

Parenting and the gender gap in mental health: evidence from pandemic school closures*

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Abstract

This paper examines the impact of parenting on the mental health of mothers and fathers, and the mechanisms driving the effects we find. We exploit the exogenous variation in parenting responsibilities caused by school closures during the COVID-19 pandemic in England. Using a difference-in-difference design and longitudinal high-frequency data, we compare mental health changes among parents whose pre-teen children were prioritised to return to school in June 2020 to those whose similar-aged children were not. We find significant mental health effects of increased parenting demands on mothers, while fathers' mental health remains unaffected. The effects for mothers are comparable to those observed in life-altering events such as divorce. Exploring mechanisms, we find suggestive evidence that juggling childcare obligations alongside work may explain the differential effects between mothers and fathers. We further propose a measure of mental load, namely children's perceived difficulties, and show that mothers took on a larger share of this load, potentially contributing to the observed gender gap in mental health.

Keywords: Parenting, mental health, GHQ, school closures

JEL code: I14, I18, I31

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1 Introduction

Mental health is of considerable social and economic importance. Poor mental health is a major cause of disability, reduces economic activity and causes substantial public health costs (The Lancet Global Health, 2020). The mental health and well-being of parents is particularly significant because it spills over onto child well-being and development (Johnston et al., 2013; Moroni et al., 2024). Yet parents often have lower life satisfaction and experience higher levels of negative emotion than childless adults (Deaton and Stone, 2014; McLanahan and Adams, 1987; Nelson et al., 2014; Stanca, 2012). Importantly, recent evidence suggests that parenthood affects mothers’ well-being and mental health more adversely than fathers’ (e.g., Ahammer et al., 2023). However, it is difficult to identify the effect of parenting on mental health as selection into parenthood is not random.

Why parenting may affect mothers’ mental health more than fathers’ is not well understood. Mothers often take on a larger share of childcare and housework than fathers (Craig and Mullan, 2011; Guryan et al., 2008), and juggling these obligations, alongside work, may negatively affect their mental health (Ahammer et al., 2023). Even larger gender gaps have been found in the allocation of mental load, that is the burden of managing and planning the running of the household, and taking care of the emotional needs of family members. Even in couples who share household chores and childcare equally, most of the mental load of parenthood is borne by mothers (Damingier, 2019), and this could affect mothers’ mental health (Petts and Carlson, 2023). This paper investigates how parenting affects fathers’ and mothers’ mental health and studies both juggling of childcare with other obligations and the mental load of parenting as mechanisms of the results we find.

We identify parenting effects on fathers’ and mothers’ mental health by using exogenous variation in parenting demands among parents of pre-teen children, generated by temporary school closures in England during the Covid-19 pandemic.¹ School closures increased the amount of time parents spent with their children, and with it both the amount of childcare/homeschooling required and the mental load of organising the household and looking after the emotional wellbeing of its members. Following widespread school closures from late March 2020, schools in England reopened only partially in June 2020 to facilitate social distancing, with government guidance to prioritise schooling for the first two and the last grade in primary school (‘reception year’, ‘year 1’ and ‘year 6’) over other

¹See Hansen et al. (2024) for a similar use of school closures during the Covid-19 pandemic.

grades. Using longitudinal data collected at high frequency during the pandemic and a difference-in-difference design, we compare changes over time in the mental health of parents whose children were all prioritised to return to school in June 2020 with the mental health of parents with at least one child in the same age range who was not prioritised to return to school. Our main results use variation in school reopening, thus a *decrease* in parenting demands, to identify the effects of parenting. However, we show that results using school closures, thus an *increase* in parental demand, are symmetrical.

We find large contemporaneous intention-to-treat effects of school availability on mothers' mental health, measured through the General Health Questionnaire. The effect is similar in magnitude to the change in women's mental health in the two years leading up to divorce (Gardner and Oswald, 2006; Laporte and Windmeijer, 2005) and after a partner's job loss (Mendolia, 2014). In contrast, we find no effects on fathers' mental health. Results are robust to changes in the measures of mental health, model specification, estimation method, and data used. Having documented a gender gap in the mental health effects of parenting, we go on to study possible mechanisms.

First, we focus on the possibility that juggling childcare with other obligations differentially affected the mental health of mothers and fathers. We use the same variation in parenting demands and data as before to assess whether hours worked and hours spent doing housework changed with school availability. We find no effect of school availability on hours worked or housework for mothers or fathers, suggesting that juggling childcare with other obligations is a candidate mechanism for the mental health effect for mothers if they took on more childcare and homeschooling than fathers - something that has been suggested in the literature (Sevilla and Smith, 2020) but we cannot observe in our data. As Goldin (2022) puts it in relation to the pandemic more in general, *'employed women who were educating their children [...] were stressed because they were in the labor force, not because they left'*.

Second, we study mental load, particularly the load associated with managing household *feelings* ('emotional load'), as a potential mechanism for the gender gap in the mental health effect of parenting. We propose that the emotional load can be measured by parents' *perception* of their child's emotional and behavioral difficulties. Regardless of whether these perceptions are accurate, if parents perceive that their children are struggling, their emotional load increases, which in turn may

negatively affect their mental health. Uniquely, our data include measures of children’s emotional and behavioral needs, assessed separately by each parent using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997, 2001). We use these to estimate family fixed effect regressions separately for mothers and fathers, comparing the SDQ score of siblings who were prioritised for school and those who were not. This allows us to test whether school availability affects children’s emotional needs *as perceived by parents* and whether this effect differs between mothers and fathers. We also exploit the fact that, for a subsample, SDQ scores are reported by the children themselves. By comparing these self-reports with parents’ assessments, we can gauge how well parents understand their children’s emotional needs.

We find evidence suggesting that school availability is linked to children’s mental health when mothers are reporting, but not when fathers are. Family fixed effects help rule out the possibility that these results are driven by mental health spillovers from parents to children or reporting bias. Moreover, evidence from children’s own responses indicates that SDQ scores reported by mothers align more closely with children’s self-reports than those reported by fathers, suggesting that mothers were more accurately attuned to their children’s feelings. Taken together, our findings indicate that mothers dis-proportionally shoulder the emotional load of increased parenting demands, and this might have contributed to the deterioration of their own mental health.

Mental health effects of parenting might be particularly severe in a pandemic setting where parents had little chance to re-optimize to lessen the burden of parenting demands. For example, parents had no access to family and friends, childcare, and household services that would have made it easier to juggle work alongside other tasks. Also, pandemic school closures affected children’s mental health quite severely (Fancourt et al., 2021), potentially putting a larger-than-average emotional load on mothers. Of course, there are non-pandemic circumstances that may affect children’s and by extension, mothers’ mental health severely (e.g., a bully in school or a child’s sickness as in Breivik and Costa-Ramón, 2024). While the *size* of the mental health effect of parenting is therefore context-dependent, it is notable that fathers’ mental health was unaffected by shifts in parenting demands, even in the difficult pandemic context. This suggests that our evidence of a *gender gap* in the mental health effects of parenting is likely to extend to other contexts.

Our paper makes several important contributions. First, it adds to the only just emerging eco-

nomics literature on the parenthood penalty in mental health. Using prescription data from various European countries, and charting changes in mental health of first-time new parents over time, recent studies document mental health penalties for mothers (Dehos et al., 2024; Bearth, 2024) that exceed those experienced by fathers (Ahammer et al., 2023) in the first years of the child’s life. Our paper is for England, and our source of identification is not restricted to first-time new parents, but instead applies to both single- and multiple-child families. Our focus on parents of pre-teen age children provides the first evidence that the mental health effects of parenting falling on mothers extend far beyond the early years of a child’s life.² Moreover, we use validated measures of mental health from the General Health Questionnaire (GHQ-12) that unlike prescription data do not suffer from gender differences in help-seeking behavior and are not restricted to the most severe mental health issues.

Second, we make important progress in studying potential mechanisms driving the gender gap in mental health. Like Ahammer et al. (2023) we provide suggestive evidence that mothers’ mental health penalty may come from mothers having to juggle multiple tasks. Moreover, to our knowledge, this is the first economics paper to analyse the role of parental mental load, despite growing attention to the concept and its gendered consequences in both public discourse (Grose, 2021; Borresen, 2024) and sociological literature (Damingier, 2019; Dean et al., 2022; McLanahan and Adams, 1987). This literature distinguishes two types of mental load: ‘cognitive’, which involves managing household *activities*, through practical planning and problem solving, and ‘emotional’, which involves managing household *feelings*, to ensure that everyone feels emotionally supported (see: Dean et al., 2022). While work has been done to conceptualize cognitive load (Damingier, 2019), there is little guidance on how to empirically conceptualize emotional load. The cognitive and emotional aspects of mental load are difficult to separate, as addressing emotional needs requires recognizing and understanding them in the first place. Directly asking parents about their efforts to tune in to their family members’ emotional needs is prone to social desirability bias, which likely affects mothers and fathers differently, due to distinct societal expectations around their roles in child rearing. By comparing child mental health measures reported by mothers, fathers, and the children themselves, we make inroads into

²Papers investigating the mental health effects of pandemic school closures for parents of school-age children in the USA, Japan and Germany, though framed as pandemic studies, generally document larger effects of an increase in parenting demands on mothers’ mental health, if compared to fathers’, (Gupta et al., 2024; Huebener et al., 2021; Ito et al., 2023; Takaku and Yokoyama, 2021; Yamamura and Tsustsui, 2021), though in some cases with less reliable measures of mental health and identification strategies.

capturing the emotional aspect of parents’ mental load, thus helping to fill an important gap. These comparisons also provide a measure of mental load that, unlike direct parental reports of their worries for their children, is free from social desirability bias.

More broadly, our paper contributes to the literature examining the well-being effects of state support for families in the form of childcare. Previous work has focused on the role of childcare for child development (Blanden and Rabe, 2021; Duncan et al., 2023; Elango et al., 2015; Hotz and Wiswall, 2019) and maternal labor supply (Brewer et al., 2022; Duchini and Van Effenterre, 2022; Felfe et al., 2016). Only a handful of papers have considered the effect of offering free or subsidised childcare on measures of parental well-being, finding mixed results (Baker et al., 2008; Brodeur and Connolly, 2013; Herbst and Tekin, 2014; Schmitz, 2020). While most of these studies are concerned with the availability of childcare for pre-school age children, we are able to explore the effect of losing childcare for school-age children.

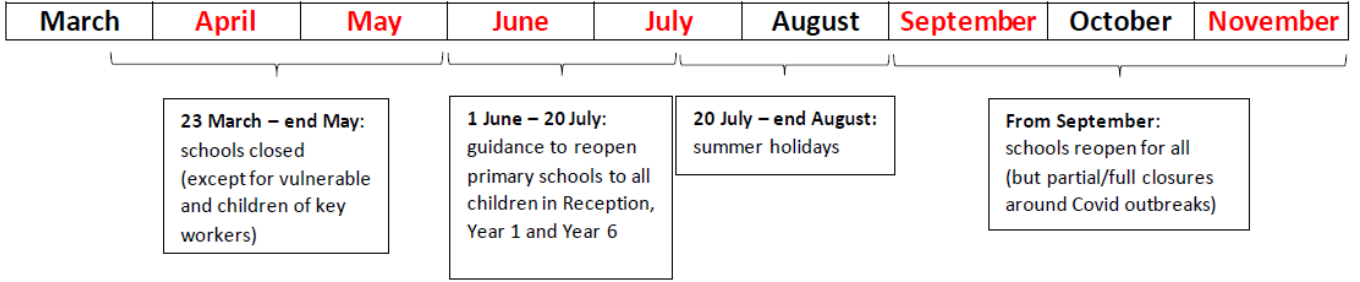
The paper proceeds as follows. Section 2 explains the institutional background of school closures in England. Section 3-5 each discuss data and methods used separately by Section. Section 3 explains the data and methods used to investigate the effect of a shift in parenting demands on parental mental health and presents the results. Sections 4 and 5 study possible mechanisms.

2 Institutional background

We use pandemic school closures as an exogenous shock that increased parenting demands for mothers and fathers. In England, closure of schools and pre-schools was announced on Wednesday 18th March 2020 and implemented from Monday 23rd March 2020. Children had to remain at home, and school-aged children were provided with distance learning resources by their schools. Children of essential workers and vulnerable children were allowed to attend school or nursery in person, but only around 2% of children did so during that initial lockdown (Department for Education, 2020). With schools and nurseries closed, the full responsibility of caring for and educating their children at home fell on families. Parents spent about two hours every day home-schooling primary school children (Del Bono et al., 2021) and also spent considerable time on childcare and housework (Andrew et al., 2022).

Figure 1 illustrates the timeline of school closures in 2020. Schools remained closed to most children between 23rd March 2020 and the end of May 2020. From 1st June 2020 until the end of

Figure 1: Timeline of school closures in 2020



Note: Months with Covid-19 Study waves are highlighted. Data collection was in the last week of the month.

the school year (around 20th July, with slight local variations), government guidelines recommended a full reopening of pre-schools and a partial reopening of schools. This partial reopening of schools, which was deemed necessary to facilitate social distancing in classrooms, created the variation we use to identify the effect of school availability on parents' mental health. Government guidance suggested that primary schools - which in England comprise a Reception Year and Years 1 to 6 - should prioritise children enrolled in Reception (age 4/5), Year 1 (age 5/6) and Year 6 (age 10/11) to return to school for that roughly seven-week period, and that children in these year groups should be able to return full-time, or close to it. We refer to children in these year groups as the 'priority group'.³

Note that schools were not penalised for departing from government guidance - indeed some schools offered face-to-face schooling to other year groups while others offered none - and school attendance was not compulsory for children during this period, meaning we do not expect full compliance.⁴ From the start of the next academic year (beginning in September 2020), schools reopened to all pupils as normal, with children in all year groups equally likely to be affected by any subsequent class, school and local-level lockdowns.

³Students in secondary school years 10 and 12 were also prioritised for a return to school, but only from 15th June and in many cases on a part-time basis only. We focus on younger children because arguably the parenting demands are higher for them.

⁴In Appendix A we show that government guidance was salient for both school access (i.e., children being offered to attend) and school attendance. Figure A1 shows that 72% of children in the priority group attended school at least once in June 2020, compared to 28% of children in the non-priority group, a difference of 44 percentage points. On the intensive margin, Figure A shows that children in the priority group attended school for around 78 hours in June 2020, on average, compared to only around 19 hours for children in the non-priority group.

3 Parent mental health

3.1 Data and sample

Our main data come from Understanding Society, the UK Household Longitudinal Study (UKHLS). We use two components of the study: for the main analysis we use the the Understanding Society COVID-19 study, for ancillary analysis we complement these data with data from the Understanding Society main survey. The Understanding Society main survey is a longitudinal, nationally representative, panel survey which started in 2009 and annually interviews participating households (University of Essex, Institute for Social and Economic Research, 2022). The Understanding Society COVID-19 study is a longitudinal survey set up in response to the Covid-19 pandemic (University of Essex, Institute for Social and Economic Research, 2021). Its sample comprises members of the Understanding Society main survey who, in April 2020, were 16 or older and were in households that had participated in at least one of the previous two waves of the Understanding Society main survey. Members of the COVID-19 study were interviewed monthly from April to July 2020 and bimonthly thereafter. The main interview mode was via the web, and the fieldwork took place roughly in the last week of each month.⁵

Our measure of parental mental health comes from the General Health Questionnaire (GHQ), a screening instrument for psychological distress that has been validated and extensively used in different settings.⁶ Understanding Society uses the GHQ-12 that consists of 12 questions, each assessing the severity of a mental problem using a 4-point scale. For example, one of the questions asked is: ‘Have you recently felt you couldn’t overcome your difficulties?’ with answer options being Not at all/same as usual/rather more than usual/much more than usual, coded as 0, 1, 2 or 3 respectively. Other questions touch on topics including sleep, worrying, enjoying day-to-day activities and feeling unhappy/depressed (see Appendix B for question wording of the 12 components of the

⁵Response rates were 42.1% in the first wave (April) and reduced to 28.6% by November, the last wave we use (Institute for Social and Economic Research, 2021). Our main results are unweighted as weights are not optimised for specific sub-samples and increase variance. We show in a robustness check that weighted results are very similar to unweighted ones.

⁶The GHQ-12 is often used in primary care settings to screen patients for non-psychotic and minor psychiatric disorders (for example, Banks and Jackson, 1982; Cooper et al., 1988; Picardi et al., 2000). It has been widely adopted by economists as a measure of mental health and well-being (Cornaglia et al., 2015; Clark et al., 2001; Gardner and Oswald, 2007, *inter alia*) including in the investigation of the impact of COVID-19 (Banks and Xu, 2020; Etheridge and Spantig, 2022; Proto and Quintana-Domeque, 2021; Davillas and Jones, 2021).

GHQ-12). The components of the GHQ are aggregated into a Likert score, obtained by summing scores across the 12 components of the GHQ to generate a total score ranging from 0 to 36, with higher scores indicating worse mental health. Alternatively, the Caseness measure counts the number of components for which the response score was 2 or 3 (more than usual, much more than usual), yielding a range from 0 to 12. This can be interpreted as the number of problems reported (Goodchild and Duncan-Jones, 1985). We use the Likert score as our main outcome and show results based on the Caseness measure and based on a measure of loneliness as a robustness check.

For our main estimates we focus on parents with children from the first primary school year, or ‘Reception year’, henceforth ‘R’ (age 4/5) to the first secondary school year, or Year 7 (age 11/12). We also restrict the sample to families living in England, as there was no equivalent to the partial school reopening by year group in other countries of the UK.

Figure A in Appendix A uses the main and COVID-19 studies to provide descriptive statistics of parents’ mental health before and during the pandemic. Mental health was worse in all the pandemic months in 2020 than in the same months in pre-pandemic years for both mothers and fathers. Mothers appear to suffer more, in line with the findings from other studies suggesting that women, and mothers especially, experienced a stronger fall in well-being than men - including fathers - in the early months of the pandemic (Banks and Xu, 2020; Cheng et al., 2021; Etheridge and Spantig, 2022; Huebener et al., 2021), but that this gender gap narrowed when children returned to school (Quintana-Domeque and Proto, 2022). Mental health improved in July and September of 2020, when restrictions were eased, and deteriorated once again in November 2020, when national restrictions on certain activities were re-imposed, and remained below pre-pandemic levels throughout 2020.

3.2 Methods

We estimate the effects of parenting demands on mental health by using school *reopening*, comparing parents’ mental health in April and May 2020 (when schools were closed for everybody) and in the subsequent months, when schools were reopened for some age groups first and then for everybody (see Figure 1). We estimate a difference-in-difference model where treatment is equal to one for parents whose children in school years R-7 were *all* in priority year groups in June and July 2020, and zero otherwise. We combine data from April and May 2020 when schools were closed as our

pre-treatment observations. Response rates vary across months, and we do not restrict the sample to individuals observed in every month. Our sample therefore varies by month, but in each month consists of roughly 200-300 treated mothers and 100-200 treated fathers whose children in year groups R-7 were all prioritised to return to school in June 2020, compared to 600-800 mothers and 300-500 fathers with at least one child in that age range that was not prioritised to return to school in June 2020 (our control group).

We estimate the following equation:

$$y_{it} = \alpha + \beta T_i + \sum_{t=1}^4 \gamma_t P_t + \sum_{t=1}^4 \delta_t P_t T_i + \phi \mathbf{X}_{it} + \epsilon_{it} \quad (1)$$

where y_{it} is mental health of parent i at time t with $t = \text{April-May, June, July, September or November 2020}$. T_i is equal to one if all of parent i 's children in school years R-7 were prioritised to return to school in June 2020, and zero otherwise. P_t with $t = \text{June, July, September or November 2020}$ are post-treatment time dummies, one for each post-treatment period (the omitted category being April-May 2020). $P_t T_i$ is the set of interactions between the time dummies and the treatment indicator. X_{it} are individual-level time-varying characteristics: interview date and presence of children younger than school age.⁷ Finally, α is an intercept, and ϵ_{it} is the error term.

The coefficients δ_t are our treatment effects of interest. For each time period, δ_t captures how the difference in mental health between treated parents ($T_i = 1$) and untreated parents ($T_i = 0$) compares with the difference in mental health between the same groups of parents in the pre-treatment period (April/May 2020). The treatment effect estimated for June reflects the contemporaneous effect of school availability (and hence parenting demands) on parents' mental health; the estimated treatment effects for July, September and November check whether these effects persisted during the school holidays and when schools reopened to all children.⁸ Note that because treatment is defined on government guidance, our estimates are intention-to-treat effects of potential exposure to full school reopening, and hence are likely to be conservative estimates of the impact of school being available.

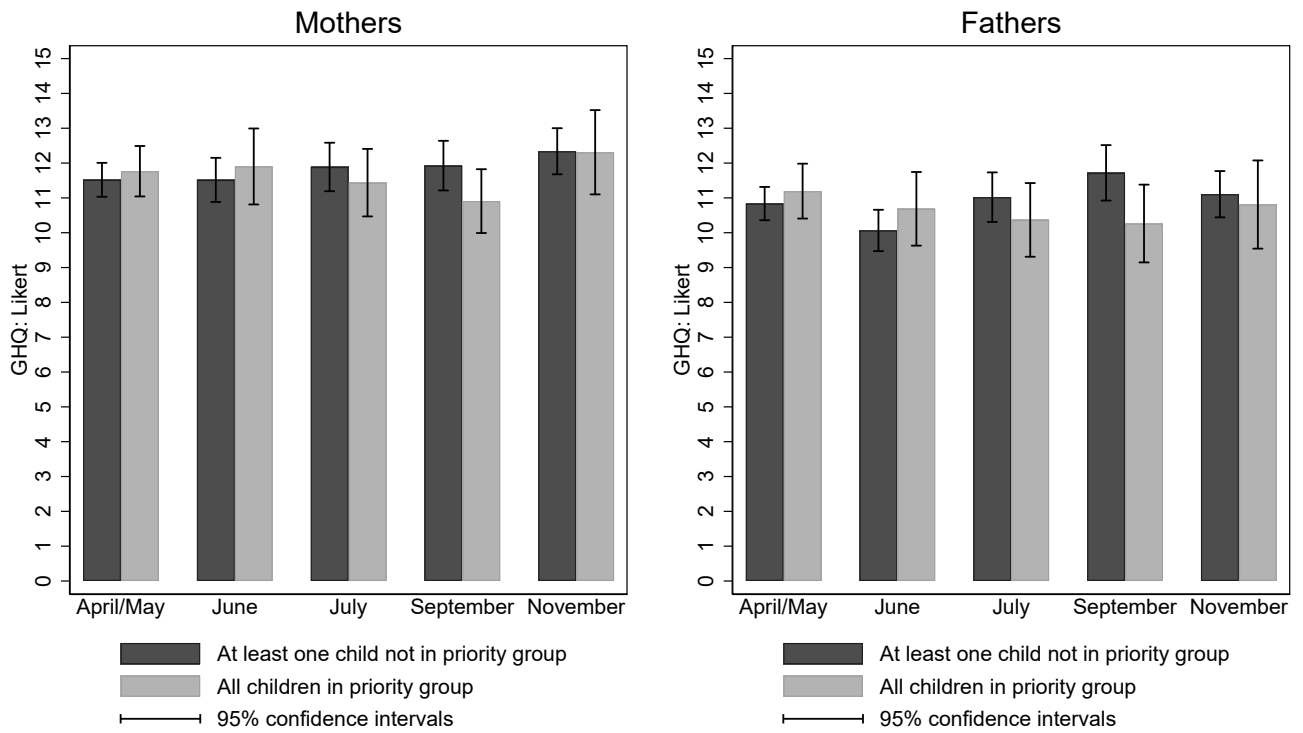
The identifying assumption is that the mental health outcomes of parents in the treatment and

⁷Note that most characteristics are fixed over the short time-period we consider. We do not control for time-varying characteristics that might plausibly have been affected by school closures or reopening, such as parents' employment status. Instead, we consider these as potential mechanisms.

⁸Strictly speaking, as the control group also regains access to school from September and enters treatment, the estimates for September and November illustrate that the difference compared to the control group vanishes.

control group follow the same trajectory in the absence of the treatment (parallel trends). In equation (1) the dummy T_i removes all the unobserved differences between the treatment and control group that do not vary over time. The usual check for time-varying differences is to look for evidence of similar pre-trends between the treatment and control group. To do so we compare trends between parents who, when observed in April/May, June, July, September or November of waves 9 and 10 of the Understanding Society main survey (relating to years 2017-2019), would have been in the treatment and control groups as per June 2020 government guidance.⁹

Figure 2: Pre-pandemic trends in mental health



Notes: UK Household Longitudinal Study (waves 9 and 10). The figure shows mean GHQ Likert scores and 95% confidence intervals by gender, hypothetical treatment status and month of interview. Sample of parents of children in school years R-7 living in England, observed in waves 9 and 10 but excluding data collected in 2020. Each calendar month contains a different sample (N mothers=2,467; N fathers=1,715).

Figure 2 compares average GHQ Likert scores for parents in England whose school-aged children in year groups R-7 were all in Reception, Year 1 or Year 6 (lighter bars) and parents with children in years R-7 who had at least one child in another school year group (darker bars) in the years

⁹Interviews for the main Understanding Society survey are spread throughout the year, so that each calendar month contains a different sample. We elected not to compare previous outcomes for the individuals in our sample (when their children were younger) as the identifying assumption would be unlikely to hold when comparing families with pre-school vs. school-age children, for example, which would differ systematically between our treatment and control groups.

immediately preceding the pandemic. It shows that the GHQ scores of mothers (left-hand panel) and fathers (right-hand panel) in our hypothetical treatment and control groups observed pre-pandemic are very similar and never statistically different from each other. Importantly, there is no evidence of any diverging trends or differences in seasonal patterns between the two groups.

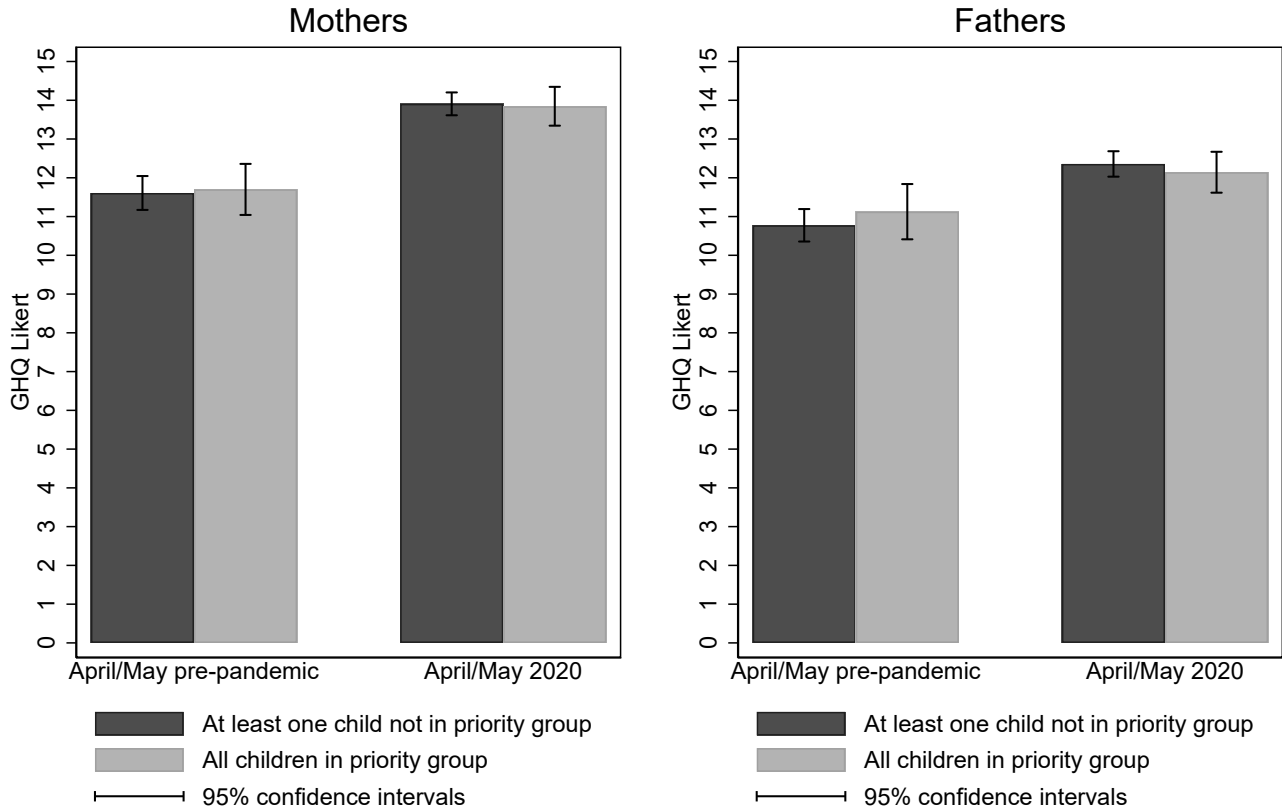
An alternative approach to assessing if mental health among treatment and control groups would have evolved similarly in the absence of the treatment is to check how the two groups reacted in the early Covid period when schools were closed for all age groups. Figure 3 demonstrates that parents' GHQ rose sharply in April and May 2020 compared to the same months in previous years. However, the change observed is very similar for mothers and fathers in the treatment (lighter bars) and control (darker bars) group providing support for the assumptions required by our identification strategy.

3.3 Results

Figure 4 presents the effects of a reduction in parenting demands through school reopening on parents' mental health in June, July, September and November 2020, estimated using equation (1). Mental health is measured using the GHQ Likert score, so lower scores indicate better mental health. The left panel of Figure 4 shows that school availability leads to better mental health for mothers: School reopening decreased mothers' GHQ score by 1.5 points in June (see Table A1 in Appendix A for coefficient estimates). The beneficial effect seen in June fades in July, when all children are at home for the school summer holidays (recall that interviews took place in the last week of July), and is no longer statistically different from zero. Point estimates decrease further and are very close to zero in September and November, when all year groups were back at school. This indicates that the effect of school reopening on maternal mental health did not persist over time. The results are robust to changes in the definition of treatment, estimation method, sample and measures of mental health (see: Appendix E). The right panel of Figure 4 shows that, in contrast to mothers, the reduction in parenting demands did not affect fathers' mental health. None of the estimated effects is statistically distinguishable from zero.

The decrease in parenting demands caused by school reopenings evidently affects mothers and fathers very differently: mental health effects of school availability fall exclusively on mothers. The

Figure 3: Trends in mental health in April and May 2020 compared to the same months pre-pandemic



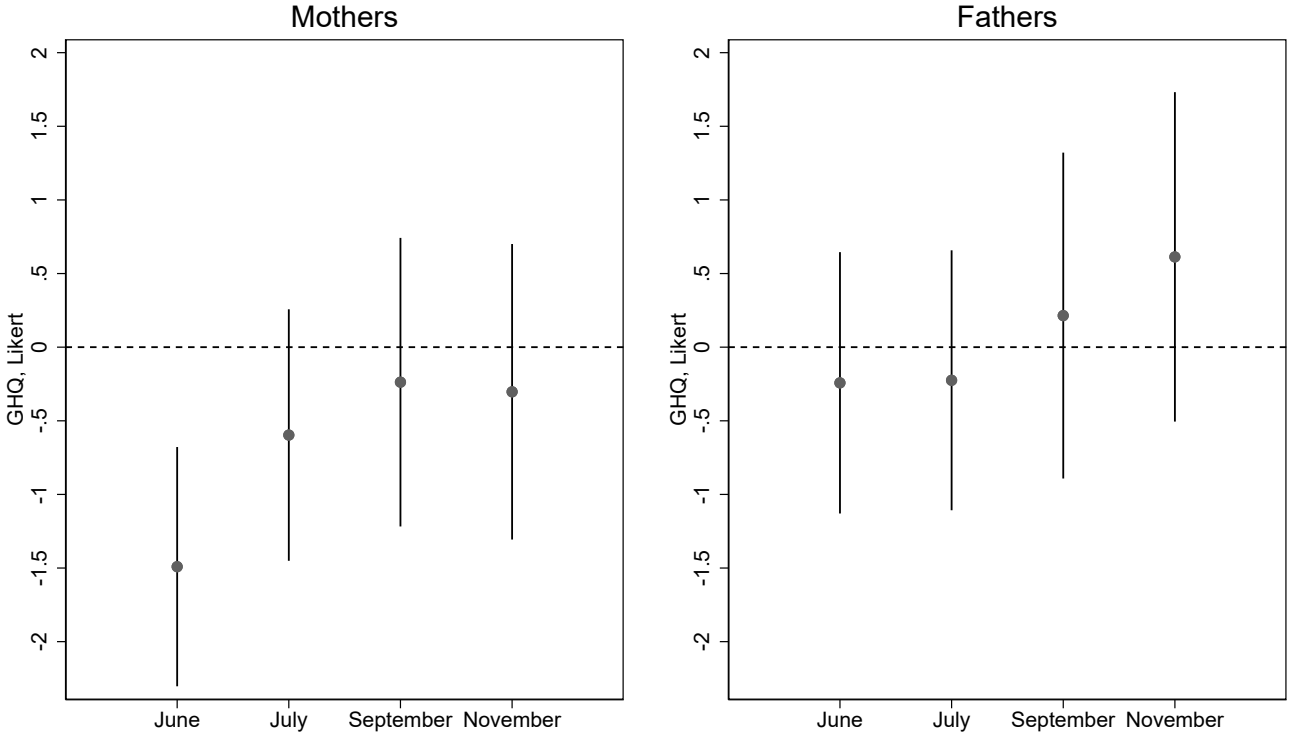
Notes: UK Household Longitudinal Study (waves 9 and 10) and COVID-19 Study. The figure shows mean GHQ Likert scores and 95% confidence intervals by gender for observations in April and May in waves 9 and 10 (excluding 2020), and April and May 2020. Sample of parents of children in school years R-7 living in England, observed in waves 9 and 10 but excluding data collected in 2020 for the pre-pandemic observations and for waves 1 and 2 of the Covid Survey. Each calendar month contains a different sample (N mothers pre pandemic=845, post pandemic=2100; N fathers pre pandemic=888, post pandemic = 1269).

effect is sizeable, equivalent to moving from feeling a problem such as being unhappy or depressed ‘much more than usual’ to somewhere between ‘rather more than usual’ and ‘no more than usual’. It amounts to around 12% of the average GHQ Likert score found for mothers in June in pre-pandemic years and is about two thirds the size of the total increase in mental health problems experienced by mothers in June 2020, compared to pre-pandemic levels (see Figure A). For comparison, women’s GHQ rises by a similar amount in the two years leading up to divorce (Gardner and Oswald, 2006; Laporte and Windmeijer, 2005) and after a partner’s job loss (Mendolia, 2014).¹⁰

While our main results leverage the decrease in parenting demands following school reopening,

¹⁰Mendolia (2014) use the GHQ Caseness measure and their results are equivalent to our results using that measure, presented in Appendix E.

Figure 4: Effects of school reopening on parents' mental health



Notes: Understanding Society COVID-19 study. The figure displays the coefficients and 95% confidence intervals estimated using equation (1), showing the effects of having all children in the family prioritised to return to school in June/July of 2020 on parents' GHQ Likert scores over time, by parent's gender. Difference-in-difference estimates with standard errors clustered at the individual level, controlling for interview date and presence of children younger than school age in the household. Sample of parents of children in school years R-7 living in England (N mothers=5,407; N fathers=3,295).

our conclusions are also generalisable to school closures and, more broadly, to the issue of school availability. In Appendix C we present symmetric results for mothers and fathers that leverage an increase (rather than decrease) in parenting demands through school closures (rather than reopenings), using pre-pandemic data. They show that mothers', but not fathers', mental health worsens when parenting demands increase. In Appendix D we also show that the results are not driven by parents with specific characteristics, as treatment effects estimated for mothers in June 2020 do not seem to vary significantly by individual-level characteristics, although we find suggestive evidence that the effects of school availability may be larger for mothers in low-income households.

4 Juggling tasks

We investigate the mechanisms behind our finding of a mental health penalty of parenting experienced by mothers but not fathers. We consider that mental health may be affected by having to juggle different tasks (housework and childcare obligations, often alongside work), and by the mental load associated with parenting. In this section we examine the extent to which juggling tasks may have contributed to the gap in mental health between mothers and fathers. To this end, we examine the effect of school availability on hours worked and hours spent doing housework. We do not have information on the time each parent spends on childcare in our data, preventing us from obtaining a complete picture of time use. However, the available information can help us narrow down potential mechanisms.

School availability and hours worked The mental health patterns we observe for mothers and fathers could have arisen because the lack of school availability may have forced mothers (and not fathers) to substitute work for childcare, with detrimental effects on mental health. In this case we would to see significant positive effects of school availability on hours worked in June 2020 (relative to April/May 2020) for mothers whose children were all eligible to return to school, and smaller or even null effects for fathers with the same characteristics. Alternatively, if parents did not substitute work for childcare, the challenges of balancing work, childcare and home-schooling as well as housework could have had a particularly detrimental effect on the mental health of mothers, particularly if they took on larger shares of these tasks. In this case we would see little or no effect of school availability on hours worked for both mothers and fathers whose children were all eligible to return to school. To test which of these hypotheses is more plausible, we use the Understanding Covid-19 survey and estimate the model in equation (1) with hours worked as dependent variable. Our measure of hours worked refers to the week before the interview; weekly hours worked of people not in employment (including those on furlough) is set to zero.

Figure 5 presents the effects of school reopening on mothers' and fathers' hours worked in June, July, September and November 2020, estimated using equation (1). We find no significant effects on hours worked for either mothers (left panel) or fathers (right panel), suggesting that juggling work with other tasks could help explain the gender difference in the mental health effects of parenting

Figure 5: Effects of school availability on parents' weekly hours worked



Notes: Understanding Society COVID-19 study. The figure displays the coefficients and 95% confidence intervals estimated using equation (1), showing the effects of having all children in the family prioritised to return to school in June/July of 2020 on parents' weekly hours worked over time. Difference-in-difference estimates with standard errors clustered at the individual level, controlling for interview date and presence of children younger than school age in the household. Sample of mothers of children in school years R-7 living in England (N mothers=5,569; N fathers=3,391).

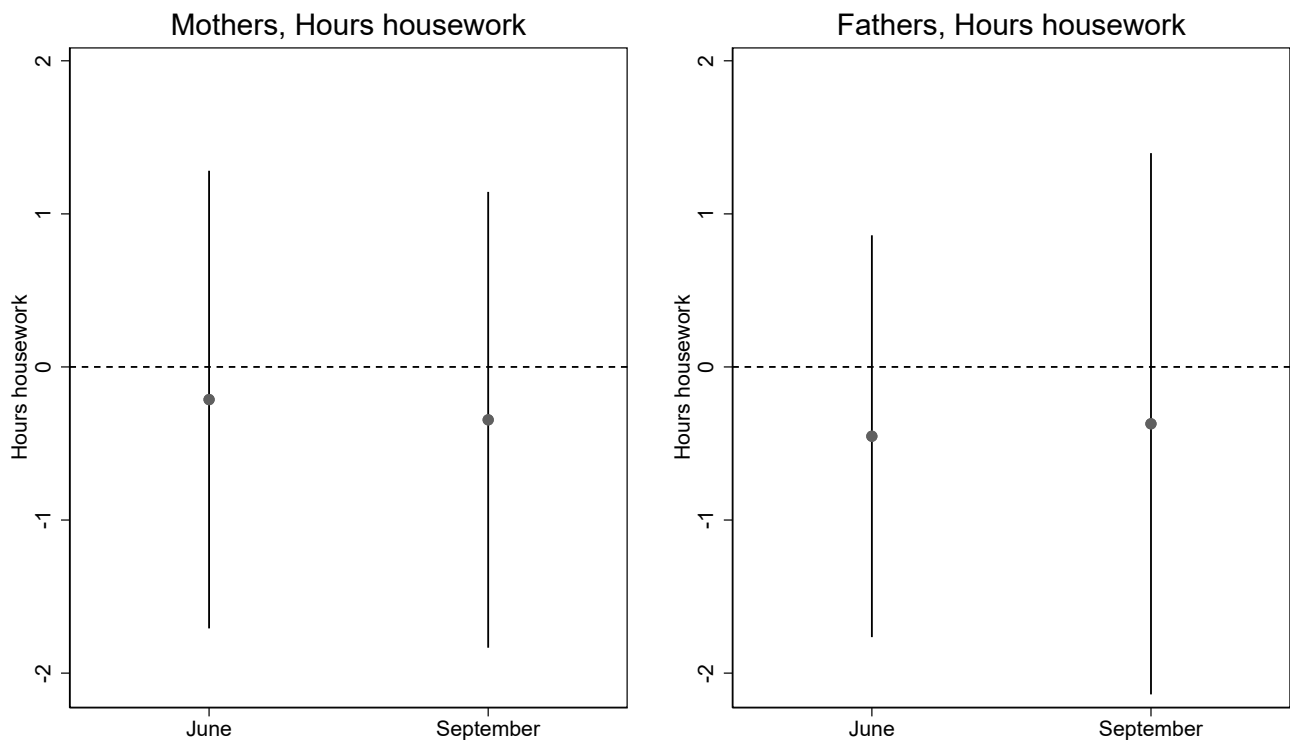
demands. Appendix F provides complementary evidence on hours worked between June and November 2020, compared to April 2020, and on a slightly wider range of labour supply measures from the UK Labour Force Survey in June and July 2020 (labour force participation, being in work, working fewer hours than normal). These results also show no evidence of significant labour supply responses to school availability for either mothers or fathers during this period, suggesting that our findings are robust to the use of different data sources and proxies for labour supply.¹¹

Write a final paragraph:

¹¹Other studies find negative effects on parental employment from pandemic-related school closures (Amuedo-Dorantes et al., 2023; Beauregard et al., 2022; Garcia and Cowan, 2022; Hansen et al., 2024; Heggeness, 2020) but they use data from the US and Canada where overall employment was much more strongly affected by the pandemic (Office for National Statistics, 2022). Moreover, these studies generally find effects for both mothers and fathers, with mothers being more affected at the extensive margin (probability of employment) and fathers at the intensive margin (hours worked). Only Beauregard et al. (2022) and Hansen et al. (2024) find stronger labour supply effects for mothers, but in the latter case, the results are driven by mothers whose children were older than those in our sample (aged 12-17).

School availability and housework The second aspect of juggling different tasks we can explore is housework. Mothers' mental health may have been more affected than fathers' mental health if shifts in parenting demands were accompanied by shifts in housework that disproportionately affected mothers. In the Understanding Covid-19 survey we have information on the hours spent doing housework (such as time spent cooking, cleaning and doing the laundry) by mothers and fathers in the months April, May, June and September of 2020, allowing us to estimate equation (1) with hours of housework as the dependent variable. April and May are again our reference periods, and Figure 6 presents treatment effects in June 2020 when schools reopened for the treatment group and in September, when they were open for all children. There is no evidence that school availability affected the hours of housework of mothers or fathers, suggesting that housework accompanying parenting demands was not a driver of the mental health gap in parenting we find.

Figure 6: Effects of school availability on parents' weekly hours of housework



Notes: Understanding Society COVID-19 study. The figure displays the coefficients and 95% confidence intervals estimated using equation (1), showing the effects of having all children in the family prioritised to return to school in June/July of 2020 on parents' weekly hours of housework over time. Difference-in-difference estimates with standard errors clustered at the individual level, controlling for interview date and presence of children younger than school age in the household. Sample of mothers of children in school years R-7 living in England (N mothers=3,768; N fathers=2,272).

Taken together, our findings suggest that, in the short term at least, labour supply was relatively inelastic to variation in caring and home-schooling responsibilities driven by school closures and re-openings during the pandemic, and thus mental health effects for mothers are unlikely to be driven by substituting work for childcare. Instead, they may have been driven by having to combine and juggle different tasks. Our analysis on the hours spent doing housework suggests that housework was inelastic to children being eligible to return to school for both mothers and fathers. Therefore, if anything, we expect that either mothers took on a larger share of childcare, affecting their mental health, or the same combined burden of childcare/home-schooling and work disproportionately affected their mental health, though this is something we cannot test.

5 Parents’ mental load

We now study the extent to which parenting demands affect parents’ mental load, and whether this effect is larger for mothers. We focus on the emotional load, which we measure using parents-reported emotional and behavioral difficulties of children. The idea is that perceptions of child difficulties increase parents’ emotional load and this in turn may affect their mental health. If mothers are more likely than fathers to perceive the emotional challenges faced by children through school closures and the effects of missed social and educational opportunities on their children, this could help explain the gender gap in mental health effects of parenting we documented earlier through a greater emotional load on mothers.

In our data, children’s emotional and behavioral difficulties are captured through the Strengths and Difficulties Questionnaire (SDQ), a behavioural screening questionnaire for children and young people aged 3 to 17. The SDQ has been created and validated for use by adults to report on the mental health of children and for young people to report their own mental health. We use the scores for the five domains included in the SDQ (conduct problems, emotional symptoms, hyperactivity, peer relationships, and prosocial behaviour),¹² as well as the ‘externalising’ score that summarises the conduct and hyperactivity domains, the ‘internalising’ score that summarises the emotional and peer

¹²The SDQ presents 25 statements describing children’s behaviour and asks the respondent if the description is ‘not true’ (no points), ‘somewhat true’ (one point) or ‘certainly true’ (two points). Five items are included for each of the domains and the score for each domain is the sum over the five items (Goodman, 2001). Full details of the questions are given in Appendix B.

problems domains, and the total difficulties score which is the sum of all four of these domains. In contrast to the Understanding Society main survey where SDQ is reported by one parent (generally the mother) for children aged 5 and 8, in the COVID-19 study SDQ is reported by both parents for all children aged 5 to 11. This allows us to compare children’s mental health as reported by mothers and fathers. For the sub-sample of children aged 10 and 11, we also have self-reports by the young people themselves.

We use data on the parent reported SDQ of children aged 5-11 living in England collected at the end of July, that is right after the partial reopening of schools during the summer term (SDQ data have not been collected in June), and we estimate the following regression, separately for whether SDQ scores were reported by mothers or by fathers:

$$sdq_{cp} = \alpha + \beta T_c + \phi \mathbf{X}_c + \theta_p + \epsilon_{cp} \quad (2)$$

where sdq_{cp} is the SDQ score of child c reported by parent p , T_c is school availability in June for child c , which is equal to one if the child was prioritised to return to school in June 2020 and zero otherwise, $\mathbf{X}_c$ is a set of characteristics of child c (child’s gender, age and age squared), θ_p is a parent fixed effect and ϵ_{cp} is an idiosyncratic error.

Our coefficient of interest is β that picks up the effect of school availability on children’s mental health, *as perceived* by parent p . The inclusion of the parent fixed effect θ_p means that β is identified by comparing the mental health of children in the same household who were and were not prioritised to return to school in June 2020. This identification strategy has the important advantage that the estimated effect is not affected by parents’ mental health (see Datta Gupta et al., 2018, for a discussion on the role of parents’ mental health on children’s reported SDQ measures), as only within-parents variation in children’s school availability is used for identification. Appendix G shows that our conclusions do not change when, instead, we use child fixed effects to compare changes in SDQ before and during the pandemic of children who have and have not been exposed to longer school closures. This suggests that our results are not driven by the specific estimation method and samples used, are not specific to the case of school reopening - rather than school closures - and are not driven by differences in mental health between parents with different exposure to school closures.

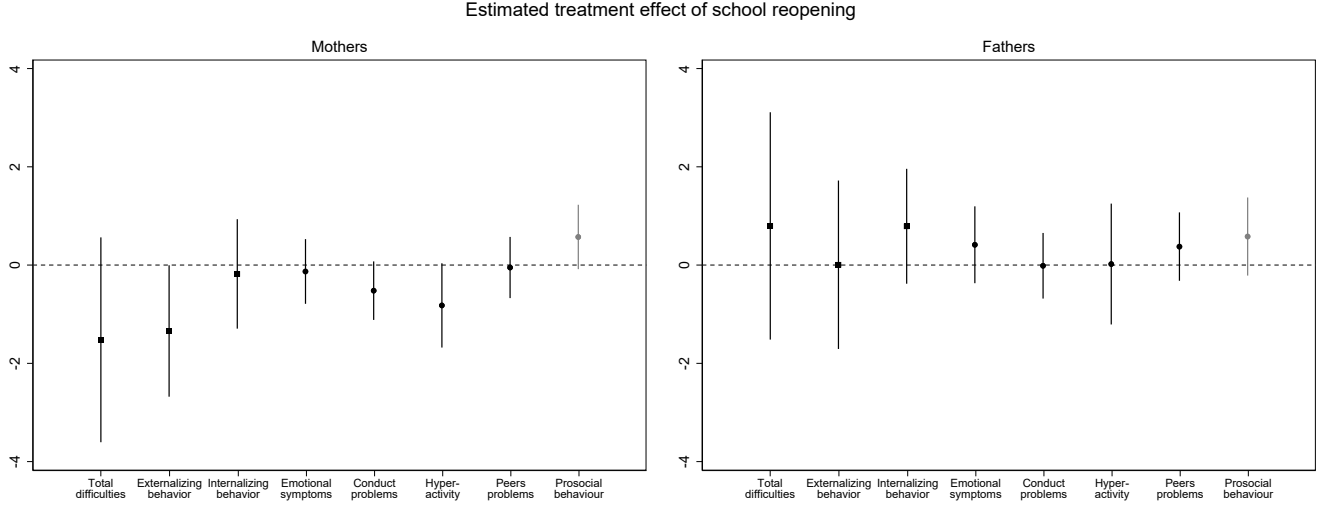
The identifying assumption for the estimation of β in equation (2) is that there are no unobserved

factors that differ by children’s June school availability that are correlated with their mental health. As guidelines for a school return were chosen by the government, rather than by families, violations of this assumption are likely to be rare. The identification assumption would be violated, for example, if parents tried to compensate for the lack of school availability by over-investing in children who were not prioritised for a return to school, thus boosting their mental health. A second possible violation would be if children who were prioritised have worse (mental) health than their siblings due to a higher likelihood of being infected with COVID-19, for example at school. Both these violations would lead to attenuation bias and thus to under-rejection of the null hypothesis of no (perceived) effects. Finally, there is the case in which parents who are worried about their children who have not been prioritised for a school return are more prone to detect emotional and behavioural problems in these children, compared to those children who have been prioritised. This would only be problematic if one wants to estimate the *pure* causal effect of school closure on children mental health. However, as we want to estimate parents’ *perceptions* of children’s mental health, this would not be a violation of the identifying assumption, and we would like the coefficient β to pick up this additional effect.

Figure 7 shows the results from equation (2) estimated for mothers (left) and fathers (right). When child SDQ is reported by mothers, we find that being in an age group prioritised to return to school in June 2020 led to improved child mental health captured both by a decrease in problematic behaviours and by an increase in desirable behaviour. In particular, we find that being prioritised to return to school leads to a 0.821 and 0.520 decrease in hyperactivity and conduct problems respectively, translating into decreases in total difficulties and externalizing behaviours and a 0.572 increase in prosocial behaviours, though the effects are at the boundary of conventional significance levels. Recall that SDQ is collected in July, during summer holidays, so the effects for June, which we are unable to measure due to a lack of suitable data, are likely to be larger. When SDQ is reported by fathers, estimates lack a clear pattern, as being prioritised to return to school leads to small and statistically insignificant increases in measures of *both* strengths and difficulties. In summary, our results suggest that the emotional load resulting from changes in parenting demands seems to fall on mothers but not fathers.

As discussed, to be informative of a differential emotional load for mothers and fathers, parents’

Figure 7: Effects of school reopening on children’s SDS in July, parent fixed effects, main sample 95% confidence intervals



Data: Understanding Society: COVID-19 Study, 2020. and Understanding Society: Waves 1-13, 2009-2022 and Harmonised BHPS: Waves 1-18, 1991-2009: Secure Access.

Sample: Children in year groups R-7 living in England interviewed in the July wave of the Covid-19 study. 95% confidence intervals. Method: parent fixed effects with standard errors clustered at the parent level, controlling for child’s gender, age and age squared.

Sample sizes: Mothers sample: 1136-1137, Fathers sample: 718

perceptions of their children’s mental health do not necessarily have to reflect the true causal effect of school closures on children’s mental health. However, finding that mothers adequately perceive (and report) their children’s difficulties would provide additional evidence that mothers, compared to fathers, spend extra time and effort in reading their children’s needs, adding to the emotional load. To shed light on whether mothers’ worries are justified, we exploit the fact that in the Understanding Society COVID-19 Study the SDQ score of children aged 10/11 is reported by themselves and their parents and we estimate the following regression:

$$sdq_{cp} = \gamma_0 + \gamma_1 sdq_{cc} + \gamma_2 Mother_{cp} + \gamma_3 sdq_{cc} * Mother_{cp} + \epsilon_{cp} \quad (3)$$

where sdq_{cp} is the SDQ score for child c reported by parent p , sdq_{cc} is the self-reported SDQ score for child c , $Mother_{cp}$ is a dummy variable equal to one if sdq_{cp} is reported by the mother, and zero otherwise, $sdq_{cc} * Mother_{cp}$ is the interaction term between sdq_{cc} and $Mother_{cp}$. We estimate the model separately for each SDQ score using OLS, with standard errors clustered at the child level.

The coefficient γ_1 in equation (3) shows how a one point increase in the relevant SDQ score

as reported by the child is translated into the same score as reported by fathers; the sum of the coefficients γ_1 and γ_3 shows how a one point increase in a SDQ score reported by the child is translated into the same score reported by mothers, and the coefficient γ_3 in isolation shows how the mapping between the SDQ score reported by the child and the same SDQ score reported by the parents differs when mothers vs. father report it. A positive and statistically significant coefficient on γ_3 would indicate that the mother's report is more in line with the child's own report than the father's.

Table 1: Consistency between child-reported and parent-reported SDQ: total difficulties, externalizing behaviour and internalizing behaviour.

	(1) Total. Difficulties	(2) Externalizing Behaviour	(3) Internalizing Behaviour
Mother reporting	-1.960** (0.838)	-1.536*** (0.422)	-0.316 (0.410)
Self-reported total difficulties	0.504*** (0.076)		
Mother reporting $\times$ Self-reported total difficulties	0.189** (0.089)		
Self-reported externalizing behaviour		0.413*** (0.069)	
Mother reporting $\times$ Self-reported externalizing behaviour		0.225*** (0.074)	
Self-reported internalizing behaviour			0.524*** (0.072)
Mother reporting $\times$ Self-reported internalizing behaviour			0.121 (0.090)
Constant	3.019*** (0.746)	2.587*** (0.416)	0.889*** (0.336)
Observations	389	389	389 height

Notes: Sample: Young people with self-reported SDQ as well as SDQ reported by at least one parent living in England and interviewed in the July wave of the study. Standard errors clustered at the child level.

Results from equation (3) for summary SDQ measures (total difficulties, externalizing behavior and internalizing behavior) are reported in Table 1, while results for the individual scores are reported in Appendix Table G1. A one point increase in children's self-reported SDQ score leads to an increase of around half a point in the SDQ score reported by fathers, with coefficients ranging between 0.413 for externalizing behavior and 0.524 for externalizing behavior. SDQ scores reported by mothers are more in line with those reported by children. This is shown by the estimated coefficients for the interaction between self reported SDQ and the reporting parent being a mother. These coefficients are all positive, although they are only statistically significant for externalizing behavior and total

difficulties. As shown in Appendix Table G1, this is driven by hyperactivity and conduct problems reported by mothers being particularly in line with the equivalent scores self reported by the children.

In summary, the results in Table 1, together with those in Figure 7, show that mothers are more likely than fathers to recognise their children’s mental health problems and to report meaningful variation in their children’s emotional and behavioral difficulties, which aligns with the children’s own reports. This provides evidence that mothers are in tune with their children’s mental health and suggests that they shoulder a larger share of the emotional load of increased parenting demands, compared to fathers. The mental load of parenting is believed to contribute to stress and poor mental health, especially for mothers, (Petts and Carlson, 2023). Therefore, a gendered increase in mental load triggered by school closures, particularly salient for mothers, might have contributed to the gendered effect of school availability on parents’ mental health.

Our results can also shed light on the effects of school closures on children’s mental health. While these effects are not the central focus on the paper, they are extremely policy relevant. We find that school closures increased hyperactivity and conduct problems as reported by mothers, and that hyperactivity and conduct problems are precisely the areas where mothers seem to be better than fathers at reading their children’s needs. This suggest that our results on the effects of school closures as perceived by mothers are also informative of the *true* causal effects of school closures. Indeed, our results are in line with existing literature suggesting that school closures increased hyperactivity and inattention (Monnier et al., 2023; Werner and Woessmann, 2023), but potentially decreased peer problems due to a drop in bullying (Bacher-Hicks et al., 2022; Hansen et al., 2024) and this translated into small increases in total difficulties (Hawrilenko et al., 2021).¹³ We are not aware of any research attempting to link parents’ and children’s mental during pandemic school closures, as we do in this paper.

6 Conclusions

This paper uses shifts in parenting demands triggered by pandemic school closures in England to study the effect of parenting on the mental health of mothers and fathers. Our findings reveal a

¹³For studies reporting increased mental health problems among children during the pandemic more in general, see: Hamatani et al. (2022); Landman et al. (2023); Leigh et al. (2023).

substantial gender gap: while school availability had significant effects on mothers’ mental health, fathers’ mental health remained largely unaffected. These results contribute to a growing body of literature documenting the mental health penalties associated with parenthood for mothers but not fathers, and highlight the importance of understanding gendered dynamics in parenting roles.

Our evidence suggests that the mental health effects of parenting fall disproportionately on mothers. We provide tentative evidence that during the pandemic this may have been caused by combining work with housework and likely childcare. Further, we show that mothers carry a larger share of the mental load of parenting than fathers in the form of emotional load. By examining parent-reports of children’s emotional and behavioural needs, we show that mothers were more attuned to their children’s feelings than fathers, potentially experiencing greater stress when they perceived their children were struggling. This aligns with sociological insights into the emotional dimension of parental mental load and emphasizes its critical role in shaping maternal mental health. By contrast, fathers’ assessments of children’s emotional needs was not affected by changes in parenting demands. We assert a link between this result and the null effect of school availability on fathers’ mental health.

While our study focuses on the Covid-19 pandemic context, the mechanisms driving the mental health effects we identify are likely relevant in other settings as well. Pandemics involving school closures happened in the past (see: Goulas and Megalokonomou, 2020) and will likely happen in the future (Marani et al., 2021); school closures also occur due to teacher strikes, crumbling concrete in school buildings and severe weather exacerbated by climate change.¹⁴ More importantly, situations that heighten children’s emotional needs, such as puberty, illness, school changes or school-related stress, are common throughout parenting and can increase the mental load on parents. Although these stressors may be less intense than those experienced during the pandemic, there is no reason to believe that the finding that mothers are more likely than fathers to bear the mental health impacts of household shocks cannot be generalized to non-pandemic settings, as documented by Breivik and Costa-Ramón (2024) in the case of a child’s illness.

Our findings have broader implications for policy and research. First, they highlight the need for support systems that alleviate the practical and mental load of parenting, particularly for mothers.

¹⁴In 2023, 5% of the school year in England was affected by teacher strikes (Department for Education, 2023), and six US states experienced widespread school closures as a result of extreme weather events (Climate Action Campaign, 2024).

Policies such as subsidized childcare, access to mental health resources, and measures to promote equitable sharing of household responsibilities could mitigate the disproportionate mental health burden experienced by mothers. Our methodological contribution in measuring emotional load using perception gaps between parents opens pathways for further research on how emotional dynamics within households impact parental well-being.

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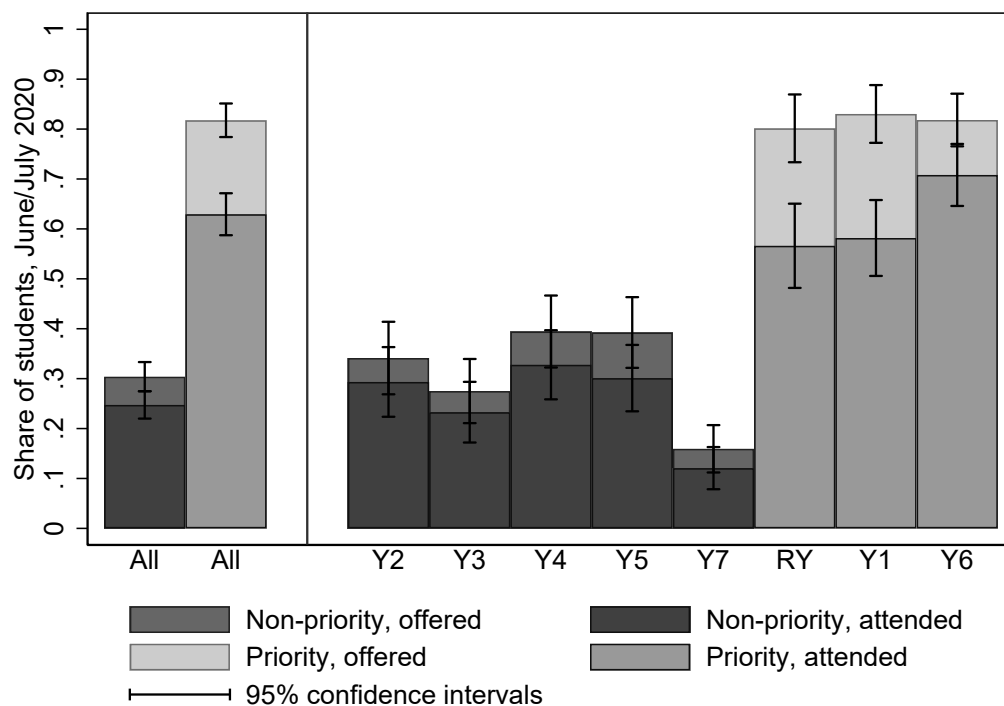
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Appendices

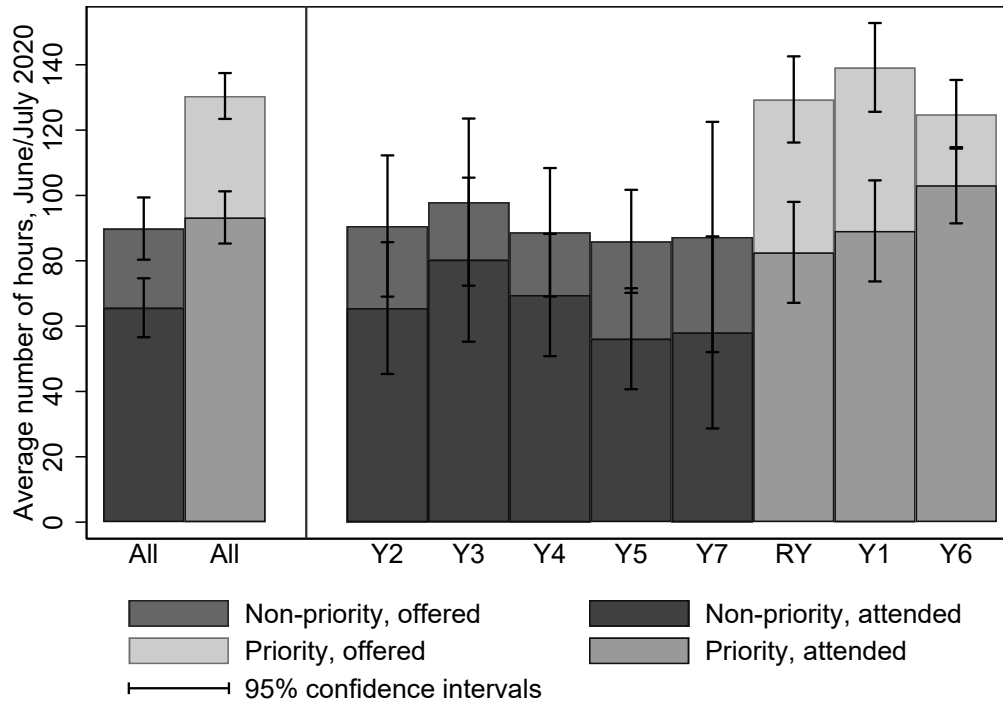
A Additional Figures and Tables

Figure A1: Share of children offered and attended school in June/July 2020



Notes: Understanding Society COVID-19 Study (September 2020 wave). The figure shows the share of children who have been offered and attended school in June/July 2020, by school year, and 95% confidence intervals. Sample of children in school years R-7 living in England (N=1,464).

Figure A2: Number of hours offered and attended school by children in June/July 2020



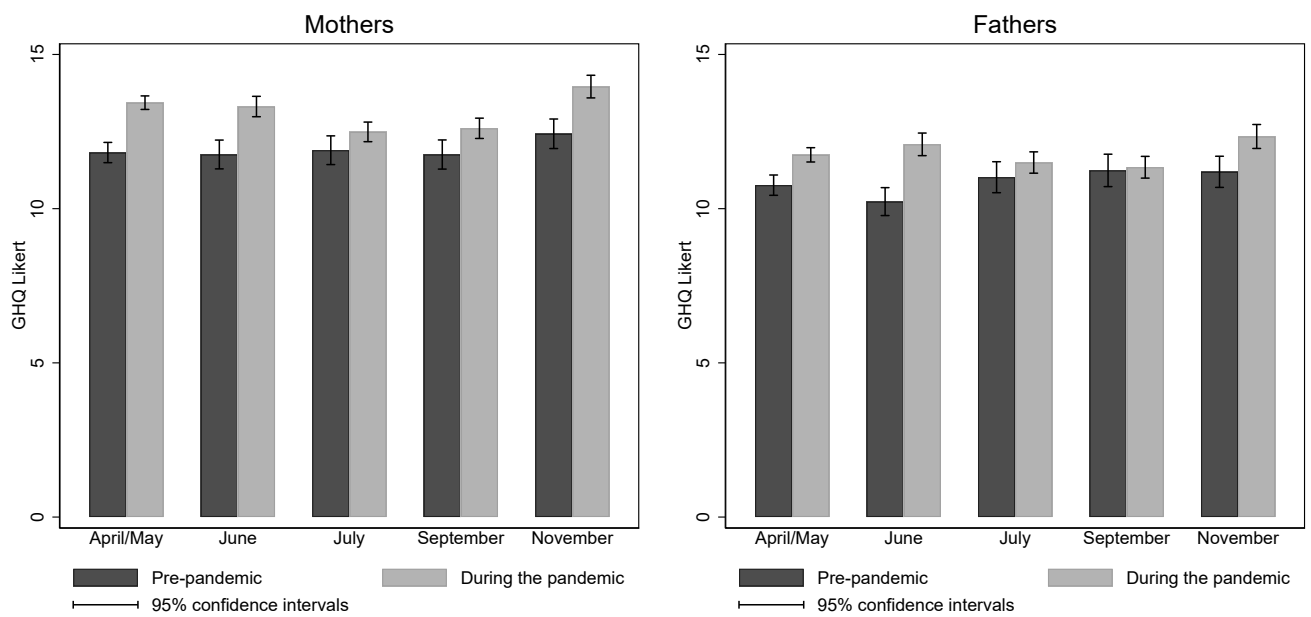
Notes: Understanding Society COVID-19 Study (September 2020 wave). The figure shows the number of hours children were offered and attended school in June/July 2020, by school year, and 95% confidence intervals. Sample of children in school years R-7 living in England (N=1,464).

Table A1: Effects of school reopening on parents' mental health

	(1) Mothers	(2) Mothers	(3) Fathers	(4) Fathers
All children priority	-0.177 (0.426)	-0.268 (0.430)	-0.339 (0.414)	-0.428 (0.421)
June*All children priority	-1.484*** (0.414)	-1.490*** (0.414)	-0.241 (0.452)	-0.242 (0.452)
July*All children priority	-0.615 (0.435)	-0.597 (0.435)	-0.218 (0.447)	-0.225 (0.450)
September*All children priority	-0.242 (0.499)	-0.238 (0.499)	0.203 (0.563)	0.215 (0.564)
November*All children priority	-0.303 (0.511)	-0.303 (0.512)	0.611 (0.570)	0.613 (0.570)
N	5407	5407	3295	3295
Time varying characteristics	No	Yes	No	Yes

Notes: Understanding Society COVID-19 study. Estimates using equation (1), showing the effects of having all children in the family prioritised to return to school in June/July of 2020 on parents' GHQ Likert scores over time, by parent's gender. Difference-in-difference estimates with standard errors clustered at the individual level. Time-varying controls: interview date and presence of children younger than school age in the household. Sample of parents of children in school years R-7 living in England.

Figure A3: Parents' mental health before and during the pandemic, by months



Notes: Understanding Society COVID-19 Study (waves 1-6), 2020 and Understanding Society Mainstage study, (waves 9 and 10, selected months). Bars show GHQ Likert scores for selected sample in months stated, with error bars showing 95% confidence intervals. Sample of parents of children in years R-7 living in England. Sample sizes in the following ranges: mothers before the pandemic [615, 1317], mothers during the pandemic [1238, 3355], fathers before the pandemic [399, 894], fathers during the pandemic [755, 2047].

B Measurement Instruments

The General Health Questionnaire

Have you recently:

1. Been able to concentrate on what you're doing? (Better than usual/Same as usual/Less than usual/Much less than usual)
2. Lost much sleep over worry? (Not at all/No more than usual/Rather more than usual/Much more than usual)
3. Felt you were playing a useful part in things? (More so than usual/Same as usual/Less so than usual/Much less than usual)
4. Felt capable of making decisions about things? (More so than usual/Same as usual/Less so than usual/Much less than usual)
5. Felt constantly under strain? (Not at all/No more than usual/Rather more than usual/Much more than usual)
6. Felt you couldn't overcome your difficulties? (Not at all/No more than usual/Rather more than usual/Much more than usual)
7. Been able to enjoy your normal day-to-day activities? (More so than usual/Same as usual/Less so than usual/Much less than usual)
8. Been able to face up to your problems? (More so than usual/Same as usual/Less so than usual/Much less than usual)
9. Been feeling unhappy and depressed? (Not at all/No more than usual/Rather more than usual/Much more than usual)
10. Been losing confidence in yourself? (Not at all/No more than usual/Rather more than usual/Much more than usual)
11. Been thinking of yourself as a worthless person? (Not at all/No more than usual/Rather more than usual/Much more than usual)
12. Been feeling reasonably happy, all things considered? (More so than usual/Same as usual/Less so than usual/Much less than usual)

Strengths and Difficulties Questionnaire

To what extent do these statements describe your child's behaviour:

Conduct problems:

1. Often has temper tantrums or hot tempers
2. *Generally obedient, usually does what adults request*
3. Often fights with other children or bullies them
4. Often lies or cheats
5. Steals from home, school or elsewhere.

Hyperactivity:

1. Restless, overactive, cannot stay still for long
2. Constantly fidgeting or squirming
3. Easily distracted, concentration wanders
4. *Thinks things out before acting*
5. *Sees tasks through to the end, good attention span.*

Emotional symptoms:

1. Often complains of headaches, stomach-ache or sickness
2. Many worries, often seems worried
3. Often unhappy, down-hearted or tearful
4. Nervous or clingy in new situations, easily loses confidence
5. Many fears, easily scared.

Peer relationships:

1. Rather solitary, tends to play alone
2. *Has at least one good friend*
3. *Generally liked by other children*
4. Picked on or bullied by other children
5. Gets on better with adults than with other children.

Prosocial behaviour:

1. Considerate of other people's feelings
2. Shares readily with other children (treats, toys, pencils, etc.)
3. Helpful if someone is hurt, upset or feeling ill
4. Kind to younger children
5. Often volunteers to help others (parents, teachers, other children).

Note that items in *italics* are reverse coded.

C Effects of school closures

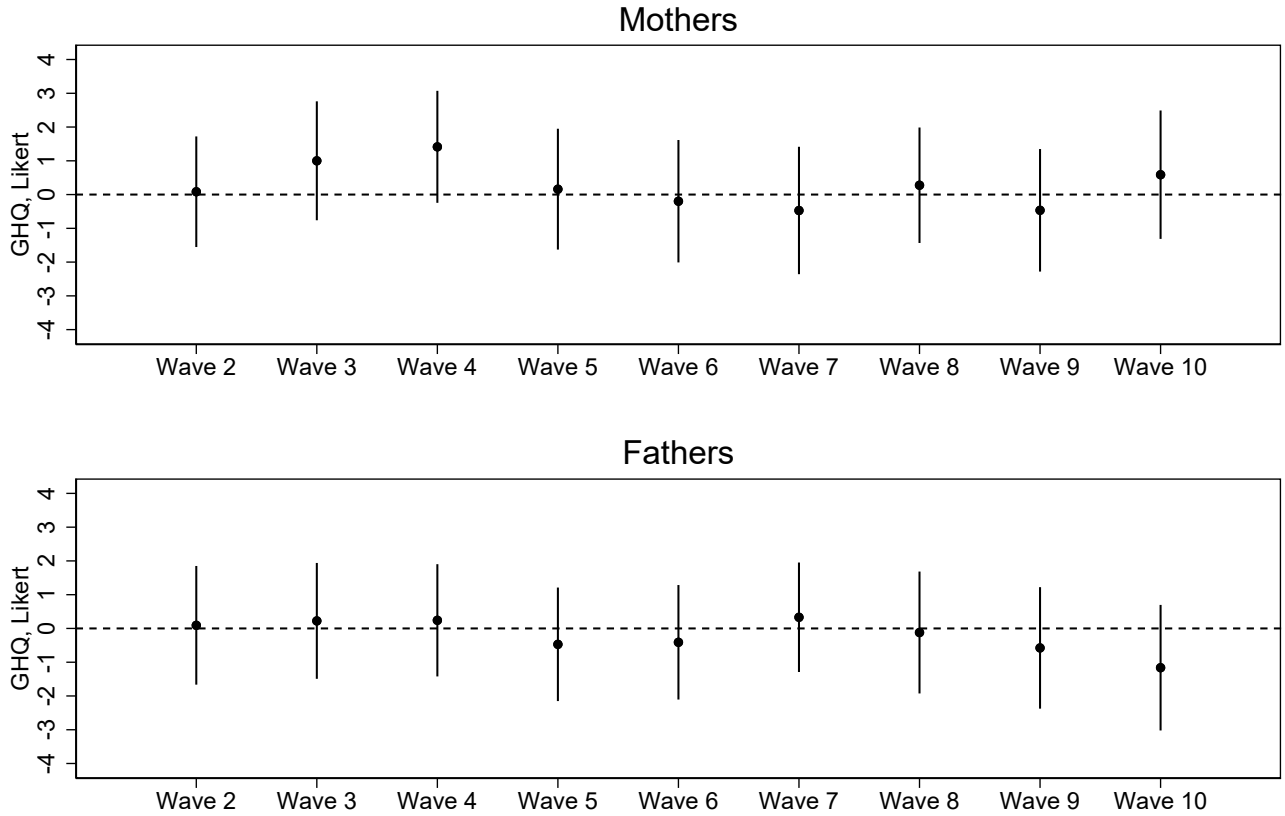
We check whether school closing effects are similar in size to school reopening effects. We use the same variation in children’s eligibility for school in June 2020, but instead of comparing parents’ mental health with the situation in April/May 2020 when all children were out of school, we compare mental health with pre-pandemic data from the Understanding Society mainstage survey, waves 1-10, covering the years 2009-2019 when schools were open for all age groups. We restrict the sample to parents of children in years R-7, and for the pre-covid years to observations collected between June 1st and July 15th to avoid summer holidays; for 2020 we use the June wave of the Understanding society Covid-19 survey. We estimate the following equation:

$$y_{it} = \alpha + \beta T_{Ci} + \pi w_t + \rho \mathbf{w}_t \mathbf{T}_{Ci} + \phi \mathbf{X}_{it} + \epsilon_{it} \quad (4)$$

where y_{it} is mental health of parent i in wave t measured using the GHQ Likert measure. T_{Ci} is the treatment indicator indicating whether the parent has at least one child in the non-priority group years, namely: years 2, 3, 4, 5, 7 (recall we are estimating the effect of school closure, rather than reopening). w_t are wave fixed effects and $\mathbf{w}_t \mathbf{T}_{Ci}$ is a set of interactions of wave and treatment indicator, X_{it} is a set of individual-level time-varying characteristics. Finally, α is an intercept, and ϵ_{it} is the error term. The effect on parents’ mental health of school closure is captured by the estimated coefficient of the interaction between the 2020 Covid June wave and the treatment indicator for having at least a child in the non-priority group, which is the group exposed to school closures in the 2020 Summer term.

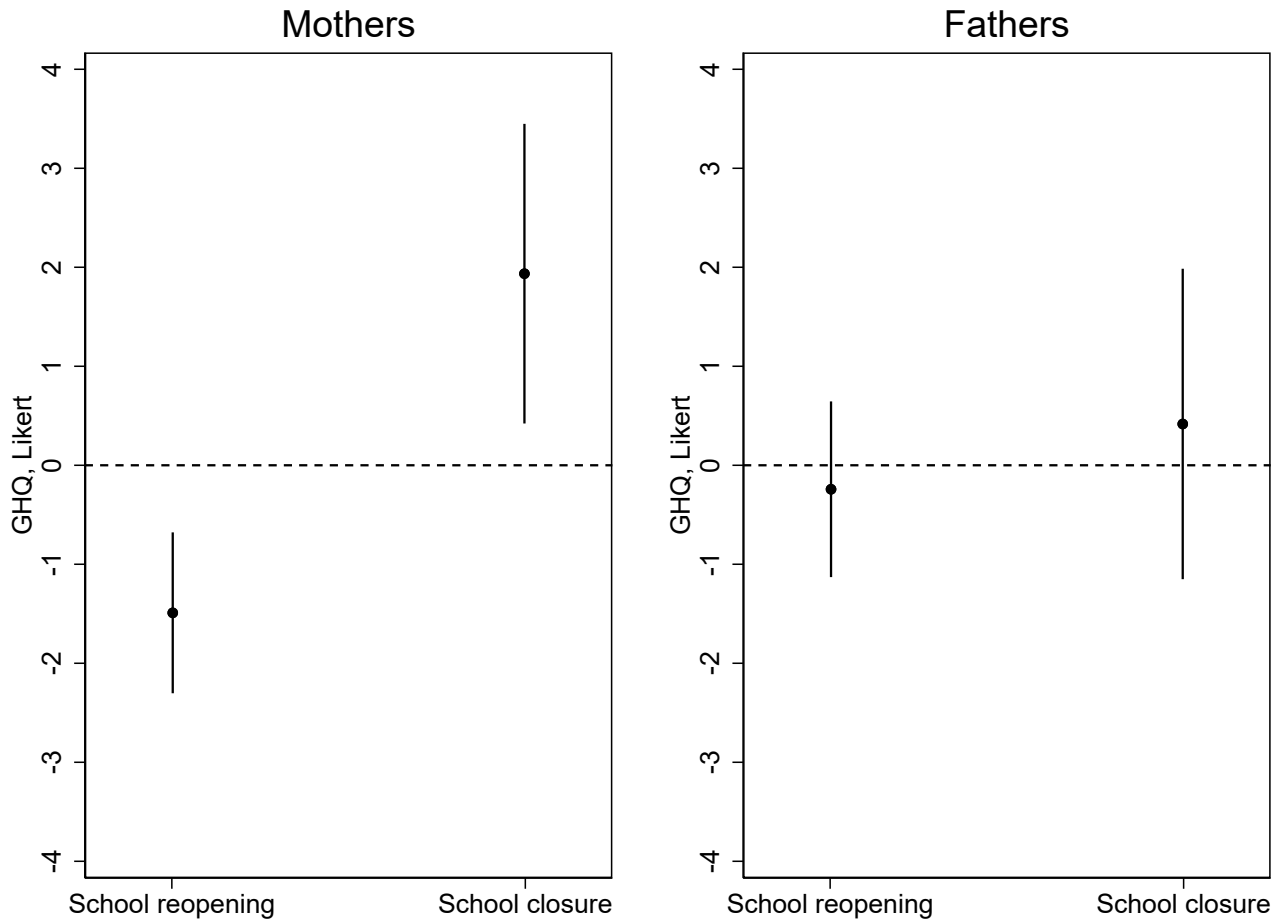
The estimated coefficients of the interaction of the treatment indicator with pre-covid waves can be used to test the parallel trends assumption. Figure C1 shows that pre-trends between treatment and control groups were parallel in the pre-Covid waves. Figure C2 displays the June 2020 school closure effect estimated based on equation 4 alongside our main school reopening effects. The effects are of approximately equal size and in opposite direction for mothers, while for fathers both effects are not different from zero. This symmetry suggests that the effects of increasing and reducing parenting demands are of similar magnitude.

Figure C1: Effects of school closures: pre-trends.



Notes: Understanding Society Mainstage study (wave 1-11, data collected from June 1st to July 15th). The figure displays coefficients and 95% confidence intervals showing differences between treatment and control groups in periods before Covid, where treatment group is those parents with at least one child in a year group that was not prioritised to return to school in June 2020. Difference-in-difference estimates with standard errors clustered at the individual level controlling for interview date and presence of children younger than school age. 95% confidence intervals. Sample of parents of children in school years Reception to Year 7 living in England. Method: Sample size: Mothers = 4731 ; Fathers = 3042.

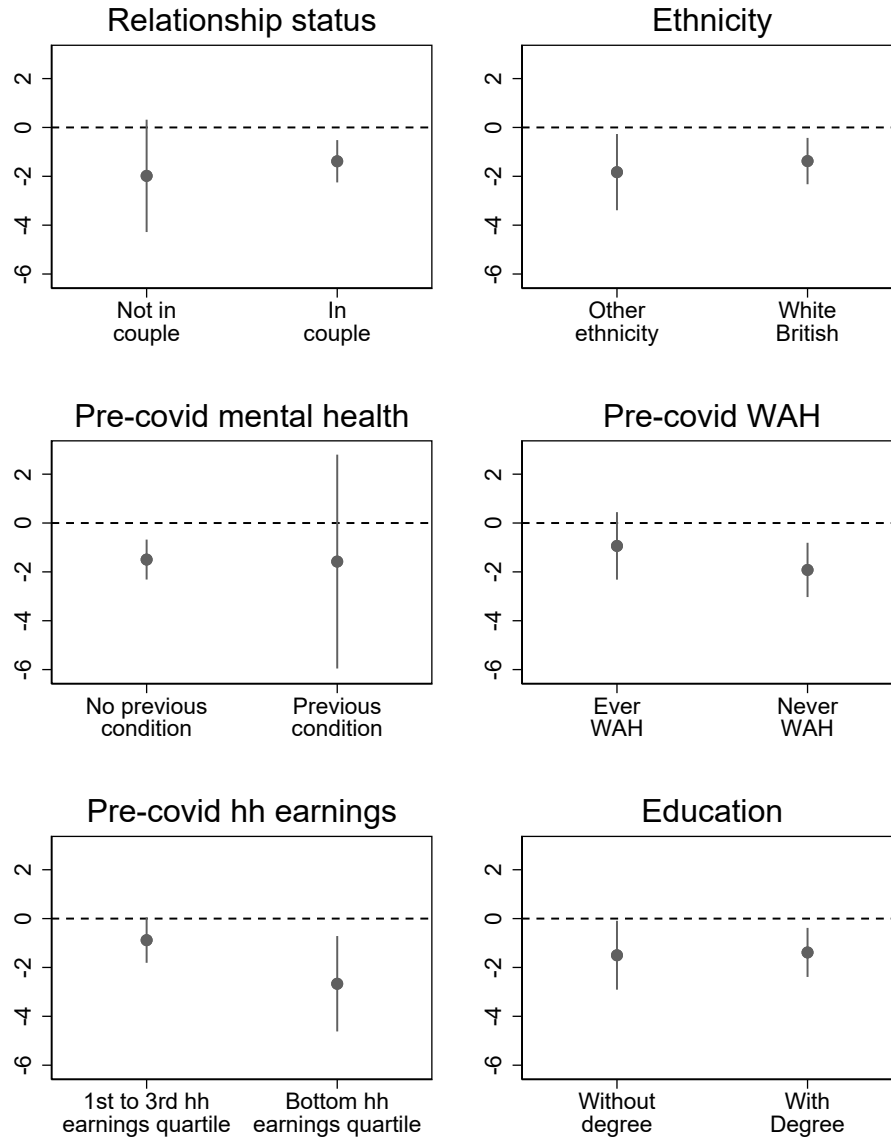
Figure C2: June effects on parents' mental health of school closures and school reopening



Notes: DUnderstanding Society Mainstage study (waves 1-11, data collected from June 1st to July 15th) and Understanding Society COVID-19 study (June wave) for the effects of school closures and from the Understanding Society COVID-19 study only (waves April to November) for the effects of school reopening. See text for definitions of treatment groups for the two models. Difference-in-differences with standard errors clustered at the individual level controlling for Interview date and presence of children younger than school age. Sample is parents of children in school years Reception to Year 7 living in England. Sample size for the school reopening analysis: Mothers = 5,400; Fathers = 3,280. Sample size for the school closures analysis: Mothers = 4731; Fathers = 3042.

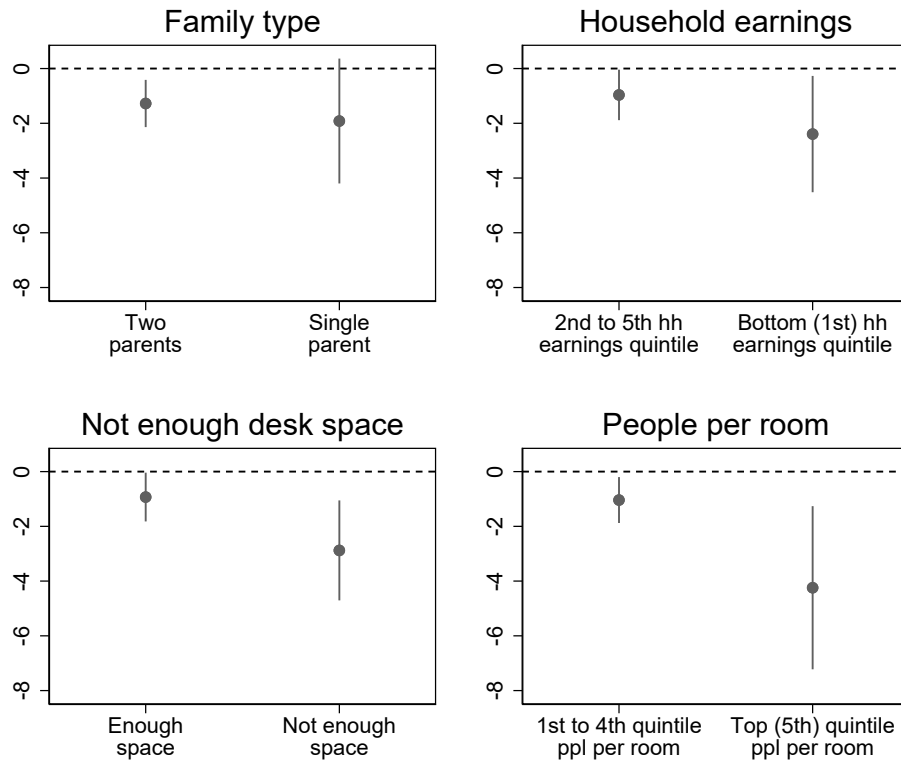
D Heterogeneity of mother's June 2020 treatment effect

Figure D1: Effects of school availability on mothers' mental health by mothers' characteristics



Notes: Understanding Society COVID-19 study. The figure displays estimates based on equation (??) interacted with mothers' pre-pandemic background characteristics, showing the total effects and 95% confidence intervals of having all children in the family prioritised to return to school in June/July of 2020 on mothers' GHQ Likert scores in June 2020 by the background characteristics shown in each panel. Difference-in-difference estimates with standard errors clustered at the individual level, controlling for interview date and presence of children younger than school age in the household. Information on pre-Covid mental health and pre-Covid ever working at home is derived from retrospective questions asked in the Covid-19 Study about January and February 2020. Sample of mothers of children in school years R-7 living in England (N ethnicity=2,943; N mental health=2,939; N education=2,899; N ever worked from home=2,394).

Figure D2: Effects of school availability on on mothers' mental health by household characteristics



Notes: Understanding Society COVID-19 study. The figure displays estimates based on equation (1) interacted with pre-pandemic household characteristics, showing the total effects and 95% confidence intervals of having all children in the family prioritised to return to school in June/July of 2020 on mothers' GHQ Likert scores in June 2020 by the background characteristic shown in each panel. Difference-in-difference estimates with standard errors clustered at the individual level, controlling for interview date and presence of children younger than school age in the household. Respondents are classified as not having enough desk space if in May they answer no to the following question: 'Thinking about everyone in your household who is currently working from home or home schooling. Does everyone have their own quiet space at a desk or table to work at?' Note that the question was not asked in April. People per room is computed by dividing household size by the total number of rooms in the house. Sample of mothers of children in school years R-7 living in England (N family type = 2946; N household earnings = 2600; N desk space = 2693; N household density = 2791).

E Robustness checks on main results

We focus on the mental health results for mothers and we show that they are robust to i) the definition of the treatment indicator; ii) the method in which information from the General Health Questionnaire (GHQ) is aggregated into GHQ scores; iii) the introduction of individual fixed effects in our estimation of equation (1); iv) the use of the Understanding Society COVID-19 weights; v) variations in the estimation sample; vi) the use of a completely different measure of mental health indicating whether the respondent felt lonely ‘often’ or ‘some of the time’ in the four weeks before the interview. Results of all these checks are presented in columns (2)-(9) of Table E1, together with those of our baseline specification, presented for comparison in column (1).

Table E1: GHQ results for mothers: Robustness checks

	(1) Baseline	(2) At least one child in priority	(3) GHQ Caseness	(4) Fixed effects	(5) Survey weights	(6) Excl. key worker hh	(7) Years R-6 sample	(8) Years R-8 sample	(9) Felt lonely
Treat	-0.268 (0.430)	0.056 (0.373)	-0.076 (0.234)	0.000 (.)	-0.132 (0.656)	-0.540 (0.631)	-0.111 (0.426)	-0.013 (0.440)	-0.008 (0.029)
June*treat	-1.490*** (0.414)	-0.870** (0.368)	-0.751*** (0.239)	-1.128*** (0.392)	-1.924*** (0.636)	-1.460** (0.611)	-1.609*** (0.412)	-1.661*** (0.432)	-0.069** (0.033)
July*treat	-0.597 (0.435)	-0.416 (0.385)	-0.403 (0.262)	-0.437 (0.418)	-1.077 (0.695)	-0.418 (0.632)	-0.575 (0.428)	-0.719 (0.445)	-0.044 (0.034)
September*treat	-0.238 (0.499)	-0.092 (0.426)	-0.221 (0.287)	-0.185 (0.480)	-0.105 (0.665)	0.415 (0.652)	-0.293 (0.498)	-0.531 (0.534)	-0.038 (0.036)
November*treat	-0.303 (0.512)	-0.515 (0.452)	-0.318 (0.299)	-0.023 (0.488)	-0.407 (0.790)	0.834 (0.739)	-0.219 (0.514)	-0.562 (0.532)	-0.045 (0.036)
N	5407	5407	5407	5407	5407	2668	4803	6027	5635
Time-varying Xs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Understanding Society COVID-19 study. The Table displays selected coefficients estimated using equation (1), showing the effects of having all children in the family prioritised to return to school in June/July of 2020 on mothers’ outcomes over time. Difference-in-differences estimates with standard errors clustered at the individual level, controlling for interview date and presence of children younger than school age in the household as indicated. Outcome is GHQ Likert score in all columns except column (3) where it is GHQ Caseness and column (9) where it is a binary indicator for having felt lonely ‘often’ or ‘some of the time’ in the four weeks before the interview. Treatment is having all children in the age-range in the priority group except in column (2) where it is at least one child in the priority group. Sample of parents of children in school years R-7 living in England, except column (6) which excludes households with a key worker, column (7) which includes parents of children in school years R-6 and column (8) where it is school years R-8.

Column (2) of Table E1 presents estimates obtained using a different treatment definition. Here we define as treated parents who have *at least one* child in the priority group (Reception, Year 1 or Year 6) and as untreated those parents who have *all* children in the non-priority group (school years 2, 3, 4, 5, and 7). This definition tests whether mothers’ mental health reacts to potentially having fewer pre-teen children in the home during school hours, whereas the definition for our main results

tests whether it reacts to potentially having no pre-teen school children in the home during school hours. Results for this treatment definition are consistent with our baseline results, though the effect size is smaller. Having at least one child in the priority group reduces mothers' GHQ Likert score in June by just less than one point (0.88). The smaller beneficial effect of having at least one child eligible for return to school could reflect the fact that it is more likely that there is another pre-teen child left at home, a potentially more difficult arrangement. As before the effect of school reopening fades after June.

Column (3) presents results obtained using the GHQ Caseness measure instead of the GHQ Likert score as dependent variable. The GHQ Caseness measure counts the number of problems reported by an individual that are occurring 'rather more than usual' or 'much more than usual'. Therefore, it gives more emphasis to cases where mental health changed substantially and disregards small changes. The results are similar to those based on the Likert score: for mothers, having all children prioritised to return to school leads to a decrease of almost one mental health problem (a fall of 0.75 in the Caseness score) in June 2020. This compares to an average Caseness score of around two among mothers of children in school years R-7 in June before the pandemic. Results again show that the impact on mothers' mental health is temporary: the effect of having all children in school year 7 or below prioritised to return to school fades after June, and, from July onwards, can no longer be statistically distinguished from zero.

Column (4) returns to using the GHQ Likert score as the dependent variable and reports results from a specification that includes mother fixed effects. This has the benefit of making comparisons between the same individuals observed in different months but has the disadvantage of limiting the number of individuals in the sample identifying the treatment effect to mothers who report in both the pre-treatment wave and one post-treatment wave. Results are qualitatively the same as our baseline results in column (1).

Column (5) shows results obtained using the Understanding Society COVID-19 weights which are designed to correct for selection into the web-based COVID-19 sample from the main Understanding Society sample. The results are slightly larger in June than for the unweighted results. While the COVID-19 weights are not optimised to make our sample representative of the population of interest for this model, which is parents of children in years R-7, they do provide some indication that

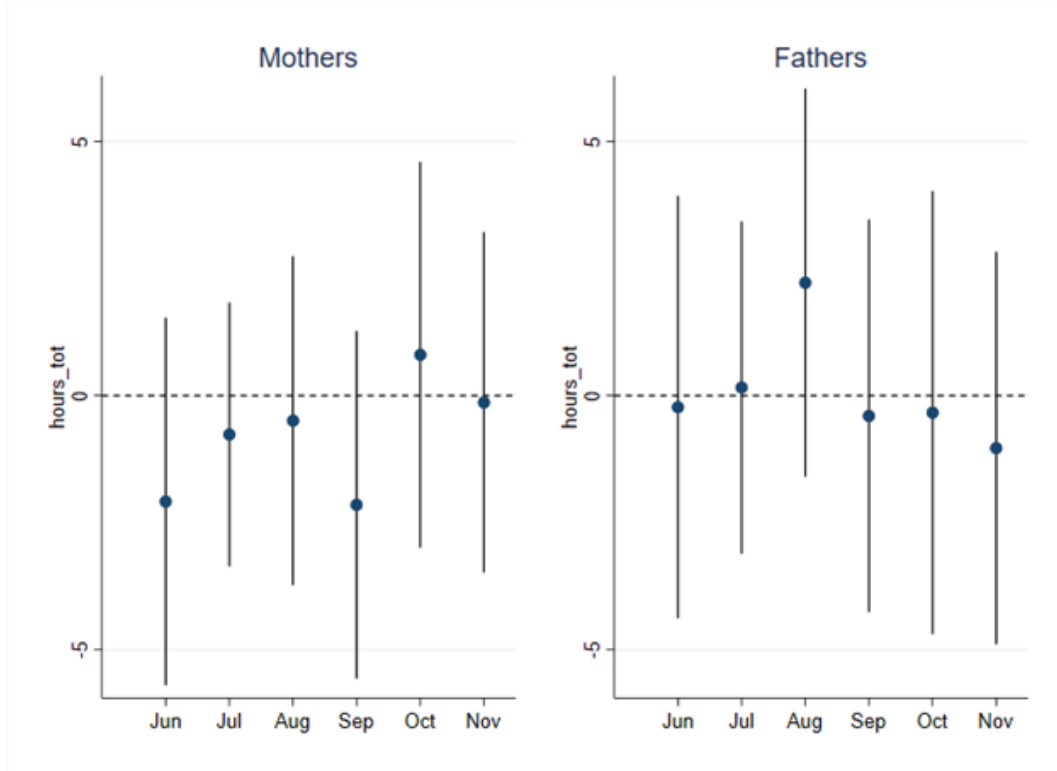
selection into the COVID-19 sample is unlikely to bias our estimates.

Columns (6) to (8) vary the sample. Column (6) shows results when omitting households in which at least one parent is a key worker (self-reported). This is because children of key workers were allowed to attend school throughout the first period of school closures (though only about 2% of children did), potentially leading us to underestimate the effect of school reopening. Results in column (6) are very similar in size to our baseline results, showing that this is not a concern. Results in column (7) are derived from a sample that only considers parents with children in primary schools (years R to 7), results in column (8) are derived from a sample that also includes parents of children in Year 8 (age 12/13). Results are not substantively altered by these changes.

Finally, the last column of of Table E1 report the results of a regression that uses the same specification and sample as in equation (1) but, as a dependent variable, uses a binary indicator equal to one if the parent reports having felt lonely ‘often’ or ‘some of the time’ in the four weeks before the interview, and zero otherwise. School availability leads to a almost percentage points drop in the probability of having felt lonely often or some of the time in June. This effect is 18% of the same probability reported by mothers pre-pandemic (38%). As for the case of GHQ, effects for mothers fade after June, and there are no effects for fathers (results on fathers available upon request).

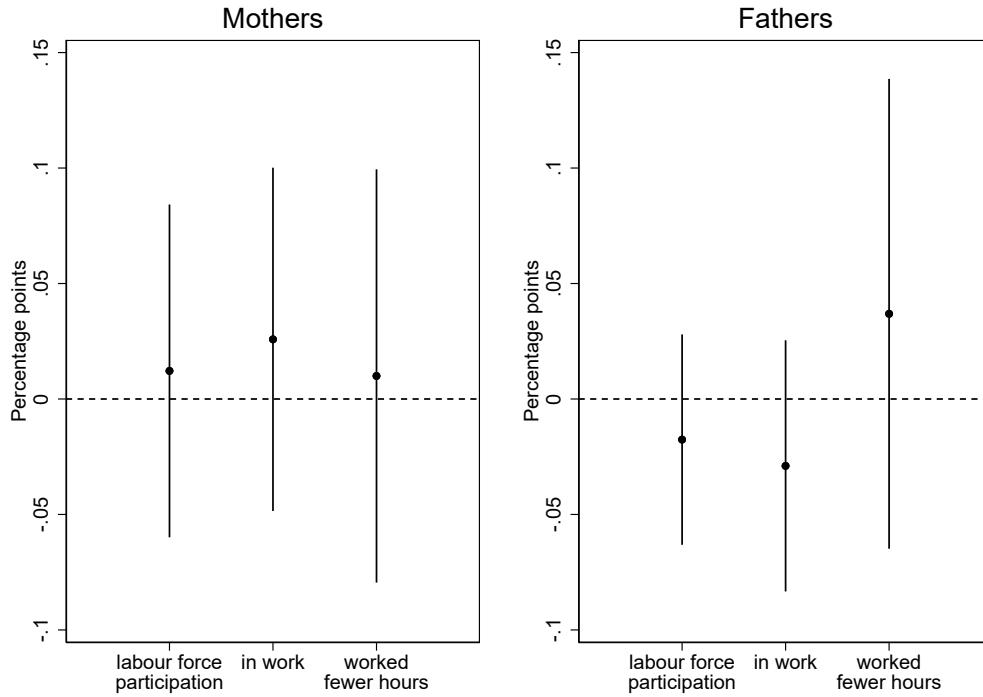
F School availability and labour supply in the Labour Force Survey

Figure F1: The effect of school availability on hours worked by mothers and fathers (June to November 2020)



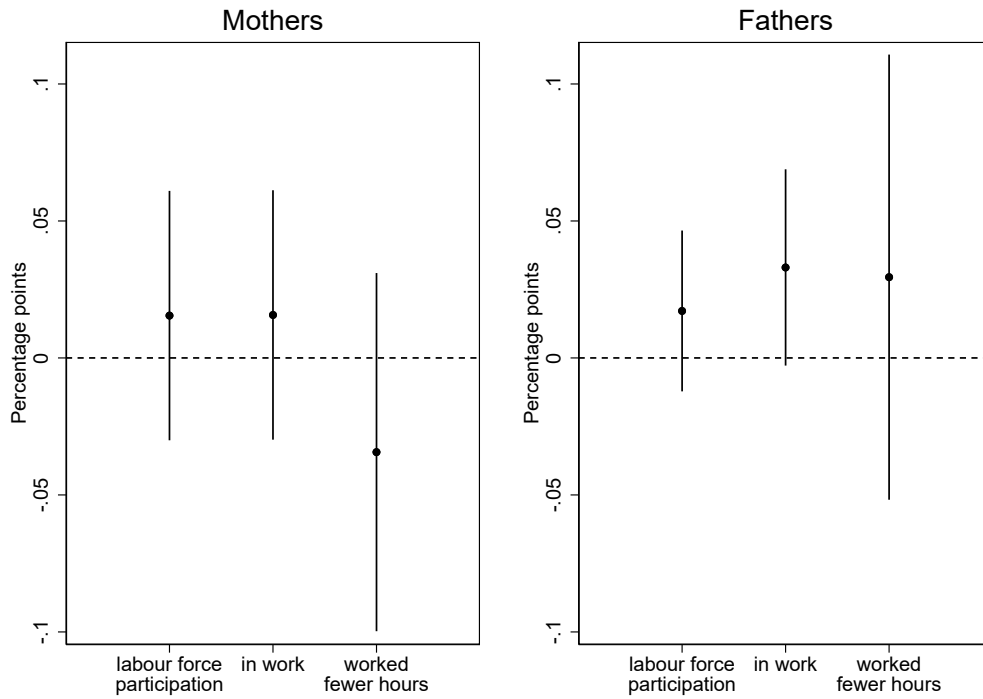
Notes: Quarterly UK Labour Force Survey 2020. The figure shows the coefficients and 95% confidence intervals estimated using equation (1), showing the effects of having all children in the family prioritised to return to school in June/July 2020 on hours worked over time, by parents' gender. Difference-in-difference estimates with standard errors clustered at individual level, controlling for a set of binary indicators for month of interview (relative to April 2020), dummy variables for the number of children aged 0-1, 2-4, 5-9 and 10-15, ethnicity, being an immigrant, whether the parent has a partner, whether the highest qualification of the parent was below A-levels or equivalent, region, and continuous linear measures of age of youngest child and date of interview. Sample of parents of children in school years R-7 living in England (N mothers=10,867; N fathers=10,290).

Figure F2: The effect of school availability on parentsâ labour supply in June 2020



Notes: Notes: uses data from the Quarterly UK Labour Force Survey 2020. Sample of parents with at least one child who was in school years Reception to Year 7 in the academic year 2019-20, observed between January 2020 and December 2020. (The question about lack of childcare being the reason for working less in the reference week is only available in Q2 and Q3, so the sample for this outcome is restricted to April to September 2020.) Figure shows the coefficients and 95% confidence intervals of estimates of the effect of having all children in school years R-7 prioritised to return to school in June 2020 (treatment group) relative to having at least one child in school years R-7 not prioritised to return (control group). Each coefficient estimate comes from a different event study regression, estimated using OLS, which includes a binary indicator for being in the treatment group, a set of binary indicators for month of interview (relative to April 2020), and a set of interaction terms between the two, which are the source of the reported estimates. The regressions also include dummy variables for the number of children aged 0-1, 2-4, 5-9 and 10-15, ethnicity, being an immigrant, whether the parent has a partner, whether the highest qualification of the parent was below A-levels or equivalent, region, and continuous linear measures of age of youngest child and date of interview. Standard errors clustered at individual level (N mothers=14,158; N fathers=11,204).

Figure F3: The effect of school availability on parentsâ labour supply in July 2020

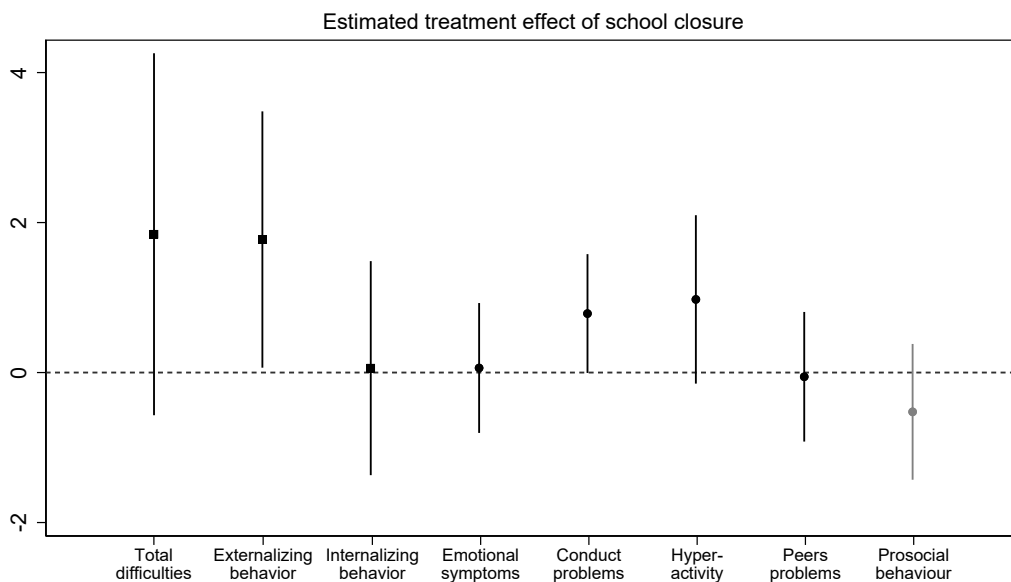


Notes: uses data from the Quarterly UK Labour Force Survey 2020. Sample of parents with at least one child who was in school years Reception to Year 7 in the academic year 2019-20, observed between January 2020 and December 2020. (The question about lack of childcare being the reason for working less in the reference week is only available in Q2 and Q3, so the sample for this outcome is restricted to April to September 2020.) Figure shows the coefficients and 95% confidence intervals of estimates of the effect of having all children in school years R-7 prioritised to return to school in June 2020 (treatment group) relative to having at least one child in school years R-7 not prioritised to return (control group). Each coefficient estimate comes from a different event study regression, estimated using OLS, which includes a binary indicator for being in the treatment group, a set of binary indicators for month of interview (relative to April 2020), and a set of interaction terms between the two, which are the source of the reported estimates. The regressions also include dummy variables for the number of children aged 0-1, 2-4, 5-9 and 10-15, ethnicity, being an immigrant, whether the parent has a partner, whether the highest qualification of the parent was below A-levels or equivalent, region, and continuous linear measures of age of youngest child and date of interview. Standard errors clustered at individual level. (N mothers=14,158; N fathers=11,204).

G Mental load, additional analysis

Figure G1 shows the effects of school closures on children’s mental health in July 2020, measured through the strength and difficulties questionnaire administered to mothers. To estimate these effects we use the July 2020 wave of the Covid-19 survey (available for children aged 5 to 11) and data from Understanding Society collected in the previous waves during the summer holidays (available for 5 and 8 years old only). As pre-pandemic children’s SDQ is reported by either mother or fathers and very few fathers take-up this role pre-pandemic, this analysis can only be carried out for mothers. We use child fixed effect, that is, we compare changes over time in the reported mental health of children whose school was closed in June 2020 and changes over time in the mental health of children whose school was open in June 2020. Specifically, for the pandemic year our treatment indicator is equal to one if the child was not in the priority group and zero otherwise; for the pre-pandemic year, our treatment indicator is equal to 0 for everyone. This means that our results must be interpreted as the estimated effects of school closures.

Figure G1: Effects of school closures on children’s SDQ in July, child fixed effects, main sample, 95% confidence intervals



Notes: Understanding Society: COVID-19 Study and main survey. Sample: Children in year groups R-7 living in England interviewed during the summer holidays. 95% confidence intervals. Method: Child fixed effects with standard errors clustered at the individual level, controlling for: age, age squared, mother’s age, house tenure, household’s financial situation. Sample sizes: 1931-1940

We find indication that school closures lead to increased perceived emotional and behavioral difficulties and decreased perceived emotional and behavioral strengths, suggesting a negative effect of school closures on children’s mental health, as reported by mothers. Like for our main results, the larger effects are seen in conduct problems and hyperactivity, and the domain summarizing them (externalizing behavior), while the effect on peer problems is null. The similarity between these results and those discussed in Section 5 provides important evidence that our conclusions are not driven by the data, the sample, the treatment indicator or the estimation method used.

Table G1: Consistency between self-reported SDQ and SDQ as reported by parents, all domains.

	(1) Emotional symptoms	(2) Conduct problems	(3) Hyperactivity	(4) Peer problems	(5) Prosocial behaviour
Mother reporting	-0.150 (0.236)	-0.369** (0.149)	-0.878*** (0.326)	-0.035 (0.199)	0.379 (1.051)
Self-reported emotional symptoms	0.402*** (0.068)				
Mother reporting × Self-reported emotional symptoms	0.113 (0.087)				
Self-reported conduct problems		0.388*** (0.058)			
Mother reporting × Self-reported conduct problems		0.148** (0.068)			
Self-reported hyperactivity			0.418*** (0.079)		
Mother reporting × Self-reported hyperactivity			0.192** (0.084)		
Self-reported peer problems				0.566*** (0.094)	
Mother reporting × Self-reported peer problems				0.065 (0.104)	
Self-reported pro-social behaviours					0.462*** (0.120)
Mother reporting × Self-rep pro-social behaviours					0.019 (0.124)
Constant	0.612*** (0.193)	0.734*** (0.140)	1.879*** (0.322)	0.574*** (0.174)	3.899*** (1.014)
Observations	389	389	389	389	389

Notes: Sample: Young people with self-reported SDQ as well as SDQ reported by at least one parent living in England and interviewed in the July wave of the study. Standard errors clustered at the child level.