# Learning inequalities during the Covid-19 pandemic

## A longitudinal analysis using the UK Understanding Society 2020 and 2021 data

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# Executive Summary of Findings

- The transition to distance schooling has exacerbated inequalities by socio-economic status (SES) due both to the gap in the volume of schoolwork completed and to the relative ability or inability of some parents to support their children's learning.
- While parental occupation alone was found to be a significant determinant of differences in the volume of schoolwork among students, its effect was amplified when combined with student access to computers, family circumstances and parental working patterns.
- The provision of schoolwork improved in both primary and secondary schools in the second closure period (January 2021 through February 2021) compared to the first school closure period (from late March 2020 to the start of June 2020). The number of offline and online lessons per day increased and this led to a larger volume of schoolwork being done, from 2.3 hours per day to 3.3 hours per day in primary schools, and from 2.6 hours per day to 4 hours per day in secondary schools.
- The increase in schoolwork provision can be explained by the improved provision of lessons, by greater availability of computers and by the fact that families were better prepared for the second school closure and could engage more with the schoolwork provided.
- The results show that in January 2021 the gaps between 'service class' students (students whose parents are large employers, higher managers and professionals) and 'routine class' students (students whose parents are in routine and semi-routine sales, service, technical, agricultural and clerical occupations) reduced and became non-significant for primary school pupils. Service class and 'intermediate class' children (those whose parents are lower managerial, administrative and professional, small employers and own account workers) did not receive any more support from their parents than routine class children.[1]
- Primary school children of single parents who worked from home were able to reduce the gap in schoolwork done compared to the most advantaged socio-economic group, but generally, inequalities between socio-economic groups in the uptake of schoolwork remained stable between the two school closure periods.

[1] We use the National Statistics Socio-economic Classification (NS-SEC) for jobs.

## Executive Summary of Recommendations

Our findings suggest that:

- If it is feasible in terms of containment of the virus, it is important that schools remain open during any further phases of high infection in order to avoid a further widening of the achievement gap between socio-economic groups and to avoid the negative impact on the mental well-being of children and their parents, which itself is likely to be associated with socio-economic status. The priority must be to avoid a 'Matthew Effect of disadvantage' where more and more opportunity is taken from those children who already suffered the most from the two school closures.
- Should schools be forced to close again in the event of another lockdown, inequalities in learning can be remediated by increasing the provision of lessons, providing students with better access to IT and by providing academic tutors to compensate for the absence of parents who cannot work from home.
- Better and more widely available access to IT and online resources is not enough. Provision targeted at the most disadvantaged should include more and better *guidance* for parents on using the IT resources provided. It is in the nature of socio-economic disadvantage that parents in such circumstances are less familiar with and less adept at navigating the wide array of resources that the government has properly provided during the pandemic.
- The traditional proxy measure of socio-economic disadvantage in education is entitlement to Free School Meals (FSM). Our research shows that this measure is too crude in the circumstances of the current pandemic: that within the FSM category there are pockets of even greater disadvantage related to poor access to IT, parental occupation and family circumstance; and outside the FSM category there are pockets of similar disadvantage, all of whom are less likely to access schoolwork during school closures and are more likely to suffer the largest learning losses. When providing schoolwork remotely during a school closure, schools should consider providing guidance and tutoring *targeted* at: children who do not have a computer or do not have ready access to one; children of single parents; and children of routine class parents who cannot work from home.
- The government catch-up funding and schemes like the National Tutoring Programme are a timely response and a laudable effort at closing the attainment gap between socio-economic groups. From a quantitative point of view, the total allocation per pupil of £80, which amounts to 6 additional days of schooling, is likely to be insufficient to attenuate significantly the attainment gap between socio-economic groups widened by the pandemic. Catch-up tutoring should be of the order of several weeks of schooling, but qualitatively it is important to target online and offline resources, tutoring (online and face-to-face), IT hardware and

guidance for parents on using it to those students which our research has identified as being in greatest need. To do otherwise is to risk piling disadvantage upon disadvantage, from which it would be very difficult to recover, when the next school year opens in September.

- Schools and not central government are in the best position to identify those students and families most in need and should be provided with the necessary funding and flexibility to target provision and support immediately to the most disadvantaged students. If government concedes the principle, schools must not delay its application.

# 1. Introduction

The spring of 2020 saw the widespread and prolonged closure of schools across the UK due to the Covid-19 pandemic. Schools had to switch to distance learning very rapidly without any prior experience, preparation or training. Although a phased reopening from the First National Lockdown[2] began in July 2020, students transitioned to distance learning again in January 2021, impairing an already difficult learning recovery. The transition to distance schooling has affected student learning and transferred a great deal of responsibility for educational activities to families, some of whom struggled with the challenge, thus exacerbating inequalities in learning opportunities by socio-economic status (SES). The current debate on the extent of the learning loss resulting from these two periods of school closure and the measures necessary to remediate that loss, against a backdrop of possible further closures as new variants of the disease get a foothold, demands a thorough analysis of the learning experiences of children during the closure periods and the extent to which schools improved their remote delivery between the two closure periods. This report provides such an analysis, using longitudinal data from the April 2020 and January 2021 Understanding Society (USoc) Covid-19 surveys.

As both surveys interviewed the same families, were representative of the UK and were linked to previous USoc surveys, we were able to construct a rich, reliable and longitudinal dataset of approx. 2300 children in primary school and 3000 children in secondary school to look at:

1. Whether (and to what extent) the prevalence of schoolwork[3] changed between the first and the second school closure periods. We focus on four outcomes: time spent doing work provided by the school; provision of online school lessons; provision of offline school lessons; and amount of parental support.
2. Whether (and to what extent) the gap in schoolwork between the least disadvantaged (high socio-economic status, SES) and most disadvantaged (low SES) families changed between the first and the second school closures.
3. The extent to which changes in schoolwork can be explained by compositional effects; i.e. changes in observed circumstances such as acquisition of new computers and home-working patterns versus changes in family engagement with schoolwork, such as being more committed and ready and able to assist children.

We define SES using parental occupation, and as a combination of occupation, working patterns and access to computers.

We finish the report by recommending several policies to mitigate the impact of school closures on the learning gap between different socio-economic groups.

[2] The period of the First National Lockdown was from late March 2020 to the start of June 2020. The period of the Second National Lockdown, which did not result in a nationwide school closure, was from early November 2020 to early December 2020. The period of the Third National Lockdown was from January 2021 through February 2021.

[3] We define 'schoolwork' as the sum of synchronous and asynchronous online lessons and off-line assigned work. Offline lessons typically consist of a mix of worksheets, assignments and watching videos.

## 1.1 How this study complements other research

During the first school closure from late March 2020 to the start of June 2020, students spent fewer hours doing schoolwork than they would have done in normal circumstances (Andrew et al. 2020, Bayrakdar & Guveli 2020, ONS 2020, Pensiero et al. 2020) and most schoolwork consisted of offline asynchronous activities rather than live sessions (Green 2020, Pensiero et al. 2020). The reduction in schoolwork and learning was more severe among disadvantaged (low SES) students whose families were not well-equipped to cope with home-schooling (Andrew et al. 2020, Bayrakdar & Guveli 2020, Pensiero et al. 2020).[4] Similar effects were found in mainland Europe: in the Netherlands, Bol (2020) found that less educated parents felt 'less capable' of helping their children with schoolwork; and in Denmark inequalities between SES groups (using both parental education and income as indicators) were found with respect to library takeout during the lockdown (Jæger & Blaabæk 2020). Using survey data collected from teachers during the first school closure in the UK, Lucas et al. (2020) found that student engagement with schoolwork was lower in more deprived schools, among students eligible for free school meals (FSM) and among those with limited access to computers and study space at home. Using income as an indicator of the ability of families to provide opportunities for home-learning, Andrew et al. (2020) found that UK children from families in the top income quintile spent on average 1.3 hours per day longer on educational activities during the first closure period than those in the bottom income quintile (5.8 hours per day compared to 4.5 hours per day). Research conducted following the first lockdown in 2020 by the Office of National Statistics (ONS) found children tended to do less schoolwork if they were younger or when there was a child under five-years-old in the household (ONS, 2020).

Research in the UK and abroad has focused on how families and schools responded to distance learning during the first school closure period, but there is little research on learning during the second closure or on the extent to which schools benefited from their first closure experience. The few UK and international studies that looked at distance learning over time showed that following the first school closure, school provision and remote schoolwork subsequently showed marked differences. Reimer at al. (2021) found that inequality in reading in Denmark during Covid-19 increased during the first school closure *only*, but that the gap returned to pre-pandemic levels following subsequent school closures. Cattan et al. (2021) found that in the UK, between April/May 2020 when schools were closed, and June/July 2020 when schools reopened, the total learning time fell for both primary and secondary school students. Our study is unique in that it looks for the first time at schoolwork during both school closures *for the same students and their families*.

Generally, research in the UK and elsewhere on access to learning opportunities during the Covid crisis has focused on parental income, parental level of education, and FSM eligibility as proxy indicators of socio-economic disadvantage (Grätz & Lipps 2021, Andrew et al. 2020, Bayrakdar & Guveli 2020, Lucas et al. 2020). The use of family income

[4] In an earlier report (Pensiero et al. 2020), we estimated the potential education loss to children of the first school closure in absence of data on *actual* educational achievements. We did not carry out a similar exercise in this research because of the complexity of considering two distinct school closures and because research in the UK and abroad has since produced a variety of analyses on the learning loss using *actual* educational achievements (e.g. Education Policy Institute et al. 2021; Engzell, Frey and Verhagen 2020).

and parental level of education captures the ability of families to cope with home-schooling, but for our research we considered *parental occupation* to be a better indicator because it identifies those parents who are more amenable to home-working and who can therefore provide more time and more proximal support for their children's home-learning. Occupation is also a good indicator of parents' ability to provide academic support and of the likelihood that children are enrolled in better-performing schools, which in turn are more likely to cater for the likelihood that disparities in learning activities by parental occupation are magnified by working patterns and (lack of) access to computers. We used the occupational status of parents – whether employed, furloughed or unemployed - and the availability of computers for our analysis. We also considered family structure in our analysis to capture the fact that assisting children with schoolwork is likely to be easier when the competing tasks of caring, working and home-schooling are shared among adults in the household.

## 1.2 The COVID-19 pandemic: the UK policy timeline

On March 16, 2020, Prime Minister Boris Johnson said that it was 'time for everyone to stop non-essential contact and travel'. The UK was expected to 'turn the tide of coronavirus' in twelve weeks, but on March 23, the Prime Minister announced the First National Lockdown, ordering people to 'stay at home'. Two days later, the Coronavirus Act 2020[5] received Royal Assent and the following day, the lockdown measures legally come into force. The Act granted the government emergency powers to handle the pandemic: the discretionary power to limit or suspend public gatherings; to detain individuals suspected of being infected; and to intervene in a range of sectors to limit transmission, ease the burden on public health services, and assist those most affected economically. An important area covered by the Act was schools, which were closed across the UK[6] in response to the pandemic, except for children of key workers and vulnerable children, and teaching moved online.

On April 16, the lockdown was extended for 'at least' three weeks with the UK government setting out five tests that had to be met before restrictions were lifted. Two weeks later, on April 30, the Prime Minister announced that we were 'past the peak' of the pandemic, and on May 10 announced a conditional plan for lifting lockdown, with people who could not easily work from home returning to the workplace but avoiding public transport. On June 1, schools started reopening across England, ending the First National Lockdown and the first school closure period. On June 15, non-essential shops reopened and on June 23 the Prime Minister jauntily announced that the UK's 'national hibernation' was coming to an end as the government relaxed restrictions and its 'two-meter (2m) social distancing rule'.

[5] The act was introduced to Parliament on 19 March 2020. It passed the House of Commons without a vote on 23 March and the House of Lords on 25 March.

[6] Education and health in the UK is delegated to the four home nations: to the Scottish Government, the Welsh Government and the Northern Ireland Executive, while the UK Government in London is responsible for England. The Act applied to Wales and Northern Ireland. The Welsh First Minister issued a Declaration of Threat to public health on 29 March 2020 under Schedule 22 to the Act in order to exercise the powers conferred upon Welsh Ministers under that Act. The Scottish Parliament agreed a Legislative Consent Motion on 24 March 2020 for the Act to apply in Scotland. The Scottish Parliament subsequently passed the Coronavirus (Scotland) Act 2020 to regulate the devolved response to the pandemic.

On June 29, the Secretary of State for Health and Social Care, Matt Hancock, announced that the UK's first *local* lockdown would be applied in parts of Leicestershire, and this came into force on July 4 even as restrictions (such as reopening pubs and restaurants) were further lifted in other parts of England. Over the course of the summer, the messages were mixed. On July 18 local authorities in England gained additional powers to enforce social distancing, but restrictions continued to be lifted, including the reopening of indoor theatres, bowling alleys and play areas on August 14.

Within a month, there were ominous signs. On September 14, the 'Rule of Six' was introduced, banning indoor and outdoor social gatherings with more than six people. On September 22, the Prime Minister announced new restrictions in England, including a return to working from home and a 10 pm curfew for pubs and restaurants. On September 30 he said that the UK was 'at a critical moment' in the crisis and that he would 'not hesitate' to impose further restrictions if required. On October 14, he kept his promise, introducing a new three-tier system of restrictions, and on October 31 he announced a second lockdown in England to prevent a 'medical and moral disaster'.

On November 5, 2020, the Second National Lockdown came into force in England. On November 24, the government announced a lockdown easement over the Christmas period from 23 to 27 December when up to three households were allowed to meet up. In fact, well in advance of the festive period, on December 2, the four-week Second National Lockdown ended with England switching to a stricter version of the three-tier system of restrictions it had announced in mid-October. The distinction between the lockdown and the strict three-tier system that replaced it was largely semantic, made even more so by the introduction of a fourth 'Stay at Home' Tier on December 21, applied immediately to London and the South East. On December 26, more areas of England entered Tier 4 restrictions. Throughout this period the government maintained that children would return to school after the Christmas vacation, even as the Prime Minister warned on January 4, 2021, that restrictions in England would get tougher.

Children did not return to school after the Christmas vacation. On January 6, 2021, England entered its Third National Lockdown and its second national school closure period, but the national mood was more optimistic this time and the government better prepared. A month previously, on December 8, 2020, the first person had been vaccinated against Covid-19, and the UK's hugely successful national vaccination plan was already rolling out. On February 15, hotel quarantine was imposed for travellers arriving in England from high-risk countries and on February 22 the Prime Minister published the government's 'roadmap' for lifting the lockdown. On March 8 the national lockdown and school closure ended with the return to school for primary and secondary school students in England. Later than same month, on March 25, MPs voted by 484 to 76 to extend the emergency powers of the Coronavirus Act 2020 for another six months.

### 1.3 The pandemic and schooling: the first lockdown and school closure period

The first closure period ran for approximately ten weeks - from late-March 2020 until the start of June 2020 - although several schools in the north of England had already closed their doors by the end of February when a group of pupils returned from Italy with symptoms (Bedingfield 2020). On 18 March, the Welsh and Scottish governments and the

Northern Ireland Executive announced that all schools would be closing from 20 March (BBC 2020a) and might not reopen before the summer (BBC 2020b; ITV, 2020). Soon afterwards, the Secretary of State for Education, Gavin Williamson, announced that schools in England would close from 20 March for an unspecified period of time (BBC 2020c). This closure, while nationwide, did not affect all pupils equally. The children of key workers and vulnerable children, for whom the Department for Education (DfE) published guidance on eligibility (DfE 2020a) that was liberally applied, still attended school in the usual way, so there was *ab initio* a differential effect of closures by parental occupation. In due course GCSE and A-level exams and their Scottish equivalents were cancelled, with grades eventually assigned based on teacher predictions following a policy collapse in August 2020 (Kelly 2021).

The Coronavirus Act 2020, which became law on March 25, gave the government emergency powers to handle the pandemic by intervening with regulations in a range of sectors including education, but there was little or no guidance provided to schools and parents by the UK's devolved administrations at the time.

### 1.4 The pandemic and schooling: the first reopening

Primary schools in England reopened tentatively on 1 June 2020, beginning with nursery classes and children in Reception, Year 1 and Year 6, although many schools and local councils delayed reopening (BBC 2020d). It was planned that all primary-age pupils would be back in school by the end of June, but on 9 June the government backtracked and announced that primary schools would not reopen for other year groups because of concerns about the rate of infection. Instead, all primary pupils would return to school in September, almost six months after schools first closed (Coughlan 2020).

Secondary schools in England reopened for Year 10 (typically 15 year-olds) and Year 12 (typically 17 year-olds) from 15 June, but schools were instructed to continue to educate young people in these age groups mainly online at home, and to keep face-to-face lessons to a minimum (DfE, 2020a). All secondary students returned in full at the start of the new academic year in September (Richardson, 2020).

Schools in Wales reopened at the end of June for all year groups, four weeks later than schools in England, although in most cases it was part-time and discretionary (BBC, 2020e). Scottish schools reopened in mid-August where it was originally intended they would use a blended model of learning (partly at school and partly at home), though it was later decided that schools would operate full-time as soon as they reopened (BBC, 2020f). Schools in Northern Ireland reopened in August for students studying for exams or transitioning between primary and secondary schools, and for all others in September.

### 1.5 The pandemic and schooling: the second lockdown and reopening, and the third lockdown and second school closure period

On December 2, the four-week Second National Lockdown ended with England returning to a tiered system of restrictions. It proved to be the start of a series of policy spasms as the government tried to reconcile two opposing imperatives: the political desire to capture the public mood for an easing of restrictions; protecting lives and the ability of the National Health Service to treat patients. Within two weeks the infection rate had

rocketed alarmingly. In London, the boroughs of Greenwich and Islington instructed their schools to switch to remote learning, but education minister Gavin Williamson ordered them, under threat of legal action, to stay open for face-to-face teaching (Guardian, 2020). On December 17, it was announced that schools would reopen in the New Year and carry out their own testing with the help of the Army. The DfE reassured parents that there would be no 'extension of the Christmas holiday' and that all students would:

> "*return to education from the first day of term [in 2021]. Secondary school and college students should learn remotely for one week except those in exam years, vulnerable young people and the children of critical workers. It remains our national priority to keep education open and we are not closing education for any period other than during the set holiday periods*" (DfE, 2020b).

On Sunday January 3, 2021, the Prime Minster said there was 'no doubt that schools were safe' and urged parents to send their primary-age children back to school for the start of the new school year. The next day, he announced that the Third National Lockdown would start on Wednesday January 6 saying that 'schools were acting as vectors for transmission, causing the virus to spread between households'. Two days later, Michael Gove, Minister for the Cabinet Office, said that the step to close schools was taken 'very, very reluctantly' because the children who suffer most are those from disadvantaged backgrounds who have less access to online learning (BBC, 2021a).

At the start of January 2021, Wales, Scotland and England introduced further measures to deal with the second wave of infection (Boseley et al., 2021). Schools in Wales would remain shut for in-person teaching in favour of online teaching, and would not resume in-person teaching on 6 January as planned (BBC, 2021b). In Scotland a new lockdown postponed the opening of schools for face-to-face teaching until 1 February, instead moving to online teaching (BBC, 2021c). In England, schools were instructed to switch to remote learning until 'at least mid-February' (BBC, 2021b).

### 1.6 The pandemic and schooling: the third reopening (March 2021)

Primary school children in Scotland and Wales returned to schools on February 22 and secondary school children on March 15. In England both primary and secondary schools returned on 8 March. Primary school children in Northern Ireland returned to schools on March 8 and secondary school pupils on March 22. All schools in the UK have remained open since without any policy-significant spike in infection rates, largely due to the UK's hugely successful vaccination programme, the most effective of any major country.

### 1.7 Online home learning during the closures: government guidance

During the school closure periods, schools were expected to set work for pupils to do online at home, while additionally organising online live interactive instruction. To this end the BBC, as the state broadcaster, provided a range of resources to help pupils and parents through its Bitesize platform. In England, this covered a range of (for GCSE students) some 49 subjects across several exam boards. In Scotland and Wales, Gaelic and Welsh versions were also made available. There was a 400% increase in CBBC / Bitesize usership during the lockdowns with more than 1.5 million users (Horton,

2021). The DfE itself provided hundreds of thousands of computer devices to support those without the equipment necessary to work online from home. They also requested Ofsted inspectors to play an active role in checking the support that schools were providing to pupils in their online learning (DfE, 2021a), but it is not clear the extent to which this was done. Anne Longfield, the Children's Commissioner for England called on the government to ensure consistency in pupils' access to technology.

> "*A lot of pupils still don't have laptops. They are surviving on broken phones - those children now need to be seen as a priority to get into the classroom and deemed to be a vulnerable child.*" (PA, 2021)

Longfield went on to demand that technology companies and broadband providers 'step up' to address the cost of data for remote learning, which was another obstacle for some families. The Prime Minister acknowledged the impact of continued school closure and pledged to "work with parents, teachers and schools to develop a long-term plan to make sure that pupils have the chance to make up their learning" before 2024. He said £300m "of new money to schools" would fund a catch-up programme over the coming year, with financial incentives for providers to educate pupils who have missed lessons due to the pandemic (BBC, 2021d).

Little or no guidance was provided for schools by the UK's devolved administrations in the run-up to the first school closure period in 2020, although this had improved by the time of the second school closure (DfE, 2021b).

### 1.8 Operating schools during the closures: government guidance

The operational guidance provided to schools[7] covered areas such as help with accessing and buying resources for remote education. The DfE collated a list of resources to support schools in planning and delivering remote teaching including: free online education platforms such as Oak National Academy and BBC Bitesize video lessons; educational suppliers and publisher directories such as EdTech Impact to help schools find the best education technology for their needs; and subject associations, which provided curriculum support for remote education in a range of subjects. It also included advice on a single route for schools to buy ICT hardware, audio-visual equipment, software and licences, and connectivity solutions (DfE, 2020c).

As early as April 2020, the DfE issued guidance on getting help with technology through its 'Get Help with Technology' programme. By contacting their schools, parents and students could apply for digital devices or Internet access although they could not do so themselves directly (DfE, 2020d). By March 2021, the DfE had provided more than 1.3 million laptops and tablets to help disadvantaged pupils and students access remote education if they could not access face-to-face teaching. Support for access to the Internet (including mobile internet) was also available for disadvantaged children, in addition to 4G wireless routers dispatched to local authorities and Academy Trusts in the summer 2020 term.

[7] Independent fee-paying schools were not covered by the 'remote education temporary continuity directive', but were still expected to meet fully the Independent School Standards at all times.

In the run-up to the second closure period, the Coronavirus Act 2020 was regarded by the Secretary of State for Education as "a necessary and proportionate action for the continued provision of education for a specified period" starting "at the beginning of 22nd October 2020 and finishing at the end of the school year" (UK Government, 2020). The Act defined 'remote education' as meaning "education provided to a registered pupil who does not attend at school" (DfE, 2020e). It was accompanied by a 'Continuity Direction Explanatory Note' explaining the purpose of the various provisions within the Act. This "made clear that schools have a legal duty to provide remote education for state-funded, school-age children unable to attend school due to coronavirus" (ibid) and required that where pupils needed to self-isolate, or where there were local or national restrictions requiring pupils to remain at home, schools were "expected to provide immediate access to remote education". The minister could take legal action against any school that failed to comply with this Direction. The expectations regarding the quality of remote education were more difficult to police. Schools were instructed to complete attendance registers for pupils receiving remote education and monitor pupil engagement (DfE, 2020f), and were expected to 'replicate the classroom remotely' and effectively by ensuring that pupils received 'clear explanations' and were 'properly scaffolded through their learning' (DfE, 2021c).

The Remote Education Good Practice issued by the DfE (2021c) and updated regularly over the course of the closures and re-openings, stated clearly that 'to help mitigate potential digital barriers' which certain pupils experienced, schools were expected to: maintain an up-to-date record of pupils and families that 'did not have sufficient devices or appropriate internet access'; consider how school technology resources could support pupils without sufficient remote facilities, including loan agreements for laptops and chargers to 'identified families'; supplement digital provision with other forms of remote education such as printed resources and textbooks. Schools were expected to use a single, interactive platform such as Microsoft Teams or Google Classroom for their remote education provision, 'enabling a single point of access for all lessons and resources, and allowing teachers to host both live and recorded explanations and lessons' (DfE, 2021c). The guidance suggested that video recording apps like Loom would allow for easy explaining and questioning, and could easily be linked to platforms such as Microsoft Teams. Google Forms, Kahoot, Classkick, Socrative and Edpuzzle were other examples of recommended software that the DfE claimed worked well for rapid feedback and live marking.

Where lessons were recorded, they were to be open to access later by pupils, making flexible use possible when and where homes had limited or shared device access. Other recommended resources and subscription-based online resources such as the DfE-funded Isaac Physics provided free online teaching resources. The same platforms were also to be used by schools for teaching as for whole staff briefings, professional development sessions for staff, pastoral support and school assemblies.[8] It was seen as important to continue these aspects of school life during lockdown and to use a single chosen digital platform consistently across all school activities so that all stakeholders could be trained and confident in its use (DfE, 2021d). In terms of communication, staff

[8] If schools did not have an education platform in place, they could access free support to get help with technology.

and pupils were to use school email addresses with group lists for classes of pupils. The expectation was that 'a normal school day would be worked remotely by both pupils and teachers, incorporating recorded or live direct teaching as well as time for pupils to complete activities independently'; and to have a routine as close as possible to normal, but to operate flexibly to 'accommodate contexts where pupils had to share a single device at home' (DfE, 2021c).

Continuing to teach the normal curriculum remotely was also stipulated, with video demonstrations - accompanied by teacher commentary and supporting electronic resources - replacing practical work in the sciences, although later guidance allowed schools to suspend some non-statutorily mandated subjects for some pupils in exceptional circumstances if it was in the best interests of those pupils and following discussion with parents. Lengthy or open-ended activities were discouraged in favour of more interactive, teacher-led approaches. Technology training was regularly refreshed for teachers, with appropriate trouble-shooting support. A peer support network of schools and colleges was put in place through the EdTech Demonstrator Programme 'offering training on ways to embed digital platforms and devices to strengthen recovery plans' and sustain practice (DfE, 2021c).

Typically, pupils submitted work to teachers for review and feedback via multi-functional remote platforms, email, smartphones, post and school drop-off points. Schools were directed to monitor this and general pupil engagement on a 'daily' basis (DfE, 2021d) by logging participation and motivation levels, and feeding back to parents through regular reports. Schools were directed to make effective use of regular formative assessment while avoiding the introduction of unnecessary tracking systems. For younger pupils the priorities were ensuring progress in early reading using a curriculum of synthetic phonics, ensuring continued access to appropriate books and resources, and helping parents and other adults at home support their children in reading. Good communication between schools and parents was seen as critical and the DfE mandated that this should include group seminars, briefings and one-to-one telephone calls to inform parents and elicit their support in establishing routines with their children and looking out for their mental health and well-being (DfE, 2021c).

Later operational guidance issued by the DfE stated that remote education 'should be equivalent in length to the core teaching that pupils would receive in school and should include recorded or live direct teaching time, as well as time for pupils to complete tasks and assignments independently' (DfE, 2021d). As a minimum, this was set out for the Key Stages (KS) as:
3 hours per day on average across the cohort for KS1
4 hours per day for KS2
5 hours per day for KS3 and KS4.
A school's own teaching staff was not obliged to record their own online video lessons. They could, if they wished, use externally produced materials such as those developed by Oak National Academy, but they *were* expected to identify a named senior leader with overarching responsibility for the quality and delivery of remote education, ensuring that 'normal' best practice was transferred to remote education, including frequent and clear explanations, high-quality curriculum resources, questioning, reflective discussion, timely and frequent feedback, and addressing critical gaps in pupil knowledge. Later guidance (DfE, 2021d) made it a legal duty - previously it was only an

'expectation' - for schools to 'publish information about their remote education provision on their website'. Schools were also encouraged to engage with the National Tutoring Programme for catch-up tuition.

"*Education is not optional. All pupils [should] receive a high-quality education that promotes their development and equips them with the knowledge and cultural capital they need to succeed in life*." (DfE, 2021d)

### 1.9 Catching up: the National Tutoring Programme

The National Tutoring Programme (NTP) was introduced to support schools in closing the attainment gap during, and in the aftermath of, the pandemic. It commenced operation in November 2020 through a collaboration of five charities – the Education Endowment Foundation, the Sutton Trust, Impetus, Nesta and Teach First - with £80 million from the DfE as part of the government's £350m allocation to tutoring. The ongoing programme co-ordinates high-quality tuition from an approved list of providers through school-based Academic Mentors. One-quarter of the cost is paid by schools and the remaining 75% is subsidised by NTP. The first Academic Mentors were placed in schools at the end of October 2020 and Tuition Partners began delivery a month later. The second and third tranches of Academic Mentors started on January 18 2021 and after the February mid-term 2021.

Academic Mentors are trained graduates employed by schools in disadvantaged areas to provide intensive catch-up support to pupils whose education has been badly affected by school closures, allowing teachers in these schools to focus on classroom and group teaching. Teach First support the recruitment, training and placement of Academic Mentors and was provided with £6.4m to fund this work. Participating schools decide on the delivery approach that best suits their needs, choose which Tuition Partners to work with and which pupils will benefit most from the additional tuition. Tuition Partners offer schools a choice of online or face-to-face support, and small-group and one-to-one tuition.

NTP is only available to state-maintained primary and secondary schools in England and cannot be accessed by parents directly. Private fee-paying schools cannot access the programme at all. NTP is designed specifically to support disadvantaged pupils defined by their Pupil Premium eligibility, but while the majority of pupils receiving tutoring fall into this category, 'schools have the discretion to identify the pupils most likely to benefit from support' (NTP, 2021). Teach First on behalf of NTP uses the Income Deprivation Affecting Children Index (IDACI) and Achieving Excellence Areas (AEA) as their measures of deprivation for parts of the country where children consistently underperform. For a school to be eligible for NTP it must have an IDACI score of 40 or greater (i.e. 40% of pupils live in the three most deprived deciles); or an IDACI of 35-40 and an AEA score of 4-6; or an IDACI of 30-35 and an AEA score of 5 or 6; or an IDACI of 25-30 and an AEA score of 6.

Although Academic Mentors have experience in education, they may not be qualified teachers, but the aim is that schools treat them as part of the staff, supporting and managing them to deliver tuition support that is appropriate, timely and linked to the curriculum. Academic Mentors are not expected to deliver whole-class teaching. They

mostly provide one-to-one or small-group support to individual pupils. Participating schools can request a maximum of two mentors across the following subject areas: Mathematics, English, Science, Humanities, Modern Foreign Languages, Numeracy (in primary schools) and Literacy (in primary schools). Typically, schools purchase one 15-hour subsidised block of tuition per pupil from a Tuition Partner, 'selecting the subject that they think a pupil would benefit from having tutoring in the most' (NTP, 2021).

The NTP is predicated on the acknowledgement that 'there is a substantial attainment gap between pupils from disadvantaged backgrounds and their classmates' and that this 'is likely to have grown significantly since school closures' (NTP, 2021). NTP estimated that around 80% of disadvantaged pupils did not have access to 'quality tuition', and that 'one-to-one and small-group tuition can boost progress by up to +5 months' (ibid). A small number of Tuition Partners are expected to offer some tutoring over the summer holidays 2021, either face-to-face in school (if the school is open), or online in school, or online at-home, but only if students need to finish their block of 15 hours of tutoring during the holidays. However, the vast majority of tutoring sessions are expected to be delivered 'during the normal academic year'. Schools and Tuition Partners offered in-school delivery, either online or face-to-face, during the Easter holidays 2021 and the May half-term. NTP believes that tutoring *during the school day* has greater impact (and higher attendance) than tutoring after school because pupils from disadvantaged backgrounds are less likely to have the necessary technology or quiet space at home for effective tutoring to happen.

NTP was extended at the start of the third lockdown (in January 2021) to include online at-home delivery at weekends, but with effect from the third reopening in March 2021, tuition blocks took place in school (either online or in person).

### 1.10 Data

We have linked the Understanding Society Covid survey to the Understanding Society household survey, which has rich and reliable data on parental SES and family circumstances. Understanding Society (USoc) is the UK Household Longitudinal Study exploring how life in the UK is changing. The sample size is large and covers all ages and all educational and social backgrounds, and there is continuous data collection every year through interviewing participants (Understanding Society, 2021).

USoc is built on the successful British Household Panel Survey (BHPS), which ran from 1991 to 2009 and had some 10,000 participating households. USoc started in 2009 and involves some 40,000 households, including around 8,000 of the original BHPS households. Additional samples of 1,500 households in each of Scotland and Wales were added to the main sample in 1999, and in 2001 a sample of 2,000 households was added in Northern Ireland, making the panel suitable for UK-wide research from 2001 onwards. The attrition is low. In the last wave of data collection over 95% of participants who participated in the previous wave continued to take part, making it a very stable longitudinal study.

Every year participants complete their questionnaire either via a face-to-face interview or online. All adults complete an interview. For children in the household who are up to age 10, parents answer the questions. Children aged 10-15 have their own paper-based

questionnaire with questions appropriate to their age group, and when they turn 16 they become eligible for the full adult interview.

Our study used the USoc Covid dataset from the April 2020 and January 2021 waves, which included a module on home schooling undertaken by parents. We also used data from Survey 10 (most recent), Survey 9 and Survey 8 to obtain information on parental occupation. Parental occupation in USoc uses the eight-category version of the National Statistics Socio-Economic Classification (NS-SEC) system for jobs. We recoded the variable into a three-category variable distinguishing between 'service class', 'intermediate class' and 'routine class' occupations. Service class students are students whose parents are large employers, higher managers and professionals; routine class students are students whose parents are in routine and semi-routine sales, service, technical, agricultural and clerical occupations; and 'intermediate class' children are those whose parents are lower managerial, administrative and professional, small employers and own account workers. Occupation is that of the 'main' parent, which is assumed to be the mother unless the mother does not live with the child. If a child does not live with its parents or if the parents do not provide that information, the family member who provided the information is considered the main parent.

Parents were also asked to report on their working patterns (including employment status) during lockdown and we used this information to distinguish between:

- Parents who were both employed and at home regularly either because they worked from home regularly or because they had been furloughed.
- The main parent who worked from home / at office / unemployed and the second parent not working from home (either because of unemployment or because they were required to work at the office[9]) / not present.

Family structure was also included. It was defined as living either in a two-parent or in a single-parent family, and by a simple measure of sibling birth order. We distinguished between being a single child, an eldest child, a middle child or a youngest child.[10]

We also included the following factors: gender; age; ethnic background based on the main parent's ethnicity, distinguishing between British and non-British;[11] and whether the child owns a computer, uses a shared computed or does not have a computer.

Including only those children who were not in school and excluding those for whom there was incomplete information on all relevant variables, we generated a sample of approx. 2330 children in primary school and approx. 3000 children in secondary school.[12] To make inferences about the population of school age children, we used the weights and variables provided in the Understanding Society study.

In terms of time spent doing work provided by schools, the answer categories were:

- less than an hour
- 1 to 2 hours

[9] The sample size prevents us from distinguishing between the reasons for the second parent not working from home.
[10] Information was only available on siblings aged 18 and younger.
[11] The sample size prevents us from distinguishing between non-British minorities.
[12] Sample size varied slightly depending on the outcome.

- 2 to 3 hours
- 3 to 4 hours
- 4 to 5 hours
- 5 or more hours.

We used the mid-points of the intervals, with 5.5 for the top category and 0.5 for the bottom category. This means that our top category is right-truncated, introducing uncertainty in the measurement of high volumes of schoolwork, although it is reasonable to assume that students are unlikely to exceed significantly 5.5 hours of schoolwork per day, which is the typical length of a school day across the UK (Education Endowment Foundation 2018). We tested whether the use of these mid-points might generate biased results: we replicated the results using interval regression (Stewart 1983), which takes into account the uncertainty concerning the exact values within each interval, and deals with the left- and right-censoring in the extreme categories. The results are reported in Appendix A and are very similar to those obtained using OLS regression with the mid-points.

In terms of hours of support from adults, the answer categories were:

- none
- less than an hour
- 1 to 2 hours
- 2 to 3 hours
- 3 to 4 hours
- 4 to 5 hours
- 5 or more hours.

Again, we used the mid-points of the intervals (with 5.5 for the top category and 0 for the bottom category).

In terms of the raw number of offline and online lessons offered by the school, the answer categories were:

- none
- less than 1 per day
- 1 per day
- 2 per day
- 3 per day
- 4 or more per day.

We used 4 for the top category and 0 for the bottom category.

We compute the total number of online and offline lessons to quantify the total provision of lessons.

Finally, we included the region of residence.

## 1.11 Analytical approach

The April 2020 and January 2021 USoc samples were pooled and analysed in Stata 16 using mixed models. Mixed models combine fixed and random effects and are well suited to analysing hierarchically structured data such as the USoc datasets. Mixed models extend linear models by (in our study) taking account of the interdependence between children in any given household. The number of children in households varied from 1 to 5, with an average of 1.6. Within each educational phase (primary school / secondary school) it varied between 1 and 4, with an average of 1.3. A dummy 'wave' variable and its interaction with the covariates of interest was used to analyse changes between the two school closure periods.

Home-schooling reflects household-specific practices and resources, thus violating the independence assumption of linear regression. Mixed models take household differences as parallel shifts in the regression line using workplace-specific (random) intercepts. In contrast to fixed models, which control for membership in a family, mixed models estimate the effect of variables that are constant within households, such as parental occupation (Raudenbush & Bryk 2002). The fixed effect of the model takes the average effect of the independent variables using an overall regression line, which does not vary between households. The random workplace intercept models between-household variability by shifting the regression line up or down according to each household, after controlling for other variables. To estimate the level of the outcome variables for specific categories of the explanatory variables (or their combination), we used marginal effects.

We use the decomposition method introduced by Juhn, Murphy and Pierce (1993)[13] to analyse the changes in the volume of schoolwork completed between the first and second school closure periods.

[13] See also Blau and Kahn (1996).

# 2. Results

This section of the report presents the results of our analyses. First, we present descriptive statistics that show the changes from the first wave of USoc data (April 2020) to the second wave (January 2021) of USoc data. Secondly, we present the results from regression analyses to quantify the association between the predictors and our outcome variables. Thirdly, we look at decomposition effects and to what extent working patterns, the availability of computers and the number of lessons offered explain differences in outcomes. Finally, we look at combined effect of family circumstances using marginal effects.

## 2.1 Descriptive statistics

Schools provided more schoolwork in January 2021 than in April 2020. Table 1 shows that this increase is especially pronounced for secondary school students, although levels were already high during the first school closure period (96% for primary and 86% for secondary). We can conclude from this that almost all students received some form of schoolwork from the schools they attended. There was a large increase in total hours provided.

**Table 1: Schoolwork provided for primary and secondary school students, April 2020 (USoc wave 1) and January 2021 (USoc wave 2).**

School provides schoolwork

| Primary | April 2020 | January 2021 |
|---|---|---|
| | Percent (N) | Percent (N) |
| No | 4 | 1 |
| Yes | 96 | 99 |
| Total | 100 (1336) | 100 (663) |

| Secondary | April 2020 | January 2021 |
|---|---|---|
| | Percent (N) | Percent (N) |
| No | 14 | 3 |
| Yes | 86 | 97 |
| Total | 100 (1622) | 100 (1020) |

**Table 2: Descriptive statistics hours of schoolwork for primary and secondary school students, April 2020 (wave 1) and January 2021 (wave 2).**

Hours of schoolwork

| Primary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| | 2.3 | 1.4 | 3.3 | 1.4 |

| Secondary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| | 2.6 | 1.7 | 4.0 | 1.4 |

Table 2 shows that the mean number of hours provided to both primary school students and secondary school students increased, especially for secondary school students: it went up from 2.6 hours in April 2020 to 4 in January 2021. In April 2020 primary school students on average were provided with 2.3 hours of schoolwork, which increased to 3.3 hours in January 2021. The spread of average number of hours of schoolwork for secondary school students reduced considerably.

Table 3 presents the distribution of offline lessons provided for both primary and secondary school students for both waves.

**Table 3: Number of offline hours offered for primary and secondary school students, April 2020 (USoc wave 1) and January 2021 (USoc wave 2).**

Offline lessons offered per day

| Primary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | Percent (N) | | Percent (N) | |
| 0 | 10 | | 8 | |
| 0.5 | 9 | | 3 | |
| 1 | 22 | | 8 | |
| 2 | 20 | | 12 | |
| 3 | 22 | | 29 | |
| 4 | 18 | | 40 | |
| Total | 100 (1334) | | 100 (663) | |
| | Mean | SD | Mean | SD |
| | 2.0 | 1.3 | 2.8 | 1.3 |

| Secondary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | Percent (N) | | Percent (N) | |
| 0 | 21 | | 12 | |
| 0.5 | 10 | | 12 | |
| 1 | 14 | | 16 | |
| 2 | 15 | | 17 | |
| 3 | 18 | | 15 | |
| 4 | 22 | | 28 | |
| Total | 100 (1618) | | 100 (1012) | |
| | Mean | SD | Mean | SD |
| | 2.0 | 1.5 | 2.1 | 1.5 |

The number of offline lessons offered increased for primary school students from 2 to 2.8. Secondary students were offered the same number of average offline lessons, yet it is notable that the proportion of students receiving no offline lessons decreased, whilst the proportion of students receiving the highest number of offline lessons increased.

**Table 4: Number of online hours offered for primary and secondary school students, April 2020 (USoc wave 1) and January 2021 (USoc wave 2).**

Online lessons offered per day

| Primary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | Percent (N) | | Percent (N) | |
| 0 | 60 | | 22 | |
| 0.5 | 9 | | 21 | |
| 1 | 15 | | 21 | |
| 2 | 7 | | 16 | |
| 3 | 4 | | 12 | |
| 4 | 5 | | 9 | |
| Total | 100 (1334) | | 100 (663) | |
| | Mean | SD | Mean | SD |
| | 0.6 | 1.1 | 1.3 | 1.3 |

| Secondary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | Percent (N) | | Percent (N) | |
| 0 | 58 | | 8 | |
| 0.5 | 12 | | 9 | |
| 1 | 7 | | 12 | |
| 2 | 8 | | 17 | |
| 3 | 7 | | 22 | |
| 4 | 8 | | 32 | |
| Total | 100 (1617) | | 100 (1016) | |
| | Mean | SD | Mean | SD |
| | 0.8 | 1.3 | 2.4 | 1.4 |

The most sizable change in school provision between the January 2020 and April 2021 school closures is the increase in the number of online lessons (Table 4). The proportion of students receiving little or no online lessons reduced and the proportion of students receiving a high number of online lessons increased, raising the mean number of online lessons both for primary schools (from 0.6 to 1.3, an increase of more than 100%) and for secondary schools (from 0.8 to 2.4, a 200% increase).

**Table 5: Hours of adult support for primary and secondary school students, April 2020 (USoc wave 1) and January 2021 (USoc wave 2).**

Hours of adult support

| Primary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| | 2.0 | 1.4 | 2.3 | 1.4 |

| Secondary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| | 0.7 | 0.9 | 0.8 | 1.0 |

While the provision from schools increased substantially, support from adults for schoolwork did not increase as much. Table 5 shows that the average number of hours of support only showed an increase from 2 to 2.3 for primary pupils and from 0.7 to 0.8 for secondary students. As such support is likely to be related to family's working patterns, we looked at these as possible explanations for shifting support. Table 6 presents the distribution of working patterns of both the main parent and the second parent in both USoc waves.

**Table 6: Work patterns for main and second parent for primary and secondary school students, April 2020 (USoc wave 1) and January 2021 (USoc wave 2).**

Work patterns

| Main parent | | |
|---|---|---|
| Primary | April 2020 | January 2021 |
| | Percent (N) | Percent (N) |
| Not working | 13 | 15 |
| Working at office | 33 | 31 |
| Working from home | 54 | 54 |
| Total | 100 (1336) | 100 (656) |
| Secondary | April 2020 | January 2021 |
| | Percent (N) | Percent (N) |
| Not working | 9 | 11 |
| Working at office | 40 | 44 |
| Working from home | 51 | 45 |
| Total | 100 (1622) | 100 (1007) |
| Second parent | | |
| Primary | April 2020 | January 2021 |
| | Percent (N) | Percent (N) |
| Not present | 13 | 10 |
| Working from home | 49 | 50 |
| Other | 38 | 41 |
| Total | 100 (1336) | 100 (665) |
| Secondary | April 2020 | January 2021 |
| | Percent (N) | Percent (N) |
| Not present | 14 | 13 |
| Working from home | 45 | 41 |
| Other | 41 | 46 |
| Total | 100 (1662) | 100 (1020) |

Comparing the two school closures, the data in Table 6 are stable, hinting at similar working patterns during both closures. Assuming that such working patterns influence the extent of support students are given at home, this is consistent with the stability in the number of hours of adult support in Table 5.

As policies between the four home countries and between regions can vary, we also looked at the association between geographical location and hours of schoolwork completed (Table 7).

**Table 7: Region and hours of schoolwork for primary and secondary school students, April 2020 (USoc wave 1) and January 2021 (USoc wave 2).**

Hours of schoolwork by region

| Primary | April 2020 | | January 2021 | |
|---|---|---|---|---|
| | mean | SD | mean | SD |
| North East | 2.4 | 1.3 | 3.5 | 1.4 |
| North West | 2.3 | 1.2 | 3.4 | 1.6 |
| Yorkshire and The Humber | 2.1 | 1.3 | 3.4 | 1.4 |
| East Midlands | 2.9 | 1.5 | 3.4 | 1.1 |
| West Midlands | 2.1 | 1.4 | 2.9 | 1.4 |
| East of England | 2.5 | 1.2 | 3.1 | 1.4 |
| London | 2.0 | 1.4 | 3.7 | 1.3 |
| South East | 2.5 | 1.3 | 3.4 | 1.5 |
| South West | 2.3 | 1.5 | 3.4 | 1.3 |
| Wales | 2.4 | 1.4 | 2.7 | 1.5 |
| Scotland | 2.1 | 1.4 | 2.8 | 1.2 |
| Northern Ireland | 2.4 | 1.0 | 3.2 | 1.1 |
| Total | 2.3 | 1.4 | 3.3 | 1.4 |
| Secondary | April 2020 | | January 2021 | |
| | mean | SD | mean | SD |
| North East | 2.2 | 1.5 | 3.7 | 1.4 |
| North West | 2.4 | 1.6 | 4.0 | 1.6 |
| Yorkshire and The Humber | 2.5 | 1.6 | 3.8 | 1.7 |
| East Midlands | 2.5 | 1.7 | 3.8 | 1.6 |
| West Midlands | 2.5 | 1.5 | 4.2 | 1.3 |
| East of England | 2.7 | 1.9 | 4.0 | 1.5 |
| London | 3.0 | 1.9 | 4.4 | 1.2 |
| South East | 2.8 | 1.8 | 4.4 | 1.3 |
| South West | 2.9 | 1.8 | 4.4 | 1.1 |
| Wales | 2.1 | 1.6 | 4.0 | 1.5 |
| Scotland | 2.0 | 1.6 | 3.6 | 1.5 |
| Northern Ireland | 2.8 | 1.6 | 3.7 | 1.0 |
| Total | 2.6 | 1.7 | 4.0 | 1.4 |

Within the general improvement of the provision, primary school pupils in Wales, Scotland and the West Midlands experienced the least improvement, using as proxy the amount of schoolwork completed, whilst their counterparts in London and the North East experienced the largest improvement. Secondary school students in Wales, Scotland and the North East of England completed fewer hours of schoolwork than average, despite a sizable increase in January 2021. Secondary school students in London, the South East and the South West completed the largest volume of schoolwork in April 2020 and experienced the largest gains in January 2021. This hints at an emergent compounding

effect at the regional level where areas that are doing well improve, and those doing badly fall further behind. It would be catastrophic, socially and educationally, if this were to be replicated at the pupil level.

Finally, we present descriptive statistics for computer availability in Table 8.

**Table 8: Computer availability for primary and secondary school students, April 2020 (USoc wave 1) and January 2021 (USoc wave 2).**

Computer availability

| Primary | April 2020 | January 2021 |
|---|---|---|
| | Percent (N) | Percent (N) |
| Yes, child's own | 29 | 43 |
| Yes, shared | 62 | 51 |
| No | 4 | 4 |
| No schoolwork | 4 | 2 |
| Total | 100 (1336) | 100 (665) |
| Secondary | April 2020 | January 2021 |
| Yes, child's own | 50 | 76 |
| Yes, shared | 35 | 20 |
| No | 2 | 1 |
| No schoolwork | 13 | 3 |
| Total | 100 (1622) | 100 (1020) |

For both primary and secondary schools, only a minority of students had no computer. Secondary students were more likely to have their own computers than primary pupils. The most notable change was the increasing proportion of students having their own computer. Computers have become increasingly available for students. As of April 2021, 43% of primary and 76% of secondary students had their own computer.

## 2.2 Results of the statistical models

We grouped our results by key predictors for our four dependent variables: hours of schoolwork per day; hours of support from adults per day; number of offline lessons per day; and number of online lessons per day. We present below results from the main regression models and from the marginal effects computed from those models. Note that we present the models for the complete sample including those students who were not offered *any* work by their schools. Appendix B shows the results obtained by focusing only on children who were offered *some* schoolwork. Although Table 8 shows that this was only a very small percentage of children, we wanted to check if this group influenced our estimates. We found that the results were comparable. Furthermore, we estimated two further models for schoolwork including 'total lessons' as a predictor variable to analyse the extent to which the effect of family and children's characteristics is accounted for by the volume of total lessons offered by the school. The ten models are presented in Table 9. The intra-class correlation (ICC) coefficients show that the outcomes are clustered at the household level (Table 9). On average the ICCs indicate that 34% of the

variance lies at the household level, suggesting that children within the same household have similar outcomes.

## Table 9: Models for the four outcome variables for primary and secondary students.

| | Primary | | Secondary | | Primary | Secondary | Primary | Secondary | Primary | Secondary |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hours of schoolwork. Model 1 | Hours of schoolwork. model 2 | Hours of schoolwork. Model 1 | Hours of schoolwork. Model 2 | Hours of support from adults | Hours of support from adults | Offline lessons | Offline lessons | Online lessons | Online lessons |
| Column | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| NS-SEC (3 Category) Ref: Routine | | | | | | | | | | |
| Service | 0.42*** | 0.46*** | 0.26* | 0.21* | -0.01 | -0.08 | 0.21~ | 0.36** | -0.36*** | -0.24* |
| | (0.11) | (0.10) | (0.11) | (0.10) | (0.12) | (0.07) | (0.12) | (0.11) | (0.11) | (0.12) |
| Intermediate | 0.18 | 0.23* | 0.17 | 0.16 | 0.01 | -0.09 | 0.09 | 0.19~ | -0.30** | -0.20~ |
| | (0.12) | (0.11) | (0.11) | (0.10) | (0.12) | (0.07) | (0.13) | (0.11) | (0.11) | (0.12) |
| January 2021 | 0.94~ | 0.67 | 1.33 | 0.45 | 0.60 | 0.58~ | 1.05** | 0.84 | -0.16 | 1.92* |
| | (0.56) | (0.47) | (0.82) | (0.76) | (0.40) | (0.32) | (0.37) | (0.70) | (0.33) | (0.92) |
| Service # January 2021 | -0.34~ | -0.39* | 0.07 | 0.22 | -0.36 | 0.09 | -0.25 | -0.62** | 0.38~ | 0.18 |
| | (0.20) | (0.17) | (0.15) | (0.15) | (0.22) | (0.11) | (0.23) | (0.19) | (0.22) | (0.18) |
| Intermediate # January 2021 | 0.13 | 0.08 | -0.08 | 0.05 | -0.13 | 0.10 | -0.17 | -0.33~ | 0.31 | -0.02 |
| | (0.23) | (0.21) | (0.17) | (0.16) | (0.23) | (0.11) | (0.23) | (0.19) | (0.22) | (0.18) |
| Ref.: Working from home # Working from home | | | | | | | | | | |
| Not working # Single | -0.09 | -0.21 | -0.47 | -0.17 | -0.44 | 0.48 | 0.35 | -0.49 | 0.05 | -0.42* |
| | (0.39) | (0.39) | (0.39) | (0.35) | (0.37) | (0.37) | (0.40) | (0.32) | (0.29) | (0.20) |
| Not working # Working from home | -0.40 | -0.40~ | 0.20 | 0.20 | 0.02 | 0.05 | -0.07 | 0.06 | 0.07 | -0.04 |
| | (0.28) | (0.23) | (0.40) | (0.34) | (0.30) | (0.24) | (0.31) | (0.32) | (0.22) | (0.31) |
| Not working # Other | -0.07 | 0.15 | -0.08 | -0.09 | 0.18 | 0.17 | -0.46** | -0.37* | -0.24~ | 0.49* |
| | (0.20) | (0.20) | (0.17) | (0.16) | (0.21) | (0.15) | (0.18) | (0.17) | (0.14) | (0.22) |
| Working at office # Single | -0.02 | 0.03 | -0.26 | -0.27 | -0.45 | -0.11 | -0.27 | -0.26 | 0.15 | 0.21 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (0.27) | (0.27) | (0.22) | (0.17) | (0.29) | (0.11) | (0.33) | (0.21) | (0.30) | (0.23) |
| Working at office # Working from home | -0.13 | -0.11 | -0.11 | -0.06 | -0.34~ | -0.10 | -0.16 | -0.06 | 0.10 | -0.07 |
| | (0.16) | (0.15) | (0.15) | (0.15) | (0.17) | (0.09) | (0.18) | (0.17) | (0.23) | (0.16) |
| Working at office # Other | 0.00 | 0.05 | -0.26** | -0.20* | -0.19 | -0.11~ | -0.06 | -0.24* | -0.12 | 0.02 |
| | (0.12) | (0.11) | (0.10) | (0.09) | (0.12) | (0.06) | (0.12) | (0.10) | (0.10) | (0.10) |
| Working from home # Single | -0.46* | -0.35~ | 0.55** | -0.36* | -0.54* | 0.15 | -0.30 | -0.40** | -0.06 | -0.17 |
| | (0.21) | (0.20) | (0.20) | (0.17) | (0.22) | (0.11) | (0.21) | (0.15) | (0.17) | (0.14) |
| Working from home # Other | -0.11 | -0.07 | -0.30~ | -0.26~ | -0.15 | -0.11 | -0.11 | -0.08 | -0.09 | -0.01 |
| | (0.15) | (0.13) | (0.17) | (0.15) | (0.17) | (0.10) | (0.18) | (0.17) | (0.12) | (0.19) |
| Not working # Single # January 2021 | 0.50 | 0.79~ | 0.14 | -0.08 | 1.17~ | 0.05 | -0.78~ | 0.29 | -0.19 | 0.42 |
| | (0.52) | (0.47) | (0.46) | (0.37) | (0.63) | (0.49) | (0.46) | (0.45) | (0.51) | (0.45) |
| Not working # Working from home # January 2021 | 0.32 | 0.23 | -0.08 | 0.07 | 0.06 | -0.28 | -0.36 | -0.25 | 0.74~ | -0.05 |
| | (0.29) | (0.28) | (0.37) | (0.38) | (0.32) | (0.23) | (0.45) | (0.59) | (0.39) | (0.36) |
| Not working # Other # January 2021 | 0.00 | -0.16 | 0.12 | 0.20 | 0.13 | -0.17 | 0.33 | -0.03 | 0.16 | -0.32 |
| | (0.31) | (0.31) | (0.21) | (0.19) | (0.30) | (0.17) | (0.26) | (0.27) | (0.23) | (0.30) |
| Working at office # Single # January 2021 | -0.21 | -0.11 | -0.08 | 0.09 | 1.55** | 0.44* | 0.49 | 0.03 | -0.88*** | -0.55~ |
| | (0.29) | (0.29) | (0.35) | (0.29) | (0.50) | (0.20) | (0.31) | (0.31) | (0.24) | (0.33) |
| Working at office # Working from home # January 2021 | 0.28 | 0.47 | 0.44~ | 0.08 | 0.56* | -0.12 | -0.26 | 0.44 | -0.32 | 0.64* |
| | (0.28) | (0.30) | (0.22) | (0.21) | (0.28) | (0.11) | (0.57) | (0.35) | (0.44) | (0.31) |
| Working at office # Other # January 2021 | 0.03 | -0.02 | 0.32* | 0.23~ | 0.12 | 0.18~ | -0.13 | 0.28~ | 0.31 | 0.01 |
| | (0.21) | (0.18) | (0.14) | (0.13) | (0.19) | (0.10) | (0.19) | (0.16) | (0.20) | (0.16) |
| Working from home # Single # January 2021 | 0.19 | 0.09 | 0.30 | 0.25 | -0.13 | -0.08 | -0.17 | 0.25 | 0.53 | -0.04 |
| | (0.35) | (0.34) | (0.34) | (0.32) | (0.30) | (0.15) | (0.50) | (0.26) | (0.43) | (0.29) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Working from home # Other # January 2021 | 0.46~ | 0.43~ | 0.64** | 0.48* | 0.36 | -0.01 | 0.70* | 0.11 | -0.59~ | 0.23 |
| | (0.28) | (0.25) | (0.25) | (0.22) | (0.31) | (0.16) | (0.28) | (0.37) | (0.31) | (0.38) |
| Ref.: No Computer | | | | | | | | | | |
| Child's own | 0.56** | 0.28 | 0.74* | 0.53* | 0.37~ | 0.12 | 0.72*** | 0.14 | 0.18 | 0.51** |
| | (0.21) | (0.18) | (0.29) | (0.24) | (0.22) | (0.22) | (0.22) | (0.32) | (0.15) | (0.20) |
| Shared | 0.51* | 0.24 | 0.42 | 0.33 | 0.43* | 0.26 | 0.69** | 0.02 | 0.19 | 0.29 |
| | (0.21) | (0.17) | (0.29) | (0.24) | (0.21) | (0.23) | (0.21) | (0.32) | (0.14) | (0.20) |
| Not required | -1.72*** | -1.35*** | -2.10*** | -1.46*** | -1.56*** | -0.34 | -1.13*** | -1.68*** | -0.25 | -0.29 |
| | (0.24) | (0.21) | (0.29) | (0.25) | (0.23) | (0.23) | (0.26) | (0.32) | (0.16) | (0.19) |
| Child's own # January 2021 | 0.20 | 0.07 | -0.35 | -0.03 | -0.32 | -0.67* | -0.23 | -0.62 | 0.76* | -0.37 |
| | (0.54) | (0.46) | (0.80) | (0.74) | (0.35) | (0.30) | (0.35) | (0.68) | (0.31) | (0.91) |
| Shared # January 2021 | -0.02 | -0.12 | -0.45 | -0.17 | -0.23 | -0.66* | -0.13 | -0.59 | 0.52~ | -0.33 |
| | (0.55) | (0.46) | (0.80) | (0.74) | (0.35) | (0.31) | (0.36) | (0.69) | (0.30) | (0.91) |
| Not required # January 2021 | 0.59 | 0.97~ | -0.71 | 0.02 | 0.62 | -0.57 | -0.68 | -0.49 | -0.36 | -1.82~ |
| | (0.65) | (0.59) | (0.88) | (0.85) | (0.77) | (0.35) | (0.41) | (0.72) | (0.32) | (0.93) |
| Female | 0.14* | 0.15** | 0.31*** | 0.23*** | -0.12~ | -0.06 | 0.06 | 0.17** | -0.08~ | 0.10~ |
| | (0.06) | (0.05) | (0.06) | (0.05) | (0.06) | (0.04) | (0.06) | (0.06) | (0.05) | (0.05) |
| Child's age | 0.14*** | 0.12*** | -0.09*** | -0.02 | -0.11*** | -0.17*** | 0.01 | -0.15*** | 0.08*** | -0.04* |
| | (0.01) | (0.01) | (0.02) | (0.02) | (0.02) | (0.01) | (0.02) | (0.02) | (0.01) | (0.02) |
| Family size | -0.03 | -0.03 | -0.08* | -0.06~ | -0.08* | -0.06~ | -0.03 | -0.03 | 0.02 | -0.03 |
| | (0.04) | (0.04) | (0.04) | (0.03) | (0.04) | (0.03) | (0.05) | (0.04) | (0.04) | (0.04) |
| Ref.: Oldest child | | | | | | | | | | |
| Single child | 2.22*** | 2.04*** | -0.51** | -0.21 | 2.70*** | -0.02 | 1.52*** | -0.48*** | -0.92* | -0.34*** |
| | (0.39) | (0.38) | (0.16) | (0.14) | (0.33) | (0.07) | (0.45) | (0.11) | (0.40) | (0.10) |
| Middle child | -0.00 | 0.03 | -0.04 | -0.09 | -0.14 | -0.11 | -0.06 | 0.02 | -0.08 | 0.19~ |
| | (0.12) | (0.11) | (0.12) | (0.10) | (0.12) | (0.10) | (0.13) | (0.13) | (0.11) | (0.11) |
| Youngest child | 0.12 | 0.15* | -0.07 | -0.01 | -0.01 | -0.03 | -0.14~ | -0.09 | 0.02 | -0.03 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (0.07) | (0.07) | (0.07) | (0.06) | (0.08) | (0.05) | (0.07) | (0.07) | (0.07) | (0.06) |
| British | 0.14 | 0.07 | 0.02 | 0.00 | 0.24* | -0.06 | 0.21* | -0.16 | 0.02 | 0.15 |
| | (0.10) | (0.09) | (0.10) | (0.09) | (0.10) | (0.07) | (0.10) | (0.10) | (0.09) | (0.09) |
| Ref.: North East | | | | | | | | | | |
| North West | -0.08 | -0.14 | 0.39* | 0.27 | -0.14 | 0.10 | 0.16 | 0.24 | 0.06 | 0.15 |
| | (0.24) | (0.24) | (0.20) | (0.18) | (0.25) | (0.11) | (0.23) | (0.20) | (0.21) | (0.19) |
| Yorkshire and The Humber | -0.07 | -0.10 | 0.40* | 0.29 | -0.01 | 0.31* | 0.26 | 0.15 | -0.18 | 0.16 |
| | (0.24) | (0.24) | (0.20) | (0.18) | (0.26) | (0.13) | (0.23) | (0.21) | (0.21) | (0.20) |
| East Midlands | -0.10 | -0.16 | 0.55* | 0.40* | 0.06 | 0.09 | 0.19 | 0.33 | 0.02 | 0.09 |
| | (0.24) | (0.24) | (0.22) | (0.20) | (0.26) | (0.12) | (0.25) | (0.22) | (0.22) | (0.19) |
| West Midlands | -0.11 | -0.20 | 0.40~ | 0.32~ | -0.10 | 0.11 | 0.16 | 0.06 | 0.15 | 0.11 |
| | (0.25) | (0.25) | (0.20) | (0.18) | (0.27) | (0.13) | (0.24) | (0.21) | (0.23) | (0.19) |
| East of England | 0.08 | 0.02 | 0.58** | 0.39* | 0.07 | -0.04 | 0.27 | 0.27 | -0.05 | 0.31 |
| | (0.24) | (0.24) | (0.20) | (0.18) | (0.26) | (0.11) | (0.25) | (0.20) | (0.22) | (0.19) |
| London | 0.08 | -0.15 | 0.83*** | 0.51** | 0.07 | 0.17 | 0.62* | 0.29 | 0.18 | 0.61** |
| | (0.25) | (0.24) | (0.21) | (0.19) | (0.27) | (0.13) | (0.25) | (0.22) | (0.23) | (0.20) |
| South East | 0.16 | 0.04 | 0.73*** | 0.51** | 0.15 | 0.07 | 0.55* | 0.30 | -0.12 | 0.35~ |
| | (0.24) | (0.23) | (0.20) | (0.17) | (0.25) | (0.11) | (0.23) | (0.20) | (0.21) | (0.18) |
| South West | -0.10 | -0.15 | 0.65** | 0.45* | -0.04 | 0.03 | 0.05 | 0.38~ | 0.12 | 0.23 |
| | (0.25) | (0.25) | (0.20) | (0.18) | (0.27) | (0.11) | (0.25) | (0.21) | (0.22) | (0.19) |
| Wales | -0.26 | -0.12 | -0.02 | -0.00 | -0.17 | 0.28~ | -0.13 | 0.21 | -0.36~ | -0.25 |
| | (0.25) | (0.25) | (0.23) | (0.21) | (0.28) | (0.15) | (0.24) | (0.22) | (0.22) | (0.20) |
| Scotland | -0.24 | -0.22 | -0.01 | -0.01 | -0.07 | 0.21 | 0.20 | 0.31 | -0.26 | -0.34~ |
| | (0.25) | (0.24) | (0.21) | (0.18) | (0.26) | (0.14) | (0.23) | (0.21) | (0.21) | (0.19) |
| Northern Ireland | -0.04 | -0.13 | 0.16 | 0.17 | 0.03 | 0.19 | 0.51~ | 0.35 | -0.20 | -0.40~ |
| | (0.25) | (0.25) | (0.23) | (0.20) | (0.28) | (0.17) | (0.27) | (0.28) | (0.25) | (0.23) |
| Total lessons | | 0.29*** | | 0.33*** | | | | | | |
| | | (0.02) | | (0.02) | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Constant | 0.45 | 0.12 | 3.37*** | 1.66*** | 2.81*** | 3.35*** | 1.17** | 4.26*** | 0.04 | 0.96* |
| | (0.38) | (0.36) | (0.49) | (0.43) | (0.42) | (0.35) | (0.37) | (0.48) | (0.32) | (0.40) |
| Household level residual (variance) | 0.59 | 0.51 | 0.53 | 0.39 | 0.65 | 0.20 | 0.55 | 0.36 | 0.37 | 0.36 |
| | (0.07) | (0.06) | (0.06) | (0.06) | (0.07) | (0.03) | (0.07) | (0.05) | (0.06) | (0.05) |
| Individual level residual (variance) | 0.78 | 0.67 | 1.07 | 0.89 | 0.81 | 0.51 | 0.86 | 1.26 | 0.76 | 1.15 |
| | (0.07) | (0.06) | (0.06) | (0.05) | (0.07) | (0.05) | (0.07) | (0.06) | (0.07) | (0.06) |
| ICC | 0.43 | 0.43 | 0.33 | 0.30 | 0.45 | 0.28 | 0.39 | 0.22 | 0.33 | 0.24 |
| Observations | 2337 | 2337 | 3056 | 3056 | 2335 | 3057 | 2337 | 3047 | 2338 | 3051 |

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

ICC: intra-class correlation (household residual/(household residual+individual residual))

The first row in Table 9 shows that service class students completed 24 more minutes of schoolwork per day (β=0.42, Model 1) in primary schools and 16 more minutes per day (β=0.26, Model 1) in secondary schools compared to routine class students in April 2020. Intermediate class students did not complete significantly more hours of schoolwork than routine class students (Model 1). In January 2021 the gaps between service class students and routine class students reduced and become non-significant for primary students (see the estimates regarding the interaction between service class and USoc wave). For secondary students the gap between service class and routine class students did not change significantly.

Model 2 introduced the total number of offline and online offered by the school. The estimates regarding the social class of origin did not reduce substantially showing that inequalities in the uptake of schoolwork were not accounted for by differences between schools in the provision of lessons.

In April 2020 Service class and intermediate class parents did not provide more support to their children than routine class parents (columns 5 and 6). The estimates are non-significant and close to zero. This is true also for the second school closure period for secondary school students. For primary pupils, in January 2021 it seems that routine class children received more support from their parents (interaction between class and USoc wave was negative), but the coefficient was not significant. Service class and intermediate class children tended to spend more time doing schoolwork than routine class children, yet they did not receive more support from their parents. It is possible that service class and intermediate class children are more independent, and / or those children receive qualitatively better parental support, and / or that less disadvantaged parents have less time to give to their children's schoolwork. This is also consistent with the results regarding offline and online lessons. We found that service class and intermediate class children were offered a higher number of offline lessons. In April 2020, service class primary children received 0.2 more *offline* lessons per day than routine class children. Service class secondary school students received 0.36 more *offline* lessons per day and intermediate class secondary students received 0.19 more *offline* lessons per day than routine class students. The results for *online* lessons were reversed: service class and intermediate children received *fewer* online lessons per day than routine class children. Rather than reflecting differences in school provision, these results shows that high SES parents may provide better guidance with offline lessons which can then be completed more flexibly, but that they are at a disadvantage when it comes to online lessons which must be completed synchronously. This implies that the questions regarding the school provision of lessons in the USoc Covid survey reflect the uptake of schoolwork too. In January 2021, the gap between intermediate classes and routine classes in offline lessons vanishes, whilst the one between service classes and routine class is reversed in favour of routine classes. The advantage of routine classes in online lessons also tended to vanish in January 2021.

Regarding working patterns and family composition, compared to children living with two parents who work from home (our reference category), children of single parents who work from home in April 2020 showed a significant disadvantage when it came to completing schoolwork and offline lessons, although the negative coefficient for primary pupils was not significant. The coefficients for online lessons were also found to be negative, but they were sizable only for secondary school students. Single parents who

work from home were found to provide less support to their primary-aged children, but they provided more support to their secondary-aged children, although again the coefficient was not significant. Single parents who worked at the office tended to provide less support to their children, although the coefficients were not significant.
The coefficients regarding the other outcomes are non-significant too.
Compared to the reference category, children in families where the main parent works at the office and the second parent works from home received less support from their parents particularly for primary school pupils. Children in families where the main parent worked at the office and the second parent did not work from home had worse outcomes compared to the reference category: in April 2020, they completed fewer hours of schoolwork; were offered fewer offline lessons; and (in secondary schools) received less support from their parents. These results suggest that having the main parent at home is more important than having the second parent at home.

The most notable change in January 2021 is that single parents who worked at the office were found to provide more support to their children compared to the reference category.

In April 2020, compared to not having a computer, having a computer was associated with completing approx. 33 more minutes of schoolwork per day in both primary ($\beta$=0.56) and secondary ($\beta$=0.55) schools (Model 1). Having a computer was also associated with receiving more support in primary schools, being offered more offline lessons in primary schools and more online lessons in secondary schools. Sharing a computer with other members of the family versus not having a computer leads to similar positive outcomes. There were no significant changes to these patterns in January 2021.

Moving to the other control variables, on average across the two school closure periods, being female was associated with spending more time on schoolwork, but with less support receives from adults in primary schools. Being female is also associated with more offline and online lessons in secondary schools, but fewer online lessons in primary schools.

A child's age was found to be positively associated in primary schools, and negatively in secondary schools, with the volume of schoolwork. Older students received less support from their parents. They were offered fewer online and offline lessons in secondary schools and more offline lessons in primary schools.

Family size was a negative predictor of our outcome variables, but the effect was generally quite small.

In primary schools, children with no siblings completed a much higher volume of schoolwork compared to children who were the oldest in family, but in secondary schools they completed less schoolwork. This pattern was found to repeat when it came to the support received from parents, which is higher for this group in primary schools and lower – although non-significantly so – in secondary schools. Children with no siblings have a disadvantage in online lessons and in offline lessons in secondary schools, whilst they have an advantage in offline lessons in primary schools.

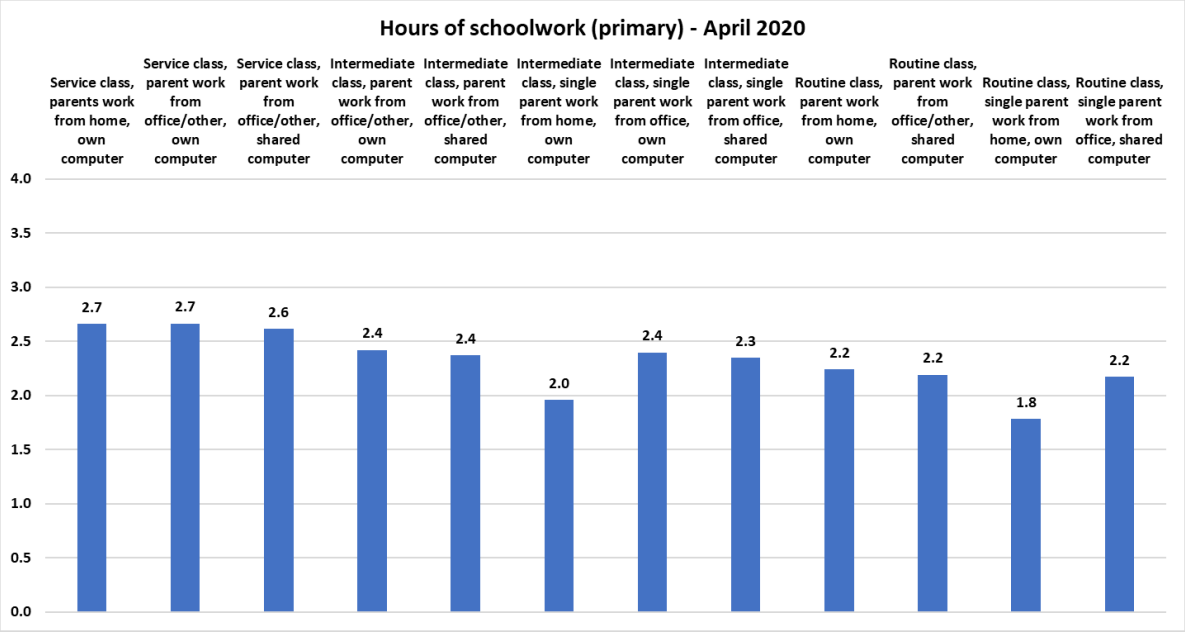
We found that British children did not complete any more or any less (hours of) schoolwork compared to non-British children, but they did receive more support from their parents and were offered more offline lessons in primary schools. Other coefficients were found to be non-significant, including the negative one with respect to offline lessons in secondary schools.

Regional differences were found to be relevant mostly for secondary schools. Compared to the North East, other English regions – particularly London, the South East and the South West - offered more schoolwork, whilst schools in Wales and Scotland offered similar levels of schoolwork. Northern Ireland offered more schoolwork, but the difference was not statistically significant. The advantage of secondary schools in London and the South East and the disadvantage of schools in Northern Ireland, Scotland and Wales was confirmed by the provision (or lack of provision) of online lessons.

## 2.3 Inequalities by socio-economic groups

Figures 1 and 2 present the marginal effects of different combinations of work patterns, parental occupation and computer availability for primary and secondary school children. Figure 1 shows findings for primary schools and Figure 2 shows findings for secondary schools. For full tables with all combinations and standard errors, please refer to the Appendix C.

**Figure 1: Effect of work patterns, occupation and computer availability on hours of schoolwork for primary school students. April 2020, marginal effects.**




The gaps in the volume of schoolwork between children from different occupational backgrounds were magnified when combined with the other two indicators of advantage. In April 2020, children in the least disadvantaged families, where both parents worked regularly from home, where the main parent was in a service class occupation and where the children had their own computer, were found to spend on average 2.7 hours per day on school-work in primary schools and 3.3 hours per day in secondary schools. More

disadvantaged children who live in families where the main parent was in a routine class occupation, where the child had to share a computer with other family members and where either parent did not work regularly from home were found to spend 2.2 hours per day on school work in primary schools and 2.5 in secondary schools. The gap between these two groups is therefore 24 minutes of schoolwork per day (60*0.4) in primary schools and 48 minutes (60*0.8) in secondary schools. Children who live with a single parent who worked from home were found to be the most disadvantaged group as they spent 2 hours on schoolwork in primary schools and 2.7 in secondary schools when the parent was in an intermediate class occupation; and 1.8 hours in primary schools and 2.5 in secondary schools when the parent was in a routine class occupation. These two groups spent respectively 42 (60*0.7) and 52 (60*0.9) fewer minutes per day on schoolwork in primary schools and 36 (60*0.6) and 48 (60*0.8) fewer minutes on schoolwork per day in secondary schools.

Moving to January 2021, children in the least disadvantaged families were found to spend on average 3.5 hours per day on schoolwork in primary schools and 4.4 hours per day in secondary schools. More disadvantaged children were found to spend 3.1 hours per day on schoolwork in primary schools and 3.7 in secondary schools. Like April 2020, the gap between the two groups was therefore 24 minutes of schoolwork per day (60*0.4) in primary schools and 42 (60*0.7) in secondary schools. Children who lived with a single parent who worked from home spent 3.4 hours on schoolwork in primary schools and 3.9 in secondary schools when the parent was in an intermediate class occupation; and 3.1 hours in primary schools and 3.8 hours in secondary schools when the parent was in a routine class occupation. These two groups spent respectively 6 (60*0.1) and 24 (60*4) fewer minutes per day on schoolwork in primary schools and 30 (60*5) and 36 (60*0.6) fewer minutes on schoolwork per day in secondary schools. We conclude from this that single parent families seem to have closed the schoolwork gap with their most advantaged peers.

**Figure 2: Effect of work patterns, occupation and computer availability on hours of schoolwork for primary school students. January 2021, marginal effects.**

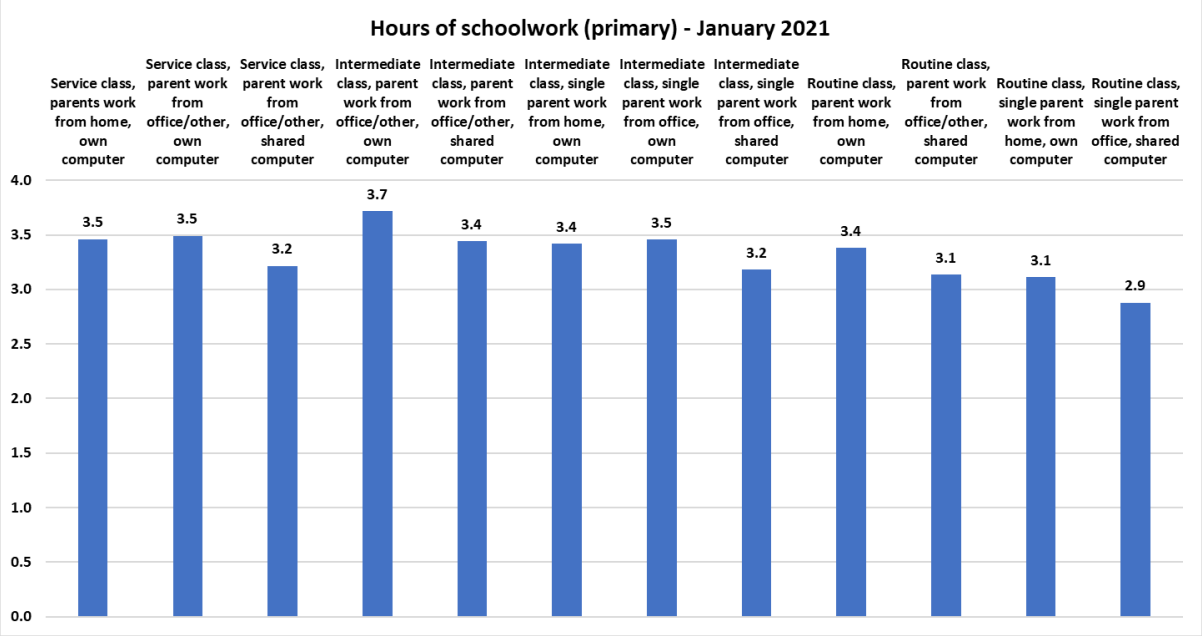


**Figure 3: Effect of work patterns, occupation and computer availability on hours of schoolwork for secondary school students. April 2020, marginal effects.**

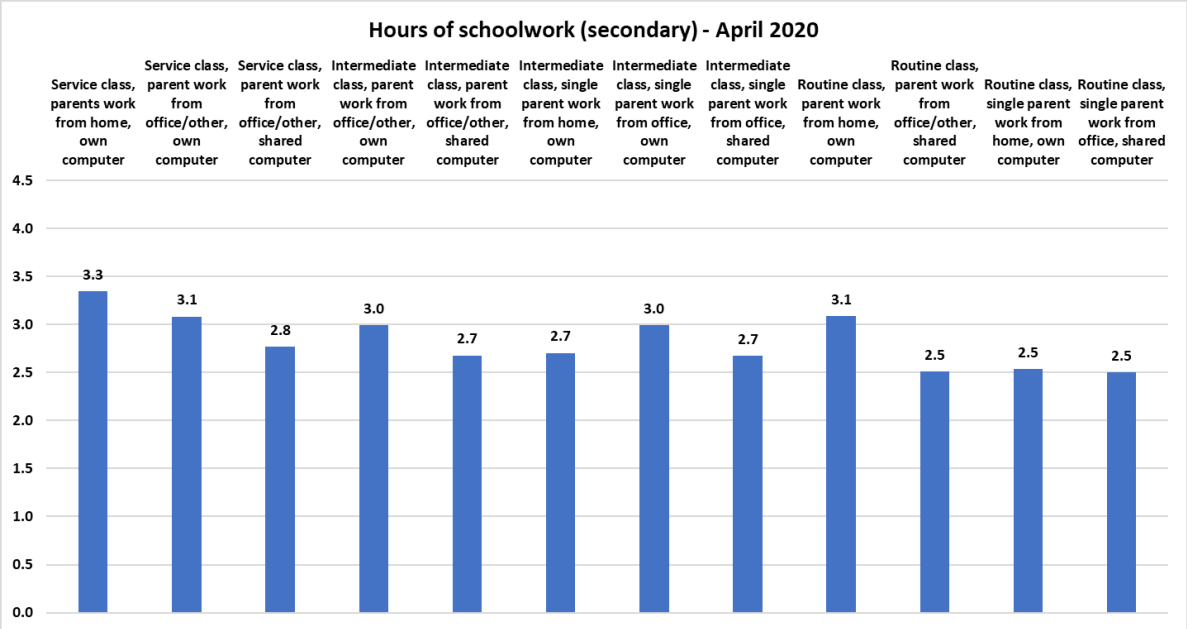



**Figure 4: Effect of work patterns, occupation and computer availability on hours of schoolwork for secondary school students. January 2021, marginal effects.**

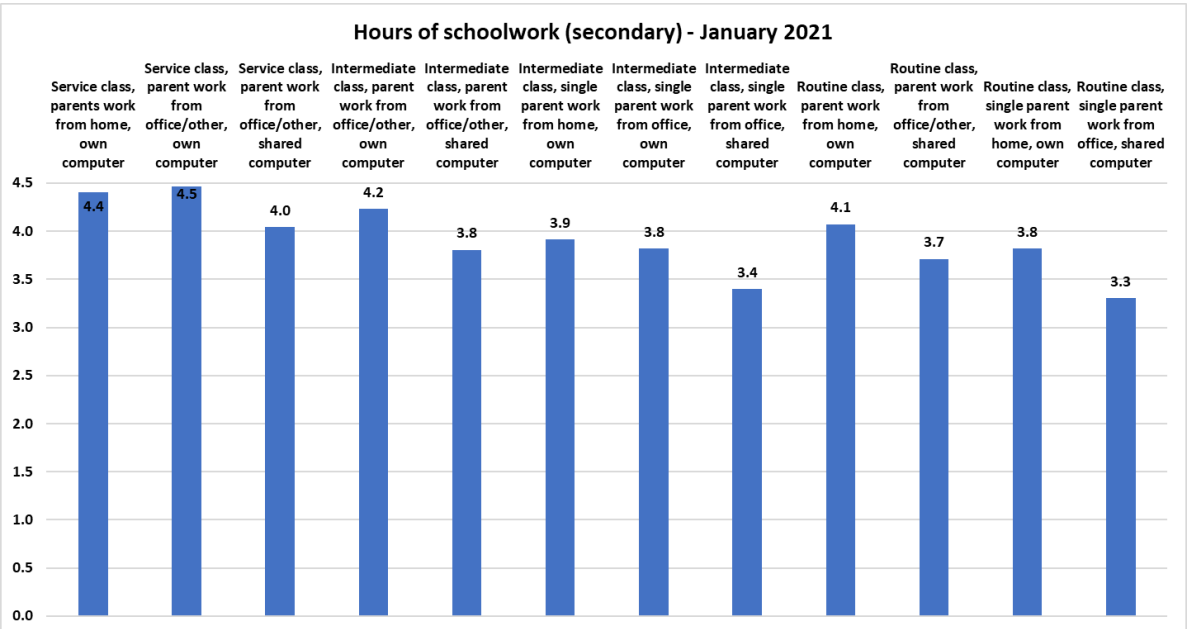


**Figure 5: Gap between the top SES group and other categories for primary school students. April 2020 (blue) and January 2021 (orange).**

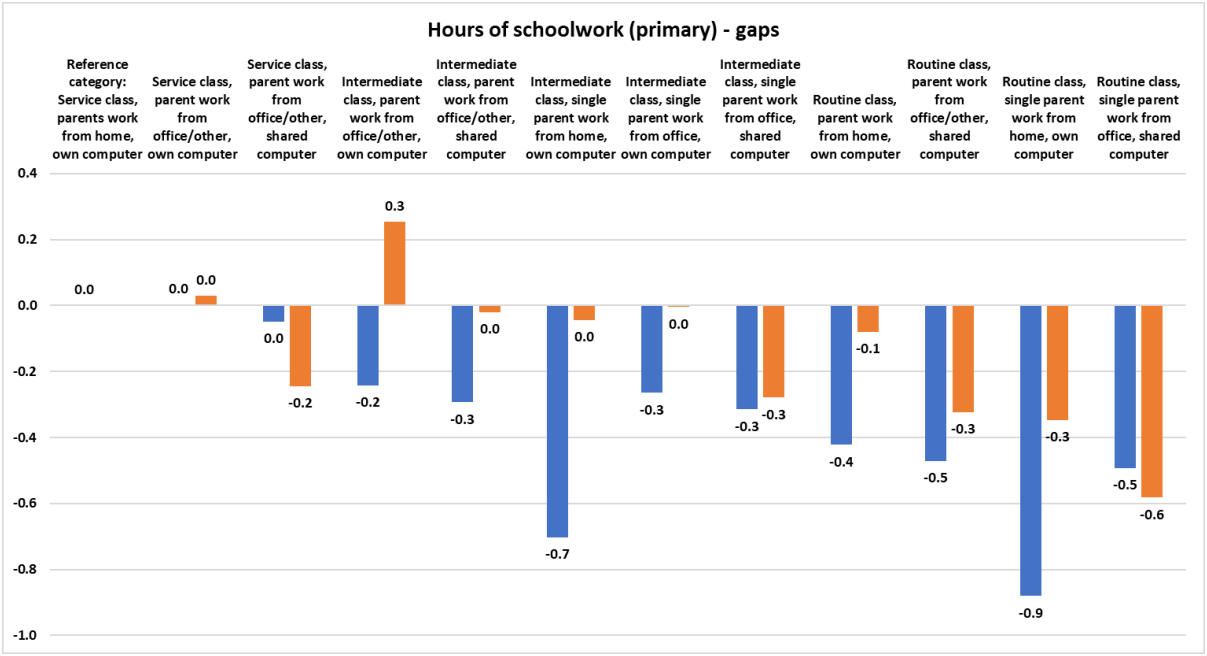
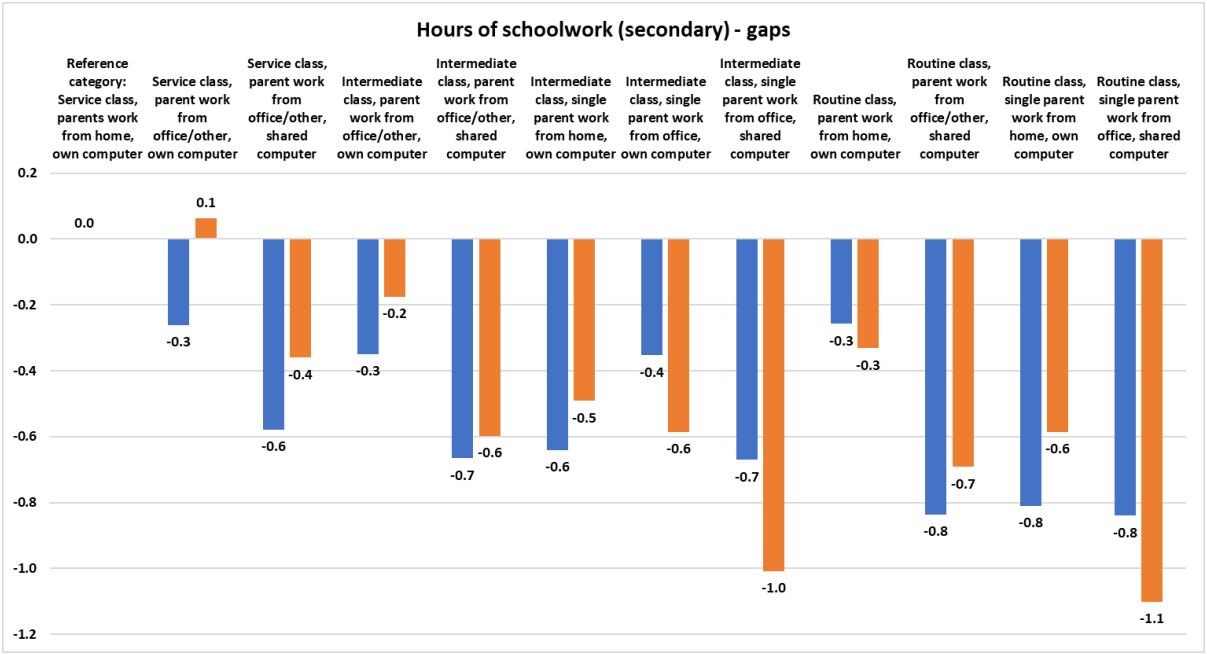



**Figure 6: Gap between the top SES group and other categories for secondary school students. April 2020 (blue) and January 2021 (orange).**



To analyse the changes in inequalities across socio-economic groups between April 2020 and January 2021, we first computed the gaps between the top SES group and the other groups. Then we looked at how the gaps had widened or narrowed between April 2020 and January 2021 (Figure 5 and 6). In primary schools, changes in gaps between April 2020 and January 2021 were not statistically significant. The children of single parents who worked from home reduced their gap with respect to the most advantaged group substantially and the reduction was just below the accepted statistical significance thresholds. Similarly, in secondary schools the fluctuations in gaps between the two periods was not statistically significant.

## 2.4 Decomposition analysis

We conducted a Juhn-Murphy-Pierce decomposition analysis (Juhn, Murphy, and Pierce 1993) to analyse the extent to which changes in working patterns, computer availability, and total number of lessons contributed to explaining the changes in the number of hours of schoolwork between the two school closure periods. For this purpose, we use Model 2s. The analysis distinguishes between over-time changes, which are accounted for by changes in the distribution of factors, changes in the effect of factors and residual (unobservable) effects.

**Table 10: Decomposition analysis of the trend between April 2020 and January 2021 (Juhn-Murphy-Pierce). Hours of schoolwork, primary and secondary schools.**

**Juhn-Murphy-Pierce decomposition (reference estimates: April 2020)**

Primary education

| | T | Q | P | U |
|---|---|---|---|---|
| Mean | 0.94 | 0.48 | 0.50 | -0.04 |
| Contribution of parents' working patterns: 0.002 | | | | |
| Contribution of availability of computers: 0.1 | | | | |
| Contribution of lessons offered: 0.37 | | | | |

Secondary education

| | T | Q | P | U |
|---|---|---|---|---|
| Mean | 1.47 | 0.94 | 0.56 | -0.03 |
| Contribution of parents' working patterns: -0.006 | | | | |
| Contribution of availability of computers: 0.38 | | | | |
| Contribution of lessons offered: 0.63 | | | | |

T = Total difference (January 2021-April 2020)
Q = Contribution of differences in observable quantities
P = Contribution of differences in observable coefficients
U = Contribution of differences in unobservable quantities and prices

The improvement observed in the uptake of schoolwork for primary schools (0.94) is explained equally by changes in the distribution of factors and changes in the coefficients. The higher availability of computers contributed to the improvement (0.1 out of 0.9 hours), but the increased provision of offline and online lessons was the main factor that explained the improvement (0.4 out of 0.9). 0.50 of the total 0.94 hours improvement was fund to be due to the change in the effect of the observed variables, implying that families were better prepared to engage with schoolwork during the second school closure.

In secondary schools, there was a larger improvement of 1.47 hours, and 0.94 of this improvement was explained by changes in the distribution of factors. This means that changes in the distribution of factors explained more of the total improvement compared to primary schools. Despite the increase in the provision of lessons is the main factor explaining the change (0.63), the increased availability of computers also contributed substantially to the positive outcome (0.4). 0.56 of the 1.47 improvement can be attributed to the changing behaviour of families, i.e. better strategies, preparation and commitment.

# 3. Conclusions

This report analysed the extent to which inequalities in the uptake of schoolwork changed between the first and second school closure periods caused by the pandemic. It is likely that the transition to distance schooling has exacerbated inequalities by SES due both to the gap in the volume of schoolwork completed and to the relative ability or inability of some parents to support their children's learning. While parental occupation on its own was found to be a significant determinant of differences in the volume of schoolwork among pupils and students, its effect was magnified when combined with access to computers, family circumstance and working patterns. Whilst inequalities between socio-economic groups in the uptake of schoolwork have remained generally stable between the two school closure periods, better school provision and better family engagement with schoolwork contributed to an improvement in the total hours of schoolwork completed.

Compared to the first school closure period, the second closure showed an improved provision of schoolwork in both primary and secondary schools. The number of offline and online lessons per day increased between the two school closures. This led to a larger volume of schoolwork, which increased form 2.3 per day to 3.3 hours in primary schools, and from 2.6 to 4 hours per day in secondary schools. The improved provision of lessons contributed to explaining this outcome along with, for secondary school students, a better availability of computers. In addition, families were not unexpectedly better prepared in the second school closure and could engage more with the schoolwork provided.

Our results show that in January 2021 the gaps between service class students and routine class students was substantially reduced and became non-significant for primary school pupils. Children of single parents who worked from home were able to reduce the gap in in primary schoolwork when compared with the most advantaged socio-economic group, but overall inequalities between socio-economic groups remained stable between the two closures. Children in families where the main parent was in a service class occupation, where both parents worked from home and where the children had their own computers spent persistently more time doing schoolwork than other groups, particularly compared to children in families where the main parent was in a routine class occupation, where the child had to share a computer with other family members and where the parents did not work regularly from home. The children of single parents who work from home was a particularly disadvantaged group.

With regard to the support provided by parents: service class and intermediate class children did not receive any more support from their parents than routine class children. A possible reason for this is that service class and intermediate class children may be more independent, may receive qualitatively better parental support, and / or that advantaged parents may have less time to give to their children's schoolwork.

Given the negative consequences of losing time in school, it is important that schools remain open if at all possible during any further phases of high infection in order to avoid a further widening of the achievement gap between socio-economic groups and to avoid a negative impact on the mental well-being of children and their parents, which itself is likely to be associated with SES. Our research suggests that should schools be forced to close again in the event of another lockdown, inequalities in learning can be remediated

by increasing the targeted provision of lessons, providing students with better access to IT, providing targeted parents with better guidance to online resources and by providing academic tutors to compensate for the absence of parents who cannot work from home. Importantly, our research will enable schools to identify the groups that are least likely to access schoolwork during school closure periods and are more likely to suffer the largest learning losses. When providing schoolwork remotely during any future school closure, and in remediating the effects of past closures, schools should consider providing guidance and tutoring targeted at children who do not have a computer, at children of single parents and at children of routine class parents who cannot work from home. Entitlement to free school meals alone is not capable of identifying those pupils, students and families, or their needs. This is also true for the policies aimed at mitigating the learning loss, such as small-group or one-to-one tutoring and extending of the school day. The government catch-up funding and the initiatives such as the National Tutoring Programme are a timely attempt to close the achievement gap between socio-economic groups. From the quantitative point of view, the total allocation per pupil of £80, which amounts to 6 additional days of schooling, is likely to be insufficient to mitigate significantly the achievement gap between socio-economic groups widened by the pandemic. Tutoring instead should amount to several weeks of school (Pensiero et al. 2020). However, it is important to target those students that this research has identified as being most in need. Schools are in a better position than central government to identify those students and families, and should be provided with the necessary funding and flexibility to adapt their provision and remediation to suit those students. Having said that, it must be noted that schools varied considerably in the provision of schoolwork during the school closure periods and despite the general improvement in the provision nationally between the two school closures, there remains a minority of schools that provided little or no schoolwork. Ofsted and / or local government agencies and / or formal school groupings such as academy chains should have a role in monitoring whether schools are making adequate provision to remediate the learning loss suffered by the most disadvantaged children in our society. The social and educational effects of another school year starting in September 2021 with large numbers of disadvantaged children falling ever further behind are potentially catastrophic.

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# Appendix

## Appendix A.

### Table A1: Interval regression models for primary and secondary students.

| | Hours of schoolwork | | Hours of support from adults | |
|---|---|---|---|---|
| | Primary | Secondary | Primary | Secondary |
| NS-SEC (3 categories) Ref.: Routine | | | | |
| Service | 0.42*** | 0.26* | -0.01 | -0.07 |
| | (0.11) | (0.11) | (0.12) | (0.07) |
| Intermediate | 0.18 | 0.17 | 0.01 | -0.09 |
| | (0.12) | (0.12) | (0.12) | (0.07) |
| January 2021 | 0.93~ | 1.35 | 0.59 | 0.57~ |
| | (0.56) | (0.89) | (0.40) | (0.31) |
| Service # January 2021 | -0.33 | 0.14 | -0.36 | 0.09 |
| | (0.21) | (0.18) | (0.22) | (0.10) |
| Intermediate # January 2021 | 0.14 | -0.05 | -0.13 | 0.10 |
| | (0.24) | (0.20) | (0.23) | (0.11) |
| Ref.: Working from home # Working from home | | | | |
| Not working # Single | -0.11 | -0.48 | -0.45 | 0.47 |
| | (0.40) | (0.41) | (0.36) | (0.36) |
| Not working # Working from home | -0.41 | 0.23 | 0.02 | 0.05 |
| | (0.28) | (0.44) | (0.30) | (0.23) |
| Not working # Other | -0.07 | -0.05 | 0.17 | 0.16 |
| | (0.20) | (0.18) | (0.21) | (0.14) |
| Working at office # Single | -0.03 | -0.29 | -0.45 | -0.10 |

| | | | | |
|---|---|---|---|---|
| | (0.27) | (0.23) | (0.29) | (0.11) |
| Working at office # Working from home | -0.14 | -0.13 | -0.34~ | -0.10 |
| | (0.16) | (0.16) | (0.17) | (0.08) |
| Working at office # Other | -0.01 | -0.27** | -0.19 | -0.11~ |
| | (0.12) | (0.10) | (0.12) | (0.06) |
| Working from home # Single | -0.46* | -0.55** | -0.54* | 0.15 |
| | (0.21) | (0.20) | (0.21) | (0.11) |
| Working from home # Other | -0.13 | -0.35* | -0.14 | -0.11 |
| | (0.15) | (0.18) | (0.18) | (0.10) |
| Not working # Single # January 2021 | 0.67 | 0.13 | 1.19~ | 0.03 |
| | (0.58) | (0.51) | (0.64) | (0.48) |
| Not working # Working from home # January 2021 | 0.33 | -0.09 | 0.05 | -0.29 |
| | (0.30) | (0.43) | (0.32) | (0.22) |
| Not working # Other # January 2021 | 0.00 | 0.17 | 0.14 | -0.16 |
| | (0.31) | (0.25) | (0.31) | (0.17) |
| Working at office # Single # January 2021 | -0.22 | -0.10 | 1.54** | 0.41* |
| | (0.29) | (0.37) | (0.50) | (0.18) |
| Working at office # Working from home # January 2021 | 0.26 | 0.58* | 0.55* | -0.11 |
| | (0.28) | (0.30) | (0.28) | (0.10) |
| Working at office # Other # January 2021 | 0.05 | 0.37* | 0.12 | 0.17~ |
| | (0.22) | (0.17) | (0.19) | (0.10) |
| Working from home # Single # January 2021 | 0.20 | 0.29 | -0.13 | -0.09 |
| | (0.37) | (0.39) | (0.30) | (0.15) |
| Working from home # Other # January 2021 | 0.46 | 0.72* | 0.34 | -0.01 |
| | (0.30) | (0.30) | (0.31) | (0.16) |
| Ref.: No computer | | | | |
| Child's own computer | 0.55** | 0.76* | 0.37~ | 0.12 |
| | (0.21) | (0.30) | (0.22) | (0.22) |
| Shared computer | 0.50* | 0.42 | 0.43* | 0.26 |
| | (0.21) | (0.30) | (0.21) | (0.22) |

| | | | | |
|---|---|---|---|---|
| Not required | -1.68*** | -2.03*** | -1.53*** | -0.32 |
| | (0.24) | (0.30) | (0.23) | (0.22) |
| Child's own computer # January 2021 | 0.23 | -0.25 | -0.30 | -0.65* |
| | (0.54) | (0.87) | (0.35) | (0.29) |
| Shared computer # January 2021 | -0.02 | -0.45 | -0.23 | -0.64* |
| | (0.55) | (0.87) | (0.35) | (0.30) |
| Not required # January 2021 | 0.53 | -0.80 | 0.57 | -0.58~ |
| | (0.65) | (0.94) | (0.76) | (0.34) |
| Female | 0.15* | 0.34*** | -0.12~ | -0.05 |
| | (0.06) | (0.06) | (0.06) | (0.04) |
| Child’s age | 0.14*** | -0.09*** | -0.11*** | -0.16*** |
| | (0.02) | (0.02) | (0.02) | (0.01) |
| Family size | -0.03 | -0.09* | -0.08* | -0.05~ |
| | (0.04) | (0.05) | (0.04) | (0.03) |
| British | 0.15 | 0.03 | 0.24* | -0.05 |
| | (0.11) | (0.11) | (0.10) | (0.07) |
| Ref.: Oldest child | | | | |
| Single child | 2.20*** | -0.54** | 2.69*** | -0.02 |
| | (0.41) | (0.17) | (0.33) | (0.07) |
| Middle child | -0.00 | -0.07 | -0.13 | -0.11 |
| | (0.13) | (0.14) | (0.12) | (0.10) |
| Youngest child | 0.12 | -0.08 | -0.01 | -0.03 |
| | (0.08) | (0.08) | (0.08) | (0.05) |
| Ref.: North East | | | | |
| North West | -0.09 | 0.46* | -0.14 | 0.09 |
| | (0.24) | (0.21) | (0.25) | (0.11) |
| Yorkshire and The Humber | -0.07 | 0.47* | -0.01 | 0.30* |
| | (0.25) | (0.22) | (0.26) | (0.13) |
| East Midlands | -0.10 | 0.59* | 0.06 | 0.09 |
| | (0.25) | (0.24) | (0.26) | (0.12) |

| | | | | |
|---|---|---|---|---|
| West Midlands | -0.10 | 0.46* | -0.10 | 0.11 |
| | (0.26) | (0.22) | (0.27) | (0.12) |
| East of England | 0.08 | 0.64** | 0.07 | -0.03 |
| | (0.25) | (0.21) | (0.26) | (0.10) |
| London | 0.08 | 0.95*** | 0.07 | 0.17 |
| | (0.25) | (0.24) | (0.27) | (0.12) |
| South East | 0.17 | 0.84*** | 0.16 | 0.07 |
| | (0.24) | (0.21) | (0.25) | (0.11) |
| South West | -0.10 | 0.74*** | -0.04 | 0.03 |
| | (0.25) | (0.22) | (0.27) | (0.11) |
| Wales | -0.27 | 0.01 | -0.17 | 0.27~ |
| | (0.26) | (0.24) | (0.28) | (0.15) |
| Scotland | -0.25 | -0.01 | -0.07 | 0.21 |
| | (0.25) | (0.22) | (0.26) | (0.13) |
| Northern Ireland | -0.05 | 0.14 | 0.03 | 0.19 |
| | (0.25) | (0.24) | (0.28) | (0.16) |
| Total lessons | | | | |
| Constant | 0.40 | 3.42*** | 2.76*** | 3.25*** |
| | (0.39) | (0.53) | (0.42) | (0.34) |
| Household level residual (variance) | 0.62 | 0.71 | 0.64 | 0.19 |
| | (0.07) | (0.08) | (0.07) | (0.03) |
| Individual level residual (variance) | 0.73 | 1.18 | 0.75 | 0.44 |
| | (0.07) | (0.08) | (0.07) | (0.05) |
| ICC | 0.46 | 0.38 | 0.46 | 0.30 |
| Observations | 2337 | 3056 | 2335 | 3057 |

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

ICC: intra-class correlation (household residual/(household residual+individual residual))

## Table A2: All models for subsample of children offered some schoolwork.

| | Primary Hours of schoolwork. Model 1 | Hours of schoolwork. Model 2 | Secondary Hours of schoolwork. Model 1 | Hours of schoolwork. Model 2 | Primary Hour of support from adults | Secondary Hour of support from adults | Primary Offline lessons | Secondary Offline lessons | Primary Online lessons | Secondary Online lessons |
|---|---|---|---|---|---|---|---|---|---|---|
| NS-SEC (3 categories) Ref.: Routine | | | | | | | | | | |
| Service | 0.46*** | 0.50*** | 0.27* | 0.22* | 0.00 | -0.06 | 0.19 | 0.42*** | -0.38*** | -0.29* |
| | (0.12) | (0.11) | (0.12) | (0.11) | (0.13) | (0.08) | (0.13) | (0.12) | (0.12) | (0.13) |
| Intermediate | 0.19 | 0.26* | 0.18 | 0.16 | -0.01 | -0.08 | 0.07 | 0.24~ | -0.32** | -0.23~ |
| | (0.12) | (0.12) | (0.13) | (0.12) | (0.13) | (0.08) | (0.13) | (0.13) | (0.12) | (0.13) |
| January 2021 | 0.96~ | 0.69 | 1.32 | 0.43 | 0.60 | 0.68* | 1.03** | 0.87 | -0.17 | 1.94* |
| | (0.56) | (0.47) | (0.83) | (0.77) | (0.41) | (0.32) | (0.37) | (0.71) | (0.33) | (0.93) |
| Service # January 2021 | -0.40~ | -0.44** | 0.05 | 0.21 | -0.38~ | 0.06 | -0.23 | -0.68*** | 0.40~ | 0.20 |
| | (0.20) | (0.17) | (0.16) | (0.15) | (0.23) | (0.11) | (0.24) | (0.20) | (0.23) | (0.19) |
| Intermediate # January 2021 | 0.09 | 0.04 | -0.11 | 0.04 | -0.15 | 0.06 | -0.14 | -0.41* | 0.32 | -0.02 |
| | (0.24) | (0.21) | (0.18) | (0.16) | (0.24) | (0.11) | (0.23) | (0.21) | (0.23) | (0.20) |
| Ref.: Working from home # Working from home | | | | | | | | | | |
| Not working # Single | -0.03 | -0.13 | -0.50 | -0.20 | -0.43 | 0.54 | 0.23 | -0.42 | 0.09 | -0.48* |
| | (0.39) | (0.38) | (0.43) | (0.39) | (0.38) | (0.39) | (0.36) | (0.35) | (0.30) | (0.23) |
| Not working # Working from home | -0.41 | -0.42~ | 0.21 | 0.19 | 0.01 | 0.08 | -0.07 | 0.06 | 0.08 | -0.03 |
| | (0.28) | (0.23) | (0.42) | (0.36) | (0.30) | (0.25) | (0.32) | (0.35) | (0.22) | (0.33) |
| Not working # Other | -0.07 | 0.15 | -0.17 | -0.17 | 0.18 | 0.20 | -0.47** | -0.41* | -0.23~ | 0.49* |
| | (0.20) | (0.20) | (0.19) | (0.18) | (0.22) | (0.16) | (0.18) | (0.19) | (0.14) | (0.24) |
| Working at office # Single | -0.06 | -0.02 | -0.32 | -0.31~ | -0.46 | -0.10 | -0.29 | -0.29 | 0.19 | 0.21 |
| | (0.29) | (0.29) | (0.24) | (0.18) | (0.31) | (0.12) | (0.35) | (0.23) | (0.31) | (0.25) |
| Working at office # Working from home | -0.14 | -0.12 | -0.13 | -0.07 | -0.36* | -0.10 | -0.19 | -0.06 | 0.09 | -0.09 |
| | (0.17) | (0.16) | (0.16) | (0.16) | (0.18) | (0.09) | (0.19) | (0.18) | (0.23) | (0.17) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Working at office # Other | 0.01 | 0.06 | -0.29** | -0.21* | -0.18 | -0.09 | -0.07 | -0.27* | -0.12 | 0.02 |
| | (0.12) | (0.11) | (0.11) | (0.10) | (0.12) | (0.07) | (0.12) | (0.11) | (0.10) | (0.12) |
| Working from home # Single | -0.53* | -0.42* | -0.60* | -0.38~ | -0.56* | 0.17 | -0.29 | -0.49** | -0.06 | -0.19 |
| | (0.22) | (0.20) | (0.23) | (0.20) | (0.23) | (0.13) | (0.22) | (0.17) | (0.18) | (0.17) |
| Working from home # Other | -0.10 | -0.06 | -0.25 | -0.21 | -0.16 | -0.04 | -0.09 | -0.09 | -0.07 | 0.01 |
| | (0.16) | (0.14) | (0.18) | (0.17) | (0.18) | (0.12) | (0.19) | (0.20) | (0.13) | (0.23) |
| Not working # Single # January 2021 | 0.44 | 0.72 | 0.23 | -0.00 | 1.15~ | 0.20 | -0.69 | 0.22 | -0.23 | 0.57 |
| | (0.52) | (0.46) | (0.58) | (0.44) | (0.63) | (0.49) | (0.45) | (0.55) | (0.51) | (0.56) |
| Not working # Working from home # January 2021 | 0.34 | 0.24 | -0.08 | 0.08 | 0.07 | -0.32 | -0.35 | -0.25 | 0.73~ | -0.07 |
| | (0.29) | (0.28) | (0.39) | (0.40) | (0.32) | (0.23) | (0.45) | (0.61) | (0.39) | (0.37) |
| Not working # Other # January 2021 | 0.03 | -0.14 | 0.27 | 0.34~ | 0.15 | -0.20 | 0.35 | -0.02 | 0.16 | -0.31 |
| | (0.31) | (0.31) | (0.23) | (0.20) | (0.31) | (0.18) | (0.27) | (0.29) | (0.24) | (0.33) |
| Working at office # Single # January 2021 | -0.19 | -0.09 | -0.03 | 0.15 | 1.55** | 0.43* | 0.50 | 0.05 | -0.91*** | -0.56 |
| | (0.29) | (0.29) | (0.36) | (0.30) | (0.51) | (0.19) | (0.31) | (0.33) | (0.25) | (0.34) |
| Working at office # Working from home # January 2021 | 0.29 | 0.47 | 0.45~ | 0.09 | 0.57* | -0.13 | -0.24 | 0.43 | -0.32 | 0.65* |
| | (0.28) | (0.30) | (0.23) | (0.21) | (0.28) | (0.11) | (0.57) | (0.36) | (0.44) | (0.31) |
| Working at office # Other # January 2021 | -0.01 | -0.07 | 0.33* | 0.24~ | 0.09 | 0.13 | -0.13 | 0.30~ | 0.32 | 0.00 |
| | (0.22) | (0.19) | (0.15) | (0.14) | (0.20) | (0.11) | (0.20) | (0.17) | (0.20) | (0.17) |
| Working from home # Single # January 2021 | 0.25 | 0.15 | 0.34 | 0.27 | -0.11 | -0.08 | -0.18 | 0.32 | 0.53 | -0.04 |
| | (0.35) | (0.33) | (0.37) | (0.34) | (0.30) | (0.16) | (0.51) | (0.28) | (0.43) | (0.30) |
| Working from home # Other # January 2021 | 0.44 | 0.41~ | 0.59* | 0.44* | 0.36 | -0.09 | 0.69* | 0.11 | -0.62* | 0.20 |
| | (0.28) | (0.25) | (0.25) | (0.22) | (0.31) | (0.17) | (0.28) | (0.39) | (0.31) | (0.40) |
| Ref.: No computer | | | | | | | | | | |
| Child's own computer | 0.55** | 0.28 | 0.73* | 0.52* | 0.38~ | 0.18 | 0.73*** | 0.13 | 0.17 | 0.54** |
| | (0.21) | (0.17) | (0.29) | (0.24) | (0.22) | (0.22) | (0.22) | (0.33) | (0.15) | (0.20) |
| Shared computer | 0.50* | 0.23 | 0.42 | 0.32 | 0.43* | 0.31 | 0.69** | 0.00 | 0.19 | 0.32 |
| | (0.20) | (0.16) | (0.29) | (0.24) | (0.21) | (0.22) | (0.21) | (0.33) | (0.15) | (0.20) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Child's own computer # January 2021 | 0.22 | 0.09 | -0.33 | -0.02 | -0.30 | -0.72* | -0.23 | -0.62 | 0.76* | -0.39 |
| | (0.54) | (0.46) | (0.81) | (0.75) | (0.36) | (0.29) | (0.35) | (0.69) | (0.31) | (0.92) |
| Shared computer # January 2021 | -0.01 | -0.11 | -0.44 | -0.16 | -0.22 | -0.72* | -0.13 | -0.58 | 0.51~ | -0.35 |
| | (0.55) | (0.46) | (0.81) | (0.75) | (0.35) | (0.30) | (0.37) | (0.70) | (0.30) | (0.91) |
| Female | 0.15* | 0.16** | 0.37*** | 0.27*** | -0.12~ | -0.06 | 0.06 | 0.20** | -0.09~ | 0.12* |
| | (0.06) | (0.05) | (0.06) | (0.05) | (0.06) | (0.05) | (0.06) | (0.06) | (0.05) | (0.06) |
| Child's age | 0.15*** | 0.12*** | -0.09*** | -0.02 | -0.11*** | -0.17*** | 0.00 | -0.16*** | 0.09*** | -0.04* |
| | (0.02) | (0.01) | (0.02) | (0.02) | (0.02) | (0.01) | (0.02) | (0.02) | (0.01) | (0.02) |
| Family size | -0.04 | -0.03 | -0.09* | -0.06 | -0.09* | -0.05 | -0.04 | -0.03 | 0.02 | -0.03 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.03) | (0.05) | (0.04) | (0.04) | (0.04) |
| British | 0.16 | 0.09 | 0.02 | 0.02 | 0.26* | -0.07 | 0.21* | -0.18~ | 0.02 | 0.14 |
| | (0.11) | (0.10) | (0.10) | (0.09) | (0.10) | (0.07) | (0.10) | (0.11) | (0.09) | (0.10) |
| Ref.: Oldest child | | | | | | | | | | |
| Single child | 2.24*** | 2.07*** | -0.68*** | -0.30~ | 2.68*** | -0.07 | 1.46** | -0.62*** | -0.92* | -0.43*** |
| | (0.39) | (0.38) | (0.20) | (0.18) | (0.33) | (0.09) | (0.45) | (0.14) | (0.40) | (0.12) |
| Middle child | -0.00 | 0.03 | -0.03 | -0.09 | -0.14 | -0.10 | -0.05 | 0.06 | -0.09 | 0.19 |
| | (0.13) | (0.11) | (0.13) | (0.10) | (0.13) | (0.11) | (0.14) | (0.13) | (0.12) | (0.11) |
| Youngest child | 0.12 | 0.15* | -0.08 | -0.03 | -0.02 | -0.03 | -0.14~ | -0.09 | 0.02 | -0.04 |
| | (0.08) | (0.07) | (0.08) | (0.07) | (0.08) | (0.06) | (0.07) | (0.07) | (0.07) | (0.07) |
| Ref.: North East | | | | | | | | | | |
| North West | -0.07 | -0.13 | 0.44* | 0.27 | -0.16 | 0.09 | 0.17 | 0.32 | 0.07 | 0.22 |
| | (0.24) | (0.24) | (0.22) | (0.20) | (0.25) | (0.13) | (0.23) | (0.22) | (0.21) | (0.21) |
| Yorkshire and The Humber | -0.07 | -0.09 | 0.40~ | 0.26 | 0.02 | 0.30* | 0.28 | 0.20 | -0.20 | 0.22 |
| | (0.24) | (0.24) | (0.22) | (0.20) | (0.26) | (0.14) | (0.23) | (0.22) | (0.22) | (0.21) |
| East Midlands | -0.09 | -0.15 | 0.59* | 0.40~ | 0.06 | 0.05 | 0.19 | 0.39~ | 0.04 | 0.14 |
| | (0.24) | (0.25) | (0.25) | (0.22) | (0.26) | (0.14) | (0.25) | (0.24) | (0.22) | (0.22) |
| West Midlands | -0.11 | -0.21 | 0.42~ | 0.32 | -0.10 | 0.11 | 0.16 | 0.10 | 0.18 | 0.16 |
| | (0.25) | (0.25) | (0.22) | (0.19) | (0.27) | (0.14) | (0.24) | (0.22) | (0.23) | (0.21) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| East of England | 0.10 | 0.04 | 0.59** | 0.36~ | 0.08 | -0.08 | 0.27 | 0.31 | -0.05 | 0.37~ |
| | (0.24) | (0.24) | (0.22) | (0.19) | (0.26) | (0.12) | (0.25) | (0.22) | (0.22) | (0.20) |
| London | 0.10 | -0.11 | 0.88*** | 0.53** | 0.07 | 0.15 | 0.56* | 0.30 | 0.17 | 0.70** |
| | (0.25) | (0.24) | (0.23) | (0.21) | (0.27) | (0.14) | (0.25) | (0.23) | (0.23) | (0.21) |
| South East | 0.17 | 0.05 | 0.75*** | 0.49** | 0.15 | 0.05 | 0.56* | 0.34 | -0.12 | 0.42* |
| | (0.24) | (0.23) | (0.22) | (0.19) | (0.25) | (0.12) | (0.23) | (0.21) | (0.21) | (0.20) |
| South West | -0.08 | -0.13 | 0.68** | 0.44* | -0.03 | 0.02 | 0.06 | 0.42~ | 0.13 | 0.31 |
| | (0.25) | (0.25) | (0.22) | (0.20) | (0.27) | (0.12) | (0.25) | (0.23) | (0.22) | (0.20) |
| Wales | -0.26 | -0.11 | -0.03 | -0.05 | -0.18 | 0.27 | -0.14 | 0.26 | -0.36~ | -0.22 |
| | (0.25) | (0.25) | (0.25) | (0.23) | (0.29) | (0.17) | (0.25) | (0.23) | (0.22) | (0.22) |
| Scotland | -0.25 | -0.23 | -0.06 | -0.07 | -0.08 | 0.19 | 0.21 | 0.36 | -0.26 | -0.34~ |
| | (0.25) | (0.25) | (0.23) | (0.20) | (0.26) | (0.15) | (0.23) | (0.23) | (0.21) | (0.21) |
| Northern Ireland | -0.03 | -0.12 | 0.16 | 0.15 | 0.03 | 0.18 | 0.49~ | 0.41 | -0.20 | -0.36 |
| | (0.25) | (0.25) | (0.25) | (0.22) | (0.28) | (0.18) | (0.27) | (0.30) | (0.25) | (0.25) |
| Total lessons | | 0.29*** | | 0.33*** | | | | | | |
| | | (0.02) | | (0.02) | | | | | | |
| Constant | 0.41 | 0.06 | 3.35*** | 1.65*** | 2.87*** | 3.40*** | 1.26*** | 4.25*** | 0.06 | 0.95* |
| | (0.39) | (0.36) | (0.51) | (0.44) | (0.43) | (0.36) | (0.37) | (0.50) | (0.32) | (0.42) |
| Household level residual (variance) | 0.62 | 0.54 | 0.60 | 0.44 | 0.67 | 0.24 | 0.55 | 0.40 | 0.38 | 0.40 |
| | (0.07) | (0.07) | (0.07) | (0.06) | (0.07) | (0.04) | (0.07) | (0.06) | (0.06) | (0.06) |
| Individual level residual (variance) | 0.78 | 0.67 | 1.11 | 0.93 | 0.83 | 0.54 | 0.88 | 1.34 | 0.78 | 1.24 |
| | (0.07) | (0.07) | (0.07) | (0.06) | (0.07) | (0.05) | (0.07) | (0.07) | (0.07) | (0.06) |
| ICC | 0.44 | 0.45 | 0.35 | 0.32 | 0.45 | 0.31 | 0.38 | 0.23 | 0.33 | 0.24 |
| Observations | 2270 | 2270 | 2819 | 2819 | 2268 | 2820 | 2268 | 2809 | 2269 | 2813 |

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

## Table A3: Marginal effects for hours of schoolwork from Table 9.

| | April 2020 Primary Hours of schoolwork | | January 2021 Primary Hours of schoolwork | |
|---|---|---|---|---|
| | Mean | SE | Mean | SE |
| Service class, parents work from home, own computer | 2.7 | 0.1 | 3.5 | 0.1 |
| Service class. single parent work from home, own computer | 2.2 | 0.2 | 3.2 | 0.3 |
| Intermediate class, parent work from home, own computer | 2.4 | 0.1 | 3.7 | 0.2 |
| Intermediate class, single parent work from home, own computer | 2.0 | 0.2 | 3.4 | 0.3 |
| Routine class. parent work from home, own computer | 2.2 | 0.1 | 3.4 | 0.2 |
| Routine class, single parent work from home, own computer | 1.8 | 0.2 | 3.1 | 0.4 |
| Service class, parent work from office/other, own computer | 2.7 | 0.1 | 3.5 | 0.2 |
| Service class, single parent work from office, own computer | 2.6 | 0.3 | 3.2 | 0.3 |
| Intermediate class, parent work from office/other, own computer | 2.4 | 0.1 | 3.7 | 0.2 |
| Intermediate class, single parent work from office, own computer | 2.4 | 0.3 | 3.5 | 0.3 |
| Routine class, parent work from office/other, own computer | 2.2 | 0.1 | 3.4 | 0.2 |
| Routine class, single parent work from office, own computer | 2.2 | 0.3 | 3.2 | 0.3 |
| Service class, parent work from office/other, shared computer | 2.6 | 0.1 | 3.2 | 0.2 |
| Service class, single parent work from office, shared computer | 2.6 | 0.3 | 3.0 | 0.3 |
| Intermediate class, parent work from office/other, shared computer | 2.4 | 0.1 | 3.4 | 0.2 |
| Intermediate class, single parent work from office, shared computer | 2.4 | 0.3 | 3.2 | 0.3 |
| Routine class, parent work from office/other, shared computer | 2.2 | 0.1 | 3.1 | 0.2 |
| Routine class, single parent work from office, shared computer | 2.2 | 0.3 | 2.9 | 0.3 |

| | April 2020 Secondary Hours of schoolwork | | January 2021 Secondary Hours of schoolwork | |
|---|---|---|---|---|
| | Mean | SE | Mean | SE |
| Service class, parents work from home, own computer | 3.3 | 0.1 | 4.4 | 0.1 |
| Service class, single parent work from home, own computer | 2.8 | 0.2 | 4.2 | 0.3 |
| Intermediate class, parent work from home, own computer | 3.3 | 0.1 | 4.2 | 0.1 |
| Intermediate class, single parent work from home, own computer | 2.7 | 0.2 | 3.9 | 0.3 |
| Routine class, parent work from home, own computer | 3.1 | 0.1 | 4.1 | 0.1 |
| Routine class, single parent work from home, own computer | 2.5 | 0.2 | 3.8 | 0.3 |
| Service class, parent work from office/other, own computer | 3.1 | 0.1 | 4.5 | 0.1 |
| Service class, single parent work from office, own computer | 3.1 | 0.2 | 4.1 | 0.3 |
| Intermediate class, parent work from office/other, own computer | 3.0 | 0.1 | 4.2 | 0.1 |
| Intermediate class, single parent work from office, own computer | 3.0 | 0.2 | 3.8 | 0.3 |
| Routine class, parent work from office/other, own computer | 2.8 | 0.1 | 4.1 | 0.1 |
| Routine class, single parent work from office, own computer | 2.8 | 0.2 | 3.7 | 0.3 |

| | | | | |
|---|---|---|---|---|
| Service class, parent work from office/other, shared computer | 2.8 | 0.1 | 4.0 | 0.1 |
| Service class, single parent work from office, shared computer | 2.8 | 0.2 | 3.6 | 0.3 |
| Intermediate class, parent work from office/other, shared computer | 2.7 | 0.1 | 3.8 | 0.1 |
| Intermediate class, single parent work from office, shared computer | 2.7 | 0.2 | 3.4 | 0.3 |
| Routine class, parent work from office/other, shared computer | 2.5 | 0.1 | 3.7 | 0.2 |
| Routine class, single parent work from office, shared computer | 2.5 | 0.2 | 3.3 | 0.3 |