

A generation at risk

Rebalancing education in the post-pandemic era

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Executive summary

We present for the first time a model of children's evolving **socio-emotional** and **cognitive** skills to assess how the educational and lifetime prospects of children of **different ages, genders and socio-economic backgrounds** were affected by mass school closures in England during the Covid pandemic.

International evidence

Our international review suggests that children suffered significant Covid learning loss – **up to 6 months** – with children from low-income backgrounds experiencing an **extra 2 months** of learning loss. Children also suffered a significant decline in socio-emotional skills. These 2 factors combined to limit pupils' emerging development at every life stage. Covid **amplified long term persistent education gaps** across a range of OECD countries including the UK.

Compared with most other nations, England's pandemic response was heavily **focused on academic catch-up** with less emphasis on socio-emotional skills, extracurricular support, and wellbeing. Our results suggest that to improve child outcomes, much greater emphasis is needed in schools on activities that improve both socio-emotional and cognitive skills.

Findings from our framework of skill formation

Importance of socio-emotional skills

We find that **socio-emotional skills are as important as cognitive skills** in achieving good GCSEs and decent wages after school. In our model, socio-emotional skills include the ability to engage in positive social interactions, cooperate with others, show empathy, and maintain attention. Cognitive skills are measured by how well children perform in cognitive tests, highlighting quantitative knowledge, reading and writing skills, and fluid reasoning.

We find for example, that **20%** of the highest performing pupils in cognitive tests who had **average socio-emotional skills** at age 14 fail to attain 5 good GCSEs including English and maths. During early adolescence, socio-emotional skills play a significant role in helping to develop future cognitive skills.

Parent investments, including time spent reading with children and interest in children's education, also shape children's socio-emotional and cognitive skills.

The model of skill formation is based on an analysis of just under 19,000 pupils in the Millennium Cohort Study. This was applied to later pupil cohorts to predict how GCSE results will be impacted by disruption during the pandemic.

Gender divide

During the teenage years we identify a clear **gender divide** in the importance of different skills. For boys, cognitive skill levels at age 14 are twice as important as socio-emotional skills in determining future GCSE prospects; for girls the opposite is true, **with socio-emotional skills 50% more impactful than cognitive skills**.

Covid consequences

Our results highlight a **double whammy** to the educational progress for successive Covid cohorts: they are on course for the biggest overall decline in basic GCSE achievement for at least 2 decades, and an unprecedented widening of the socio-economic gap in GCSE prospects. This will impact on children taking GCSEs **well into the 2030s**. Boys at age 5 at the time of Covid school closures are up to 4.4 percentage points less likely to achieve 5 good GCSEs and females 4.8 percentage less likely to do so. We predict for example that **less than four in ten pupils in 2030 will achieve grade 5 or above in English and mathematics GCSEs**. In 2022/23, 45.3% of pupils in England achieved this benchmark.

The socio-economic gap in basic GCSE achievement for age 11 pupils at the time of Covid school closures will widen: by 4.5 percentage points for males and by 4.3 percentage points for females. This equates to a **32-percentage point socio-economic gap in standard passes in English and maths GCSEs** from 2024.

Economic losses and income mobility

We estimate that the educational damage wrought by Covid will have an economic cost to the national economy due to lower lifetime earnings because of falling GCSE achievement of **£31.4 billion** in today's prices.

Growing socio-economic divides point to a step change downwards in the UK's relative income mobility levels. We estimate that for age 11 children – who experience greater inequality in attainment due to Covid – the relationship between parental and child income will increase by **15%** for females and **12%** for males. By international standards, this equates to a **significant decline in income mobility**.

Low-cost equalising policies

Informed by our findings and international review of evidence, we propose several evidence-informed low-cost policies with the potential to level the education playing field and improve outcomes overall in the post pandemic era.

These include:

- A national programme of trained **undergraduate tutors** providing academic and mentoring support to help boost the foundational skills of pupils
- **An enrichment guarantee** in schools so that all children benefit from wider activities outside the classroom that nurture socio-emotional skills
- A national programme to measure pupils' **wellbeing** to create greater focus on wellbeing that is strongly linked to children's evolving skills
- A dedicated research programme to develop evidence-informed approaches to **school parent and community partnerships**
- Rebalancing Ofsted inspections to explicitly consider disadvantage in schools and credit those excelling when **serving under-resourced communities**

- A new deal for teachers **clarifying working hours** and supporting a more balanced school calendar to improve the wellbeing of teachers and pupils

Chapter 1: Introduction

Could learning loss suffered by school pupils in England and across the UK end up being the most enduring and inequitable legacy of the Covid pandemic? Our research seeks to provide the most authoritative answer yet to this question. By deploying the latest econometric methods to model children's evolving formation of skills, using data from the UK's longitudinal studies, we estimate the educational and lifetime impacts suffered by a generation of children in the wake of mass school closures and deepening societal divides.

Our work is relevant to the UK Covid-19 inquiry aimed at learning lessons from the Government's handling of the pandemic – in particular relating to the question of whether the impact of school closures on children and young people was adequately considered by Ministers, officials and advisers when responding to the Covid crisis. It is worth bearing in mind that the educational legacy from school closures will be felt well into the next decade: children taking GCSEs in the 2030s will have been disrupted by momentous decisions taken during the pandemic.

In previous work, we highlighted the likely devastating impact that school closures would have on young people's life prospects (Elliot Major et al., 2021). We estimated that a quarter of pupils – around 2 million children – received no schooling during the first lockdown in early 2020. When the equalising force of the classroom is removed, home-learning inequities are exposed. Pupils eligible for free school meals, those educated at state schools, and, more generally, those from less affluent backgrounds, suffered learning losses at a much greater rate than their more affluent peers. Disruption to schooling between March 2020 and April 2021 was unprecedented in scale, with most pupils missing over half of their expected days in the classroom.

In the current report we produce more robust, updated estimates of learning losses and the likely post pandemic fall in income mobility levels: these consider not only cognitive learning losses but also declines in socio-emotional skills and are based on more detailed calculations of these impacts experienced at different ages and for different pupils.

Worsening inequalities inside and outside education

Even these gloomy predictions did not foresee the perfect storm of factors that would exacerbate inequalities inside and outside of education in the wake of the pandemic.

Like other countries, England is facing a national crisis in persistent school absence, with significant numbers of pupils missing 10% or more of school lessons. An analysis undertaken as part of this project calculated that over 28% of primary and 40% of secondary school pupils who qualified for free school meals were persistently absent during the 2021/22 autumn term (Eyles et al., 2023). We estimated that this equated to 2 to 3 months of learning lost. In any other era, these damning figures might constitute a national crisis.

The closure of schools deprived children of access not only to face to face learning but to the many other things that schools provide, from emotional support to social interaction to, for some, regular meals. Some claim we now face a tsunami of mental health problems among

children in the wake of Covid 19, while teachers have reported greater behaviour problems in classrooms since the pandemic. Our own estimates confirm a significant decline in the socio-emotional skills for successive Covid cohorts while international comparisons show that life satisfaction scores for pupils remain low compared with most other countries.

Longer term decline

In truth, absolute social mobility was declining amid widening societal inequalities long before the pandemic struck (Elliot Major and Machin, 2020) Real wages and living standards were stagnating and fuelling a growing sense of unfairness. Child poverty has been rising. The proportion of children qualifying for free school meals in England went up from 13.6% in 2018 to 23.8% in 2023. The latest Government data on low income households reveals that over 4 million children in the UK were below the poverty line in 2023 ([source](#)).

In the post-pandemic era, many children are missing out on what were considered universal entitlements for previous generations – healthy food, warmth and basic healthcare, including tests for eyesight, hearing and dental health (Elliot Major and Briant, 2023). A charity, Children North East, now offers a ‘poverty proofing’ service for schools to help remove barriers for pupils living in poverty.

In an increasingly unequal world moreover, divides are driven by the increasing investments made by middle class parents to secure their children’s futures (Elliot Major and Machin, 2018). Children of the richest households for example are twice as likely to benefit from private tutoring than children from low-income households (Eyles, Elliot Major and Machin, 2022). A widening family divide has emerged for children growing up in the early 21st century. Children in the UK with non-graduate parents are significantly less likely to grow up in two-parent homes and family-owned homes than children with graduate parents (Eyles et al., 2022).

Another analysis found a persistent disadvantage gap in GCSE achievement over the past 20 years. While GCSE results overall had improved over time, 16-year-olds eligible for free school meals in 2019 were still 27 percentage points less likely to earn good GCSEs than other pupils, with only 41% reaching this basic threshold (Farquharson et al., 2022).

International studies meanwhile have confirmed our worst worries following the pandemic. A systematic review found Covid learning losses were widespread across countries including the UK (Betthäuser et al., 2023). The latest Organisation for Economic Cooperation and Development (OECD) Programme for International Student Assessment (PISA) results meanwhile revealed an unprecedented global decline in average test scores. Maths scores for 15-year-olds were down by around three quarters of a year in learning, while reading scores had fallen by the equivalent of half a year (OECD, 2023). Large numbers of absent pupils mean that many studies are likely to be unrepresentative and seriously under-estimating the extent of learning loss.

The latest official exam statistics confirm a widening education divide. In 2022/23 less than a half (49.7%) of England’s 5-year-olds eligible for free school meals were at expected levels in the early learning goals compared with 7 in 10 (69.9 per cent) of other 5-year-olds (an

unchanged gap compared with 2021/22 when the new early years assessments were introduced) (Department for Education, 2023a). Overall levels of achievement remain significantly below pre-pandemic levels. Falling numbers of 2-year-olds were at expected levels of development.

In 2022/23 meanwhile the gap in GCSE attainment at age 15/16 between free school meals students and the other students widened to 3.94 according to the government's 'disadvantage gap index' (Department for Education, 2023b). The gap had widened every year since 2020 and was at its widest for over a decade. Separate analysis shows that a fifth of pupils fail to achieve a grade 4 in both English or maths GCSEs considered as the basic thresholds need to function and flourish in life after school (Elliot Major & Parsons, 2022).

Our model of skill formation

In this work we are the first to assess the damage wrought by Covid closures on England's children in a multi-dimensional, dynamic way. Our economic model of skill formation enables us to understand the effect of the pandemic on the attainment of the Covid generation in more detail, across different ages of children, considering gender and socio-economic backgrounds, and predicting the full consequences for the cohorts of children impacted by Covid.

Critically, we assess the impact of declines in socio-emotional skills alongside falls in cognitive skills on children's development, considering these over 3 distinct life stages - early childhood or formative years (age 5-11), middle childhood (age 11-14), and later childhood or teenage years (age 14-16).

Our model is based on children born just after the Millennium, educated in a similar schooling environment to the Covid cohorts, many of whom were born only a few years later. We assess the impact of losses suffered during the pandemic by measuring the future impact on GCSE grades and likely future earnings. We assess the implications for income mobility levels for the current Covid generation.

To our knowledge, this is the first time that production functions and latent factor analysis have been used in this way to assess the consequences of the pandemic.

Pragmatic policies

We offer policy makers a series of pragmatic evidence-informed low-cost proposals to improve the prospects of pupils from under-resourced backgrounds and outcomes in general, as governments look to develop long term renewal in the wake of the pandemic. The problem for governments is that in a time of economic decline, there is little extra money to help address stark educational inequalities. Some policy ideas relate directly to the findings of our model, in particular the important role socio-emotional skills play in children's development; other recommendations draw on wider evidence from the wider international literature and the cost effectiveness of different interventions.

Over the long term we would advocate for more investment in education overall. But in the current context, we believe a focus on low cost and cost-effective policies that have the

potential to level the education playing field is more useful for policy makers. We review the education policies embraced by countries around the world aimed at tackling the mid-to long-term consequences of the pandemic for children and young people. While mostly focused on England, many of our policy lessons are applicable across the UK, and we also look to Wales, Scotland and Northern Ireland for examples of good policy practice. We emphasise approaches that improve both children's academic progress and their social and emotional learning.

Economic productivity

Finally, our recommendations are not just about making the country a fairer place where a child's background doesn't determine their future success, but also improving the prospects for the economy as a whole. Improved education systems - those promoting enhanced cognitive and socio-emotional skills of children - lead to stronger national economic growth. Improved skills are the route to greater levels of absolute social mobility (Elliot Major and Machin, 2018).

It is unsurprising that we have an under-performing economy when the country is squandering the talents of a large swathe of the population. People get more productive when their skills are enhanced. If enacted, we believe our policy proposals could help create an education system fit for all our children and a flourishing and inclusive society in the post pandemic era.

This report is organised as follows. First, we present an overview of the estimated learning losses due to the pandemic and the strategies adopted by countries for education recovery. We then set out our economic framework that models the evolving skills of children and present our detailed findings on how the pandemic has damaged the educational and life prospects of a generation of children. In the final part of the report, we present a series of low-cost policy recommendations for mid- to long-term education recovery in the post pandemic era.

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Chapter 2 International Evidence

Introduction

Before turning to our framework of evolving skills of children, we first present an overview of the estimated learning losses due to the pandemic and the major strategies adopted by countries for education recovery in the post-pandemic era.

This international picture provides a useful summary of what other governments have focused on in their education recovery efforts. Here we focus on high-income OECD countries to present comparable contexts to England. We also focus on school policies primarily covering pupils of ages 5 to 18. Immediate pandemic responses included school closures and remote learning strategies; however, the focus of our review is on the mid- to long-term strategies aimed at addressing consequent learning losses. To gather this evidence, we distributed a questionnaire to policymakers from a range of countries. 11 countries responded including Austria, Chile, Denmark, Hungary, Japan, Switzerland, New Zealand, England, Northern Ireland, Scotland, Wales. Questions were asked on school absences; effects of the pandemic on learning outcomes, wellbeing and socioemotional skills; education policy responses; policy evaluation and long-term plans. Responses were supplemented by our own desk research. The policies employed by countries are categorised into several themes, forming the structure of this chapter.

In the final chapter we present practical policy recommendations for England's education recovery strategy, informed by the findings from our economic framework alongside wider evidence on the effectiveness of different approaches, set against this backdrop of our international policy review.

International evidence on learning losses

We need to tread carefully inferring conclusions from international comparisons: differences in pupils' test scores between countries can be driven by societal factors outside schools rather than what's happening in the classroom; results can be biased by skewed samples of children taking tests and when tests are taken. Countries also faced varied pandemic experiences. Factors such as the severity of the disease spread, lockdown stringency, and the duration of school closures contributed to varying degrees of learning loss.

Nonetheless, an emerging consensus indicates 3 broad findings: children across a range of countries suffered significant learning loss during the pandemic – defined by lower scores in tests compared with previous cohorts of pupils - alongside a significant decline in the wellbeing of children; children from under-resourced backgrounds meanwhile have fallen further behind their more privileged peers in average test scores; these persistent and growing achievement gaps are the consequence of long-term trends not solely disruptions due to the Covid 19 pandemic. England, and the UK, typify these patterns.

'Equality crisis' in learning

Bethhäuser et al. (2023) published a systematic review of studies on Covid learning losses in 15 different countries in *Nature Human Behaviour*. The analysis of 42 studies concluded that children aged between 5 and 18 on average had lost the equivalent of 35% of a normal year's worth of education during the pandemic (Cohen's $d = -0.14$, 95% confidence interval -0.17 to -0.10). Countries studied included Australia, Belgium, Denmark, Germany, Italy, Netherlands Sweden, Switzerland, the United States and the UK. Learning deficits were found to be particularly large among children from lower socio-economic backgrounds, defined in a range of ways. On average, the deficits were larger in maths than in reading.

For UK studies, average learning loss estimates ranged from 0 to 0.45 standard deviations - equivalent to up to 6 months in learning over an academic year. Children in the bottom 20% of the parental income distribution suffered on average an extra 2 months of learning loss (Elliot Major et al., 2021).

Smaller learning losses in Sweden (where schools did not close) and Denmark (where schools did) may have been due to the 'comprehensive Scandinavian welfare state' reasoned the authors. On the whole, learning losses were estimated to be larger in the US and UK, although this may be due to the higher numbers of studies undertaken in these countries. One US study estimated that more than 17 million students had experienced more than half a year of pandemic-related learning delay.

The authors argue that the learning crisis overall amounted to an 'equality crisis' – children from under-resourced families were disproportionately affected by school closures and had fewer means to continue learning from home. When the equalising force of the classroom is removed, stark gaps in home-learning are exposed. In the UK pupils from low-income backgrounds were less likely to access a quiet study space or an internet connection and a computer at home, with many disrupted by parents losing their jobs (Elliot Major et al. 2021).

Global decline

An alternative barometer of Covid learning loss across the world was provided by the OECD when it published its latest PISA results in December 2023 (OECD, 2023). While the Bethhäuser review summarised distinct national studies using a range of assessments, PISA is based on a common assessment of the knowledge and skills for a sample of 15-year-old students in each country in mathematics, reading and science every 3 years.

The results revealed an unprecedented global decline in average test scores between 2018 and 2022. Overall, maths scores in the 2022 tests, taken in 81 countries, were down by 16 points on the last time they were taken, in 2018, equivalent to three quarters of a year in learning. Reading scores fell by an average of 11 points, equivalent to half a year in learning. Scores in science meanwhile fell by 2 points continuing a long-term downward trend.

In England, maths scores dropped by 12 points between 2018 and 2022 while reading scores fell by 9 points – mirroring the global trends of greater Covid losses in maths than reading. These declines equate to the lowest scores in England for maths and reading since 2006. According to the OECD, the figures for England moreover are likely to be inflated by as much

as 7-8 points because the sample of children tested was unrepresentative of the pupil population. Indeed, increasing numbers of countries failed to meet sampling standards, casting more doubt on the validity of making country comparisons through the PISA rankings. As elsewhere, under-performing pupils in England were less likely to be in school to be around to take the PISA tests. The tests were also taken in November 2022 when pupils were older than those tested in other countries.

OECD interpretations

As we have said inferring hard conclusions from OECD PISA comparisons is difficult given the multiple factors outside and inside schools influencing results and the inconsistent samples of 15-year-olds used to judge countries. However, several hypotheses were articulated on the back of the 2022 results.

According to the OECD, in general countries imposing shorter lockdowns and periods of school closures during the pandemic suffered lower average learning losses. General wellbeing of students also deteriorated more in countries with longer school closures. Worryingly for the UK, it registered the fourth lowest levels of life satisfaction among 15-year-olds of all 74 countries surveyed. Long term school absenteeism meanwhile was higher than the OECD average.

The 2022 results reinforced long term trends already evident in many OECD countries. Countries where teaching is a high-status profession tend to do well, although a growing problem for all countries is teacher shortages. Current high performers such as Estonia meanwhile have been put down to its affordable and accessible pre-school system. In Estonia early years teachers are required to have a bachelor's degree and around 90% of children are enrolled in pre-school for at least 3 years, compared with the OECD average of 57%.

Socio-economic gaps

The OECD produces an index of economic, social and cultural status with students across all countries placed on the same socio-economic scale. The validity and consistency of this socio-economic measure has been questioned (Banerjee and Eryilmaz, 2022). But in keeping with other studies, the PISA results point to a persistent and significant socio-economic gradient in results.

In 2022, the gap in mathematics performance between the top and bottom 25% of students in terms of socio-economic status was 93 points across OECD countries on average, and 86 points in the UK. These divides are similar in magnitude to those recorded a decade previously in 2012. The 2022 results showed a modest increase in the gap between top and bottom deciles of achievers across OECD countries, driven largely by a decline in scores for the lowest 10% of achievers.

England and the UK

Across the UK, just under a quarter of 15-year-olds were unable to master the basics in maths, scoring below a baseline level of proficiency (Level 2) in the PISA tests, while a fifth

failed to meet basic standards in reading and science. In practical terms this means that significant numbers of teenagers are unable to digest a train timetable or understand a medical prescription. These proportions remained the same for maths and reading as those recorded a decade previously in 2012, with a worsening picture for science.

Life satisfaction scores of 15-year-olds in the UK meanwhile fell from an average of 7 to 6.1 between 2015 and 2022 (on a 1 to 10 scale). British teenagers have the second lowest average life satisfaction of 15-year-olds across all OECD countries.

Nearly half of parents meanwhile reported their children's social and behavioural difficulties had increased during the first year of the pandemic (IFS, 2023).

The evidence suggesting sustained learning loss in England following the pandemic is not replicated by all studies. England's average score in the 2021 PIRLS (Progress in International Reading Literacy Study) which assesses the reading skills of a sample of 10-year-olds, for example, was not significantly different to scores in previous PIRLS cycles (Lindorff et al., 2023). This contrasted with declines in scores observed in most other countries.

The improved standing in England's relative PIRLS performance was heralded by the then schools minister, Nick Gibb, as evidence that the introduction of the phonics screening check in 2012 alongside synthetic phonics teaching had improved reading standards. But the analysis of results, commissioned by the Department of Education, could not rule out an alternative explanation: most countries collected data from fourth grade (age 10) pupils in the autumn term of 2020 and spring term of 2021, while England collected data in 2022 due to Covid delays when pupils were significantly older.

Number of books at home was the second most powerful predictor of overall reading score, with higher numbers of books associated with higher PIRLS scores. Pupils eligible for free school meals (FSM) scored 23 points lower than their peers who were not FSM eligible, after accounting for other pupil characteristics.

Ensuring representative samples of pupils that include under-performers who are increasingly absent from school in England and avoiding upwardly biased results is a significant challenge for all national studies of learning loss. The National Reference Test (NRT), taken in England by a sample of 15- and 16-year-old students is a case in point. This would seem ideally suited to measuring average differences in student achievement from year to year. In 2023 the latest analysis concluded little change in standards of English and maths compared with previous years (NFER, 2023). Yet it is also reported that student participation rates were 81% – reflecting 'the higher absence rates in the state secondary school population'. This raises the question of whether the sample of students is likely skewed towards higher performers, producing under-estimates of any potential learning losses.

A consistent finding from national studies however is that starker socio-economic gaps are a defining characteristic of the post pandemic era. Research undertaken by the National Foundation for Educational Research (NFER) for the Education Endowment Foundation for example found the FSM-non FSM gap for reading in the spring term of 2023 for Year 3 and

Year 4 pupils was around 7 months' progress (EEF, 2023). The equivalent gap for mathematics for Year 3 and Year 4 was around 6 month's progress.

Once again, a study pointed to a group of children who had fallen significantly behind during the pandemic years. The analysis identified a notable proportion of very low-attaining pupils in Year 3 (ages 8-9) reading tests: almost twice that seen before the pandemic (4.9% in 2023 compared with 2.5% in 2017).

An analysis by the Education Policy Institute meanwhile found the gap in reading outcomes between primary schools with high and low levels of disadvantage is equivalent to about 12.3 months of learning (Andrews et al., 2023). The figure stood at 11.7 months before the first lockdown.

Table 1 Socio-economic achievement gaps in England

Study/measure	Socio-economic measure	Size of gap
GCSE attainment at age 15/16, 2022/23 (DfE)	Free school meals entitlement versus non-FSM	3.94 (widest gap in a decade)
Age 5 expected levels in the early learning goals, 2022/23 (DfE)	Free school meals entitlement versus non-FSM	20.2% (49.7% versus 69.9%)
OECD maths score at age 15 (2022)	Index of economic, social and cultural status	86 points between top and bottom 25% of status (similar to gap in 2015/18)
NFER reading tests for Year 3 and Year 4 pupils (2023)	Free school meals entitlement versus non-FSM	7 months' progress
EPI reading tests in primary school (2023)	Primary schools with high and low levels of disadvantage	12.3 months of learning (11.7 months before lockdown)

Education recovery strategies

Countries responded with a range of mid-to long-term strategies to ameliorate these pandemic learning losses. We identify several common themes in our review of country education responses. Some nations implemented national approaches, whereas others provided funding directly to schools or local authorities with guidance on remedial measures. Our review includes examples of national responses, national guidance, and state-wide or more local interventions. In each theme, we present an overview of some selected country strategies including the response in England.

Tutoring

One-to-one or small group tutoring was an approach several countries, including England, turned to as part of education recovery packages. Tutoring involves a teacher, teaching assistant, undergraduate student, or other adult giving a pupil intensive individual academic

support. It is a strong bet for boosting the learning of pupils from under-resourced backgrounds. Delivered well at the right intensity it can lead to an extra 4 to 5 months learning gain for pupils during one academic year (Elliot Major and Higgins, 2019). Indeed, it has been used as the benchmark for the greatest rate of progress a learner can make. Unlike most educational approaches it boasts evidence of improving prospects for students from lower socio-economic backgrounds. It has the potential to close attainment gaps.

In June 2020 the UK government announced a £1 billion Covid 'catch-up' package to tackle the impact of lost teaching time in England (Department for Education, 2020). This included £650 million extra funds for schools and a National Tutoring Programme (NTP), initially worth £350 million, that would 'increase access to high-quality tuition for the most disadvantaged young people' over the 2020/21 academic year. Then Prime Minister Boris Johnson heralded it as the government's great education leveller.

The programme would be run through 3 main routes: academic mentors, in-house school staff offering intensive support to pupils, tuition partners, tutoring delivered by external organisations, and school-led tutoring. The Government set out an aim that 65% of pupils helped through tutoring would be pupils attracting the pupil premium, extra funds for children qualifying for free school meals. The Government would make over £1 billion available for the NTP over the next 3 years, with a falling subsidy for schools from 75% of costs in 2020/21 to 50% of costs in 2023/24. There are currently no plans to extend the centrally funded NTP beyond 2023/24.

International examples

England was not the only country to turn to tutoring as a recovery strategy (with mixed results):

- In **New South Wales, Australia**, the COVID Intensive Learning Support Programme was a 337 million AUD state-wide programme launched in 2021. School funding was based on the distribution of students in the lowest and second lowest socio-economic quartiles. An evaluation of the programme found that student growth was the same between participating students and non-participants, but it has been well-received by schools, principals, educators and students and has been confirmed as an ongoing business as usual programme in New South Wales schools ([source](#)).
- The first pillar of **Germany's** 4 pillar recovery plan announced 1 billion EUR to remedial measures including tutoring for core subjects (among other remedial measures).
- In **Spain**, the Programme of Reinforcement, Orientation, and Support (PROA+) included tutoring.
- In **Chile**, measure 2 of their 2023 recovery plan was to address the reading gap, including hiring 20,000 tutors to work with children in 2nd and 4th grade on reading and writing.
- In the **United States**, the federal government urged school districts to spend 20 % of the \$122 billion in relief funds in 2021 for academic catch-up including tutoring. But take-up has been disappointingly low across the nation, with 10 % of students

receiving 'high-dosage' tutoring multiple days a week, according to a federal survey. (<https://ies.ed.gov/schoolsurvey/spp/>)

- Tutoring was also a strategy in **Finland, Netherlands, Canada, and New Zealand.**

Several major trials meanwhile have assessed models using university undergraduates as tutors and mentors in **England, Italy, Germany** and elsewhere (Elliot Major and Sim, 2023). These show promise of widespread impact, providing an alternative model that could be scalable and sustainable. We will come back to this area of promise in the next chapter.

International lessons

Tutoring programmes have differed across many dimensions including hiring practices, how students were targeted, funding, subjects covered and how much autonomy schools were given in delivery. Interestingly, while tutoring formed a core part of England's pandemic response, it was not a core part of Scotland, Wales or Northern Ireland's strategies. Several recurring lessons however emerge from reviews and evaluations across the world:

- Delivery is king - While tutoring has strong evidence of impact for learners overall, there is wide variation in effectiveness: quality of delivery is key, and this challenge is consistently underestimated by organisations overseeing national or regional tutoring programmes. Quality assurance is a non-negotiable - either through training of tutors or evaluation and monitoring of child outcomes.
- Shortage of high-quality tutors - Drawing on a supply of effective tutors across countries and regions is a major challenge - and can't be solved just by recruiting former or current teachers as tutors. Often school pupils in most need of extra tutors are living in areas facing acute shortages of local tutors.
- Partnering with teachers is essential - The most successful tutoring initiatives are those done in partnership with teachers to ensure extra support complements core classroom practice. Teachers quickly lose confidence in tutoring of variable quality or questionable completion rates.
- Lack of engagement with parents - Tutoring programmes often failed to communicate and engage with parents directly on the benefits of tutoring for their children - this has undermined uptake rates.
- Not all tutoring is the same - The emerging evidence suggests that most effective practice may vary for different subjects and phases. The NTP evaluation in England found that primary school sessions scheduled in school hours were associated with better English scores, but the timing of delivery for maths didn't make a difference. For secondary schools, the inverse was true for online sessions. Those scheduled outside school hours were associated with better results, yet the timing of face-to-face sessions didn't make a difference one way or another.

Boosting teaching capacity

Some countries employed alternative strategies to boost teaching capacity by increasing school days or hiring more teachers – a strategy not followed in England ([source](#)). Strategies for hiring teachers included increased recruitment budgets for schools, increased funding for

training courses, targeted recruitment campaigns, particularly for trained teachers who were not teaching and lifting restrictions to allow teachers to work more hours.

- In **Scotland**, hiring new teachers was the main focus of the pandemic response strategy with an aim to reduce teacher-student ratios.
- In Wales it was also the main strategy ([source](#)).
- Other countries that also focused on hiring extra teachers include **Italy, Wales, New Zealand** and **The Netherlands**.
- Meanwhile, in **France** one of their key strategies that continues today is the '*Devoirs fait*' programme, which provides supervised time at the end of the school day to focus on homework. Their '*Je reussis au lycee*' scheme also provides an additional hour of maths support in small groups every week.

Extracurricular and enrichment activities

Remedial measures didn't just focus on academic activities. Many recovery plans also featured extracurricular and enrichment activities.

- **France** initiated a summer school scheme with a blended focus on academic and extracurricular activities, subsidised for families from low income homes that continues into 2023 ([source](#)).
- In **Germany**, the third pillar of the 4-pillar recovery plan was support for holiday camps and extracurricular activities, offering blended focus summer schools ([source](#)).
- **Scotland** emphasised a broad curriculum in their pandemic recovery strategy and abolished music tuition fees.
- In **Wales**, the 'summer of fun' initiative ran for 2 years for people aged 0-25.
- In the **Netherlands**, one of their 6 recovery themes was socio-emotional and physical development of students which included cultural and sports education ([source](#)).
- **Ireland's** Covid Learning and Support Scheme (CLASS) scheme included the option for extra staff hours to be used to run extracurricular activities lunchtime and afterschool clubs.
- In **Japan**, children were provided with stays with nature experiences, culture and sports events.

England's recovery strategy did not place much emphasis on extracurricular activities apart from a summer school programme in 2021 offering some [enrichment](#) activities mainly targeted students transitioning between school years, and the [Holiday Activities and Food Programme](#) which supported healthy meals and enriching activities to FSM-eligible pupils over the school holidays. Schools reported struggling to provide enrichment activities due to increased workloads, rising pupil absences, and budget constraints (Ofsted, 2022).

Improving wellbeing

England, in common with many other countries, supported resources for mental health and wellbeing guidance in schools.

- In **Ontario, Canada**, extra mental health workers were hired in schools.
- **France** implemented teacher training programmes specifically designed to address pupil mental health.
- **Scotland** allocated funding for dedicated wellbeing support in schools.
- In the **Netherlands**, an evaluation found that wellbeing interventions were the most popular among schools (Ministerie van Onderwijs, 2023).
- Similarly in **Wales**, wellbeing support was found to be the second most common intervention, and the most effective approach according to qualitative feedback (Andrews et al., 2023).

Addressing absenteeism

Amid the post pandemic crisis in increased absenteeism, re-engagement strategies have been a common part of recovery plans.

In England, government plans included 'attendance hubs and attendance mentor programmes', which facilitate the sharing of effective practices and practical solutions (Department for Education, 2023c). These involve for example sending automatic texts to parents of chronically absent pupils and using data to identify students at risk.

Internationally,

- In **Glasgow, Scotland** a 12-month pilot programme called *Reach* launched in December 2023 that involved psychologists and community workers visiting students' homes to provide support in dealing with anxiety, stress and mental health challenges (Quarriers, 2022).
- The Ministry of Education in **Chile** identified improving attendance as one of its top 3 education reform priorities for 2023. Territorial teams work on raising awareness among families about the importance of attendance. These teams also assist in tracking students with chronic absenteeism and those at risk of dropping out (Ministerio de Educación, 2023).
- In the **US**, several states have received federal relief aid to implement a range of attendance interventions. For instance, in Connecticut, a \$10.7 million investment in a home-visit programme led to a 15-percentage point improvement in attendance (Center for Connecticut Education Research Collaboration, 2022). Meanwhile, New Mexico has directed resources toward strengthening mental health support by hiring additional counsellors, and Maryland has hired bus drivers and instituted prevention programmes to enhance attendance (Mehta, 2023).
- In 2023, **New Zealand** announced a \$74 million package to establish new Attendance Officer roles across the country. This investment also aimed to enhance the existing national Attendance Service, which assists schools in managing attendance effectively. The plan includes an improved system for attendance data collection and analysis, enabling the early identification of attendance problems before they escalate (Ministry of Education, 2023).

These share a common emphasis on parental involvement and the early identification of risk factors for absenteeism, which is also reflected in England's attendance hubs and attendance mentor programmes. Smaller-scale programmes piloted interventions primarily focused on wellbeing support.

Equity policies

Finally, many national recovery policies aimed to create more equitable outcomes and help address widening socio-economic gaps in learning by providing extra support for children and young people from under-resourced backgrounds. In England £1.3 billion in a 'recovery premium' funds were allocated to schools over 2021-24 intended to help pupils who are eligible for free school meals.

- In **Spain**, the Programme of Reinforcement, Orientation and Support (PROA+) provided funding to schools with at least 30 per cent educationally vulnerable students to implement remedial activities.
- In **France**, fees for summer schools were covered for students from low-income backgrounds.
- In the **United States**, activities addressing the needs of low-income children, students with disabilities, English learners, racial and ethnic minorities, students experiencing homelessness and children and youth in foster care were encouraged.
- In **Scotland**, Pupil Equity funding was increased by £20m, and an additional £1b was committed to addressing the socio-economic attainment gap.
- In **Japan**, financial support was provided to students who needed it the most.
- In **Ontario, Canada**, up to \$29.28 million was given to support equity initiatives for at-risk or marginalised students including Student Success Leads, Equity Leads, Indigenous Education Leads, Indigenous Graduation Coaches and Black Graduation Coaches.
- In **Germany**, early years education aid was increased for low-income families.
- In **New Zealand**, funding was targeted to Maori and Pacific students, including for tutoring, mentoring and additional places for summer schools.

Concluding comments

In summary, compared with other national strategies England's pandemic response was heavily focused on academic catch-up, with less emphasis on socio-emotional skills, extracurricular support, and wellbeing. These reflect longer term differences in the priorities in national education systems. In general, there is growing recognition across the globe that there is more to developing human talents than just preparing for narrow academic tests (Elliot Major and Briant, 2023). Children's progress (and teachers' efforts) are measured in many dimensions of pupils – wellbeing, socio-emotional skills, and accomplishments in arts, sports and more vocational subjects, alongside basic numeracy and literacy skills and academic test results. England's education system appears narrowly focused compared with most other countries.

It is difficult to infer causal impacts from the various national initiatives we have summarised, given the lack of evaluations and evidence gathered globally (tutoring and mentoring being

the notable exception) and the impact of wider societal as well as education factors on student outcomes.

Many countries invested significantly more in recovery funds per pupil compared with England; yet international comparisons of student outcomes also suggest that higher levels of spending over a certain threshold are not necessarily associated with better pupil outcomes. In the United States for example questions have been raised about the effectiveness of the \$122 billion in relief funds distributed to schools with general guidance in 2021, threatening future investments. In England, meanwhile surveys suggest that recovery premium funds alongside pupil premium funds have been used to address wider budget deficits in schools rather than evidence informed strategies for under-resourced pupils. The balancing act for governments is ensuring that education investments are informed by available evidence, while giving agency to schools and teachers to use their local expertise in spending funds for their specific needs.

In the next chapter, we present the results of our framework of skill formation which enables us to estimate the impact of pandemic closures on Covid cohorts.

Chapter 3: Framework of skills formation

Introduction

In this chapter we estimate a production function for skills and use the estimated model as a lens to consider the impact of Covid school closures on children's development. As we documented in the previous chapter, there is a plethora of evidence linking school closures to learning losses (Betthäuser et al., 2023). Most evidence concludes that the switch to home-schooling that occurred in early 2020 led to widening socio-economic divides in learning outcomes (Elliot Major et al. 2021, Andrew et al. 2020).

Assessing this evidence in the context of a model of human capital formation has several advantages lacking in previous estimates of Covid impacts on pupils.

Combining cognitive and socio-emotional skills

Firstly, it is well recognised that several latent or underlying factors influence children's later life outcomes. Heckman et al. (2006) show that a low dimensional vector of cognitive and non-cognitive (or socio-emotional) skills explains young people's schooling choices, wages, employment, work experience, and occupational choice. By bringing together descriptive evidence on falls in cognitive and socio-emotional skills into a single framework, we can estimate how these *jointly* impact children's future outcomes.

By cognitive skills, we mean a general factor that can explain the covariation in test scores undertaken by children in the cohorts we study. Tests measure different skills such as quantitative knowledge, reading and writing, and fluid reasoning. Children performing highly in one cognitive test are also likely to show good performance in other tests of cognitive abilities. The factor that we call cognition can explain this covariation in tests that measure these underlying concepts.

Similarly, we call the factor that accounts for the covariation in answers to the Strengths and Difficulties Questionnaire (SDQ) questionnaire socio-emotional skills. While the SDQ primarily focuses on identifying children's behavioural and emotional strengths and difficulties, it also includes a prosocial behaviour section that measures children's ability to engage in positive social interactions, show empathy, and demonstrate prosocial behaviours such as sharing, helping, and cooperating with others. Social emotional skills are sometimes referred to as character skills and encompass a wider set of attributes such as conscientiousness, perseverance, motivation, time preference, risk aversion, self-esteem, self-control, and sociability.

Parental time investments meanwhile include a range of measures including time spent reading with the child and trips to libraries/museums.

Estimating impacts on children by gender, age, and socio-economic background

Secondly, estimated falls in cognitive development and socio-emotional skills are expected to impact children differently according to their age, their gender, and their pre-existing level of skill through a dynamic process of skill accumulation (Cunha et al. 2010). We estimate the process by which family background and early stocks of skills combine to produce later skills

before feeding estimated falls in skills - induced by the pandemic - into our model. We can then estimate how the pandemic impacted children differentially by gender, age, and socio-economic background. We can also highlight how falls in skills at different ages shape later outcomes and the channels through which they operate. In practice, a reduction in, for example, early adolescent socio-emotional skills can impact outcomes by reducing socio-emotional skills at later ages *as well as* cognitive skills.

Estimating consequences of declines in GCSE performance

For the purposes of cost-benefit analysis, it can be difficult to properly 'price' the cost of the pandemic based on these metrics. Our model allows us to relate learning losses and falls in socio-emotional skills to a metric that is easily interpretable - the probability of achieving 5 good GCSEs including English and maths. We can estimate how the pandemic is likely to lead to a fall in this probability for affected cohorts of children and the extent to which attainment, as measured by this metric, is likely to become more associated with family background. As there is a robust literature relating GCSE attainment to future outcomes, we can also put a monetary cost on learning loss (see Hodge et al. 2021).

Data and Methodology

Methodology

We first aim to estimate a dynamic model of skill formation in the manner of Cunha and Heckman (2008). The model is dynamic in that stocks of skills and parental time investment for a child at one stage feed into skills at the next. Formally, this is defined by the following equation:

$$\theta_{i,t}^J = \beta_0^J + \beta_1^J \theta_{i,t-1}^C + \beta_2^J \theta_{i,t-1}^N + \beta_3^J \theta_{i,t-1}^I + \beta_4^J X_i + \varepsilon_{i,t}$$

Here, skill J at time t is related to stocks of skills, parental investment, and a range of demographic factors of a child in the previous period or life stage. For notational convenience, the β terms do not have a t subscript, but they are age specific. As is conventional in the literature, the skills we consider are socio-emotional skills and cognitive skills. In the first stage, we estimate a linear model where we assume investments are given exogenously, or originating externally and independently. Later, we extend the model so that investments by parents can react to changes in skills at a child's previous life stage. We also extend the model so that the production technology allows for interactions between cognitive and socio-emotional skills.

At the final stage – time T – stocks of skills are related to the outcome variable; in this case, the number of GCSEs attained at age 15/16 and a dummy variable for whether one achieves 5 GCSEs at grades A*-C including English and maths.

$$Y_T = \omega_0 + \omega_1 \theta_{i,T-1}^C + \omega_2 \theta_{i,T-1}^N + \omega_3 X_i + \psi_{i,T}$$

While the variables that we capture in the X vector – parental education, number of siblings, whether a child is in a single parent household, and gender – are readily measured in the data, the skills and investments are not observable. Rather our data has many different

measurements that can be thought of as proxy variables for the latent variables that we wish to measure.

Proxy measures for cognitive, socio-emotional skills and parental time investments

We follow the approach taken by Heckman et al. (2013) and reduce these proxy variables into 3 low dimensional indices that capture cognitive skills, socio-emotional skills, and parental time investments:

$$M_{\omega,i,t,j} = \mu_{\omega,t,j} + \lambda_{\omega,t,j}\omega_{i,t} + \varepsilon_{\omega,i,t,j}$$

M denotes measure, ω denotes the underlying construct (time investment, cognition, socio-emotional skill), t denotes age, and j indexes the measure. We further assume that error terms are uncorrelated across individuals, measures, and age. Subject to normalizations that fix the scale and location of the factors, the loadings (and intercepts) in the above equation are identified. We use these loadings to construct Bartlett scores that we use as inputs in our skill production function. The system that we estimate is a dedicated factor system where each measure is taken to proxy exactly one factor. In some cases - particularly with regard to the investment and socio emotional skill - the measures are not continuous, but instead are measured via an ordinal scale. In this case, we take the approach pioneered in Muthen (1984) and use polychoric correlation matrices to derive factor loadings. In this case, we normalise the model by fixing the variance of the latent factors to 1. For the cognitive measures that are continuous, we simply set the first intercept to zero and the first factor loading to one.

With the factor scores in hand, we can estimate the linear production function via a regression. We standardise the factor scores prior to estimation; therefore, the β coefficients tell us how a standard deviation change in the factor is expected to change skills at the next stage. The ω coefficients tell us how skills can be expected to change later GCSE attainment.

We use the model to assess how disruption experienced during the Covid pandemic affected GCSE attainment for the Covid generation. To do so, we take estimates from the existing literature on learning losses and use them as proxies for changes in cognition. We also measure changes in socio-emotional skills due to Covid and feed these into our model. By estimating the model separately for males and females, and by measuring both cognitive and socio-emotional skill changes for different age groups and socio-economic backgrounds, we can bring together descriptive evidence to estimate the overall effect of the Covid pandemic on attainment. As the same time, we can assess the distributional impact on children – according to their different characteristics.

Data

Our main model is estimated using data from the Millennium Cohort Study (the MCS). The MCS follows the lives of around 18,818 cohort members born at the turn of the century. It covers all 4 UK nations and contains rich data on educational, family background, health, and other variables for birth until age 17.

Benefits of MCS

As our aim is to understand the process of skill formation, this data is ideal for our purposes. Firstly, it covers a cohort of individuals who are similar to the school aged children affected by the Covid pandemic. Estimates taken from a generation growing up in the same country, a similar institutional environment, and a similar time period, are likely to be applicable to the Covid generation. Secondly, our approach requires a plethora of measurements that exist in MCS that proxy for cognitive and socio-emotional skills, and parental investments. Thirdly, we require that these measurements are taken at different ages. In our model, we relate skills at age 11 to stocks of skills at age 5, before relating age 11 skills to skills at age 14. Age 14 skills are then related to our outcomes at age 15/16. Thus we consider 3 distinct life stages - early childhood or formative years (age 5-11), middle childhood or adolescence (age 11-14), and later childhood (age 14-16).

The MCS allows us to do this by fielding an array of cognitive tests at each of these ages as well as measuring socio-emotional skills via the Strengths and Difficulties Questionnaire (SDQ) questionnaire (see Appendix Table 10). The abundance of data means that the MCS has been used in previous studies estimating skill production functions (Hernández-Alava and Popli, 2017; Del Bono et al., 2019) and measuring changes in the inequality of socio-emotional skills (Attanasio et al., 2020).

We make use of the full range of cognitive tests at ages 5, 11, and 14 (For a comprehensive overview of cognitive tests in the MCS, see Moulton et al., 2020). In our model, cognitive tests are treated as tests of pure cognition. They are low stakes and have no revision component. Our main outcome - GCSEs attainment - is conceptually distinct. These exams are high stakes and student 'effort' or application can play a role in the level of success on these tests. As such, GCSE attainment is linked to both cognitive ability and socioemotional skills. We use individual SDQ items as measures of socio-emotional skills. Finally, we use a range of measures related to parental time investment. These cover time spent reading with the child, trips to libraries/museums, as well as time spent talking about the cohort member's life. These are taken to be as close as possible to investment measures used in the literature of human capital formation (Heckman and Mosso, 2014 provide an overview of this literature). The full results from the confirmatory factor analysis, along with the final measures that go into our composite indices, are given in the Appendix.

In each case, we reduce the full set of available measures into composite indices that capture the constructs we are interested in - time investment, cognitive skills, and socio-emotional skills. The only exception is age 14 where we only have a single suitable cognitive measurement.¹ By using multiple measurements, we aim to reduce the measurement error inherent in using a single measurement or in aggregating disparate measurements in an arbitrary fashion. Therefore, for age 14, we use SDQ scores and teacher assessments of the

¹ There are two measurements at age 14 - a vocabulary test as well as a gambling test. The latter captures constructs - decision speed and reaction time - that are not obviously related to cognitive functioning.

cohort members' cognitive ability at age 11 as instruments for the single cognitive measurement and the socio-emotional factor score.²

Estimating Covid impacts

We calibrate our estimated model to estimates of learning loss and socio-emotional change induced by Covid by using pre-existing estimates from the literature as well as our own estimates.

We take learning loss to be tantamount to changes in cognition i.e. we proxy changes in (standardised) cognitive factor scores by standardised learning losses induced by Covid. Our main source of the latter is Betthäuser et al. (2023) who analyse a multitude of studies looking at learning loss in the UK amongst other nations. We also use pre-existing work that relates learning loss to socio-economic background (Elliot Major et al. 2021). The latter considers total hours of learning lost - once extra parental investments are accounted for - and relates them to cognitive achievement based on various studies that causally estimate the relationship between learning hours and test scores (Lavy, 2006; Andersen et al., 2016).

For Covid induced changes to socio-emotional skills, we use Understanding Society (USoc). USoc is a large-scale household panel survey that is repeated annually with 40,000 households across all 4 countries of the UK. USoc collects data before and during the pandemic. SDQ scores are collected for children (aged 5 and 8) and youth (aged between 10 and 15).

We also measure the socio-economic background of these individuals, using parental income measures. This enables us to measure whether socio-economic differences in SDQ scores widen during the pandemic. We are also able to measure whether socio-emotional skills fall for the affected cohort as a whole and whether there is a differential fall in socio-emotional skills by age. All measurements are used in the calibration exercise that comes later.

Findings from our model of skills

Tables 1-4 in the appendix show estimates from the production functions above. In each case, we estimate the parameters both with and without family background controls. The fact that family controls do little to alter our results suggests that the factors are not merely proxying for omitted family or socio-economic characteristics. We also run specifications with 2 different investment indices; in the first, we simply include measures of parental time investments while in the second, we include family income as a measure as well.

² Specifically, we take the teacher assessments at age 11 and produce factor scores via confirmatory factor analysis in a way analogous to our production function estimates.

Persistence of skills from age 5 to age 11

- **Cognitive levels at age 5 are highly predictive of cognitive skills at age 11, while socio-emotional skills are even more persistent during this life stage; socio-emotional skills and parental time investments at age 5 also play a significant role in predicting cognitive skills at age 11.**

Table 1 shows the age 11 production function for males. Several findings emerge from the table. Unsurprisingly, cognitive skill levels at a young age (5) are highly predictive of cognitive skills at age 11. A standard deviation increase in the cognitive measure increases age 11 cognition by between 0.396sd and 0.415sd. This implies substantial persistence in cognition; for males, 40% of those in the top 20% of performers at age 5 reside in the top 20% at age 11.

Socio-emotional skills are even more persistent. A standard deviation increase in these skills raises socio-emotional skills at the next stage by 0.572-0.590 standard deviation units meaning that 43% of those with the highest (top 20%) socio-emotional skills at age 5 reside in the highest bracket at age 11.

Complementarity between cognitive and socio-emotional skills

There is also evidence of complementarity between cognitive and socio-emotional skills; for example, the cognitive skill measure is significant in all the socio-emotional skill equations. Interestingly, the magnitude of the coefficients on the socio-emotional skill measures are also sizable in the cognitive skill equations; in fact, it is not possible to reject that a standard deviation change in the socio-emotional skill measure has an equal effect as a standard deviation change in the parental time investment measure. In other words, socio-emotional skills are equally important as parental time investments at age 5 in predicting cognitive outcomes at age 11. Coefficients on both measures range from 0.115 - 0.185 standard deviation units. This suggests that raising parental investments or socio-emotional skills has an effect size on outcomes at age 11 somewhere between one half and one third of the effect of raising cognitive skills.

For the socio-emotional equations, socio-emotional skills during the earlier life stage or period of childhood are much stronger predictors of later socio-emotional skills than either parental investments or cognitive skills. The equations for females - shown in Table 2 - are somewhat similar albeit the dependency of age 11 cognitive skills on earlier age 5 cognitive skills is somewhat lower. The general pattern of results still holds.

Persistence of skills from age 11 to age 14

- **Children's cognitive skill levels at age 14 are primarily shaped by cognitive skills and parental investments at age 11; socio-emotional skills at age 11 meanwhile are highly predictive of socio-emotional skills at age 14.**

Tables 3 and 4 in the appendix present estimates from the age 14 production function. The pattern of results is similar with a few interesting exceptions. As shown above, there is

complementarity between socio-emotional skills and cognitive skills at age 11 in producing cognitive skills in the subsequent life stage at age 14. But this result is diluted at age 14. In each specification - and for both genders - the socio-emotional skills have an insignificant effect on future cognitive skills. Socio-emotional skills impact on cognitive skills primarily at an earlier stage of childhood. Once again, parental investment is shown to raise cognitive skills as does the current stock of cognitive skill. Taking those who are in the top 20% of the age 11 cognitive distribution, we find that 45% of males still reside there at age 14 while 41% of females do.

Socio-emotional skills are once again more persistent than cognitive skills with a standard deviation change in the former raising socio-emotional skills in the next period by 0.697-0.699sd (males) and 0.623-0.641sd (females). A recurring finding is a particularly high persistence in socio-emotional skills, which are highly predictive of later skills.

Impact of skills at age 14 on GCSE outcomes at age 16

- **On average, children's cognitive and socio-emotional skill levels at age 14 are equally important in predicting whether they will go on to achieve 5 good GCSEs including English and maths at age 16. Socio-emotional skills, including positive social skills, attention and resilience, play an important role in academic attainment.**

Figures 1 and 2 in the appendix highlight the relative roles played by cognitive and socio-emotional skills at age 14 on the likelihood of achieving 5 good GCSEs - defined here as achieving grades A*- C (or grades 4 to 9 for more recent cohorts) including English and maths.

The results come from a logistic regression of whether one crosses the threshold on factor scores for cognitive skills and socio-emotional skills at age 14. We then vary each factor over from the 5th to the 95th percentile holding the other factor at its mean. The relative steepness of the curves indicates the relative roles played by each in helping cohort members achieve the 5 GCSE threshold at age 16. For both males and females, cognitive and socio-emotional skills are shown to play a similar role in shaping outcomes. The likelihood of crossing the 5 GCSE threshold rises from 0.4 to 0.8 as either cognitive skills or socio-emotional skills are varied across 90 percentile points of their full range.

These results may seem surprising in light the previous findings. We have already shown that socio-emotional skills at age 11 have little predictive power for age 14 cognitive skills once age 11 cognition is controlled for (along with other covariates). We view GCSEs as being different to the cognitive measures we use when estimating the production function. Cognitive measures are aimed at narrowly capturing cognitive capacity. As they are low stakes and pupils can't prepare for them, there is less of a role for socio-emotional skills to drive these results. This is not true for GCSEs where individuals can revise and where the stakes are high³. This opens the door for the kind of socio-emotional skills we measure to

³ Machin et al. (2020) estimate how high stakes GCSEs are by highlighting the causal effect of missing out on a single GCSE grade.

play a large role in shaping outcomes. The 'prosocial' skills identified through the SDQ questionnaire are likely to benefit pupils in many ways: expressing ideas and thoughts through interpersonal communication, adopting a positive mindset, and nurturing strong learning relationships with teachers, influencing how they are perceived as learners. This is consistent with evidence from elsewhere that broader 'character skills' play a crucial role in determining schooling outcomes (Carneiro and Heckman, 2003).

A more pressing concern with the result is that the role played by cognitive skills is surprisingly low. We might expect that the top scorers (those at the 95th percentile) on cognitive tests at age 14 - even those with average socio-emotional skills - should go on to attain 5 good GCSEs. Our estimate however suggests that only 80% of both males and females will do so. Across all our analyses we find that GCSE results are strongly related to socio-emotional skill levels, encompassing resilience, study skills, positive social skills, and attention – probably to a greater extent than is commonly recognised.

Improved estimates tackling likely measurement error

- **For boys, cognitive skill levels at age 14 are more important than socio-emotional skills in determining future GCSE prospects; for girls the opposite is true, with socio-emotional skills at age 14 playing a bigger role.**

Our low estimated impact of cognitive skills may be partly due to measurement errors. All the independent variables in Tables 1-4 are formed from multiple measurements of cognitive, socio-emotional, and investment proxies. By using estimated factor loadings and variances, we can create indices that strip out as much noise as possible from these composite measures thus reducing the influence of measurement error. However, for age 14, we only have a single cognitive measure.

Tables 6 and 7 in the appendix address this by using lagged teacher assessed measures as instruments. At age 11, teachers are asked to fill in the same SDQ module for cohort members as well as rate their proficiency in a range of academic subjects. We combine these using the same latent variable framework before using the derived scores as instruments for the age 14 test score and the socio-emotional factor score used in the outcome equation. Table 6 shows how changes in the cognitive and socio-emotional skills influence the likelihood of obtaining 5 good GCSEs. As with the previous figures, both factors play a key role in shifting the probability. Unlike before, however there is now a stark difference between males and females. The effect size of the cognitive skills on later GCSE outcomes is just over twice as large as the effect size for socio-emotional skills (0.362sd against 0.171sd). For females, the pattern is reversed – cognitive skills at age 14, while still important, have a lesser effect than socio-emotional skills on GCSE outcomes. The coefficient on cognitive skills ranges from 0.214 to 0.231sd for females while that for socio-emotional skills exerts a stronger influence of 0.331 to 0.346sd. This pattern suggests that documented changes to socio-emotional skills and learning loss are likely to have differential effects by gender.

Assessing the impact of Covid losses

In what follows, we calibrate our model using evidence on learning loss and our own estimates of how Covid affected socio-emotional skills. For the former, we use estimates

from our own work (Elliot Major et al., 2022) alongside a meta-analysis of learning loss by Betthäuser et al. (2023) summarised in the previous chapter.

- **On average children suffered 0.2sd (equivalent to around 2 months learning) in cognitive learning loss during the Covid pandemic, while those from poorest home suffered 0.38sd cognitive learning loss (equivalent to around four months learning).**
- **The socio-emotional skills gap between less and more affluent teenagers significantly widened during the pandemic.**

Table 7 in the appendix shows estimated learning losses from 2 stages of the pandemic - April 2020 and September 2020. The units are a fraction of missed schooling hours over the course of the term. They highlight a well-documented pattern of losses; overall, children lost significant learning hours. Even accounting for home-schooling, the Covid cohort completed 40% of their normal amount of schooling in April 2020. This loss is more prevalent for those in the bottom 20% of the parental income distribution - the gap in learning losses between the top and bottom 20% is 0.123 or around 21% of the mean in April 2020.

Figure 3 shows how these numbers translate into an overall learning loss. We use a subset of studies included by Betthäuser et al. (2023) in their meta-analysis looking at UK children. The range of estimates go from 0 to 0.45 standard deviations in learning loss. We take the mean estimate - 0.2sd - as the cognitive learning loss experienced by the Covid cohort. Using our own estimates of how these vary by socio-economic background, we calibrate our model to have learning losses across all childhood ages that are 0.18sd higher for those in the bottom 20% of the parental income distribution.⁴

For socio-emotional skills, we use SDQ scores from USoc and run 2 separate difference-in-differences models looking at child observations (ages 5 and 8) and youth observations (ages 10-15) before the pandemic and in a period afterwards from September 2020 to March 2021. We control for age and observation by month/year.⁵ Table 8 in the appendix shows the calibration estimates. The top panel shows raw SDQ scores for those in the bottom and top 20% of the parental income distribution. We then compute the gap before and the gap after the pandemic for 'child' observations and 'youth' observations. In each successive Covid cohort, there exists a clear gap between those at the top and those at the bottom; however, the gap remains constant for our younger cohort. In contrast, the gap between less and more affluent older children widens during the pandemic. For those aged 10-15 the gap widens by 0.650 on a raw score scale and 0.111 on a standard deviation scale.

Looking at the bottom panel, this gap widens despite there being - on aggregate - no fall in SDQ scores for the adolescents in our sample. For younger observations - where the socio-

⁴ See Elliot Major et al. (2021) for a derivation of this. We convert hours lost to standard deviation changes in cognition by assuming that an hour lost each week over the course of a 39 week year shifts cognition by 0.15sd. We then calculate the difference in hours lost between those in the bottom and top 20% using information on homeschooling and school absence data.

⁵ We consider broad ages rather than focusing solely on age 5/age 11 losses due to sample size considerations.

economic divide remains constant - there is an aggregate drop in socio-emotional scores. The raw score falls by 1.6 during the pandemic which corresponds to a 0.262sd fall in the socio-emotional score.

Impacts on GCSE outcomes

- **Covid induced learning losses and declines in socio-emotional skills will significantly damage the education prospects of 5-year-olds at the time of Covid school closures, with boys 4.4 percentage points less likely to achieve 5 good GCSEs and girls 4.8 percentage points less likely to do so.**
- **The socio-economic gap in basic GCSE grades for 11-year-olds at the time of Covid school closures is set to significantly widen – by 4.5 percentage points for males and by 4.3 percentage points for females.**
- **These results represent a double whammy to the educational progress for successive Covid generations: they are on course for the biggest overall decline in basic GCSE achievement for at least 2 decades, and a significant widening of the socio-economic gap in GCSE prospects.**

We take these estimates and run them through our model. Table 9 shows the model implied estimates of how changing cognitive and socio-emotional skill at different ages affects the probability of achieving 5 good GCSEs. Because skills are not perfectly transferable across ages, losses in skill at age 5 have persistently lower effects than losses at age 11.

A standard deviation fall in cognitive skills at age 11 is estimated to reduce the probability of gaining 5 GCSEs by 0.169sd for males and 0.106sd for females. The discrepancy is driven by our earlier finding that socio-emotional skills are more important for GCSE outcomes for females than for males. In line with this, falls in cognitive skills operate relatively more through changing socio-emotional skills for females than males. Altering socio-emotional skills at age 11 has a larger effect on females. Raising these skills raises the likelihood of good GCSEs by 0.219sd for females as opposed to 0.129sd for males. In each case, changes to socio-emotional skills operate primarily via lowering socio-emotional skills at later ages (rather than reducing measured cognition or cognitive skills).

Given the above, we find the following observed losses and socio-economic gaps in our model due to Covid disruption⁶:

- A 0.2sd fall in cognitive skills at age 5 alongside a 0.262sd fall in socio-emotional skills at age 5.
- A 0.2sd fall in cognitive skills at age 11.

⁶ Ideally, we would estimate changes in cognition and SDQ scores separately by age, gender, and socio-economic status. Due to sample size restrictions we can only estimate pooled socio-economic gaps in cognition/socio-emotional skills.

- A widening of the cognitive gap by 0.18sd where the gap is defined as the difference between those born in the top 20% of the parental income distribution and those born into the bottom 20%. We observe this widening at both age 5 and age 11.
- A widening of the socio-emotional skills gap, alongside the widening of cognitive skills, of 0.111sd at age 11.

Declines in GCSE achievement

Reading Table 9 in the appendix, the first fall - the 0.2sd decline in cognitive skills - can be expected to reduce the likelihood of achieving 5 good GCSEs by 3.4 percentage points for males and 2.1 percentage points for females. For age 5, we consider the additional fall in socio-emotional skills that we estimate in Table 8. Here the additional 0.262sd fall - alongside the 0.2sd fall in cognitive skills - leads to a 4.4 percentage point drop for male pupils and a 4.8 percentage point drop for female pupils. Although early losses dissipate over time, the additional fall in socio-emotional skills puts younger children at greater risk of not reaching the 5 GCSE thresholds. This is particularly true for females for whom socio-emotional skills load heavily on attainment.

In general, we find that the primary determinant of the cognitive score at any age is the score at previous ages which suggests that bouncing back from lower skills is quite difficult for children. It is also often unclear whether effective interventions for improving pupils' development are boosting cognitive or socioemotional skills.

Widening GCSE gaps

In the raw data, 77% of children from the top fifth of incomes achieve 5 good GCSEs with English and maths compared with 44% from the bottom of fifth of incomes.

For age 5 pupils, we estimate a rise in the cognitive skills gap of 0.18sd. This translates to a widening of the gap of 1.4 percentage points for males and 1.1 percentage points for females in GCSE prospects. At age 11, there is an additional increase in the socio-emotional skills gap alongside the cognitive skills gap. Here we estimate a greater widening gap of GCSE prospects of 4.5 percentage points for males and 4.3 percentage points for females.

The falls operate differently by gender. The widening socio-economic GCSE gap for males operates primarily through decreasing cognitive skills at age 14 – 68% of the total effect is driven by those, with the remaining 32% driven by falls in socio-emotional skills. For females, the opposite is true with 44% of the 4.3 percentage point divide driven by cognitive skills and 56% driven by socio-emotional skills.

Comparisons with historical trends

These shifts in basic GCSE grades are significant when put into the context of historical trends in England. A recent analysis found little change in the disadvantage gap in basic GCSE achievement in England over the past 20 years (Farquharson et al., 2022). While GCSE results overall had improved over time before the pandemic, pupils eligible for free school meals in 2019 were still 27 percentage points less likely to achieve at least a grade 4 ('standard pass') in both English and maths GCSEs compared with other pupils (41% reaching

this threshold in 2019 compared with 69%). Our model predicts that this GCSE gap will widen for 11-year-olds at the time of Covid school closures by 4.5 percentage points for males and by 4.3 percentage points for females. This would equate to a 32-percentage point socio-economic gap in standard passes in English and maths GCSEs from 2024 onwards.

The government's preferred benchmark in recent years is the percentage of pupils achieving grades 5 ('good pass') or above in English and mathematics GCSEs. In 2018/19 before the pandemic this stood at 43.2% for pupils in all state schools. Our model suggests that this could drop to 38.8% for male pupils and 38.4% for female pupils taking GCSEs in 2030. In 2022/23, Government statistics showed that 45.3% of pupils achieved this benchmark.

This represents a double whammy to the educational progress for Covid cohorts: they are on course for the biggest decline in basic GCSE achievement in 2 decades, and an unprecedented widening of the socio-economic gap in GCSE results.

Economic costs

To estimate an overall economic effect of these educational impacts, we multiply estimated GCSE changes by the extra discounted wage returns associated with getting at least 5 good GCSEs – which is estimated at £100,000 over a lifetime on average (Hayward et al., 2014). This suggests a future fall in lifetime discounted earnings of £3,400 for male pupils at age 11, a fall of £2,100 for female pupils at age 11, £4,400 for males at age 5, and £4,800 for females at age 5 (per capita).

Multiplying these for the pupil cohort size (4,647,851 state funded primary age pupils and 3,630,171 secondary age pupils in 2023) yields an aggregate economic cost of £31.4 billion. Our calculation also suggests that the lifetime earnings divide between children from the bottom 20% of incomes and top 20% will widen by £4,500 for males and £4,800 for females.

Consequences for income mobility

Social or income mobility levels indicate how successive generations are likely to climb up (or fall down) life's economic or social ladder. The closer the link between income levels from one generation to the next, the less socially mobile a society is. Measuring income mobility levels provide an indication of the extent of opportunities in society: life prospects are down to who you are born to, and where you are born, rather than your individual talent, hard work or luck.

We follow our previous work (Elliot Major et al., 2021; Eyles et al., 2022) using a canonical model of social mobility to assess the consequences of widening socio-economic gaps in GCSE attainment alongside knowledge of the economic returns from these qualifications. In the model, the relationship between parental resources and educational attainment, and the relationship between education and income, create an intergenerational dependency between parental and child income.

We estimate that for age 11 children – for whom we estimate greater inequality in attainment due to Covid – the relationship between parental and child income will increase by 15% for females and 12% for males. By international standards, this equates to a

significant decline in income mobility levels, as demonstrated below by measures of intergenerational earnings elasticities for a group of OECD countries.

Table 2 Comparisons of intergenerational earnings elasticities (From Corak, 2013).

Country	IGE
United Kingdom	0.5
Italy	0.5
United States	0.47
France	0.41
Japan	0.34
Germany	0.32
Australia	0.26
Canada	0.19
Finland	0.18
Norway	0.17
Denmark	0.15

Notes: The higher the intergenerational elasticity (IGE) the lower the income mobility across generations. An intergenerational elasticity of 1 corresponds to complete immobility, and 0 to complete mobility.

Chapter 4: Low-cost equalising policies

Introduction

In the final part of the report, we present a series of low-cost policy recommendations for mid- to long-term education recovery in the post pandemic era. These are informed by the findings from our economic model of skill formation and other evidence on effective education approaches from our international review.

Our focus is on low-cost, evidence-informed, actionable policies in the school years (5-18). Building a more equitable society would in our view require major education reforms - from a comprehensive early years system to a more balanced school curriculum to creating a credible vocational offering for students. Given budget constraints facing governments, our aim here is to provide policy makers with some immediate 'quick wins'. The cost of these reforms pales in comparison to the economic costs from learning losses we set out in the previous chapter.

We emphasise approaches that improve children's academic progress but also enhance their socio-emotional learning. Our results suggest much greater emphasis is needed in schools on enrichment and extracurricular activities. We add to evidence that how learners think and feel are equally important. Socio-emotional skills are instrumental to doing well in school exams and are good in of themselves. They are particularly important for the academic progress of teenage girls.

Finally, we focus on equalising policies, those with the potential to benefit children and young people from under-resourced backgrounds who have suffered disproportionately during Covid. Our findings demonstrate that the Covid cohorts are on course for a significant decline in basic GCSE achievement, and a widening of the socio-economic gap in GCSE prospects.

Summary of recommendations

- A national programme of trained undergraduate tutors delivering academic and mentoring support to help boost pupils' foundational skills
- An enrichment guarantee in schools so that all children benefit from wider activities outside the classroom that nurture socio-emotional skills
- A national programme to measure pupils' wellbeing to create greater focus on wellbeing that is strongly linked to children's evolving skills
- A dedicated research programme to develop evidence-informed approaches to school parent and school community partnerships.
- Rebalancing Ofsted inspections to explicitly recognise disadvantage and credit schools excelling when serving disadvantaged communities
- A new deal for teachers clarifying working hours and creating a more balanced school calendar to help improve teacher and pupil wellbeing

1. University-led tutoring

Recommendation 1: Support a UK-wide programme of undergraduate tutors tutoring and mentoring school pupils to help develop foundational cognitive and socio-emotional skills.

Tutoring remains a strong evidence-informed bet for education recovery, boosting the progress of pupils from under-resourced backgrounds. It is defined as one-on-one or small-group intensive support provided by teachers, trained tutors or volunteers. Recent meta-analyses (Nickow et al., 2020; Kraft and Falken, 2021) confirm previous estimates (Elliot Major and Higgins, 2019) suggesting that it can lead to average learning gains of 0.37 standard deviations. This equates to an extra 4 to 5 months gain in learning over an academic year, with higher impacts (and higher costs) for one-to-one tuition compared with small group tuition.

However, this impressive average impact masks wide variation in effectiveness: meta-analyses are based on a preponderance of studies with optimal small-scale conditions; there is variation in outcomes highlighting the importance of delivery and quality assurance of schemes. It is unsurprising that tutoring programmes developed rapidly during the pandemic at regional and national scale have produced mixed results.

An evaluation of the first year of the National Tutoring Programme (NTP) in England found that fewer than half of pupils enrolled (46 per cent) were eligible for free school meals (FSM) or pupil premium (PP) funds (NFER, 2022). A substantial minority of pupils (35 per cent) had failed to complete the requisite number of tutoring sessions thought to be needed to affect their learning. An evaluation of the programme's second year found small improvements for pupils at age 11 and 16 in maths and English - with effect sizes 'very small' equating to one month's additional progress or less for students (NFER, 2023).

Studies are beginning to provide a more nuanced picture of the conditions needed for effective tutoring for different subjects and phases of schooling. Tutoring in literacy has on average resulted in bigger progress gains than maths (+6 months compared with +2 months). And tutoring delivered in primary schools tends to show greater impact (+6 months) than tutoring delivered in secondary schools (+4 months). Effects are stronger, on average, for teachers serving as tutors compared with untrained volunteers. Tutoring conducted during the school day tends to have larger impacts than those conducted after school hours. Face to face tutoring on average is more impactful than that delivered online.

University led tutoring

University led tutoring is a potential cost-effective scalable and sustainable option for tutoring. Sometimes referred to as near-peer tutoring, it involves university students tutoring school pupils on a voluntary or paid basis. Several studies have demonstrated significant positive impacts for pupils.

In **Italy**, an online tutoring programme known as 'Tutoring Online Program' (TOP) was implemented during the 2020 pandemic lockdown. The scheme involved trained, volunteer university students tutoring middle school students online. The trial found large effects on test scores, increasing on average by 0.26 standard deviations (Carlana and La Ferrara, 2021). Pupils randomly selected for 3-6 hours of free online tutoring by students did substantially better than their peers in academic progress, socio-emotional skills, aspirations and psychological wellbeing, with stronger effects for children from lower socio-economic households.

A randomised control trial in **England** of the Tutor Trust programme involving paid undergraduate student tutors found that 11-year-olds made 3 months' extra progress in maths, while secondary school pupils experienced one-month extra progress (Torgerson et al., 2018). A campaign document published by the Tutor Trust and other tutoring charities outlined other benefits from tutoring ([source](#)).

A small pilot of the Exeter tutoring model, a university-led scheme, found that pupils who received tutoring from trained undergraduates experienced a 100 per cent increase in test scores assessing basic writing skills (Elliot Major & Sim, 2023). University students can also act as role models, helping to demystify higher education and raise aspirations. Undergraduates underwent training, developed by a headteacher, and took a university module as part of their tutoring placement for which they received credits towards their degree. Tutoring was targeted at improving foundational literacy for 13 year-olds, aiming to improve access to the full curriculum during secondary school when many children fall behind. Student tutors can also consider a career in teaching. Initial findings from an expanded pilot in 2023/24 across the south-west and north-east of England, considering the impact of both paid and credit-earning tutors, are promising. The model could be used to improve foundational maths as well as 'emotional literacy' of pupils.

Table 3 University led tutoring effect sizes

Study	Summary of intervention	Effect on attainment (SDs)	Cost
(Carlana & La Ferrara, 2021)	Tutoring Online Programme in Italy, undergraduate tutors.	+0.26	50 euro per pupil
Cabezas et al. (2011)	<i>Servicio Pais en Educacion</i> in Chile, undergraduate tutors. 3-month programme of small group tutoring using college student volunteers.	+ 0.15-0.20	\$74.50 per + 0.1 SD \$520,000 total cost of programme, for 2,749 students

Kraft et al. (2022)	CovEd programme, Chicago	+0.04 -0.07	\$32 per pupil treated
Torgerson et al. (2018)	Tutor Trust, UK	+ 0.19 [CI - 0.05 – 0.44]	£112 per pupil
Lindo et al. (2018)	Tutoring Programme in the US, where minimally trained university students tutored students in Grades K-6 twice per week after school. Students were volunteers, tutoring as part of a module. Tutors attended four 1-hour training sessions as part of their coursework.	+ 0.78 – 1.02	Not mentioned

Socio-emotional outcomes

Undergraduate tutoring programmes have also been shown to improve socio-emotional skills including educational aspirations, wellbeing (Carlana & La Ferrara, 2021) and confidence (Torgerson et al., 2018). An early evaluation of the Enhanced Learning Tutoring Initiative coordinated by Queen Margaret University in **Scotland** indicated benefits in confidence as well as exam readiness (Sosu et al., 2022).

In **Germany** a programme deploying undergraduates specifically as mentors for teenagers from lower socio-economic backgrounds increased school grades in maths by 0.29 standard deviations (and improved patience and social skills of pupils) (Resnjanskij et al., 2023). The programme offered secondary school pupils a voluntary university-mentor to prepare them for a successful transition into professional life. Outcomes from higher socio-economic backgrounds were not significantly increased.

Tutoring aims to improve academic progress and outcomes through intensive one-to-one or small-group support and feedback.

Mentoring aims to build confidence, relationships, resilience, character, or aspirations rather than teaching academic skills.

The case for university-led tutoring

Given its low cost and impacts on both cognitive and socio-emotional skills, we believe a national university-led tutoring scheme would complement other tutoring efforts and help provide a supply of quality tutors around the UK – as well as a potential pipeline for new teachers at a time when the profession is facing acute recruitment and retention challenges.

This model could be a highly cost-effective approach to raising attainment, with returns on investment as much as 10 to 1 depending on assumptions on costs and benefits. Evidence from the UK implies that a one-standard deviation (11.2 grades) improvement in overall GCSE performance is associated with an increase in discounted lifetime earnings of

approximately £96,000 (Hayward et al., 2014). If we assume an average effect size from tutoring of 0.15 to 0.37 standard deviations, this equates to 24k to £35k in discounted lifetime earnings. Direct costs of tutoring meanwhile can be as little as £100-£200 per pupil. The Exeter tutoring model uses university widening participation funds to pay for central coordination costs.

The programme could be seen as the parallel of AmeriCorps in the US – a chance to tap into the volunteering instincts of the younger generation. Universities could be incentivised to embed tutoring into the curriculum through an accredited module or as part of a 'service learning model' in which all students are expected to do community-based work as part of their degrees. We recommend that the Department of Education takes a proactive role in developing further evidence on this model and encourage partnerships between universities and schools to facilitate the implementation of university-led programmes. This could involve stronger incentives for universities (through the Office for Students) and schools to prioritise proven strategies such as tutoring for raising attainment, and considering effective tutoring approaches including working with teachers for example.

Another low-cost promising approach meanwhile is peer tutoring in schools. Peer tutoring involves getting pupils to teach each other, working in pairs or small groups. Peer tutoring can add an extra 4 to 5 months learning gain for pupils during an academic year (Elliot Major and Higgins). The overall evidence is strong but trials in **England** yielded no extra impact on attainment compared with teaching as usual (Lloyd et al., 2015). It's a low-cost intervention, but time is needed for training and preparation. The evidence shows that both the tutor and the tutee have a positive impact. A more recent pilot programme in **Portugal** ran an online peer tutoring programme in Spring 2021, and showed positive effects, with a stronger impact for those that began with lower attainment.

2. Guaranteed enrichment

Recommendation 2: Introduce an enrichment guarantee in schools. This would guarantee every student the opportunity to take part in enrichment activities and encourage schools to embed enrichment activities into their core curriculum.

Participation in arts and sports activities have important educational value in themselves. They are associated with improved socio-emotional skills from increased self-confidence and wellbeing, to enhanced social interaction and leadership skills (Elliot Major and Higgins, 2019). A broad and balanced curriculum is important both for children and for wider society in terms of how we prepare our children for life after school. Here we define enrichment as learning activities outside the narrow curriculum for which schools are currently held to account: this encompasses developing non-cognitive skills within lessons, and opportunities to engage in broader activities before and after school and at lunchtime. It is particularly important for children from under-resourced backgrounds who may not have access to enrichment in the home environment.

Enrichment should include interventions explicitly aiming to enhance social emotional learning. Ideally activities should be embedded in the school curriculum; they can improve children’s relationships with others inside and outside school. Pupils learn how to manage their emotions and become better learners. A recent meta-analysis in the US found a range of positive outcomes for teacher-delivered social-emotional learning schemes ([source](#)) The most effective programmes are those embedded into routine classroom practices and supported by staff training. Successful strategies can improve attitudinal and attainment outcomes (Elliot Major and Higgins, 2019).

Enrichment activities have also been shown to have academic benefits. For example, an arts programme in **Chile** found that participation by students aged 14-16 led to increased achievement. Moreover, the programme led to increased willingness to participate in higher education, creativity increased, and students were more likely to spend time taking part in cultural activities (Egana-delSol, 2023). It’s also been suggested that a focus on enrichment and extracurricular activities can help address school absenteeism, a major challenge in the post pandemic era ([source](#)).

Internationally, pandemic responses emphasised enrichment and extracurricular activities, with blended summer schools being a popular strategy. In England, schools struggled to provide extracurricular and enrichment activities due to increased workloads, rising absences, and budget constraint (Ofsted, 2022).

An enrichment guarantee would guarantee every student the opportunity to take part in enrichment activities in school, which would in turn encourage schools to embed enrichment activities into their core curriculum. This could look like scheduling a weekly session for enrichment. These weekly sessions could include a broad range of activities, chosen by schools and students.

Table 4 Evidence on the effect of enrichment activities on academic achievement

Study	Summary of intervention	Effect on attainment	Cost
(Egana-delSol, 2023)	Arts programme in Chile for students aged 14-16. Programme consisted bringing an artist to do workshops in public schools. Weekly 90 minute workshops over one semester.	+0.55 S.D. (on GPA)	Cost of ‘competitive salary’ for weekly 90 minute workshops led by artists over the course of a semester.
(Bowen & Kisida, 2019)	8 th grade students receiving arts education experiences through school-community partnerships with local arts	+0.13 S.D. on writing achievement	\$14.67 per student to facilitate and enhance partnerships with

	organisations, cultural institutions and teaching-artists in Texas.		arts organisations and institutions.
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3. Measure wellbeing

Recommendation 3: Measure young people’s wellbeing. Establish an annual wellbeing survey for all school pupils to create greater focus on this important aspect of children’s development

Improving children’s wellbeing is likely to have many positive impacts on learning. While the relationship is complex and multifaceted, several studies have demonstrated a reciprocal relationship between improved wellbeing in children and the development of enhanced socio-emotional skills. The results from our model of skills show that social emotional skills are an important influence on the eventual outcomes for children. Other evidence meanwhile finds a link between some measures of wellbeing and academic results, with one meta-analysis finding that greater wellbeing is associated with a significant positive but small effect size (Kaya & Erdem, 2021).

The pandemic has had a negative impact on mental health and wellbeing of young people. Internationally, the UK already performed poorly on wellbeing measures, with a lower proportion of students feeling a sense of belonging at school than the OECD average. The latest PISA results in 2022 found that life satisfaction in the UK is in the bottom 5% of some 80 countries surveyed.

From our international review meanwhile, we found that mental health was high on many education policy agendas. While England allocated resources for mental health and wellbeing guidance, some regions and countries went further for example in Ontario, hiring extra mental health workers in schools. Wellbeing interventions were one of the most popular interventions among schools in the Netherlands ([source](#)), and the second most popular in Wales (Andrews et al., 2023).

The school inspectorate, Ofsted, already assesses and reports on pupils’ mental health and wellbeing. But we believe it is time to produce more systematic measures collected across schools and local areas. This would help to rebalance the school accountability system to give more focus to mental health and wellbeing and provide important information for schools and parents and local communities.

Increasingly, governments across the world are recognising that a happy child is a learning child. The Netherlands, Finland, Estonia, Singapore and South Australia all now assess the extent to which their school children are satisfied with their lives. Inspired by the Dutch example, the Gregson Foundation has supported a programme (#BeeWell) to monitor the wellbeing of pupils in secondary schools in England (Gregson Family Foundation, 2019).

#BeeWell aims to improve the wellbeing of young people through an annual wellbeing survey delivered to secondary schools. Questions have been co-created to conceptualise wellbeing across several measures. The hope is that the data will incentivise schools to adapt what they do to improve wellbeing, offering for example a greater variety of extracurricular activities or improving the nutritional elements of food provision. Informed by current trials of the #BeeWell scheme, we recommend that measuring young people's wellbeing in schools is rolled out as a national policy.

4. Parent and community partnerships

Recommendation 4: A dedicated research programme should be initiated redirecting a proportion of current education research funding to develop evidence-informed approaches to school parent partnerships.

Our research indicates that parents' investments in their children are significant predictors of future academic achievement, influencing not just cognitive but also socio-emotional skills of children. This finding confirms one of the most robust and recurring findings in education research. Depending on what assumptions are made, at least half of variation in student outcomes can be linked to parenting background and the home learning environment (Hanushek, 2016).

In the wake of the pandemic, growing concerns have been expressed about a broken social contract between parents and schools leading to rising levels of persistent absence among a significant number of pupils. Some attempts have been made to improve partnerships between schools and parents. For example, an expansion of attendance hubs in 2023 encouraged schools to take a proactive approach in reaching out to parents and sharing information about the importance of regular attendance. The 'parent pledge' introduced in the 2022 schools white paper aimed to keep parents informed about their child's progress if they were falling behind in English or maths ([source](#)).

Internationally, parental engagement featured in recovery plans in the United States and the Netherlands. In Scotland, the Scottish Schools (Parental Involvement) Act in 2006 and subsequent national action plans involved publishing toolkits, guidance, and involving parents ([source](#)). Currently, there is no national strategy in the UK when it comes to the parental school partnerships despite significant evidence on the importance of parental engagement.

Research programme on parent partnerships

We need to review the effectiveness of standard and often time-consuming approaches in schools, including parent-teacher meetings or parents' evenings and parent communication more generally. A dedicated research programme should be initiated redirecting a proportion of current education research funding to develop evidence-informed approaches to school parent partnerships. This is an area where more trials are needed. A 3-year research

programme would aim to find out what has worked, what has shown promise and what could work in the future.

It would be straightforward to identify schools who are effective at parental engagement and test promising practice across the system. Promising practices include recruiting parents as champions to engage other parents, organising low stakes school visits for parents to see their children's work, targeted home visits, options for parent workshops when children first start at school.

School community hubs

Recognising the need to address factors outside schools impacting on children's readiness to learn, an increasing number of schools are developing community hub or 'cradle to career' (C2C) models. These aim to develop deeper relationships with local communities and reduce inequities from before birth to prevent attainment gaps from emerging in the first place. The pandemic served to highlight the role schools play in communities – acting as an anchor institution in their locality.

Each hub is different, offering a range of services from free school meals to parenting support to the signposting for other social and medical services. As they involve several strands of activity, community hubs are hard to evaluate, but emerging evidence is promising (Sim and Elliot Major, 2022).

An evaluation of hubs could yield a basic blueprint that other schools could follow, creating a national guidance for community work. Related to this, evidence informed guidance is needed to guide the work of the significant numbers of staff in schools dedicated to non-academic activity including welfare and pastoral support, attendance and community work.

Parental texting to help reading

Text messaging parents is a low-cost approach for encouraging at-home reading and improved school attendance of pupils. Recent trials outside the UK have produced promising results using low-cost behavioural tools to help motivate parents to read with younger children. These have been beneficial for children from under-resourced backgrounds.

A shared book reading (SBR) trial for children aged 4 living in socially mixed neighbourhoods of **Paris** aimed to address parents' information deficits (Barone et al., 2021). Parents were sent flyers explaining that reading storybooks to their children fosters their language helping them to succeed in school; they were then sent follow-up texts providing practical tips. The experiment led to more reading in low-educated households and improved language acquisition.

The Parents and Children Together (PACT) study in **Chicago** has also produced promising findings (Mayer et al., 2019). The aim of the trial was to help parents prioritise time with their children. Texts to parents utilised several behavioural tools designed to 'bring the future to the present'. This was a small self-selected sample of parents, but the 6 week programme had a large impact on children aged 3-5: parents in the treatment group spent 88.3 more

minutes reading and completed 16.6 more books with their children than parents in comparison group.

Trials of texting in England have also yielded promising results. One trial involved texts to inform parents of secondary school pupils about upcoming tests, homework submissions, and what children were learning at school. A small positive impact on mathematics attainment and on decreasing absenteeism was found. The cost of sending texts parents was very low (around £6 per pupil per year) making the intervention highly cost-effective. A trial was also undertaken of behavioural texts to provide actionable information on what parents could do to help their child develop language, literacy, numeracy and socio-emotional skills at home (Stokes et al., 2022). Unfortunately, data collection was disrupted by the pandemic rendering the results inconclusive. A study by Asher et al. (2022) in the US meanwhile shows that more personalised texts and framing reading as something to be enjoyed as well as developing skills are particularly effective.

Given their relative low cost and promising results, this is an area that warrants a government supported programme of replication studies. Guidance could be developed for schools on the nudges and texts for parents that are a promising low-cost approach for improving reading and learning in the home. This could help with attendance and the uptake of tutoring programmes. This has genuine promise as even marginal improvements in the home learning environment can significantly impact on outcomes.

Table 5 Effect of text interventions for parents on attainment

Study	Summary of intervention	Effect on attainment	Cost
(Miller et al., 2016)	Sending texts informing parents about dates of upcoming tests, whether homework was submitted on time, and what their childrne were learning at school in England.	+0.033 S.D. (English) +0.067 S.D. (Maths)	£6 per student
(Benjamin et al., 2019)	8-month-long text intervention for parents of preschoolers targeting behavioural barriers to engaged parenting in the US.	+0.11 S.D. (Early literacy)	Less than 1 dollar per family.

5. Improving equity

Recommendation 5: Rebalance Ofsted inspections to shine a spotlight on disadvantage School inspections should combine a focus on high expectations for all pupils while crediting schools excelling in their work serving under-resourced communities.

Our review suggests that the education playing field has become more unequal in England and the UK in the post pandemic era. These trends were already signalled before the Covid pandemic, and without significant intervention, the fear is that gaps will continue to widen. On some measures we have gone backwards by a decade. A particular worry is a significant group of left behind pupils – increasingly likely to be absent from school, and unlikely to leave school with the basic skills needed to function and flourish in life after school.

Several countries make it their explicit priority to address education divides ahead of all else. Equity comes first, and excellence follows (Elliot Major & Briant, 2023). Serving the most disadvantaged schools is a core strand of teacher training; teachers prioritise pupils struggling most in the classroom; schools are measured on how well they are doing for under-resourced learners. A series of equity-focused reforms could help to level the learning playing field.

Review the Pupil Premium

Extra funds provided through the government's Pupil Premium (PP) grant, totalling £2.5 billion in 2022/23, rightly recognise the additional resources required for under-resourced pupils. But over a decade after this flagship policy was launched, a review is needed to assess whether PP funds are effectively distributed and deployed in schools. Possible reforms could include extra weighting of funds for pupils who have been eligible for free school meals for 80% or more of their school life and expanding PP funds to the pre-school and post 16 education phases. Amid rising levels of child poverty, the proportion of pupils eligible for free school meals and Pupil Premium funds meanwhile is rising. And it is far from clear whether the current use of PP allocations by schools consistently prioritise the best evidence informed approaches for pupils. Any review should consider whether more guidance or conditions or stronger accountability measures could be introduced to ensure the most impactful practice in schools while ensuring they are empowered to use these funds for their specific context they know better than anyone else.

Equity module for trainee teachers

Recent reforms have improved the quality and availability of training and professional development materials for teachers. But disadvantage only gets a single mention in the latest guidance for new and early career teachers in England with one statement recognising the impacts of poverty on children's development. New teachers are effectively thrown into the classroom with scant preparation for the barriers inside and outside the schools that impede learning for so many children. Teachers need to be trained on key elements of disadvantage through a module as part of their initial teacher education and early career development. This would ensure they develop a nuanced understanding of disadvantage, maintain high expectations and consider practical steps to understand and help pupils from under-resourced backgrounds flourish in the classroom.

Basic entitlements for pupils

Factors outside schools have a profound impact on children's prospects. Many pupils are now missing out on the basic entitlements from food and clothing to healthcare check-ups

that previous generations took for granted, including tests for eyesight, hearing or dental health. Healthy children make for better learners. While schools can't address all societal inequalities we believe several focused evidence-informed schemes could be rolled out across the school system.

Providing free healthy breakfasts (EEF, 2018) can help with improving school attendance. A trial of breakfasts provided by the charity Magic Breakfast for primary school children produced positive results. Experiencing a session before the school day starts can prepare pupils for learning for the rest of the day.

Enabling children to wear glasses meanwhile improves academic attainment. In the Glasses in Classes initiative, the results of eye tests are shared with vision coordinators (school staff trained to support pupils to get glasses and wear them) (EEF, 2019). A second pair of glasses for pupils is kept at school.

Rebalancing Ofsted inspections

Inspections by the Office for Standards in Education (Ofsted) have a profound impact on school behaviour with the aim to 'improve lives by raising standards in education'. Recent reforms have put more emphasis on assessing the curriculum offered in schools and not just their data on pupil outcomes. Current guidance in England states that a school should be achieving for 'all its pupils, including the most disadvantaged pupils'. Yet in practice it is increasingly clear that not enough emphasis is placed in inspections on how well schools are serving children from under-resourced backgrounds (encompassing all children facing extra barriers to learning, not just those qualifying for Pupil Premium funds).

Under the latest framework, a lower proportion of schools serving disadvantaged communities achieve an 'outstanding' rating by Ofsted. This is despite many schools excelling at improving the progress of children entering the classroom experiencing multiple barriers to their learning. In higher-rated schools meanwhile, the achievement gap between children on Free School Meals and other pupils can still be wide. Inspections are currently based on the questionable assumption that generic commitments to do the best for all children will automatically deliver extra help for under-resourced pupils. The current system effectively punishes teachers who chose to work in schools serving areas of high deprivation, rather than giving them extra credit for doing so. Schools are incentivised to take in fewer students from under-resourced backgrounds, or pupils with special educational needs and disabilities (SEND) as they are less likely to do well in Ofsted inspections as a result.

We believe a rebalancing of inspections is required to challenge schools on maintaining high expectations for all pupils while at the same time taking specific contextual factors into account when making judgments. This would include a set of clearly detailed factors associated with a local place or community a school is serving, including for example numbers of pupils from under-resourced backgrounds, quality of early years providers or social support services, access to transport, and teacher recruitment challenges. Final reports would require (adequately experienced) inspectors to comment on specific contextual factors. Inspectors should provide authoritative and detailed diagnosis on why schools are failing to reduce the disadvantage gap.

Future inspections of Multi Academy Trusts and other groups of schools meanwhile should include a section on how a trust is serving under-resourced pupils. Inspections could also pose questions about whether schools are doing enough to reflect their local communities, considering whether their admissions policies are fair and inclusive, and whether they are contributing to the wider school system.

In developing a new inspection framework we should look to international practice, where school report cards hold schools to account on a host of measures – including whether the school is closing achievement gaps, the sports and arts activities that are offered, whether teachers are providing supportive environments and developing strong family and community ties (Elliot Major and Briant, 2023).

Rebalancing performance tables

Finally, there are growing equity concerns about the usefulness of the current Progress 8 measure used to assess pupil progress in the school performance tables. Most of the measure is based on EBacc subjects at GCSE including English, Maths, Science, Geography or History and a language. Very small proportions of pupil premium students are included by schools in the measure.

We recommend that an alternative performance measure be considered - Progress 5 – that all pupils would be expected to complete. This could encompass English, Maths, Science and 2 other subjects. The key is to place high but realistic expectations for all school pupils.

An alternative approach would be to assess children against a basic threshold of key literacy and number skills at age 16 – alongside higher academic grades (Elliot Major and Parsons, 2022). Maths and English language GCSEs could each be split into 2 separate qualifications: a compulsory test examining basic number and literacy skills, and a separate exam for pupils pursuing more academic study.

6. New deal for teachers

Recommendation 6: Create a new deal for teachers by clarifying ‘undirected hours’ and support moves to rebalance the school calendar to help improve teacher and pupil wellbeing

High-quality teaching is the most important within school factor impacting on children’s development (Elliot Major and Higgins, 2019) with a particular impact on pupils from under-resourced backgrounds. Like many countries across the world, England is facing a teacher recruitment and retention crisis. One of the primary factors contributing to teachers leaving the profession is the issue of workload ([source](#)). One meta-analysis found that reducing teacher workload was associated with a period of maintained or improved pupil outcomes (Churches, 2020). Reducing teacher workload also improved teacher wellbeing.

Two lost-cost reforms that could help in this respect relate to teacher hours and the organisation of the academic calendar.

Creating a new deal for teachers

The 1,265 rule, which specifies the number of hours per year that teachers in England can be 'directed' to work by their headteacher was originally intended to create greater flexibility in conducting planning and marking during 'undirected' hours. However, these undirected hours currently lack clear limits, leading to teachers working additional hours, often exceeding 50 hours per week, surpassing the OECD average (Adams et al., 2023).

It's time to consider creating a new deal for teacher hours, clarifying exactly what is expected and ensuring that teachers are not working excessively long hours each week. This would specify the number of teaching hours, administrative duties, and professional development required – as is done in many other countries. A new deal could explore more flexible working hours for teachers, for example working a nine-day fortnight. Finally, national guidelines could also clarify the 'wider welfare' role of schools (see discussion on school community hubs below). This would give some clarity to the realistic scope for addressing outside barriers to learning.

School calendar reform

It is also time to consider reforms to a school calendar that has been stuck in place since Victorian times. Spreading school holidays more evenly across the year could improve the working lives of teachers by making term lengths more equal. This would make planning easier and help to alleviate mounting fatigue and pressure faced by teachers and their pupils during the long autumn term before Christmas.

More studies are needed in the UK to determine the possible learning loss suffered by modern day pupils over the summer break. The strongest evidence from other countries, for example the United States, suggests children from under-resourced backgrounds are most likely to suffer summer learning slide (Cooper et al, 1996; Quinn et al, 2016; von Hippel and Hamrock, 2019).

It's often safeguarding worries that play on the minds of teachers who are acutely aware that abuse, neglect, and mental health do not take a break over the holidays. Studies show that children from under-resourced backgrounds can be put at risk through malnourishment, isolation, and extended periods of inactivity (Stewart et al, 2018). Families face many challenges, including lack of affordable childcare and 'holiday hunger' as children do not receive the meals they receive for free at school.

A recent study found that mental health had worsened for 7 and 14 year-olds when they returned to school after the long summer break, with the biggest declines associated with under-resourced pupils (Kromydas et al., 2022). This makes it more difficult to get back to learning. As our analysis has demonstrated, socio-emotional development is just as important as cognitive skills in shaping children's future education and life prospects.

Shortening the summer holidays would have the benefit of spreading out the logistics and costs of childcare and holidays across the year for many parents. It would help parents who work during the summer in the holiday or catering industries. Studies have shown that many parents are unable to work hindering attempts to move out of poverty. Staggering shorter

summer holidays across different regions of the country moreover could even reduce holiday costs for parents.

Increasing numbers of schools and local authorities in England are already reforming their academic calendars, some introducing a 2-week autumn half term break to incorporate all staff training over one week instead of separate days across the year. In Belgium meanwhile reforms have been introduced following concerns that children were becoming too tired during excessively long school terms. Some schools have established a new pattern of 7-week terms followed by two weeks of vacation, repeated throughout the year, while shortening the summer break.

Under these changes, teachers and pupils would still enjoy the same number of days of school holidays. Small changes to the school calendar would be a zero-cost reform that would be popular with parents with the potential to improve the working lives of teachers and the education of their pupils. At the very least, we should trial a rebalanced school calendar in some areas to generate evidence on its potential benefits.

Concluding remarks

Delivering on these low-cost reforms, we believe, would go some way to offset the falling achievement levels and stark education divides predicted by our model of skill formation for the post pandemic era.

While our analysis concerns the extra learning losses suffered by children and young people during the Covid pandemic, it should be emphasised that this disruption amplified long term persistent education gaps in England and other countries. The policies we propose aim offer a strategic response to rebalance the education system so that it supports all children irrespective of their backgrounds.

Our review of education recovery responses by a range of countries meanwhile suggests more could be gained by closer international collaboration to learn what approaches have been promising elsewhere.

Failure to rebalance the education system will risk failing a generation damaged from learning losses and declines in socio-emotional skills. The likely fall in income mobility levels will cast a long shadow over our society for decades to come.

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Appendix tables

Table 1: Skill Production Equations, Age 11, Male

	Cognitive (11)				Socio-emotional (11)			
Cognitive (5)	0.415 (0.028)	0.396 (0.028)	0.410 (0.028)	0.396 (0.028)	0.080 (0.024)	0.072 (0.024)	0.073 (0.024)	0.070 (0.024)
Socio-emotional (5)	0.178 (0.023)	0.159 (0.023)	0.167 (0.023)	0.155 (0.023)	0.590 (0.023)	0.576 (0.023)	0.583 (0.023)	0.572 (0.023)
Investment (5)	0.167 (0.024)	0.115 (0.025)	0.185 (0.025)	0.129 (0.027)	0.048 (0.026)	0.031 (0.026)	0.078 (0.026)	0.059 (0.029)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Includes income?	No	No	Yes	Yes	No	No	Yes	Yes
Sample Size	1394	1394	1394	1394	1394	1394	1394	1394

Notes: estimates refer to standard deviation changes. Columns 3, 4, 7, and 8 include income in the investment equations.

Table 2: Skill Production Equations, Age 11, Female

	Cognitive (11)				Socio-emotional (11)			
Cognitive (5)	0.399 (0.025)	0.384 (0.025)	0.385 (0.025)	0.377 (0.025)	0.054 (0.024)	0.044 (0.024)	0.040 (0.024)	0.036 (0.024)
Socio-emotional (5)	0.158 (0.022)	0.145 (0.021)	0.145 (0.022)	0.140 (0.022)	0.538 (0.022)	0.527 (0.023)	0.527 (0.023)	0.520 (0.023)
Investment (5)	0.149 (0.021)	0.107 (0.023)	0.175 (0.022)	0.131 (0.026)	0.083 (0.021)	0.055 (0.024)	0.116 (0.022)	0.089 (0.025)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Includes income?	No	No	Yes	Yes	No	No	Yes	Yes
Sample Size	1680	1680	1680	1680	1680	1680	1680	1680

Notes: see Table 1.

Table 3: Skill Production Equations, Age 14, Male

	Cognitive (14)				Socio-emotional (14)			
Cognitive (11)	0.432 (0.026)	0.424 (0.026)	0.418 (0.026)	0.417 (0.026)	0.072 (0.019)	0.075 (0.019)	0.072 (0.019)	0.075 (0.019)
Socio-emotional (11)	0.027 (0.023)	0.021 (0.024)	0.018 (0.023)	0.018 (0.024)	0.699 (0.020)	0.697 (0.021)	0.699 (0.020)	0.697 (0.021)
Investment (11)	0.100 (0.025)	0.081 (0.026)	0.131 (0.025)	0.129 (0.031)	0.067 (0.018)	0.050 (0.025)	0.067 (0.020)	0.050 (0.025)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Includes income?	No	No	Yes	Yes	No	No	Yes	Yes
Sample Size	1571	1571	1571	1571	1571	1571	1571	1571

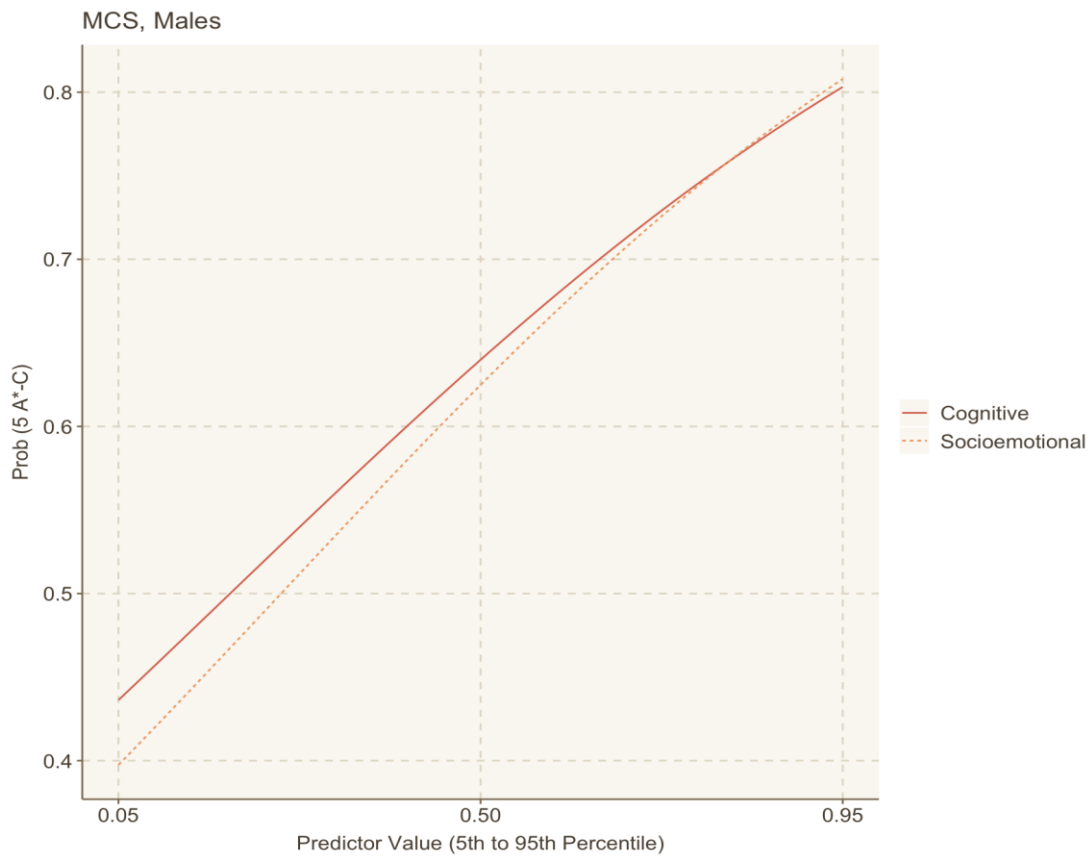
Notes: See Table 1

Table 4: Skill Production Equations, Age 14, Female

	Cognitive (14)				Socio-emotional (14)			
Cognitive (11)	0.369 (0.024)	0.357 (0.025)	0.350 (0.025)	0.347 (0.025)	0.083 (0.019)	0.074 (0.019)	0.071 (0.019)	0.071 (0.019)
Socio-emotional (11)	0.031 (0.025)	0.024 (0.025)	0.017 (0.025)	0.018 (0.025)	0.641 (0.020)	0.623 (0.020)	0.633 (0.020)	0.626 (0.020)
Investment (11)	0.108 (0.022)	0.088 (0.023)	0.155 (0.023)	0.153 (0.028)	0.043 (0.019)	0.006 (0.020)	0.075 (0.019)	0.024 (0.024)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Includes income?	No	No	Yes	Yes	No	No	Yes	Yes
Sample Size	1735	1735	1735	1735	1735	1735	1735	1735

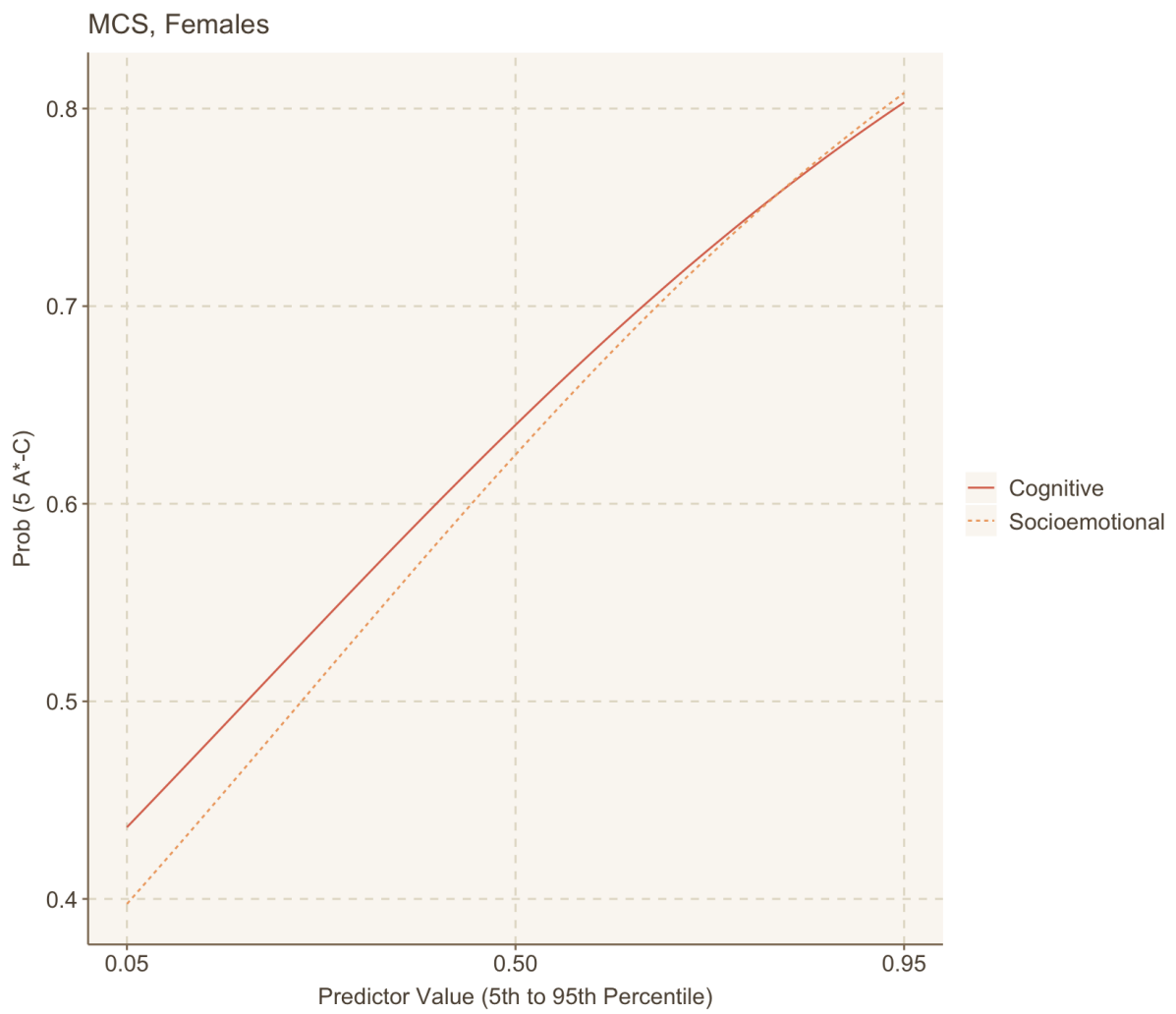
Notes: See Table 1

Figure 1: Relative roles of socio-emotional and cognitive skills, Male



Notes: the lines trace out the predicted probability of achieving 5 good GCSEs (including English and Maths), as each factor is varied over 95% of its range. In each case the other factor is held at its mean value. Predicted probabilities are estimated via logistic regression.

Figure 2: Relative roles of socio-emotional and cognitive skills, Female



Notes: See Figure 1

Table 5: Outcome Equations, Probability 5A*- C (with English and Math).

	Male		Female	
Cognitive (14)	0.362 (0.044)	0.382 (0.046)	0.214 (0.059)	0.231 (0.059)
Socio-emotional (14)	0.171 (0.047)	0.166 (0.049)	0.331 (0.061)	0.346 (0.031)
Covariates	No	Yes	No	Yes
Sample Size	1698	1698	1859	1859

Table 6: Outcome Equations, Number GCSEs.

	Male		Female	
Cognitive (14)	3.106 (0.351)	3.219 (0.369)	2.281 (0.463)	2.376 (0.459)
Socio-emotional (14)	1.607 (0.360)	1.572 (0.377)	2.604 (0.482)	2.657 (0.503)
Covariates	No	Yes	No	Yes
Sample Size	1698	1698	1859	1859

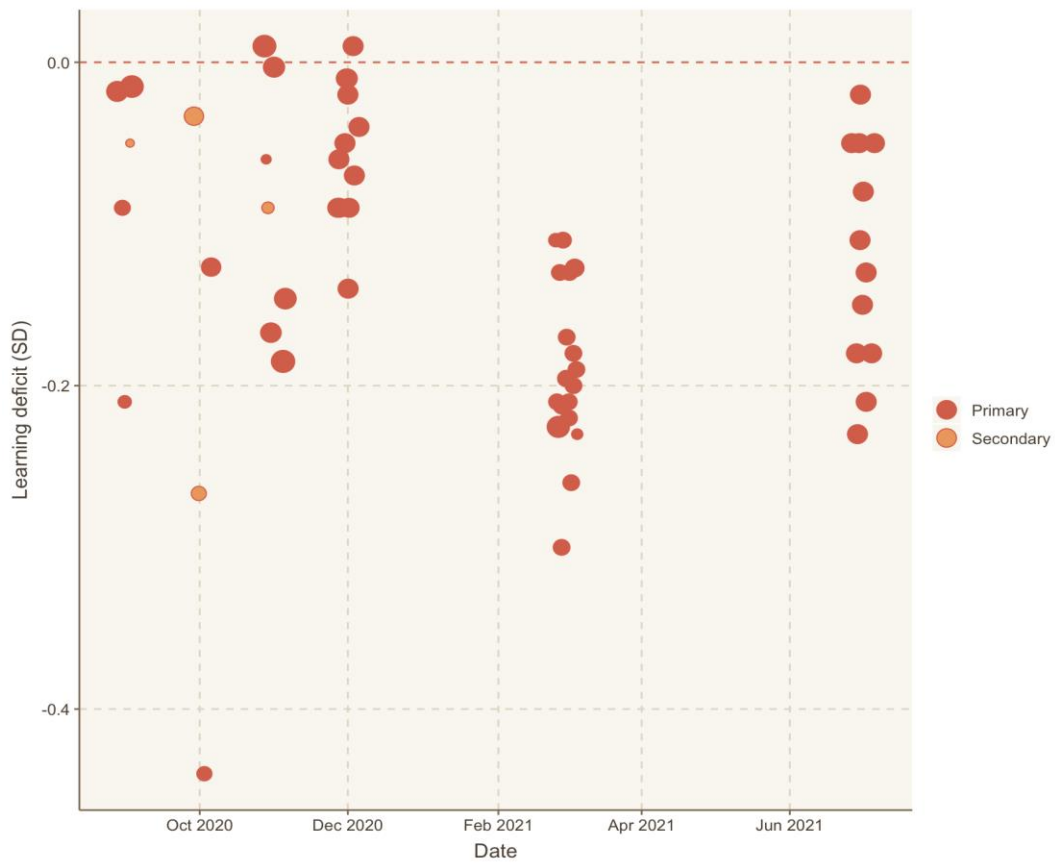
Notes: See Table 1

Table 7: Calibrating to Covid Losses, Cognition

	USoc (April 2020)	LSE-CEP Survey (April 2020)	LSE-CEP survey (September 2020)
Primary Pupil	0.045 (0.010)	-0.008 (0.016)	-0.006 (0.009)
Female	-0.054 (0.010)	0.039 (0.015)	-0.009 (0.009)
Bottom Quintile	0.037 (0.014)	0.029 (0.019)	0.007 (0.010)
Top Quintile	-0.086 (0.014)	-0.061(0.019)	-0.013 (0.014)
Average Loss	0.576	0.483	0.147
Sample Size	4114	1521	2417

Source: Elliot Major et al. (2021).

Figure 3: Meta Analysis findings



Notes: data points are taken from Betthäuser et al. (2023). Each point represents estimated standard deviation learning deficits. All included studies focus on the UK. We use these as proxies for cognitive learning loss that are fed into our model to produce estimates of changes to future GCSE attainment.

Table 8: Calibrating to Covid Losses, Socio-emotional skills

Distributional Effect				
	Before		After	
	Child	Youth	Child	Youth
Bottom 20%	0.574 (0.368)	0.391 (0.299)	1.040 (0.675)	-0.296 (0.619)
Top 20%	-2.197 (0.383)	-1.215 (0.309)	-1.706 (0.454)	-2.552 (0.473)
Sample Size	2215	4740	4369	3776
Overall Effect				
	Child	Youth		
SDQ	1.602 (0.755)	0.376 (0.475)		
Sample Size	6584	8516		

Notes: Data are taken from Understanding Society. SDQ scores for youth and child samples are collected in Covid waves 4/5/8 (child) and waves 4/6/8 (youth). The top panel plot differences (total SDQ score) by parental income quintile where income is measured at baseline (wave J of understanding society covering the period January 2018 – May 2020). The before period covers 2016-2019 while the after period uses the Covid waves of USoc. In each case, coefficients of parental income are reported after controlling for age, year, and month effects, and weighting using cross sectional weights. The bottom panel reports difference in difference estimates measuring the total change in SDQ scores before and after the pandemic based upon repeated cross sections of youth observations (aged 10-15) and child observations (aged 5 and 8).

Table 9: Implied Effects of SD change in Skills on Age 17 outcomes

	Male		Female	
	Age 5	Age 11	Age 5	Age 11
Cognitive	0.080 [87%, 13%]	0.169 [93%, 7%]	0.063 [81%, 19%]	0.106 [74%, 26%]
Socio-emotional	0.106 [28%, 72%]	0.129 [8%, 92%]	0.135 [13%, 87%]	0.219 [3%, 97%]

Notes: numbers in parentheses refer to the % of the total effect attributable to changes in cognitive skills and socio-emotional skills respectively. Columns 2 and 4 refer to the model where investment reacts to changes in cognition and socio-emotional skills. The total effect is the change in likelihood associated with a standard deviation change.

Table 10 – Strengths and Difficulties Questionnaire

	Not true	Somewhat true	Certainly true
I try to be nice to other people. I care about their feelings			
I am restless, I cannot stay still for long			
I get a lot of headaches, stomach-aches, or sickness			
I usually share with others (food, games, pens etc.)			
I get very angry and often lose my temper			
I am usually on my own/ I generally play alone or keep to myself			
I usually do as I am told			
I worry a lot			
I am helpful if someone is hurt, upset, or feeling ill			
I am constantly fidgeting or squirming			
I have one good friend or more			
I fight a lot. I can make other people do what I want			
I am often unhappy, down-hearted or tearful			
Other people my age generally like me			
I am easily distracted, I find it difficult to concentrate			
I am nervous in new situations/ I easily lose confidence			
I am kind to younger children			
I am often accused of lying or cheating			
Other children or young people pick on me or bully me			
I often volunteer to help others (parents, teacher, children)			
I think before I do things			
I take things that are not mine from home, school or elsewhere			
I get on better with adults than with people my own age			
I have many fears, I am easily scared			
I finish the work I'm doing. My attention is good.			

Notes: the following SDQ items form an index that we use as a measure of socioemotional skills. Rather than use the ad-hoc weighting provided in the MCS, we use confirmatory factor analysis to derive factor scores based upon estimated factor loadings and variances.