

University of Southampton research report¹

Learning inequalities during the Covid-19 pandemic: how families cope with home-schooling

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Summary

The transition from face-to-face to distance (home and online) schooling is likely to generate educational loss. Using data from Understanding Society, the UK Household Longitudinal Study, we estimate that loss to be more pronounced for children from disadvantaged socio-economic backgrounds than for other children.

In April 2020, one month into the lockdown:

- Children in primary schools spent on average 2.4 hours per day doing schoolwork (comprising on average 2.2 offline lessons - a mix of worksheets, assignments and watching videos – and 0.6 online lessons) plus 2 hours per day of support from adults.
- Children in secondary schools spent on average 3 hours per day doing schoolwork (comprising on average 2.3 offline lessons and 1 online lesson) plus 0.9 hours per day of support from adults.

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- Focusing on combinations of circumstances which are both common and policy relevant (see graphs), we found that children in the most advantaged families, where both parents work regularly from home, the main parent² is in a 'service class' occupation (large employers, managers of professionals) and the children have their own computer spent on average 2.9 hours per day on school work for primary and 3.8 per day for secondary pupils. More disadvantaged children in families where the main parent is not in a service class occupation, where the child has to share a computer with other family members and either parent does not work regularly from home, the hours spent per day on school work are 2.3 for primary and 2.6 for secondary education.

Socio-economic differences in the estimated education loss are marked.

- For children in primary education, those from the most advantaged families will have lost on average 24% of a standard deviation across subjects by the time schools reopen in autumn, while children from the most disadvantaged families will have lost 31% of a standard deviation.
- For children in secondary education, children from the most advantaged group will have lost on average 14% of a standard deviation across subjects, while children from the most disadvantaged group will have lost twice as much, 28% of a standard deviation.

² The main parent is the mother, or the father if the mother does not live with the child or did not provide information about home-schooling. If the child does not live with her parents or the parents did not provide information on home-schooling, then other family members who provided such information are considered the main parent.

1. Introduction

The spring of 2020 saw a widespread and prolonged closure of schools across the UK due to the Covid-19 pandemic. Schools were closed on 21 March except for vulnerable children and the children of key workers (if the child was unable to stay at home). Although the four home nations of the UK have co-ordinated their response to the pandemic, the UK government in London can only change the lockdown regulations in England. Since health is a devolved matter, the three devolved governments are responsible for their own policies in relation to public health and therefore the Scottish government, the Welsh government and the Northern Ireland Executive remain responsible for introducing and lifting restrictions in their respective territories.

England, Scotland and Wales introduced lockdown restrictions on 26 March and Northern Ireland on 28 March with only minor differences in their respective approaches, but since then, each of the four governments has published a different roadmap for easing restrictions: the London government outlined a phased approach in England to lifting lockdown restrictions from 13 May comprising three steps; the Northern Ireland Executive's 'Pathway to Recovery' sets out five steps; the Scottish government outlined 'Four Phases'; and the Welsh government set out a 'traffic-light system'.

In England, nurseries and early years providers, including child-minding services, reopened to all children from 1 June. Also, from 1 June, some Reception, Year 1 and Year 6 students returned to school. The government initially aimed to have all primary school pupils return to school before the summer for a month, but on 9 June this was dropped. From 15 June, secondary schools in England partially reopened for Year 10 and Year 12. Currently, the UK government plans to bring all schools in England back in September.

In Scotland, child-minding services and outdoor nurseries reopened from 3 June, and all childcare providers reopened from 15 July. All schools are scheduled to reopen

under a blended model of at-school and at-home learning from 11 August, the start of the autumn term.

In Wales, child-minding services reopened on a phased basis from 22 June and all schools reopened all year groups, one-third of pupils at time, from 29 June.

In Northern Ireland, child-minding services restrictions were removed on 29 June. And for schools, pupils in Year 7, Year 12 and Year 14 are scheduled to return part-time on 24 August, the start of the autumn term.

Notwithstanding the differences in approach and the fact that restrictions are being eased, with plans for further easement over the summer, the prolonged school closure that started in March 2020 and the abrupt transition to home-schooling can potentially have severe consequences on the entire cohort of students across the UK. Families play a crucial role in home-schooling. They provide the material resources (computers and space) to access the homework provided by the school, provide academic and motivational support, and provide access to extra family resources like books and online learning (Jæger and Blaabæk 2020). Using income as an indicator of the ability of families to provide such resources and support, Andrew et al. (2020) show that UK children from families in the top income quintile spent on average 5.8 hours per day on educational activities during the months of April and May 2020, while those in the bottom income quintile spent on average 4.5 hours. Using parents' education as the main indicator of socioeconomic status of UK children, Bayrakdar and Guveli (2020) find a 10 minute gap in the daily volume of home-schooling between children in families where the main parent has a degree compared to children in families where the main parent has at most an upper secondary qualification. Inequalities were also found in Denmark with respect to library takeout during the lockdown using both parents' education and income as indicators of socioeconomic status (Jæger and Blaabæk 2020).

The use of family income and parents' education in UK-based research is justified as it properly captures the ability of families to cope with home-schooling. High-income

and highly educated parents are more likely to be in professional and managerial occupations, which in turn gives access to home-working and provides more available time for home learning. They are also more capable of providing academic support and are more likely to enrol in better performing schools, which in turn are more likely to provide better learning opportunities during school closure. In other words, income and level of parental education are legitimate measures of socioeconomic status because they are proxies for 'occupation'. In this paper we analyse inequalities by parents' occupation in home-schooling, and in addition, we look at family structure. Assisting a child with home-schooling is easier when the competing tasks of caring, working and home-schooling are shared among adults in the household. We analyse the effect on home-schooling of living in a two-parent family and in a family where there is an older sibling.

2. Data

We used the April wave of the COVID-19 dataset of the Understanding Society study, which surveyed all household members and included a module on schooling undertaken by parents. The response rate was 42%.³ The respondents were asked whether they were a guardian or parent of children living in the household. If they were, they undertook the home-schooling module. We also used the surveys 9 (most recent), 8 and 7 of the annual longitudinal study to obtain information on parents' occupation. Parents' occupation is defined by the eight-category version of the National Statistics Socio-economic Classification (NS-SEC). Parents were asked to report their working patterns during the lockdown. We use this reported information to distinguish between parents who are working from home occasionally, both parents who are employed and at home regularly because they work from home regularly or

³ University of Essex, Institute for Social and Economic Research. (2020). Understanding Society: COVID-19 Study, 2020. [data collection]. 2nd Edition. UK Data Service. SN: 8644, <http://doi.org/10.5255/UKDA-SN-8644-2>

because they are in furlough, both parents employed, but only one parent who is at home regularly because she/he works from home regularly or is in furlough, or either parent unemployed. When parents do not report any information on the working patterns or on their employment situation, we assign them to the category of parents working from home occasionally. Family structure is defined by living in a two-parent vs single-parent family, and by having an older sibling (we distinguish between siblings are who between 10 and 14 and between 15 and 18). We also include the following factors: child's gender and age, and ethnic background (based on the main parent's definition of the her ethnic background, distinguishing between British and non-British) whether the child owns a computer, uses a shared computer or does not have a computer. Data on the R-rate⁴ and homeworking by UK regions dating back to April 2020 are from the ONS⁵ and BBC⁶ respectively. Including those children who are not in school and for which there is complete information on all relevant variables, we generated a sample of 1430 children in primary education and 1595 children in secondary education. To make inferences about the population of school age children, we used the weights provided in the Understanding Society study.⁷ We account for the interdependence of children within the same household by using linear random intercept modelling (using the mixed programme in Stata).

⁴ The reproduction number (R) is the average number of secondary infections produced by 1 infected person.

⁵ Office for National Statistics (2020) Statistical bulletin: Coronavirus and homeworking in the UK: April 2020. Homeworking patterns in the UK, broken down by sex, age, region and ethnicity.

Available online at:

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/coronavirusandhomeworkingintheuk/april2020>

Accessed 8 July 2020.

⁶ BBC <https://www.bbc.co.uk/news/uk-51768274>

Accessed 8 July 2020.

⁷ Understanding Society COVID-19 USER GUIDE.

Outcomes of interest: the time children spent doing work provided by the school.

The wording of the question: *Thinking about the situation now, on an average day when they are doing school work at home, how much time does {childname} spend on this?*

Answer categories are: (i) less than an hour; (ii) 1 to 2 hours;(iii) 2 to 3 hours; (iv) 3 to 4 hours; (v) 4 to 5 hours; (vi) 5 or more hours. We used the mid-points of the intervals, and 5 for the top category and 0.5 for the bottom category.

Outcomes of interest: the hours of support from adults.

The question: *How much time do you or other family members spend actively helping {childname}?*

Answer categories are: (i) None, (ii) less than an hour, (iii) 1 to 2 hours, (iv) 2 to 3 hours, (v) 3 to 4 hours, (vi) 4 to 5 hours, (vii) 5 or more hours. We used the mid-points of the intervals, and 5 for the top category and 0.5 for the bottom category.

Outcomes of interest: The number of offline and online lessons.

The wording of the questions: *How many off-line lessons (such as worksheets, assignments, watching videos) does {childname}'s school provide for them?*

and

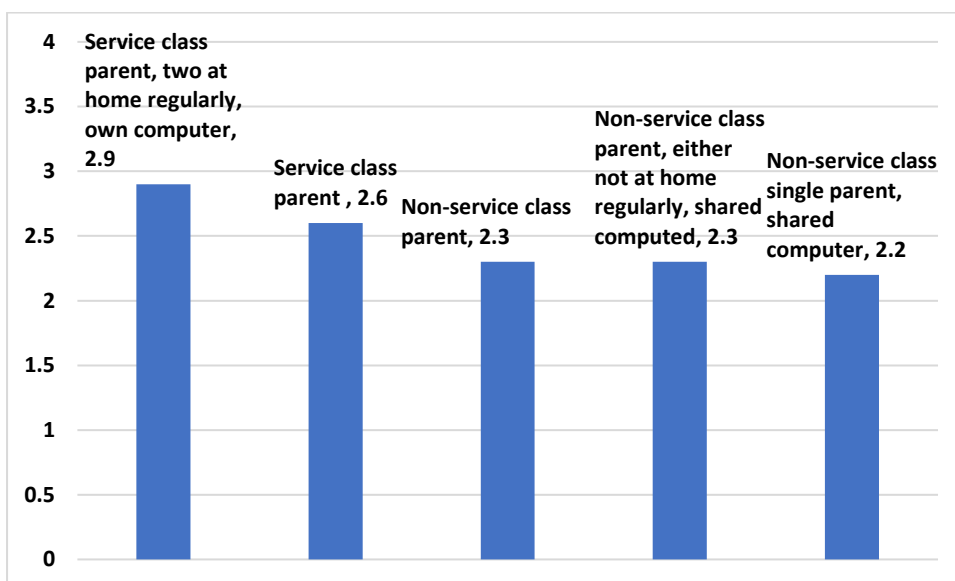
How many online (live or real-time) lessons or meetings does {childname}'s school provide for them?

Answer categories are: (i) None, (ii) Less than one a day, (iii) About 1 a day,(iv)) About 2 a day, (v) About 3 a day, (vi) About 4 or more a day. For the bottom category we used 0.5 lessons and for the top one we used 4 lessons.

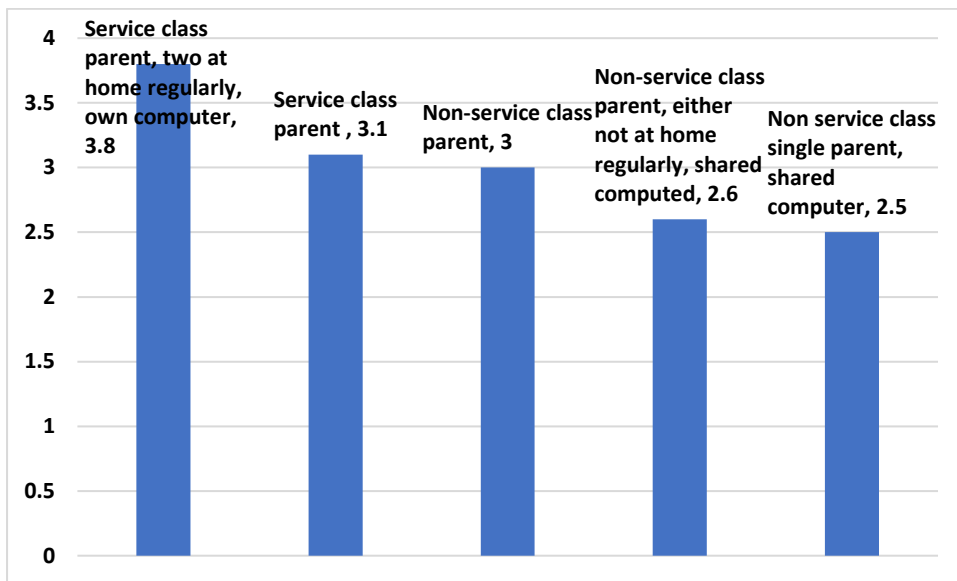
3. Results

We have grouped our results by key predictors for our outcomes: hours of schoolwork; hours of support from adults; offline lessons per day; and online lessons per day. We present results from the main regression models and from the marginal effects computed from those models. In the case of the graphs, the marginal effects are estimated from the same model specification but using a binary variable for main parent occupation distinguishing between the service class occupations (large employers, managers and professionals) and the less advantaged ones (intermediate occupations, small employers and own account occupations, lower supervisory and technical occupations, semi-routine and routine occupations).

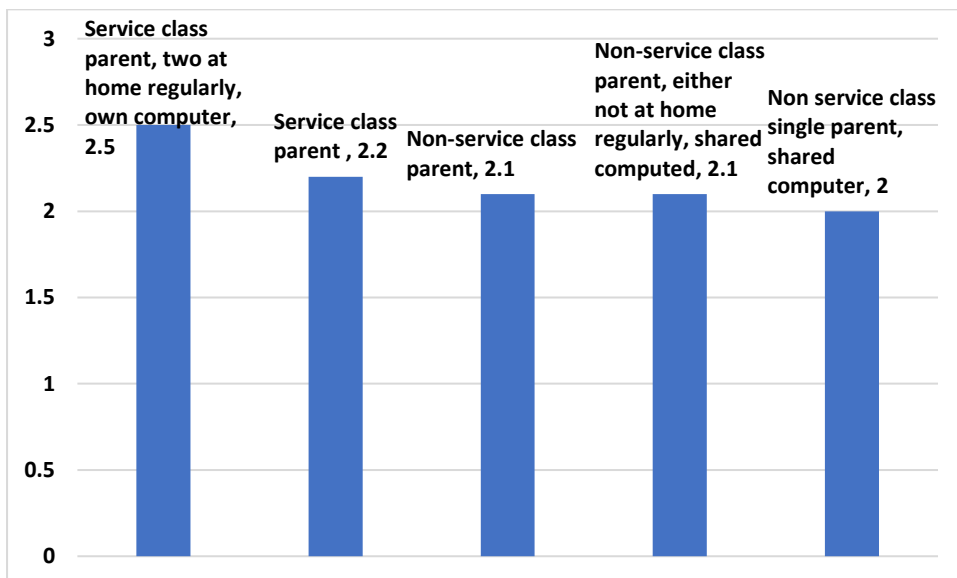
Graph 1 - Hours of schoolwork (primary)



Graph 2 - Hours of schoolwork (secondary)



Graph 3 - Number of offline lessons (primary)



Graph 4 - Number of offline lessons (secondary)

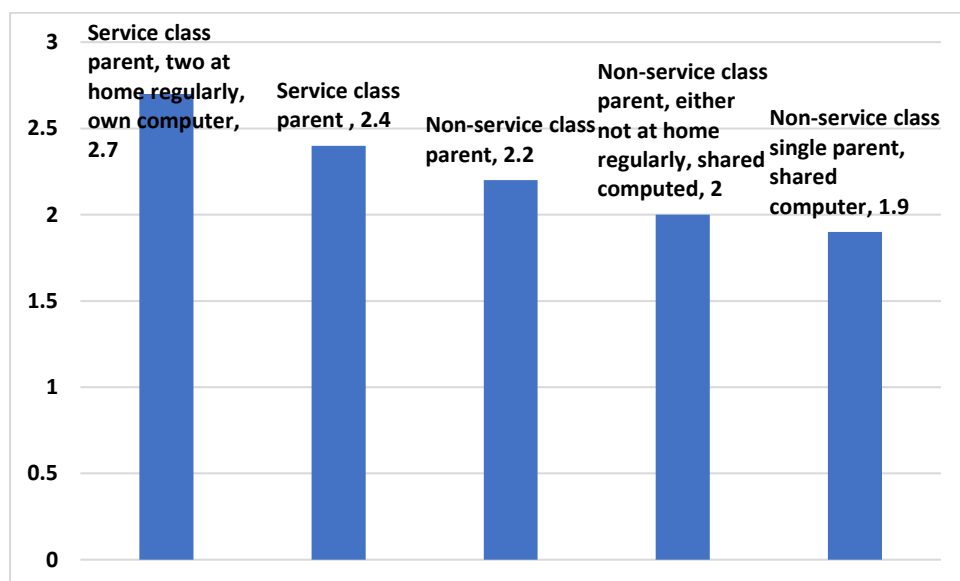


Table 1 - Determinants of schoolwork and adult support: random intercept models on understanding society data.

	Primary Hours of schoolwork	Secondary Hours of schoolwork	Primary Hours of support from adults	Secondary Hours of support from adults	Primary Offline lessons per day	Secondary Offline lessons per day	Primary Online lessons per day	Secondary Online lessons per day
NS-SEC (Ref.: Routine)								
Large employers & higher management	0.58*	0.56*	0.13	-0.38	0.09	0.74**	-0.23	-0.05
	(0.24)	(0.29)	(0.27)	(0.23)	(0.28)	(0.27)	(0.25)	(0.25)
Higher professional	0.62**	0.86***	0.28	-0.36	0.07	0.79**	-0.25	-0.06
	(0.22)	(0.26)	(0.26)	(0.24)	(0.27)	(0.26)	(0.24)	(0.24)
Lower management & professional	0.59**	0.55**	0.34	-0.33	0.16	0.75***	-0.26	-0.18
	(0.18)	(0.21)	(0.22)	(0.21)	(0.23)	(0.21)	(0.21)	(0.19)
Intermediate	0.39*	0.64**	0.25	-0.43*	0.13	0.57*	-0.39~	-0.04
	(0.19)	(0.23)	(0.23)	(0.22)	(0.24)	(0.23)	(0.21)	(0.21)
Small employers & own account	0.31	0.30	0.07	-0.43~	0.01	0.55*	-0.37	0.05
	(0.24)	(0.26)	(0.26)	(0.23)	(0.27)	(0.25)	(0.24)	(0.24)

Lower supervisory & technical	0.68**	0.39	0.55~	-0.32	0.05	0.61*	-0.16	-0.47*
	(0.25)	(0.28)	(0.29)	(0.26)	(0.28)	(0.30)	(0.25)	(0.24)
Semi-routine	0.15	0.41~	0.24	-0.27	-0.01	0.52*	-0.04	0.11
	(0.19)	(0.23)	(0.24)	(0.22)	(0.25)	(0.23)	(0.22)	(0.21)
Ref.: Parents working from home occasionally or not enough info								
Parents employed, at home regularly	0.28~	0.60***	0.18	0.12	0.39**	0.41**	0.16	0.12
	(0.15)	(0.14)	(0.15)	(0.09)	(0.14)	(0.15)	(0.13)	(0.15)
Parents employed, only one at home regularly	-0.01	0.04	-0.00	0.07	0.10	0.14	0.05	-0.17~
	(0.10)	(0.10)	(0.10)	(0.06)	(0.10)	(0.10)	(0.08)	(0.10)
At least one parent unemployed	-0.14	0.24	-0.12	0.37	0.02	0.53*	-0.05	-0.21
	(0.22)	(0.29)	(0.22)	(0.27)	(0.24)	(0.26)	(0.24)	(0.27)
Single parent vs couple	-0.12	-0.23	-0.10	0.18~	-0.20	-0.22	0.08	0.03
	(0.15)	(0.16)	(0.15)	(0.10)	(0.17)	(0.14)	(0.14)	(0.14)
Ref.: Child has own computer								
Shared computer	-0.01	-0.39***	0.12	0.15*	0.10	-0.07	-0.04	-0.25**
	(0.09)	(0.09)	(0.11)	(0.06)	(0.10)	(0.09)	(0.07)	(0.08)
No computer	-0.67***	-0.64*	-0.42*	-0.23	-0.48*	-0.08	-0.22*	-0.57**
	(0.16)	(0.31)	(0.17)	(0.26)	(0.23)	(0.36)	(0.11)	(0.17)
Female	0.18**	0.46***	-0.05	-0.08	0.14*	0.22**	-0.06	0.09
	(0.06)	(0.08)	(0.07)	(0.05)	(0.07)	(0.08)	(0.05)	(0.07)
Child's age	0.10***	-0.14***	-0.05**	-0.18***	0.04**	-0.21***	0.03~	-0.05**
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)
Ref.: No sibling 10 or older								
Between 10 and 14	0.08	-0.29*	0.16	-0.20~	0.13	-0.42**	-0.04	0.00
	(0.10)	(0.13)	(0.11)	(0.11)	(0.10)	(0.15)	(0.06)	(0.14)
Between 15 and 18	-0.13	-0.23**	0.12	-0.06	0.06	-0.20*	0.05	-0.07
	(0.10)	(0.08)	(0.11)	(0.05)	(0.11)	(0.08)	(0.09)	(0.07)
British	-0.01	0.06	0.28*	0.05	0.19	0.04	-0.18	-0.05
	(0.12)	(0.15)	(0.12)	(0.09)	(0.12)	(0.13)	(0.11)	(0.13)
Regional Homeworking rate	0.01~	0.03**	0.00	0.00	0.02*	0.01	-0.00	0.02*

	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Regional R-rate	-0.08	0.60	0.37	0.21	-0.53	0.47	0.35	0.75
	(0.44)	(0.57)	(0.48)	(0.38)	(0.50)	(0.54)	(0.42)	(0.48)
Constant	0.65	2.69***	1.24*	3.27***	0.89	3.75***	0.48	0.43
	(0.57)	(0.80)	(0.59)	(0.50)	(0.62)	(0.72)	(0.52)	(0.66)
Household level residual (variance)	0.91	0.76	0.99	0.26	1.14	0.69	0.74	0.75
	(0.10)	(0.12)	(0.12)	(0.06)	(0.09)	(0.09)	(0.10)	(0.11)
Individual level residual (variance)	0.41	1.15	0.45	0.52	0.36	0.98	0.30	0.89
	(0.10)	(0.12)	(0.10)	(0.07)	(0.08)	(0.09)	(0.08)	(0.11)
Observations	1430	1594	1430	1594	1430	1594	1430	1594

~ p<0.10 * p<0.05 ** p<0.01 *** p<0.001

Occupation of main parent

The total amount of schoolwork in both primary and in secondary phases has a positive association with the occupation of the main parent (Table 1). We repeated the analyses using the highest occupational level in the household or the free school meal eligibility instead of the occupation of the main parent, and the coefficients regarding the effect of those indicators were generally not statistically significant (results available on request). Focusing on the marginal effects regarding the two extreme occupational groups, children in families where the main parent has a 'routine' occupation spent on average 2 hours per day in primary education and 2.5 in secondary education on schoolwork, while children in families where the main parent is in the 'top' occupation including large employers and managers spent 2.6 hours per day in primary education and 3 hours in secondary education on schoolwork. The graphs show that the combinations of occupation and the other relevant factors tend to exacerbate inequalities.

Schoolwork consisted of offline and online lessons. Occupation is significantly and positively associated with the number of offline lessons per day at the secondary

school level, while in primary education the coefficients are small and non-significant. The uptake of online lessons shows a negative association with occupation, with the routine occupation group taking a higher number of online lessons than that of the other occupations, yet the difference is mostly non-significant. The exceptions are the differentials with the 'lower supervisory' and 'technical' in secondary education and 'intermediate' occupations in primary education. As of April 2020, online lessons were provided by a minority of schools (33% of children attend schools that provide at least one online lesson) and it is not clear how this provision depends on school characteristics such as performance on key stages or socio-economic composition within state schools, although we know that private schools provided more online and offline lessons (Green 2020).

Offline lessons were more common, and typically involve a mix of worksheets, assignments and watching videos. The differing results for online and offline lessons might suggest that offline lessons require more initiative and planning from families, while online lessons depend more on the school initiative.

Regarding the number of hours of support from adults, it is notable that for primary school pupils support is positively associated with occupation, with more support received by children in advantaged occupational groups, while for secondary students, the association is negative in general. In primary education, the occupational differential in the amount of adult support is significant only between the lower supervisory and technical occupations and the routine occupations, while at the secondary education only between routine occupations and small employers and own account workers. It is unclear whether this difference is caused by prior inequalities in children's academic ability by occupational group, or by opportunity (in that children of parents in more advantaged occupational groups have more time available) or by choosing to invest more time in schoolwork.

Family structure: working patterns and two-parent vs single-parent families

Parents are better able to assist their children when they are both working from home. Having both parents regularly working from home is significantly and positively associated with a larger total volume of schoolwork compared to other working patterns. When only one parent is regularly home or when the reason for staying home is unemployment, there is no advantage in having a parent regularly at home compared to having parents at home only occasionally. The advantage of having both parents working from home regularly is mostly accounted for by differences among families in the uptake of offline lessons, as online lessons and amount of support from adults are not associated with parents' working patterns. The exception is the number of offline lessons per day, which is positively associated with having a parent unemployed. Given the timing of the data collection (April 2020) it cannot be ruled out that the impact of unemployment will play a more significant role in the months to come, given the financial impact of the pandemic. Living in a single-parent family has a small, negative and non-significant effect across the outcomes, except for offline lessons in secondary education, where it has a positive and significant effect. The results could be seen as positive as a significant body of work has found that living in a single-parent household can hinder educational outcomes (Hampden-Thompson and Galindo 2015, Song et al. 2012).

Family structure: older siblings

Older siblings can support younger siblings with schoolwork, or alternatively compete for attention from parents and for material resources such as computers and space. Our findings seem to support the latter effect at least in secondary education. The presence of older siblings at home has a negative and significant association with secondary education outcomes, and mixed and non-significant ones with primary education ones.

Other factors

Compared to having one's own computer, *not* having a computer is negatively and substantially associated with schoolwork and adult support across primary and secondary education, although for secondary student the coefficients were non-significant for hours of support from adults and offline lessons. Compared to having one's own computer, having a *shared* computer at home shows mixed associations with students' outcomes.

Female students complete a larger volume of schoolwork and uptake a larger number of offline lessons than male students, but gender is not associated with online lessons and hours of support from adults.

Children's age shows mixed results, but the results are conditional on education phase and the presence / absence of older siblings.

Compared to non-British children, British children in general do not have an advantage except for the hours of adult support received in primary education, where they receive more support compared to their non-British peers.

The variation in the incidence of working from home by region has a positive association with the total amount of schoolwork, the number of offline lessons in primary education and online lessons in secondary education. The larger the percentage of the working population working from home, the larger the number of hours of schoolwork, the number of offline lessons in primary education and online lessons in secondary education.

Finally, the regional R-rate does not have any significant association with any of the outcomes.

An estimation of the learning loss

Closing schools in the last week of March represents a loss of 15 weeks of face-to-face schooling (17 calendar weeks up to the week commencing 20 July when schools would close for summer vacation, less two weeks for Easter vacation). This prolonged period

of home-schooling is unprecedented, and it is difficult to predict the learning loss that children will have suffered. Home-schooling is not a good substitute for face-to-face schooling with teachers and peers, particularly mid-year / mid-curriculum, and its efficacy is likely to depend strongly on family socioeconomic status (SES) in the same way that the regression in learning experienced by children during summer vacation time is more pronounced for children from disadvantaged backgrounds (Stewart et al. 2018). In a meta-review of mostly US-based studies, Cooper et al. (1996) found that all students lost approximately 1.8 months of progress **in maths skills** and 4 months of progress **in spelling skills** during summer vacation closure. As far as **reading recognition** is concerned, low-SES students experienced a *loss* of 1.5 months whereas high-SES children *gained* around 2.3 months, and research in the UK by Forsey (2017) suggests that it takes up to 6 weeks for teachers to help students catch up with the curriculum forgotten over the summer vacation period. The lessons we can apply to the Covid lockdown from research on summer vacation loss is that when disadvantaged children take a break from face-to-face schooling for a prolonged period of time their attainment falls, whilst their more advantaged peers see their attainment fall less steeply or rise. If we add into the mix that the uptake of homework has been at best very unequal, we can infer that as a result of school Covid closure, the academic attainment gap will be significantly increased by the time schools reopen in autumn 2020.

During the 15-week Covid school closure, primary school children from the most *advantaged* group (service class parent; two parents at home; child having own computer) will have completed roughly 218 hours of schoolwork, 26% more than their disadvantaged counterparts (which completed 173 hours of schoolwork) (non-service class parent; either parent not at home regularly; child having a *shared* computer). Secondary school children from the most advantaged group will have completed roughly 285 hours of schoolwork, 46% more than their disadvantaged counterparts (which completed 195 hours of schoolwork).

In estimating the potential education loss to children, we take a conservative approach and assume that online schooling is as effective as face-to-face schooling. In normal circumstances, students across the UK would be spending a varying number of hours in schools depending on where the school is located (i.e. which of the four home nations) and depending on the education phase (i.e. primary or secondary). For convenience, we take 5 hours as the typical length of an instruction day across the UK and 39 as the number of weeks completed during an academic year (Education Endowment Foundation 2018, Cirin 2014). Accordingly, primary students would have done 2.6 (5 minus 2.4) more hours per day in schooling, or 13 (2.6×5) more hours per week, had schools not been closed. The total number of schooling hours that students will have lost is 195 (15×13), or 20% of the total number of schooling hours in primary schools ($39 \text{ weeks} \times 5 \times 5 = 975$) during the academic year. If we accept previous research by Di Pietro et al. (2020) and Lavy (2015) and hypothesise that one additional weekly hour of instruction over the school year is associated with an increase in subject test scores of about 6% of a standard deviation. A loss of 195 school hours corresponds to 5 ($195/39$) hours per week. This would imply a learning loss of about 30% ($6\% \times 5$) of a standard deviation. "As a rule of thumb, learning gains on most national and international tests during one year are equal to between one-quarter and one-third of a standard deviation, which is 25–30 points on the PISA scale" (Woessman 2016, p. 6). As in PISA test scores are scaled to have a mean of 500 points and a standard deviation of 100 points, 25-30 points corresponds to 25-30 percent of a standard deviation. Applying this rule of thumb to the case of primary students, the magnitude of the learning loss for this group will be equivalent to a year of schooling.

For secondary students, which complete 3 hours of schoolwork per day, the estimated loss is 23% of a standard deviation, amounting broadly to slightly less than a year of schooling.

Socio-economic differences in the estimated loss are marked.

In primary education, children from the most advantaged group will have lost 24% of a standard deviation on average across subjects by the reopening of schools in autumn, while children from the least advantaged group will have lost 31% of a standard deviation.

In secondary education, children from the most advantaged group will have lost 14% of a standard deviation on average across subjects, while children from the least advantaged group will have lost twice as much, 28% of a standard deviation.

4. Conclusions

Our findings carry some caveats. The government has started providing instructional materials to give parents and students the opportunity to compose their own unique learning environment from both government and school sources, and as such our analyses do not capture the changing and maturing nature of home learning. Secondly, our learning loss estimates are based on analyses of learning gains that use PISA data on 15-year-olds, which are not specific to UK key stage results.

Notwithstanding those two limitations, our results have important implications. The transition to distance schooling is likely to exacerbate inequalities by socio-economic groups due to both the socio-economic gap in the volume of schoolwork completed and to the relative ability or inability of some parents to support children's learning. Families with a service class background have the twofold advantage of being better able to assist their children with home-schooling and of having more time to do it as they are more likely to be working from home.

While living in a family where parents work from home is important for children's volume of schoolwork, we did not find socio-economic inequalities in the amount of support from adults. It is not the *amount of support* that children receive that is important but the *quality of the attention*.

Finally, our analysis does not take into account the impact on educational attainment of the mental well-being of children and/or their parents during the lockdown, which is also likely to be associated with socio-economic status and further exacerbate socio-economic inequalities in learning losses.

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