey. [Color figure can be viewed at wileyonlinelibrary.com]
FIGURE A2  Fraction of parents with high-school children employed by region over time
NOTES: Y-axis shows the monthly fraction of mothers employed (at work or absent from work). All parents are included, not just those active on the labour market. Summer months are exceptionally included, and employment rates are seasonally adjusted over 12 months. The markers are hollow when schools are open and full when schools are closed (during the summer or because of the pandemic). Vertical bars denote 95% confidence intervals. Arrows and red dots indicate observations in May 2020 and January 2021. ROC = Rest of Canada.
SOURCE: Authors’ calculations using the Labour Force Survey. [Color figure can be viewed at wileyonlinelibrary.com]
### TABLE A1
Distribution by industry

| Industry                                      | Fathers | Mothers | Fathers | Mothers |
|-----------------------------------------------|---------|---------|---------|---------|
| Children 6–12 in the household                |         |         |         |         |
| Agriculture, forestry, fishing and hunting     | 0.021   | 0.008   | 0.025   | 0.012   |
| Mining, quarrying, and oil and gas extraction | 0.032   | 0.007   | 0.028   | 0.005   |
| Utilities                                     | 0.014   | 0.005   | 0.014   | 0.004   |
| Construction                                  | 0.138   | 0.022   | 0.134   | 0.022   |
| Manufacturing                                 | 0.133   | 0.052   | 0.153   | 0.063   |
| Wholesale trade                               | 0.049   | 0.026   | 0.058   | 0.028   |
| Retail trade                                  | 0.070   | 0.088   | 0.070   | 0.098   |
| Transportation and warehousing                | 0.077   | 0.026   | 0.088   | 0.029   |
| Information and cultural industries           | 0.024   | 0.014   | 0.019   | 0.014   |
| Finance and insurance                         | 0.047   | 0.059   | 0.041   | 0.057   |
| Real estate and rental and leasing            | 0.017   | 0.017   | 0.019   | 0.019   |
| Professional, scientific and technical services| 0.102  | 0.074   | 0.091   | 0.067   |
| Administrative and support, waste             | 0.035   | 0.036   | 0.034   | 0.040   |
| Educational services                          | 0.051   | 0.139   | 0.049   | 0.128   |
| Health care and social assistance             | 0.048   | 0.252   | 0.044   | 0.242   |
| Arts, entertainment and recreation            | 0.013   | 0.017   | 0.012   | 0.014   |
| Accommodation and food services               | 0.031   | 0.048   | 0.025   | 0.048   |
| Other services (except public administration) | 0.033   | 0.044   | 0.036   | 0.047   |
| Public administration                         | 0.065   | 0.066   | 0.061   | 0.061   |

**SOURCE:** Authors’ calculations using the Labour Force Survey
### TABLE A2
Distribution of parental occupations

| Occupation                                                                 | Children 6–12 in the household | Children 13–17 in the household |
|--------------------------------------------------------------------------|--------------------------------|---------------------------------|
|                                                                          | Fathers | Mothers | Fathers | Mothers | Fathers | Mothers |
| Senior management occupations                                            | 0.005   | 0.002   | 0.007   | 0.003   |
| Specialized middle management occupations                                 | 0.046   | 0.037   | 0.048   | 0.043   |
| Middle management occupations in retail and wholesale trade and customer services | 0.037   | 0.023   | 0.045   | 0.028   |
| Middle management occupations in trades, transportation, production and utilities | 0.050   | 0.010   | 0.059   | 0.011   |
| Professional occupations in business and finance                          | 0.041   | 0.056   | 0.038   | 0.047   |
| Administrative and financial supervisors and administrative occupations    | 0.026   | 0.083   | 0.023   | 0.093   |
| Finance, insurance and related business administrative occupations         | 0.005   | 0.022   | 0.006   | 0.026   |
| Office support occupations                                                | 0.006   | 0.061   | 0.005   | 0.067   |
| Distribution, tracking and scheduling                                      | 0.016   | 0.012   | 0.020   | 0.013   |
| Professional occupations in natural and applied sciences                   | 0.095   | 0.029   | 0.072   | 0.022   |
| Technical occupations related to natural and applied sciences              | 0.056   | 0.018   | 0.054   | 0.015   |
| Professional occupations in nursing                                       | 0.004   | 0.040   | 0.003   | 0.038   |
| Professional occupations in health (except nursing)                       | 0.015   | 0.028   | 0.014   | 0.022   |
| Technical occupations in health                                           | 0.009   | 0.040   | 0.008   | 0.034   |
| Assisting occupations in support of health services                       | 0.005   | 0.035   | 0.004   | 0.037   |
| Professional occupations in education services                            | 0.033   | 0.087   | 0.03    | 0.069   |
| Professional occupations in law and social, community and government services | 0.023   | 0.044   | 0.021   | 0.034   |
| Paraprofessional occupations in legal, social, community and education services | 0.006   | 0.060   | 0.004   | 0.054   |
| Occupations in front-line public protection services                      | 0.017   | 0.004   | 0.015   | 0.003   |
| Care providers and educational, legal and public protection support occupations | 0.005   | 0.028   | 0.004   | 0.031   |
| Professional occupations in art and culture                               | 0.007   | 0.011   | 0.006   | 0.011   |
| Technical occupations in art, culture, recreation and sport               | 0.013   | 0.018   | 0.009   | 0.011   |
| Retail sales supervisors and specialized sales occupations                | 0.035   | 0.034   | 0.038   | 0.039   |
| Service supervisors and specialized service occupations                   | 0.024   | 0.031   | 0.020   | 0.035   |
| Sales representatives and salespersons – wholesale and retail trade        | 0.029   | 0.028   | 0.033   | 0.033   |
| Service representatives and other customer and personal services occupations | 0.017   | 0.047   | 0.016   | 0.045   |
| Sales support occupations                                                 | 0.007   | 0.023   | 0.006   | 0.026   |
| Service support and other service occupations, n.e.c.                     | 0.021   | 0.038   | 0.027   | 0.048   |
| Industrial, electrical and construction trades                            | 0.101   | 0.005   | 0.096   | 0.004   |
| Maintenance and equipment operation trades                                | 0.064   | 0.003   | 0.071   | 0.004   |

(continued)
| Occupation                                                                 | Children 6–12 in the household | Children 13–17 in the household |
|---------------------------------------------------------------------------|--------------------------------|---------------------------------|
| Other installers, repairers and servicers and material handlers           | 0.018 0.005                    | 0.019 0.005                     |
| Transport and heavy equipment operation and related maintenance occupations| 0.061 0.006                    | 0.071 0.009                     |
| Trades helpers, construction labourers and related occupations            | 0.011 0.001                    | 0.010 0.001                     |
| Supervisors and technical occupations in natural resources, agriculture and related production | 0.018 0.002 | 0.018 0.003 |
| Workers in natural resources, agriculture and related production         | 0.006 0.003                    | 0.006 0.005                     |
| Harvesting, landscaping and natural resources labourers                  | 0.005 0.002                    | 0.005 0.001                     |
| Processing, manufacturing and utilities supervisors and central control operators | 0.019 0.004 | 0.025 0.005 |
| Processing and manufacturing machine operators and related production workers | 0.021 0.010 | 0.022 0.014 |
| Assemblers in manufacturing                                              | 0.014 0.004                    | 0.016 0.006                     |
| Labourers in processing, manufacturing and utilities                     | 0.006 0.006                    | 0.007 0.007                     |

**SOURCE:** Authors’ calculations using the Labour Force Survey
Supporting information

Supplementary material accompanies the online version of this article.

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