Understanding progress in the 2020/21 academic year

Complete findings from the autumn term

June 2021

Renaissance Learning, Education Policy Institute

Contents

List of figures

List of tables

About the research team

About the Education Policy Institute

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The results in this report have been given clearance at a publication level by the Office for National Statistics (ONS) Secure Research Service.[1]

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[1] This work was produced using statistical data from ONS. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

Summary

This report presents the Education Policy Institute and Renaissance Learning's second assessment of the learning loss experienced by pupils in England as a result of the coronavirus (COVID-19) pandemic. It is based on assessment data from Renaissance Learning's Star Reading and Star Maths. Star Assessments are computer-adaptive in nature adapt to the individual, providing an assessment that identifies gaps in learning from the entirety of the curriculum independent of their current year group. Star assessments are also standardised to take account of the pupil's age in years and months.

This data has been linked with data held by the Department for Education in the National Pupil Database which has enabled us to carry out analysis by pupil characteristics (such as eligibility for free school meals, and pupil ethnicity) for the first time. In addition, this is the first time we have carried out analysis of assessments carried out in the second half of the autumn term in 2020/21 which enables us to carry out an initial assessment of whether pupils started to make up for the 'lost learning' that we identified in our first report.

Chapter 1: Characteristics of pupils in the Renaissance data

For the majority of the analysis in this report we focus on pupils who had a reading assessment in either the first or second half of the autumn term 2020/21; and who had an assessment in the corresponding half-term in autumn 2019/20; and who have been matched to a record in the National Pupil Database. The first half-term in autumn is defined as any assessment undertaken in the period from 11th August until 25th October 2020, and the second half of the autumn term is from 26th October until 18th December 2020.

In total there were around 375,000 such pupils in the first half-term, and around 185,000 pupils in the second half-term, of the autumn term 2020/21 who also had an assessment in the corresponding half-term in autumn 2019/20.

We examined the characteristics of pupils who were in the Renaissance data (who we refer to as Renaissance pupils) for the first half of the autumn term in 2020/21. The proportions of Renaissance pupils who were boys, who were eligible for free school meals, who had English as an additional language, or who had an identified special educational need or disability, were very close to the proportion of pupils nationally that had each characteristic. This was true amongst both primary and secondary aged pupils.

Renaissance pupils were slightly more likely to be from white backgrounds than pupils nationally. Renaissance pupils had a range of prior attainment in national curriculum assessments at Key Stage 1 and Key Stage 2. They were more likely than average to be

assessed as having met the expected standard at Key Stage 1 and slightly less likely to be either below or above the expected standard at Key Stage 2.

Overall, the characteristics of Renaissance pupils were similar to pupils nationally. This increases our confidence in saying that the patterns of results for pupils we see from the Renaissance data are likely to reflect outcomes for the pupil population as a whole without further weighting being required. Furthermore, the characteristics of pupils with assessments in the second half of the autumn term were similar to the characteristics of pupils in the first half of the autumn term.

Chapter 2: Mean scaled scores and learning loss methodology

When we examined mean scaled scores from Renaissance assessments in 2019/20 across characteristic groups (i.e. before any school closures) we found that: on average girls outperformed boys; pupils from disadvantaged backgrounds lagged behind their more affluent peers; children from Chinese backgrounds were the highest performing ethnic group; and the label of EAL masked a variety of circumstances – recent arrivals from overseas had particularly low outcomes.

This pattern of results is consistent with similar analyses of national curriculum assessments, and outcomes in GCSEs. This suggests that the pattern of results we observe in Renaissance assessments is likely to be indicative of what would have been observed if national testing had been possible.

For primary aged pupils in years 3 and 6, the average results in reading in the first half of the autumn term in 2020/21 were lower across all characteristic groups when compared with results in 2019/20 by between 10 and 30 scaled score points.[2] For year 9 pupils in secondary schools, the average results in reading in 2020/21 were broadly the same as in 2019/20.[3] In mathematics, results in 2020/21 were substantially lower than in 2019/20 across all characteristic groups – apart from EAL recent arrival pupils. On average, year 3 pupils scored around 35 scaled score points lower in 2020/21 than in 2019/20, year 6 pupils scored around 20 points lower than in 2019/20.

As we set out in our first report, simple comparisons of average scores between years do not necessarily give an accurate reflection of learning loss (or otherwise) since we are considering different cohorts with potentially different characteristics and different profiles of prior attainment. Therefore, our learning loss estimates are based on a regression

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[2] The exception to this was pupils with English as an additional language who have recently arrived in the state school system in the last two years (who we refer to as EAL recent arrival pupils) where results were inconsistent (likely reflecting the small sample sizes).

[3] Chinese and EAL recent arrival pupils experience large differences in results between 2019/20 and 2020/21, however these particular characteristics groups have relatively small sample sizes and therefore more likely reflect individual circumstance than the effect of that characteristic.

model used to estimate what a pupil would have achieved in 2020/21 had they followed the same pattern of progress – based on their prior attainment and characteristics – as similar pupils in 2019/20.

Chapter 3: Estimated learning loss by the first half of the autumn term 2020/21

In this report we re-estimated learning loss by the first half-term in autumn 2020/21 having controlled for a range of pupil characteristics.

- We find evidence of learning loss in reading that was similar amongst primary and secondary aged pupils and was higher in mathematics than in reading. The average learning loss in reading for primary aged pupils was around 1.8 months, for secondary aged pupils it was around 1.7 months. Learning losses in primary mathematics were greater at around 3.7 months.

- Pupils from disadvantaged backgrounds have been amongst the biggest losers as a result of the pandemic. Pupils from disadvantaged backgrounds (eligible for free school meals at any point in the last six years) lost, on average, approximately 2.2 months in reading amongst both primary and secondary aged pupils, and around 4.5 months in mathematics for primary aged pupils. This means that disadvantaged pupils lost about half a month more than non-disadvantaged pupils in reading and around a month more in primary mathematics.

- The relative learning loss for disadvantaged pupils was equivalent to undoing between a third and two-thirds of the progress made in the last decade in closing the disadvantage gap in primary schools and, given further school closures during 2020/21, it would seem likely that the gap could grow further. However, the extent to which the gap widened, as a result of the first lockdown at least, was at the lower end of some of the other published estimates of learning loss.

- The analysis suggests regional disparities in the degree of learning loss. For both primary and secondary aged pupils in reading, pupils in the North East and in Yorkshire and the Humber experienced the greatest learning loss (around 2.4 and 2.6 months respectively in primary, and around 2.3 and 2.4 months respectively in secondary). In primary mathematics the differences between regions were larger. Again, it was the North East and in Yorkshire and the Humber that experienced the greatest learning loss – around five months, more than double the loss experienced in the South West.

Chapter 4: Estimated catch-up between first and second half-term in autumn 2020/21

By comparing estimates of learning loss between the first and second half of the autumn term we are able to carry out an assessment of the extent of catch-up that occurred in the autumn.

- Primary aged pupils had lost around 1.2 months of learning in reading by the second half of the autumn term, implying that primary aged pupils were able to catch-up around half a month of learning lost in one half-term.

- There was around a month of catch-up for primary aged pupils in mathematics. This catch-up in mathematics is from a lower base than reading, so there was still a notable learning loss by the second half of the autumn term of approximately two and a half months for mathematics.

- We find no statistically significant difference in our modelled learning loss for the first and second half-terms of autumn for pupils in secondary schools.

Due to the relatively small sample size at secondary, our analysis of catch-up by pupil characteristics is restricted to primary aged pupils.[4] We find that in reading:

- both male and female primary pupils recovered some learning in the latter half of the autumn term, but girls have recovered a greater amount of learning than boys. Girls have recovered around 0.7 months of learning loss by the second half of the autumn term, compared with approximately 0.5 months for boys;

- pupils from disadvantaged backgrounds (defined as pupils eligible for free school meals at any point in the last six years) recovered around 0.4 months of learning, compared with non-disadvantaged pupils who recouped 0.6 months of learning. Furthermore, we estimate that in the second half of the autumn term the gap in learning loss between disadvantaged pupils and their more affluent peers remains at around half a month, despite schools re-opening;

- most ethnic groups appeared to experience some degree of recovery, though due to sample sizes these are not all statistically significant;

- pupils with English as an additional language experienced catch-up of around 0.4 months, compared with around 0.6 months for all primary aged pupils;

- pupils with special educational needs experienced catch-up of around 0.4 months, compared with around 0.6 months for all primary aged pupils; and

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[4] The relatively small sample size in secondary schools is in part due to the methodology adopted to compare the same pupils over time and we hope that the sample size will increase in future reports.

- all regions appear to have shown some degree of recovery, though due to sample sizes these are not all statistically significant. The greatest recovery was in Yorkshire and the Humber and the East of England where pupils in these regions experienced greater recovery in learning than the average for all primary aged pupils (around 0.9 and 0.8 months respectively).

The analysis suggests that there are inequalities in primary reading stemming from schools re-opening with certain characteristic groups catching up more than others. Male pupils, disadvantaged pupils, pupils from EAL backgrounds and SEND pupils, experienced less catch-up by the second half-term of autumn than the average for all primary pupils. However, male and SEND pupils did experience a lower level of learning loss in the first half of the autumn term compared to all primary aged pupils.

In mathematics we find that:

- both girls and boys recovered around a month of learning, although learning loss for mathematics in the second half of the autumn term remains large at around 2.8 months for girls and around 2.3 months for boys;

- both disadvantaged pupils and non-disadvantaged pupils recovered around one month of learning; and

- all regions appear to have shown some degree of recovery, though due to sample sizes these are not all statistically significant. The greatest recovery was in London and in the South West (around 1.5 months).

The general trend in primary reading of certain characteristic groups catching up more than others does not appear to be the case in primary mathematics, although there are regional inequalities in primary mathematics with certain regions experiencing greater catch-up than others.

Summary tables 1 and 2 outline the estimates of learning loss by the first half of the autumn term (what we refer to as 'Autumn 1') and by the second half of the autumn term (what we refer to as 'Autumn 2') for primary reading, primary mathematics, and secondary reading for all pupils, as well as estimates broken down by disadvantage and region.[5] The catch-up figures denoted with asterisks are the estimates that are statistically significant.

In order to ensure that we are comparing the same pupils over time the analysis presented in the tables below is restricted to the pupils that undertook assessments in both the first and second half of the autumn term. This allows us to build a consistent

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[5] Estimates by pupil characteristics are not provided for secondary reading due to the relatively small sample size at secondary, therefore our analysis of catch-up by pupil characteristics is restricted to primary aged pupils.

picture of how pupils have been affected by the pandemic and then how they were affected by the re-opening of schools to all pupils.

Table 1: Estimated mean learning loss, in months, in reading (primary and secondary schools) for autumn 1 and 2 by disadvantage and region

		Primary Reading				Secondary Reading			
		Autumn 1	Autumn 2	Catch-up	Count	Autumn 1	Autumn 2	Catch-up	Count
All pupils		-1.8	-1.2	0.6**	112,971	-1.5	-2.0	-0.5	13,475
Disadvantage	**Non-FSM EVER 6**	-1.7	-1.1	0.6**	84,938				
	FSM EVER 6	-2.0	-1.6	0.4**	28,033				
Region	**East Midlands**	-1.5	-1.4	0.1	8,638				
	East of England	-1.8	-1.0	0.8**	14,390				
	London	-1.3	-0.7	0.6**	8,177				
	North East	-2.3	-2.0	0.3	9,060				
	North West	-2.0	-1.9	0.1	12,788				
	South East	-1.8	-1.1	0.7**	21,570				
	South West	-1.5	-0.8	0.7**	16,778				
	West Midlands	-1.7	-1.0	0.7**	12,740				
	Yorkshire and the Humber	-2.6	-1.7	0.9**	8,830				

Table 2: Estimated mean learning loss, in months, in mathematics (primary schools) for autumn 1 and 2 by disadvantage and region

		Primary Mathematics			
		Autumn 1	Autumn 2	Catch-up	Count
All pupils		-3.5	-2.5	1.0**	8,870
Disadvantage	**Non-FSM EVER 6**	-3.3	-2.3	1.0**	6,748
	FSM EVER 6	-4.3	-3.3	1.0**	2,122
Region	**East Midlands**	-4.9	-3.2	1.7	480
	East of England	-4.3	-3.3	1.0	708
	London	-2.5	-0.9	1.6**	948
	North East	-5.2	-4.0	1.2	270
	North West	-3.3	-2.1	1.2	944
	South East	-3.4	-2.8	0.6	2,488
	South West	-2.0	-0.5	1.5**	1,500
	West Midlands	-4.0	-3.7	0.3	692
	Yorkshire and the Humber	-5.8	-5.3	0.5	840

Note: Note that for some sub-groups the achieved sample is fewer than 500 pupils and as a result some caution should be taken with interpretation and estimates should be taken as indicative of likely patterns.

Background: Star Assessments from Renaissance Learning and current estimates of learning loss

The data analysed in this report is drawn from assessment data from Renaissance Learning's Star Reading and Star Maths. These provide criterion-based scores that run on a singular scale from Year 1 to Year 13. Star Assessments are computer-adaptive in nature adapt to the individual, providing an assessment that identifies gaps in learning from the entirety of the curriculum independent of their current year group. Star assessments are also standardised to take account of the pupil's age in years and months.

The Star Reading assessment measures students' performance on key reading skills via a brief standards-based test of general reading achievement, administering 34 questions that students complete, on average, in less than 20 minutes. The Star Maths assessment similarly comprises a brief assessment of 24 questions that students complete, on average, in less than 25 minutes. Reading draws on item banks of just under 4,000 items and under 2,000 items for mathematics.[6]

In October 2020, Renaissance Learning provided data to the Education Policy Institute comprising all assessments undertaken in schools in England between August 2017 and October 2020 (the end of the first half of the autumn term in 2020/21). This formed the basis of our first estimates of learning loss experienced as a result of the pandemic. Those results were published in February 2021 and covered pupils in years 3 to 9. They showed that:

- All year groups had experienced a learning loss in reading. Amongst primary aged pupils these were typically between 1.7 and 2.0 months, and in year 8 and year 9, 1.6 and 2.0 months respectively.

- The learning losses in mathematics were greater than the losses in reading. On average, primary aged pupils had experienced a learning loss of just over three months. It was not possible to derive robust estimates for secondary aged pupils in mathematics.

- There appeared to be some regional disparities in the level of learning loss in reading with pupils in the North East and in Yorkshire and the Humber seeing the greatest losses. However, the differences between regions were relatively small once we controlled for historic rates of progress in these areas and all regions had experienced losses.

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[6] A more detailed discussion of Star assessments is available in *'Research Foundation for Star Adaptive Assessments – Science of Star'*, Renaissance White Paper, September 2020.

- We also found that schools with high levels of disadvantage had experienced higher levels of loss than other schools, particularly in secondary (around 2.2 months in schools with high free school meal eligibility and around 1.5 months in schools with low free school meal eligibility).

The data was expanded with assessments undertaken during the second half of the autumn term in 2020/21 and subsequently matched by the Department for Education to data held in the National Pupil Database to enable us to:

- take account of contextual pupil information (e.g. gender, free school meal eligibility, and English as an additional language) in our modelling approach;

- estimate learning loss by these pupil-level characteristics and provide revised estimates of regional differences; and

- estimate the degree of catch-up in pupil outcomes towards the end of 2021.

We present the results of this further analysis in this report.

Chapter 1 : Characteristics of pupils in the Renaissance data

In this section we examine the characteristics and prior attainment of pupils in the Renaissance data in both the first and second half-terms of autumn. In this section we refer to these pupils as 'Renaissance pupils' for brevity.

We compare the achieved sample of pupils in reading with pupils in all state-funded schools. We are interested in pupils who:

- had a reading assessment in either the first or second half of the autumn term 2020/21; and who

- had an assessment in the corresponding half-term in autumn 2019/20; and who

- have been matched to a record in the National Pupil Database.

In total we have around 375,000 such pupils in the first half-term, and around 185,000 pupils in the second half-term, of the autumn term 2020/21 who also had an assessment in the corresponding half-term in autumn 2019/20.

In Figures 1.1 to 1.4 we show how the characteristics and prior attainment of Renaissance pupils compared with pupils across all state-funded schools for primary aged pupils in the first half of the autumn term 2020/21 (Figure 1.1) and secondary aged pupils in the first half of the autumn term 2020/21 (Figure 1.2).

We find that amongst both primary and secondary aged Renaissance pupils:

- The proportion of Renaissance pupils who were boys was in line with national figures. 50 per cent of primary aged pupils and 50 per cent of secondary aged pupils in the Renaissance data were boys (across all state-funded schools it was 49 per cent in primary and 49 per cent in secondary).

- The proportion of Renaissance pupils who were disadvantaged (eligible for free school meals) was broadly in line with the national rate. 20 per cent of primary aged Renaissance pupils were eligible for free school meals, compared with 18 per cent of primary aged pupils nationally, and 17 per cent of secondary aged Renaissance pupils were eligible for free school meals, compared with 16 per cent of secondary aged pupils nationally.

- The proportion of Renaissance pupils who had English as an additional language (EAL) was broadly in line with the national rate. 19 per cent of primary aged Renaissance pupils were EAL, compared with 21 per cent of primary aged pupils nationally, and 15 per cent of Renaissance pupils in secondary were EAL, compared with 17 per cent of secondary aged pupils nationally.

- The proportion of pupils who have identified special educational needs or disabilities (SEND) is also broadly in line with the national rate.

- 12 per cent of primary aged Renaissance pupils were recorded as having SEN support, with another 1 per cent having an education, health and care plan (EHCP). This compares with 13 and 2 per cent respectively amongst primary aged pupils nationally.

- 13 per cent of secondary aged Renaissance pupils were recorded as SEN support, with another 2 per cent having an EHCP. This compares with 11 and 2 per cent respectively amongst secondary aged pupils nationally.

- The ethnic composition of Renaissance pupils was broadly in line with that of all schools, although Renaissance pupils were slightly more likely to be from a white background.

- 77 per cent of primary aged Renaissance pupils were from a white background, compared with 73 per cent of primary aged pupils nationally. 77 per cent of secondary aged Renaissance pupils were from a white background, compared with 72 percent of secondary aged pupils nationally.

- There were a range of outcomes in Key Stage 1 and Key Stage 2 assessments amongst Renaissance pupils, though they had a slight tendency to be amongst the group meeting the 'expected standard' at each Key Stage. Renaissance pupils were more likely to have been recorded as having met the expected standard at Key Stage 1 than all Key Stage 1 pupils. Renaissance pupils were slightly less likely to be below the expected standard, or to have achieved the higher standard, at Key Stage 2 than all Key Stage 2 pupils.

In summary, the characteristics of Renaissance pupils were similar to pupils nationally. This increases our confidence in saying that the patterns of results for pupils we see from the Renaissance data are likely to reflect outcomes for the pupil population as a whole without further weighting being required.

Figure 1.1: Pupil characteristics for Renaissance pupils in the first half of autumn term in primary schools compared with pupils in all state-funded primary schools[7]
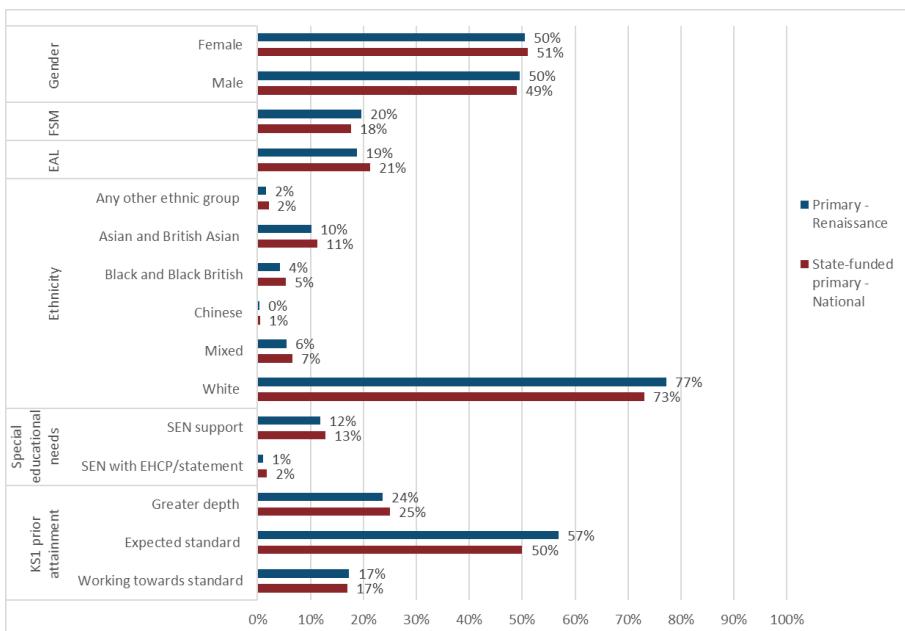
Figure 1.2: Pupil characteristics for Renaissance pupils in the first half of autumn term in secondary schools compared with pupils in all state-funded secondary schools[8]
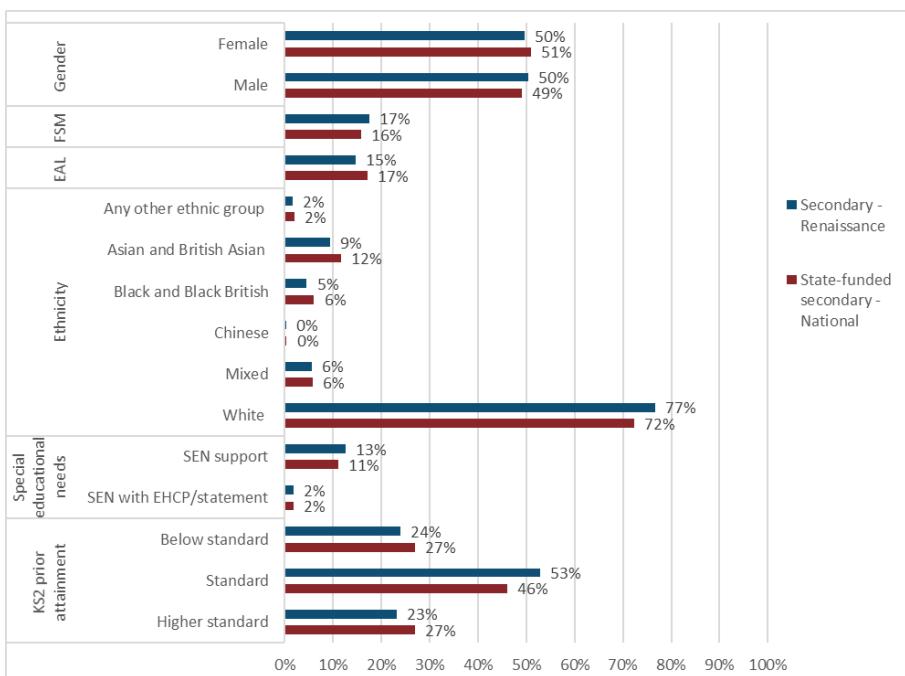
[7] Department for Education, *'Schools, pupils and their characteristics', 'Special educational needs in England: January 2020', 'Phonics screening check and key stage 1 assessments England 2019'.*
[8] Department for Education, *'Schools, pupils and their characteristics', 'Special educational needs in England: January 2020', 'National curriculum assessments key stage 2 2019 revised'.*

18

We now repeat this analysis for pupils in the second half of the autumn term. This is important for two reasons.

Firstly, we know that a much smaller number of pupils take Renaissance assessments in the second half-term (and at subsequent times) than they do at the start of the academic year. Therefore, it is possible that the pupils in this group are atypical of the pupil population as a whole (e.g. there is an unmeasured reason for them being selected into the Renaissance group).

Secondly, our estimates of catch-up will draw direct comparisons between the amount of learning loss by the first half of the autumn term and learning loss by the second half of the autumn term. Therefore, it is important that we have a similar group of pupils.

Figures 1.3 and 1.4 show the characteristics and prior attainment of Renaissance pupils in the second half-term in comparison with pupils in all state-funded schools and we find a similar composition to the first half-term. In other words: the proportion of Renaissance pupils who were boys, the proportion who were eligible for free school meals, the proportion who had English as an additional language, and the proportion who had an identified SEND, were very close to the proportions amongst all pupils. Renaissance pupils were slightly more likely to be from a white background than pupils nationally; and Renaissance pupils were slightly more likely to be at the expected standard at Key Stage 1 and Key Stage 2 (rather than above or below) than all pupils nationally.

Figure 1.3: Pupil characteristics for Renaissance pupils in the second half of autumn term in primary schools compared with pupils in all state-funded primary schools[9]
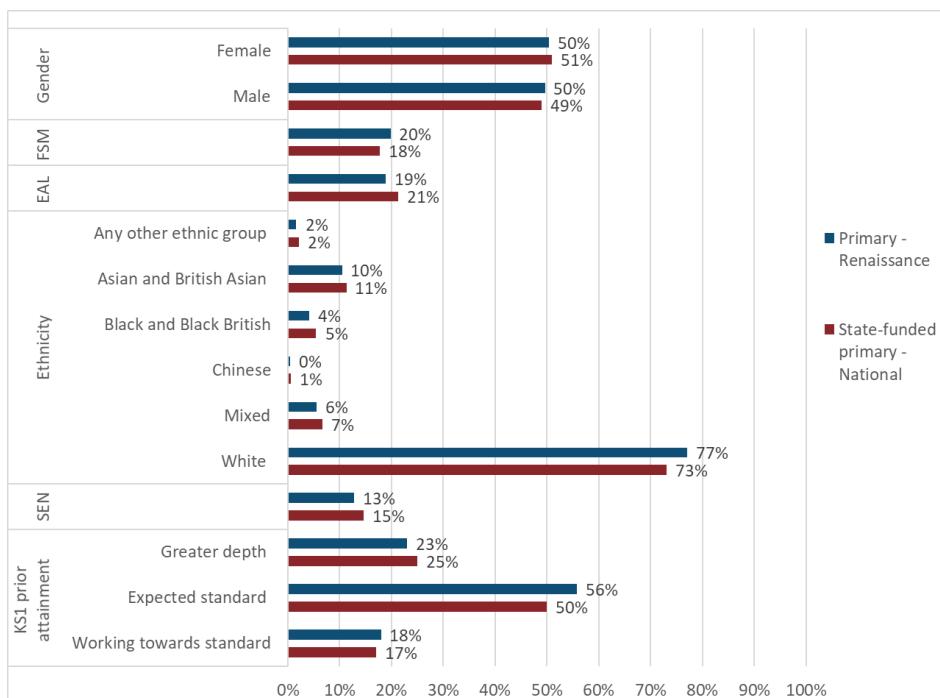
Figure 1.4: Pupil characteristics for Renaissance pupils in the second half of autumn term in secondary schools compared with pupils in all state-funded secondary schools[10]
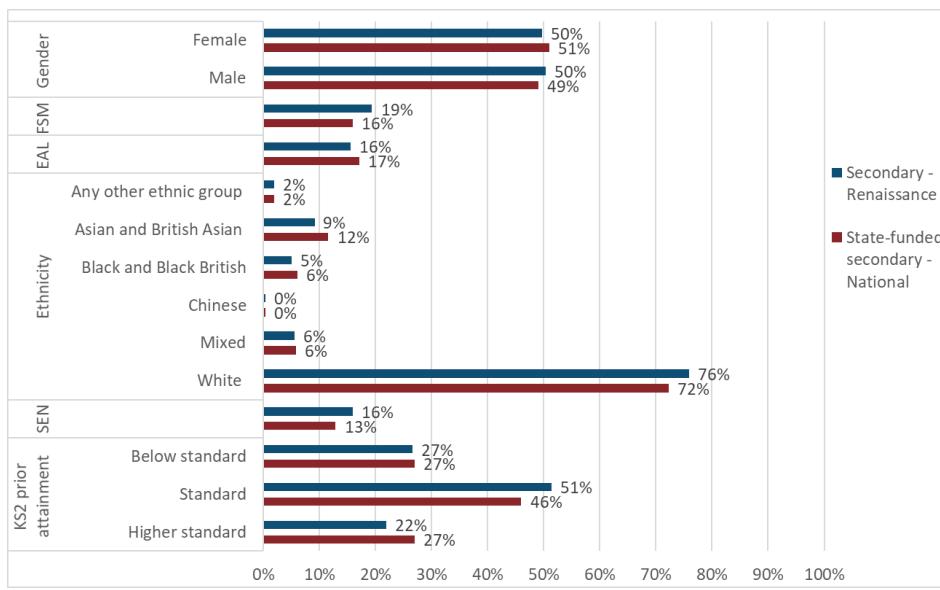
[9] Department for Education, *'Schools, pupils and their characteristics', 'Special educational needs in England: January 2020', 'Phonics screening check and Key stage 1 assessments England 2019'.*
[10] Department for Education, *'Schools, pupils and their characteristics', 'Special educational needs in England: January 2020', 'National curriculum assessments Key stage 2 2019 revised'.*

Chapter 2 : Mean scaled scores and learning loss methodology

Changes in mean attainment in Star Assessments

In Figure 2.1 we consider the average outcomes in Star Reading in the first half of the autumn term in the last two years split by pupil characteristics for pupils in primary and secondary schools. In Figure 2.2 we present the average outcomes in Star Maths in the first half of the autumn term in the last two years split by pupil characteristics for primary aged pupils only.

When we compare results across characteristic groups in 2019/20, we find that:

- on average girls outperformed boys;

- pupils from disadvantaged backgrounds lagged behind their more affluent peers;

- children from Chinese backgrounds were the highest performing ethnic group; and

- the label of EAL masks a variety of circumstances – recent arrivals from overseas had particularly low outcomes.

This pattern of results is consistent with similar analyses of national curriculum assessments, and outcomes in GCSEs. This increases our confidence that the pattern of results we observe for Renaissance assessments are likely to be indicative of what would have been observed if national testing had been possible. They also demonstrate that even before the pandemic struck there were notable and long standing-disparities in the outcomes of young people in England.

When we compare results in 2020/21 with those in 2019/20, we find that:

- For primary aged pupils in years 3 and 6, the average results in reading in 2020/21 were lower across all characteristic groups compared with 2019/20 - except pupils with English as an additional language who had recently arrived in the state school system in the last two years (which we refer to as EAL recent arrival pupils) – by between 10 and 30 scaled score points.

- For year 9 pupils in secondary schools, the average results in reading in 2020/21 were broadly the same as in 2019/20.[11]

- In mathematics, results in 2020/21 were substantially lower than in 2019/20 across all characteristic groups – apart from EAL recent arrival pupils who were again the

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[11] Chinese and EAL recent arrival pupils experience large differences in results between 2019/20 and 2020/21, however these particular characteristics groups have relatively small sample sizes and therefore more likely reflect individual circumstance than the effect of that characteristic.

exception. On average, year 3 pupils scored around 35 scaled score points lower than in 2019/20, year 6 pupils scored around 20 points lower than in 2019/20.

Figure 2.1: Mean scaled scores in reading in the first half of the autumn term 2019/20 – 2020/21 for selected year groups by characteristics
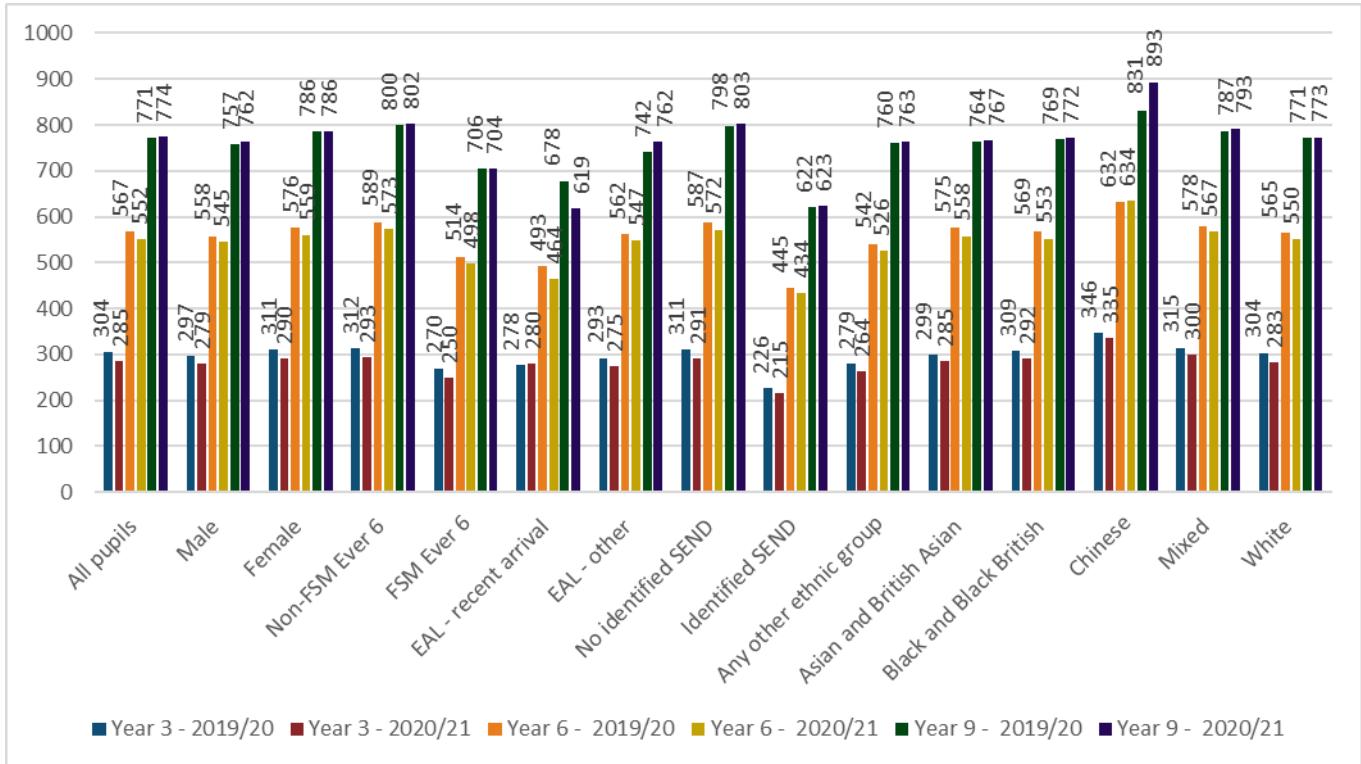
Figure 2.2: Mean scaled scores in mathematics in the first half of the autumn term 2019/20 – 2020/21 for selected year groups by characteristics
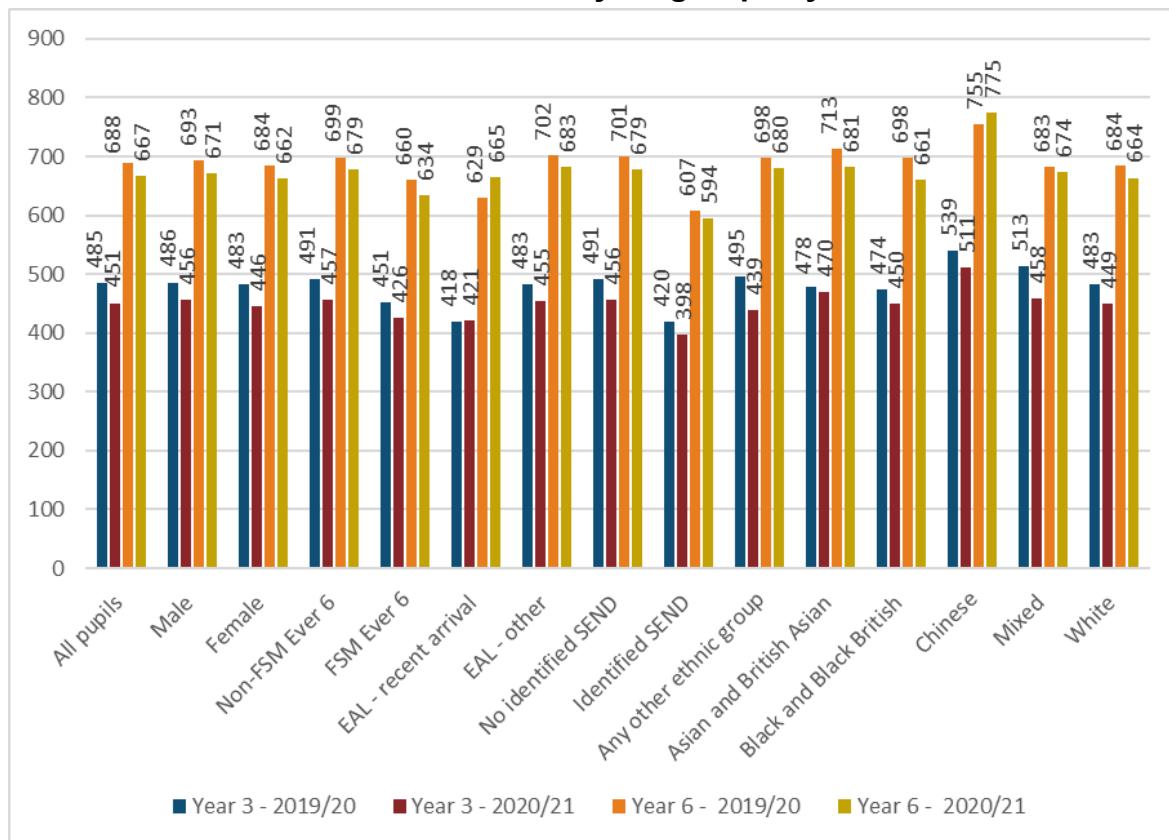
These scaled score differences suggest some degree of learning loss in reading and mathematics that is more pronounced in younger than in older age groups (where results have largely remained steady). These differences also appear to suggest that learning losses could be larger in mathematics compared to reading.

But these results also have two key limitations. Firstly, they do not account for the fact that the number of pupils taking these assessments has been growing, and the profile of pupils (in terms of average rates of progress) may be changing.

Secondly, they do not account for the fact that, prior to the pandemic, outcomes in Renaissance assessments had been improving slightly. If pupils progressed at similar rates to the past then we would expect average results to increase.

In other words, if the mean score for a year group remained the same then it does not necessarily mean that there has been no learning loss. But by comparing results this year with results last year, we make an assumption that they should be the same. We therefore need to consider in our measurement of learning loss how we might have expected results to differ this year because of changes to the pupil population.

Methodology for estimating expected progress and learning loss

In this section we re-introduce our approach to measuring learning loss that builds on the approach we took in our first assessment of learning loss.

Previously, we calculated an expected outcome for pupils this year based on what they achieved last year and applied historic rates of progress for pupils with similar prior attainment. As a result of matching the Renaissance outcomes data to the National Pupil Database, we are now able to include a wealth of pupil characteristics in our modelling. This has the benefit of allowing us to take into account the differences in the progress pupils with different characteristics make (e.g. historically, on average, a pupil from a disadvantaged, white background would make less progress than a non-disadvantaged Chinese pupil with the same given prior attainment).

We use a multiple regression model comprising prior attainment and a range of pupil level characteristics. Controlling for these pupil characteristics in our modelling approach will provide more robust estimates of learning loss and enable us to better isolate the effect of the pandemic on individual groups.

We calculate expected outcomes, and hence expected progress, for each phase and for each subject. This is to allow for any different rates of progress in different phases of education from otherwise similar starting points.[12] When we convert our scaled score learning loss estimates into months of learning loss, we protect our estimates from extreme cases in our measure by capping predictions at the 1st and 99th percentile for each year group to ensure that extreme values are not overly impacting our learning loss estimates. The values where we cap our estimates can be found in the Annex, along with a full set of regression coefficients for our estimates of learning loss in the first half of the autumn term.

Having calculated a mean learning loss (or indeed gain) for each individual pupil we are then able to aggregate up to our groups of interest. For this report we first aggregate by phase of education before grouping by a range of pupil characteristics such as deprivation, region, ethnic group and special educational needs. The conclusion that we drew in our first assessment of learning loss that the sample sizes for secondary mathematics were too small to provide robust estimates has remained in this report.

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[12] Prior to calculating the models, we remove the top and bottom 5 per cent of the prior attainment distribution to minimise the effect of extreme values.

Chapter 3 : Estimated learning loss by the first half of the autumn term 2020/21

Estimates of learning loss in reading and mathematics

Having calculated estimated learning loss for individual pupils we now aggregate by phase of education for the first half of the autumn term (which we refer to as autumn 1). The learning losses presented here are essentially relative to what the pupils would have achieved had they followed the same pattern of progress as pupils last year.

In Figure 3.1 we present the modelled learning loss of pupils in Star Reading for primary and secondary aged pupils and Star Maths for primary aged pupils in scaled score points terms, after controlling for pupil characteristics.

We find that in assessments in Star Reading in 2020/21:

- primary aged pupils achieved around 17 scaled score points lower than similar pupils in 2019/20;

- this is equivalent to a shift in the primary attainment distribution of 0.09 standard deviations;

- secondary aged pupils achieved around 13 scaled score points lower than similar pupils in 2019/20;

- this is equivalent to a shift in the secondary attainment distribution of 0.05 standard deviations;

We find that in assessments in Star Mathematics in 2020/21:

- primary aged pupils achieved around 25 scaled score points lower than similar pupils in 2019/20;

- this is equivalent to a shift in the primary attainment distribution of 0.21standard deviations;

Figure 3.2 shows the estimated learning loss in months for ease of interpretation. We find that primary and secondary aged pupils appear to experience a learning loss in reading of a similar magnitude, of between 1.5 and 2 months. Primary aged pupils in mathematics experienced a much greater learning loss of over three and a half months.

The number of cases in mathematics are much lower than in reading. In our first assessment of learning loss, the sample size in mathematics meant that there was some degree of uncertainty around the estimates and the results were somewhat sensitive to the exact specification of the model used and the specific circumstances of the pupils included. In this report we have been able to link the Star assessments data to pupil

characteristics to better control for any systematic differences between cohorts and schools, hence improving the robustness of our estimates in mathematics.

However, as with our first report, we have determined that the number of pupils in mathematics for secondary aged pupils are simply too small to draw robust conclusions about learning loss in mathematics. The numbers mean that any estimate will be based on a very small number of schools and any results are likely to reflect the individual circumstances of those schools rather than being an estimate of the effect on the school system as a whole.

Figure 3.1: Estimated mean learning loss by autumn 1, in scaled score points, in reading (primary and secondary aged pupils) and mathematics (primary aged pupils only)
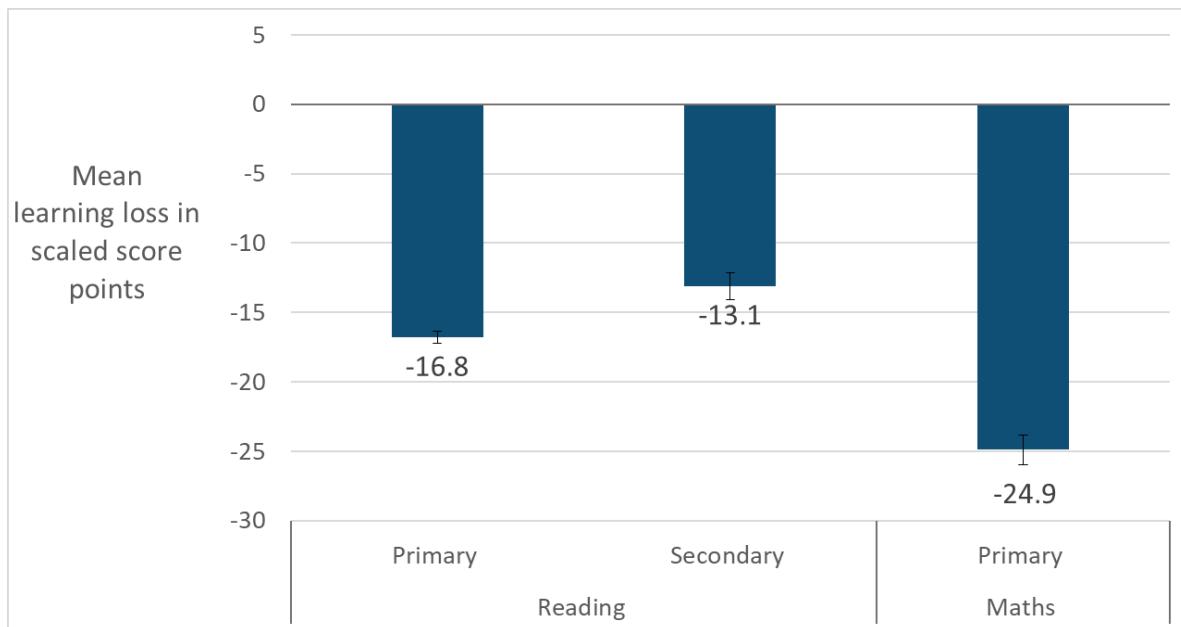
Figure 3.2: Estimated mean learning loss by autumn 1, in months, in reading (primary and secondary aged pupils) and mathematics (primary aged pupils only)
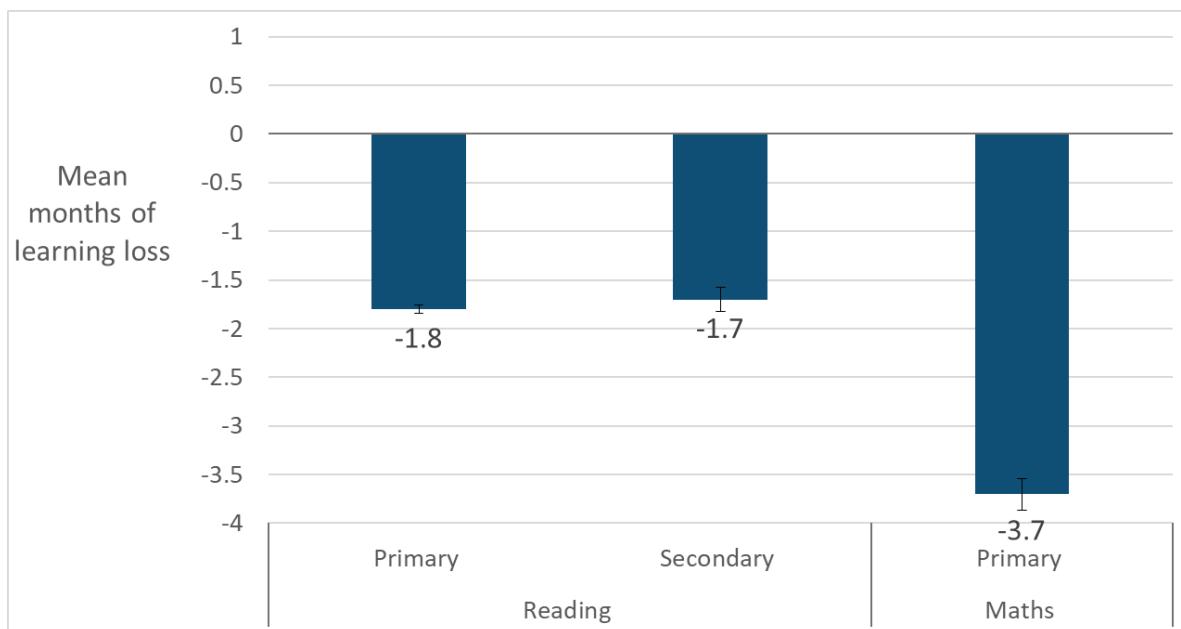
Estimates of learning loss by pupil characteristics

Figure 3.3 shows estimates of learning loss in scaled score points terms for reading by pupil characteristics and by region for primary and secondary aged pupils. The grey vertical lines indicate the average learning loss for all primary and secondary aged pupils respectively. As we are breaking results down into various sub-groups, it is important to note that the sample size is smaller within these groups and hence the confidence intervals on these estimates will be wider than for the average learning loss estimates. Asterisks have been included to indicate sub-groups where the sample is less than 500 pupils and as a result some caution should be taken with interpreting the estimate and estimates should be taken as indicative of likely patterns. Any differences that we highlight in this section are statistically significant.

When we look at learning loss in reading by pupil characteristics we find:

- primary aged pupils from disadvantaged backgrounds (defined as pupils eligible for free school meals at any point in the last six years) experienced, on average, 18.3 scaled score points learning loss, compared with 16.4 points for their more affluent peers;

- secondary aged pupils from disadvantaged backgrounds experienced, on average, 15.1 points learning loss, compared with 12.3 points for their more affluent peers;

- differences in learning loss by ethnic group were generally not statistically significant for either primary or secondary aged pupils;[13]

- there is evidence of greater learning losses for pupils with a first language other than English in secondary schools. We estimate that pupils with English as an additional language experienced a learning loss of 21 scaled score points for secondary aged pupils, this compares with a learning loss amongst all secondary aged pupils of 13.1 points;

- primary aged pupils with an identified SEND experienced a learning loss of 14.8 scaled score points, compared with 17.1 points for pupils without an identified SEND. We find no statistically significant difference between secondary aged pupils with an identified SEND and their peers;

- there were a number of regional disparities in the level of learning loss. In particular, for primary aged pupils, pupils in the North East and in Yorkshire and the Humber experienced the greatest learning loss, for secondary aged pupils

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[13] It is important to note here that the results for Chinese pupils are from a particularly small sample and also affected by the limitations of a model that does not fully reflect the rates of progress that these pupils make in a year not impacted by the pandemic.

Yorkshire and the Humber also experienced greater learning losses than other areas of the country; and

- regions such as the South West and London in primary, and South East and North West in secondary have fared much better than other regions. This may reflect differences in the learning offer across the country and something that may become more significant during the 2020/21 academic year with differential rates of attendance and full school opening.[14]

Figure 3.4 shows estimates of learning loss in mathematics by pupil characteristics and by region for primary aged pupils. We find that:

- pupils from disadvantaged backgrounds (defined as pupils eligible for free school meals at any point in the last six years), on average, had an estimated learning loss of 27.3 scaled score points. This is relative to 24.2 points for their more affluent peers;

- similar to the findings for reading, there were no differences by ethnic group that were statistically significant;

- unlike secondary reading, pupils from English as an additional language backgrounds do not appear to have been disproportionately affected by school closures (in fact their learning losses are lower) but they still experienced lost learning of 24.2 scaled score points;

- there were no statistically significant differences for special educational needs pupils for mathematics; and

- there were a number of regional disparities in the level of learning loss. Again it was the Yorkshire and the Humber that experienced the greatest learning loss – 45.3 scaled score points, more than triple the loss experienced in the South West (13.2 points).

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[14] https://epi.org.uk/publications-and-research/education-responses-uk-pandemic/

Figure 3.3: Estimated mean learning loss, in scaled score points, in reading (primary and secondary schools) by characteristics
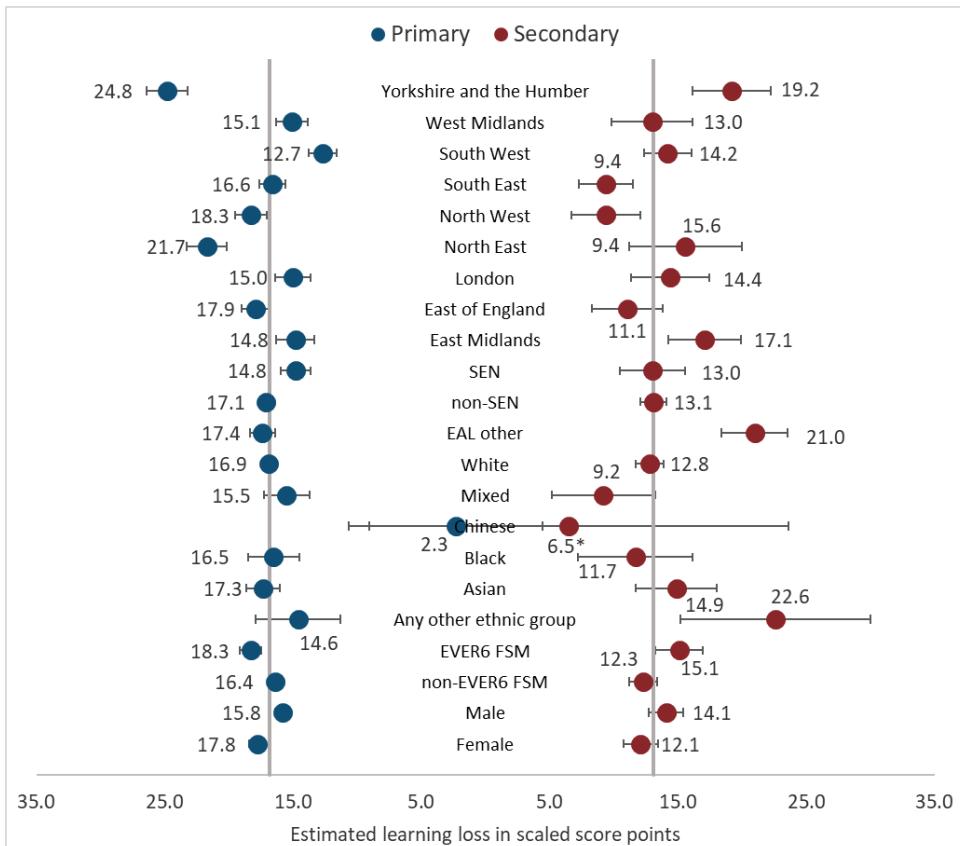
Figure 3.4: Estimated mean learning loss, in scaled score points, in mathematics (primary schools) by characteristics
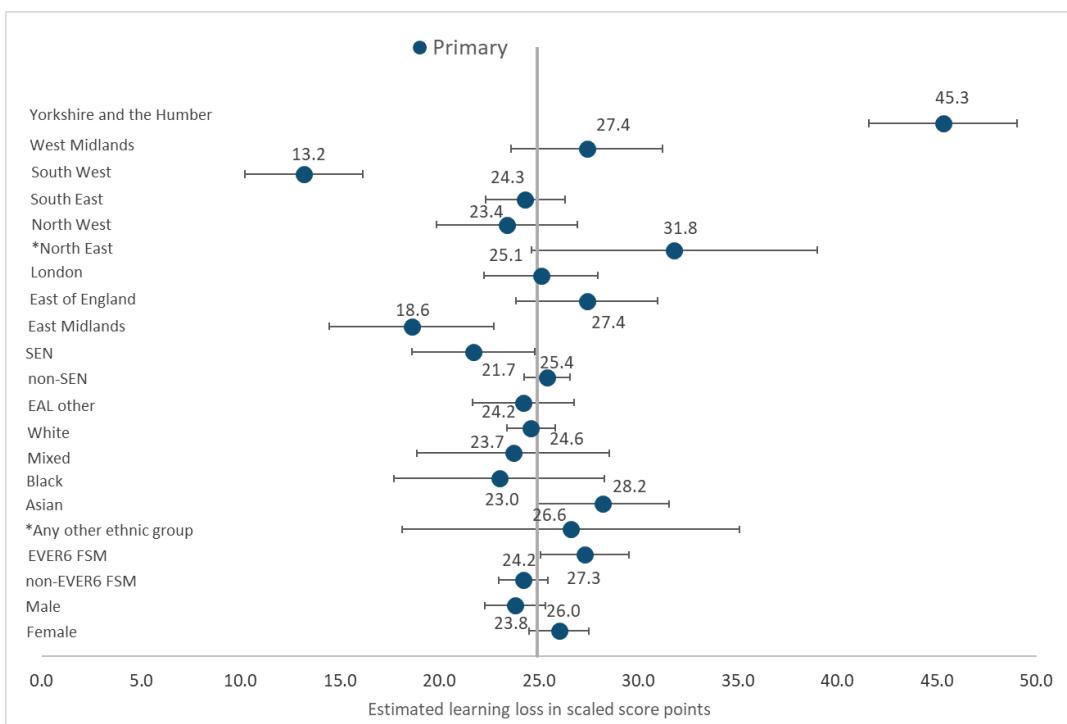
Figure 3.5 shows estimates of learning loss in reading by pupil characteristics and by region for primary and secondary aged pupils in terms of months of learning. The grey vertical lines indicate the average learning loss for all primary and secondary pupils respectively. Any differences that we report in this section are statistically significant.

We find that in reading:

- pupils from disadvantaged backgrounds (defined as pupils eligible for free school meals at any point in the last six years) experienced, on average, approximately 2.2 months of learning loss amongst both primary aged and secondary aged pupils. This means that disadvantaged pupils have lost about half a month more than non-disadvantaged pupils;

- pupils with English as an additional language experienced a learning loss of approximately 2.3 months for secondary aged pupils, this compares to average learning loss in secondary reading of around 1.7 months; and

- amongst primary aged pupils, pupils in Yorkshire and the Humber and the North East experienced a learning loss of around 2.6 and 2.4 months respectively. Amongst secondary aged pupils, pupils in these regions also experienced the largest losses (around 2.4 and 2.3 months respectively).

The analysis suggests that school closures in relation to the pandemic have led to a widening of the disadvantage gap. Furthermore, pupils from EAL backgrounds in secondary, pupils in Yorkshire and the Humber, and pupils in the North East, experienced a learning loss of a similar scale – around half a month larger than other pupils.

The extent to which disadvantaged pupils lost learning, as a result of the first lockdown at least, appears to be at the lower end of some of the other published estimates of learning loss.[15] That is not to downplay the effect that is seen in this analysis. It is still equivalent to undoing a third of the progress made in the last decade on closing the gap in primary schools, and given further school closures during 2020/21, it would seem likely that this gap could grow further.

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[15] https://educationendowmentfoundation.org.uk/covid-19-resources/best-evidence-on-impact-of-school-closures-on-the-attainment-gap/

Figure 3.5: Estimated mean learning loss, in months, in reading (primary and secondary schools) by characteristics
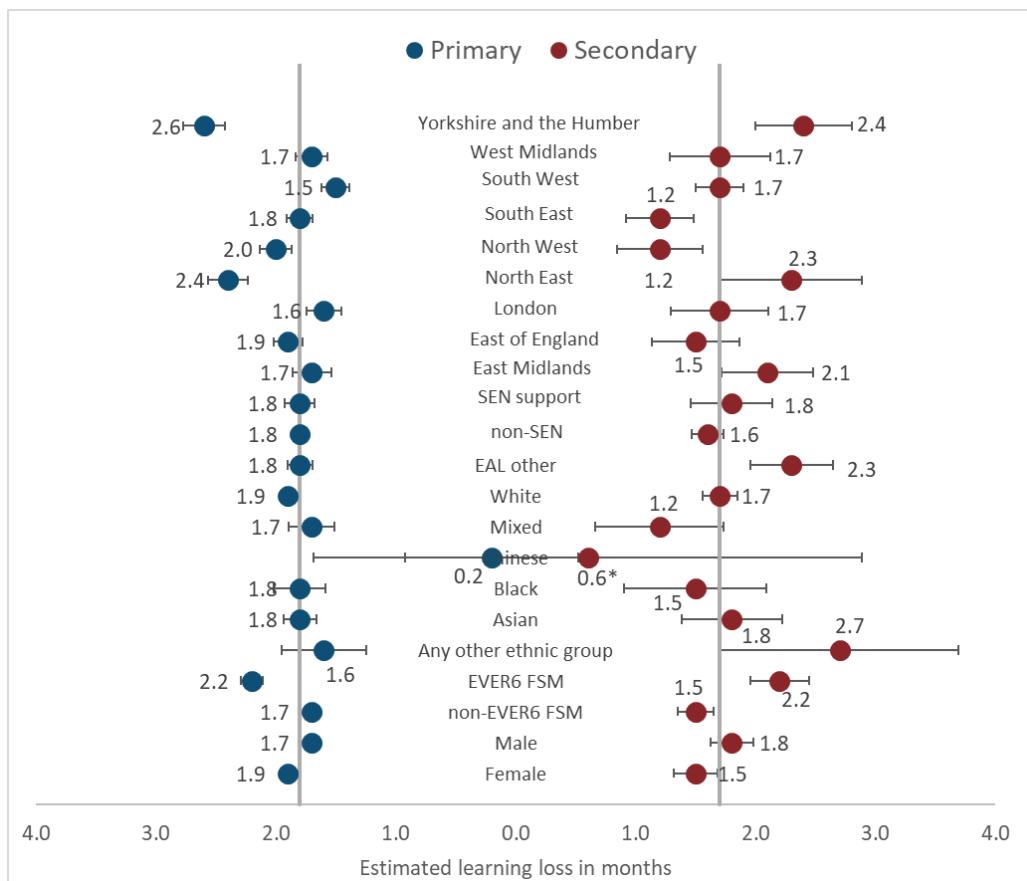
Figure 3.6 shows estimates of learning loss in mathematics by pupil characteristics and by region for primary aged pupils. We find that:

- pupils from disadvantaged backgrounds (defined as pupils eligible for free school meals at any point in the last six years), on average, had an estimated learning loss of around 4.5 months. This means that disadvantaged pupils lost about a month more than their more affluent peers;

- unlike reading, pupils from English as an additional language backgrounds do not appear to have been disproportionately affected by school closures (in fact their learning losses are lower) but they still experienced lost learning of roughly 3.3 months; and

- again it is pupils in the North East and in Yorkshire and the Humber that experienced the greatest learning loss – around five months, more than double the loss experienced in the South West (around 2.1 months).

This analysis provides further evidence that school closures in relation to the pandemic have led to a widening of the disadvantage gap. The difference of a months' progress

lost relative to other pupils would be equivalent to two-thirds of the progress made over the past decade in closing the disadvantage gap in primary schools.

Figure 3.6: Estimated mean learning loss, in months, in mathematics (primary schools) by characteristics
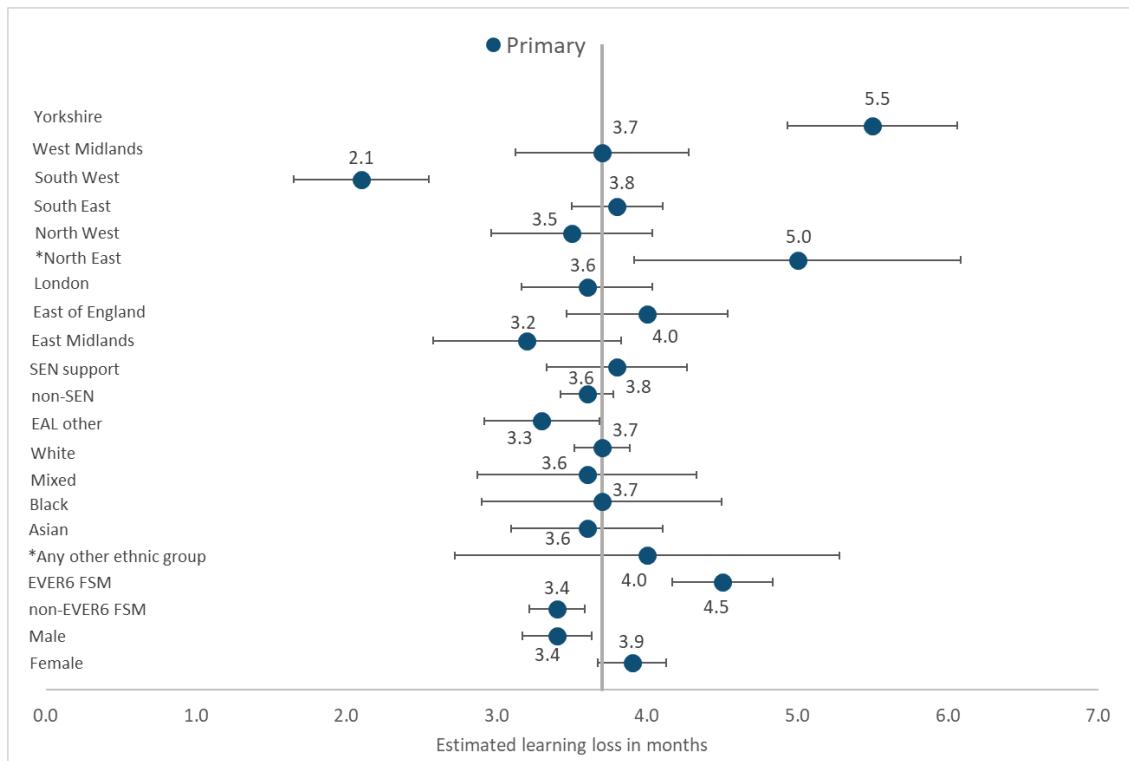
Chapter 4 : Estimated catch-up between first and second half-term in autumn 2020/21

We now look at the second half of the autumn term to understand how pupils learning had changed once schools had re-opened to assess the extent to which any learning losses were recovered.

We adopt a similar approach to estimate the learning loss experienced by the second half of the autumn term (i.e. we compare pupil results in the second half-term in 2020/21 with what we would expect them to achieve given outcomes in the second half-term in 2019/20). We then compare these results against the estimated learning loss in the first half-term of autumn. In order to ensure that we are comparing the same pupils over time we have restricted this analysis to the pupils that undertook assessments in both the first and second half of the autumn term. This allows us to build a consistent picture of how pupils have been affected by the pandemic and then how they were affected by the re-opening of schools to all pupils.

Estimates of catch-up in reading and mathematics

Figure 4.1 presents the estimated learning loss in scaled score points terms by the second half of the autumn term (which we refer to as autumn 2) in Star Reading assessments for both primary and secondary aged pupils, alongside the equivalent in autumn 1. We find that there was notable catch-up in primary reading with the learning loss for this cohort improving by 5.6 scaled score points, which equates to 0.03 standard deviations improvement. This provides one of the first pieces of evidence that during the autumn term, children began to recover some of the learning they had lost. However, when we look at secondary aged pupils in reading the picture is less clear, we find no statistically significant difference between the estimated learning loss in the first and second half-terms of autumn.

Mathematics learning loss over the autumn term, shown in figure 4.2, has a similar pattern to what we find for primary aged pupils in reading – the learning loss estimated in autumn 1 of 23.7 scaled score points decreases to 17.2 scaled score points by autumn 2. The scaled score points difference is a 0.025 standard deviation improvement. This analysis suggests there was recovery in primary schools in England in both reading and mathematics.

Figure 4.1: Estimated mean learning loss by autumn 1 and 2, in scaled score points, in reading (primary and secondary aged pupils)
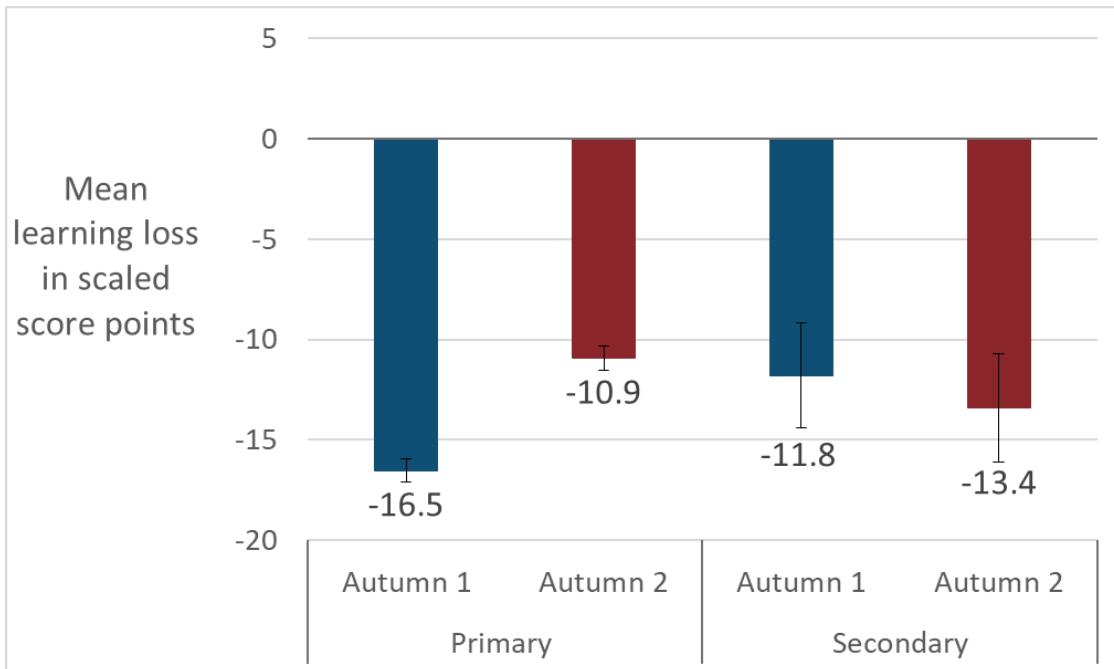
Figure 4.2: Estimated mean learning loss by autumn 1 and 2, in scaled score points, in mathematics (primary aged pupils only)
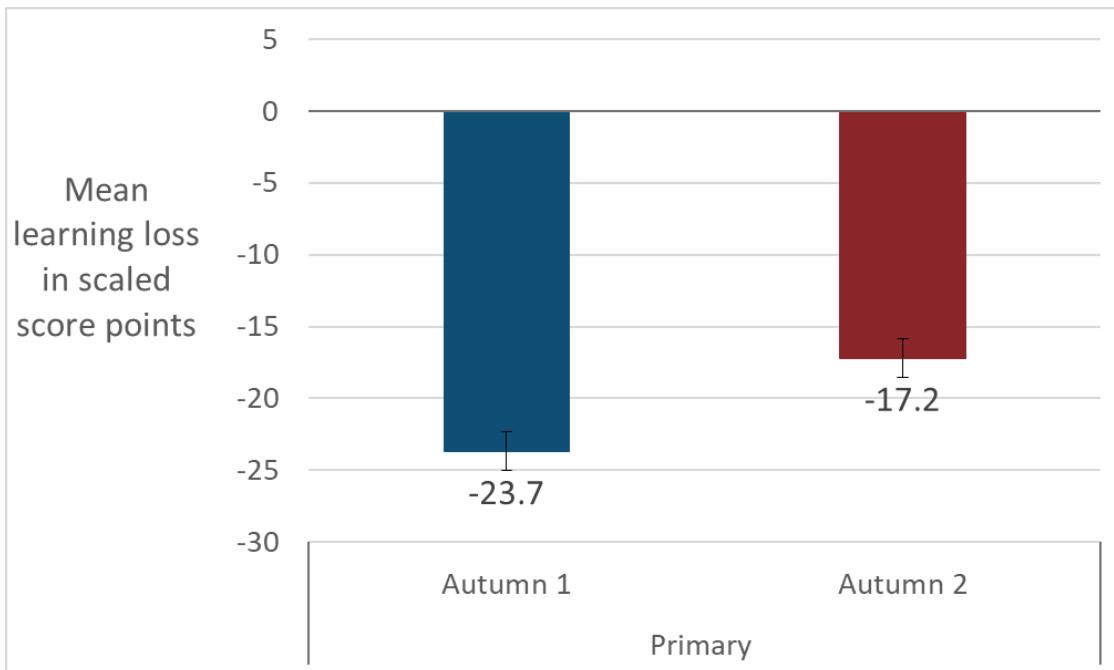
In Figure 4.3, we present the conversion of scaled score points into a months of learning loss measure. We find that primary aged pupils experienced around 1.2 months of learning loss in reading by autumn 2, compared with 1.8 months by autumn 1. This suggests that, in terms of months of learning, pupils in primary schools were able to

recover about half a month of learning in one half-term. In contrast, as with the scaled score points difference for secondary reading, we find no statistically significant difference in our modelled learning loss for the first and second half-terms of autumn for secondary aged pupils.

When we look at mathematics for primary aged pupils we find that pupils recovered some learning during the autumn term of 2020/21. Figure 4.4 presents the learning loss in months for both autumn 1 and autumn 2 and shows that recovery was equivalent to about a month of learning - although we still find a large learning loss by the second half-term of autumn of two and a half months.

Figure 4.3: Estimated mean learning loss by autumn 1 and 2, in months, in reading (primary and secondary schools)
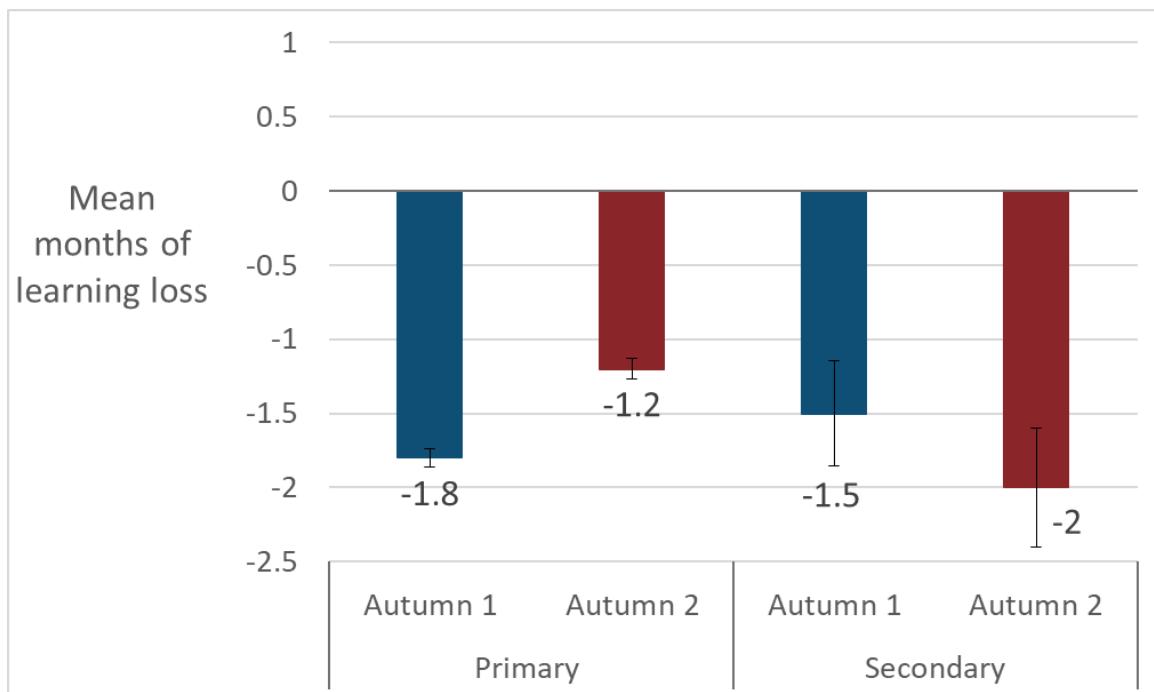
Figure 4.4: Estimated mean learning loss by autumn 1 and 2, in months, mathematics (primary schools only)
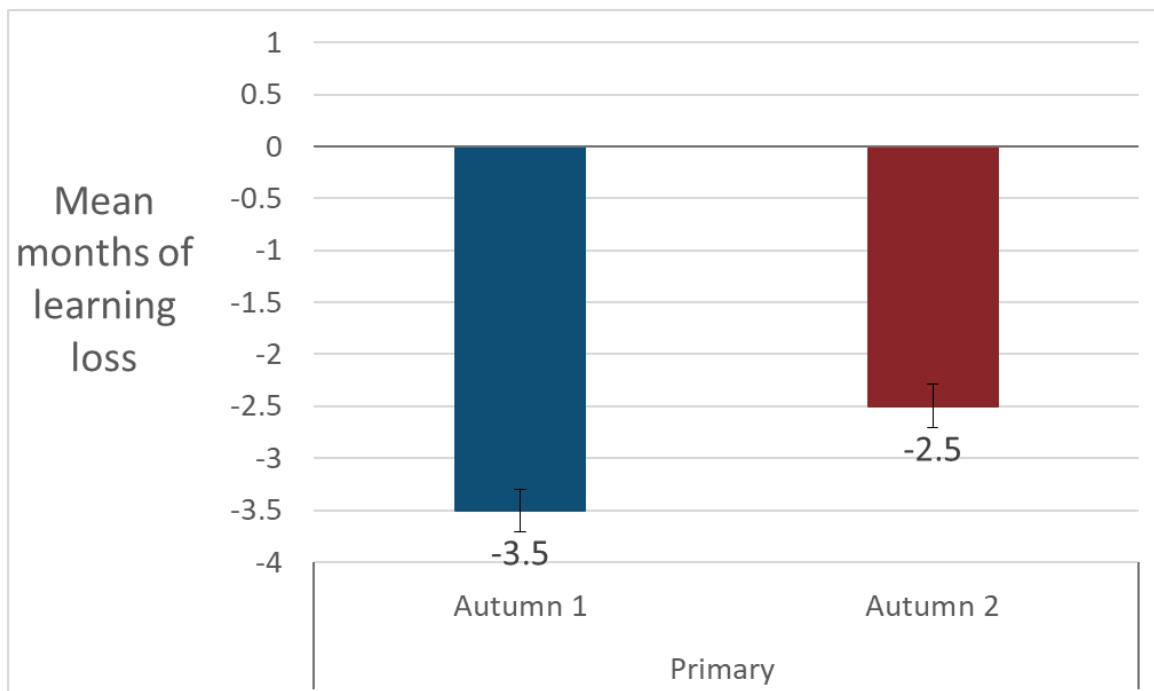
Estimates of catch-up by pupil characteristics

Figure 4.5 shows the scaled score points learning loss for primary aged pupils in reading in both autumn 1 and 2 by pupil characteristics and region. Once more it is important to note that as we are breaking results down into various sub-groups the sample size is smaller within these groups and hence the confidence intervals on these estimates will be wider than for the average learning loss estimates. Asterisks have been included to indicate sub-groups where the sample is less than 500 pupils and as a result caution should be taken with interpretation and estimates should only be taken as indicative of likely patterns. Where we report catch-up in this section, there is a statistically significant difference between the amount of catch-up that the characteristic group experiences. We find that in reading:

- both male and female primary pupils have recovered some learning in the latter half of the autumn term, but girls have recovered a greater amount of learning than boys. Girls recovered 7.1 scaled score points, compared with boys who recovered only 3.9 scaled score points;

- non-disadvantaged pupils recovered 6 scaled score points, compared with disadvantaged pupils who recovered only 4.2 points;

- most ethnic groups appear to have experienced some degree of recovery, though due to sample sizes these are not all statistically significant;[16]

- pupils with English as an additional language experienced catch-up of 4 scaled score points, which is less than the 5.6 scaled score points that all primary pupils experienced on average;

- pupils with special educational needs experienced catch-up of 3.4 points by autumn 2, which again is less than the 5.6 scaled score points that all primary pupils experienced on average; and

- learning loss estimates for autumn 1 and autumn 2 by region show that the majority of regions saw some form of catch-up by autumn 2. Yorkshire and the Humber experienced the greatest catch-up with recovery of 9.2 scaled score points. On the other hand, the East Midlands had an estimated learning loss in autumn 1 that was exactly the same by autumn 2.

We are unable to present the modelled learning loss in reading for both autumn 1 and 2 by pupil characteristics and region for secondary aged pupils. This is because the sample size is too small to derive robust estimates by sub-group and therefore more likely will

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[16] After restricting the sample to pupils who undertook assessments in both half-terms, the sample sizes for pupils from ethnic backgrounds other than white were small therefore it may not be that these pupils did not experience catch-up that varied between ethnic groups but rather the number of cases within these groups were not large enough to derive robust estimates.

reflect individual circumstances rather than the represent learning loss for that subgroup of pupils in the population.

Looking at the estimated learning loss in the first and second half-terms of autumn for primary aged pupils in mathematics in figure 4.6, we find that:

- both girls and boys recovered around 6 scaled score points of learning, which is around the average catch-up experienced by all pupils in primary mathematics. Although learning loss for mathematics in autumn 2 remained large at 18.7 points for girls and 15.7 points for boys;

- this consistent pattern of catch-up continues when we look at disadvantaged pupils and their more affluent peers, both disadvantaged and non-disadvantaged pupils recovered around 5 scaled score points, which is around the average catch-up experienced by all pupils in primary mathematics;

- all ethnic groups appear to have experienced some degree of recovery, though due to sample sizes these are not necessarily statistically significant; and

- all regions appear to have shown some degree of recovery, though due to sample sizes these are not necessarily statistically significant. The greatest recovery was in London, the South West and the North West.

Figure 4.5: Estimated mean learning loss by autumn 1 and 2, in scaled score points, in reading (primary schools) by characteristics
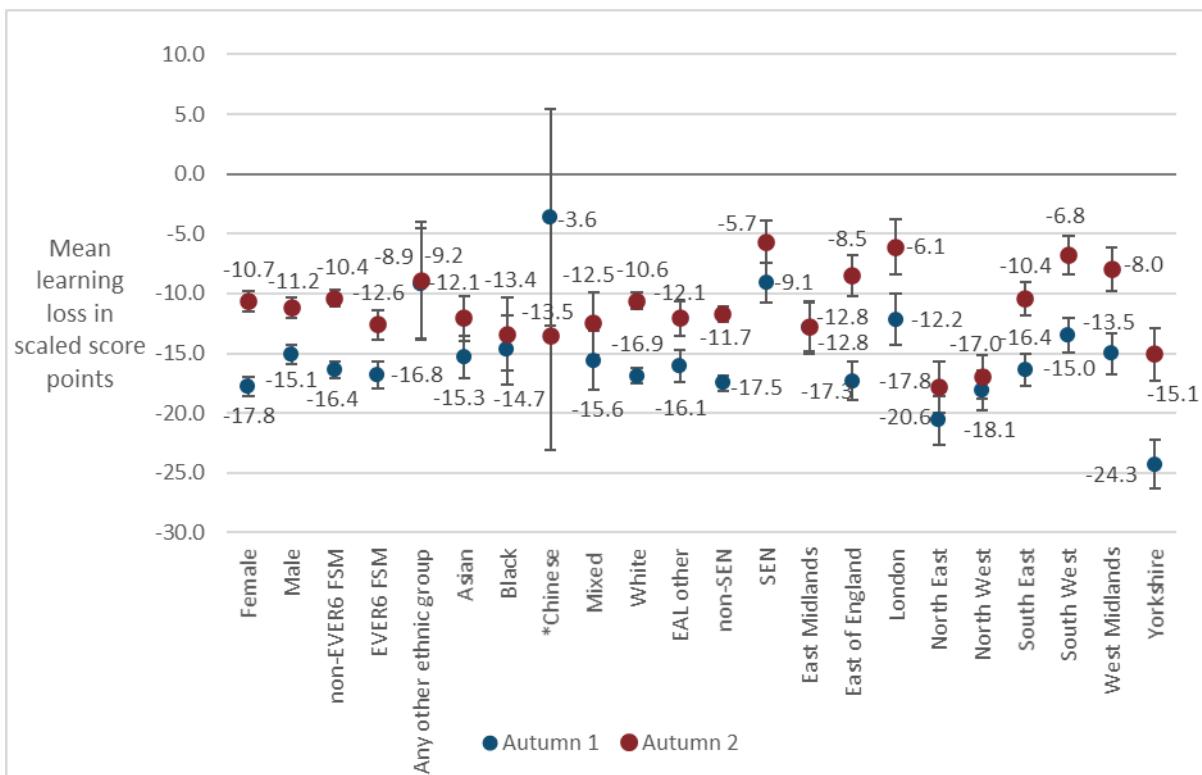
Figure 4.6: Estimated mean learning loss by autumn 1 and 2, in scaled score points, in mathematics (primary schools) by characteristics
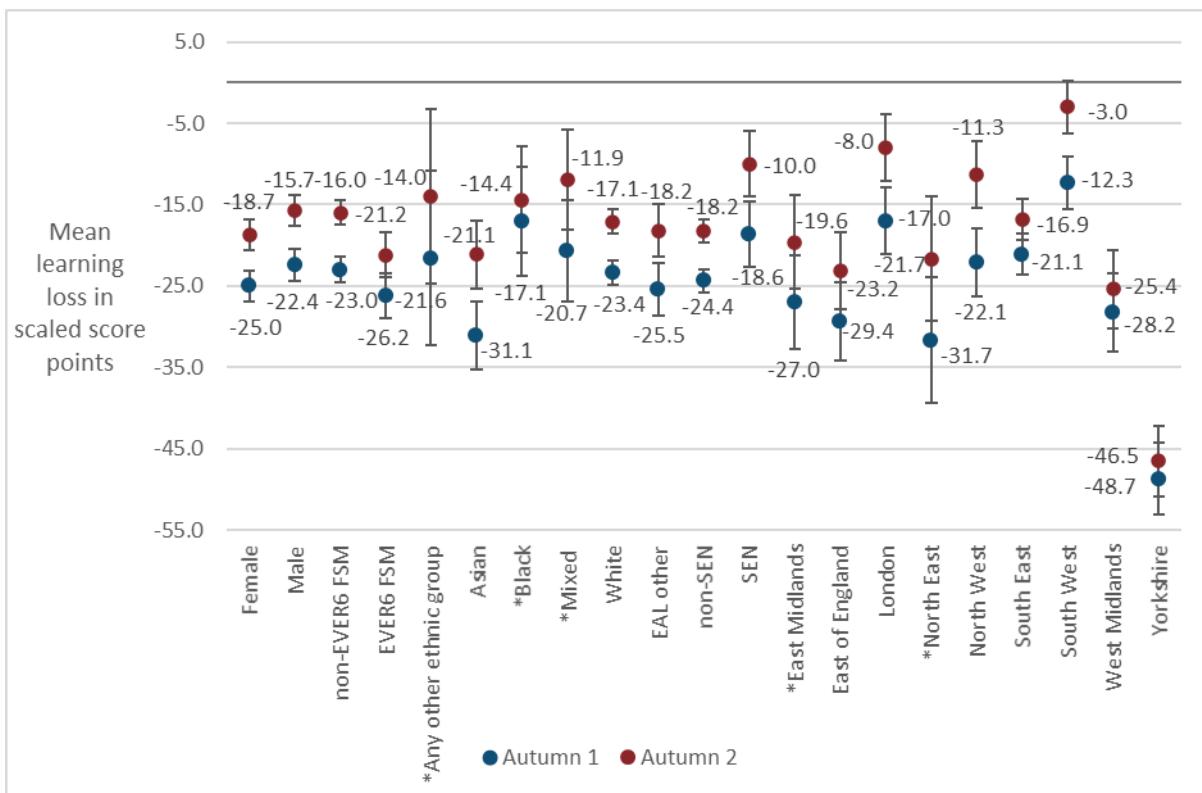
Figure 4.7 shows the conversion of scaled score points into months of learning loss for primary aged pupils in reading in both autumn 1 and 2 by pupil characteristics and region. We find that:

- both male and female primary pupils caught up some learning in the latter half of the autumn term but girls recovered a greater amount of learning than boys. Girls recovered around 0.7 months of learning loss by autumn 2, compared with 0.5 months for boys;

- pupils from disadvantaged backgrounds (defined as pupils eligible for free school meals at any point in the last six years) caught up 0.4 months of learning, compared with non-disadvantaged pupils who recouped 0.6 months of learning. Furthermore, we estimate that in the second half of the autumn term the gap in learning loss between disadvantaged pupils and their more affluent peers remained at around half of a month despite schools re-opening for all pupils;

- most ethnic groups appear to have experienced some degree of recovery, though due to sample sizes these are not necessarily statistically significant;

- pupils with English as an additional language experienced catch-up of around 0.4 months, compared with 0.6 months for all primary aged pupils;

- pupils with special educational needs experienced catch-up of around 0.4 months, compared with 0.6 months for all primary aged pupils; and

- all regions appear to have shown some degree of recovery, though due to sample sizes these are not all statistically significant. The greatest recovery was in Yorkshire and the Humber and the East of England where pupils in these regions experienced greater recovery in learning than the average for all primary aged pupils (around 0.9 and 0.8 months respectively).

The analysis suggests that there are inequalities in primary reading stemming from schools re-opening with certain characteristic groups catching up more than others. Male pupils, disadvantaged pupils, pupils from EAL backgrounds and SEND pupils, experienced less catch-up by autumn 2 than the average for all primary pupils. However, male and SEND pupils did experience a lower level of learning loss in the first half of the autumn term compared to all primary aged pupils.

Looking at the estimated learning loss in the first and second half-terms of autumn for primary aged pupils in mathematics in figure 4.8, we find that:

- both girls and boys recovered around a month of learning - although learning loss for mathematics in autumn 2 remained large at around 2.8 months for girls and around 2.3 months for boys;

- this consistent pattern of catch-up continues when we look at disadvantaged pupils and their more affluent peers, both groups of pupils recovered around a

month of learning, however this indicates that there is still a gap between disadvantaged pupils and non-disadvantaged pupils in terms of learning loss of around a month by autumn 2;

- most ethnic groups appear to have experienced some degree of recovery, though due to sample sizes these are not all statistically significant;

- all regions appear to have shown some degree of recovery, though due to sample sizes these are not statistically significant. The greatest recovery was in London and the South West (around 1.5 months).

The general trend in primary reading of certain characteristic groups catching up more than others does not appear to be the case in primary mathematics, although there are regional inequalities in primary mathematics with certain regions experiencing greater catch-up than others.

Figure 4.7: Estimated mean learning loss by autumn 1 and 2, in months, in reading (primary schools) by characteristics
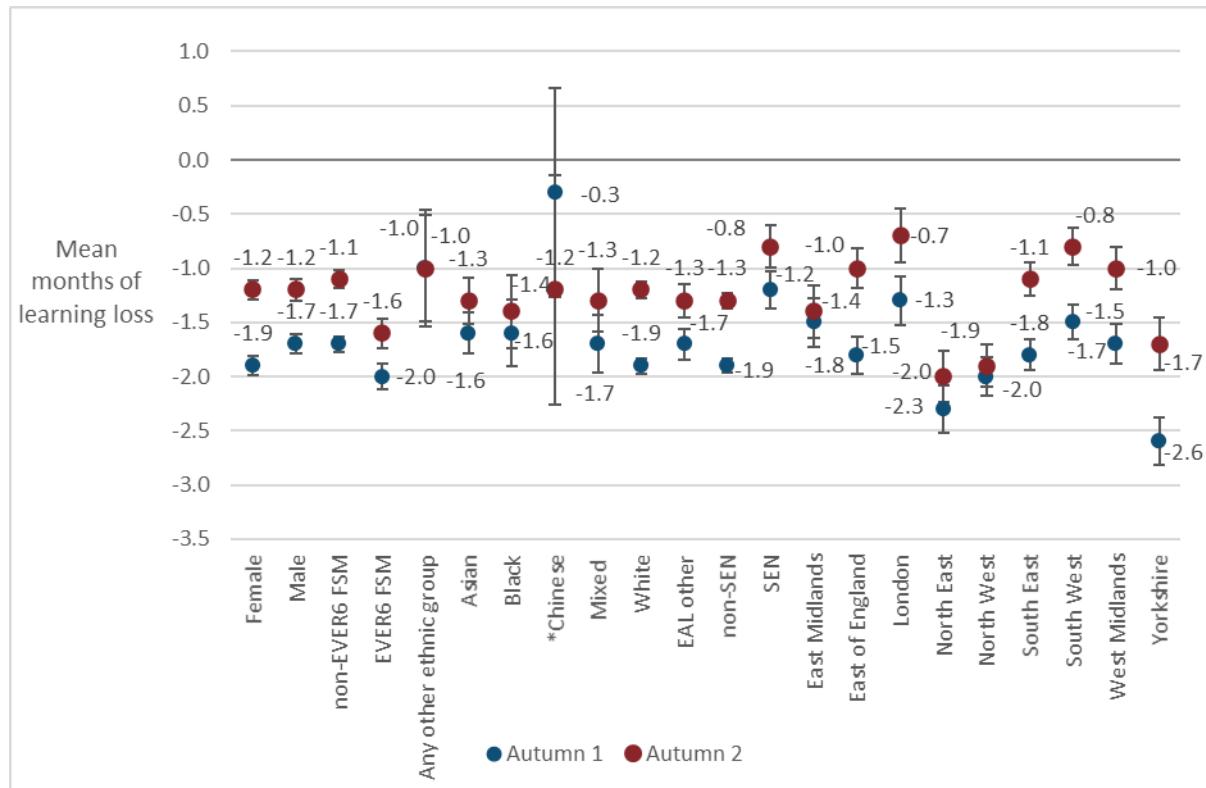
Figure 4.8: Estimated mean learning loss by autumn 1 and 2, in months, in mathematics (primary schools) by characteristics
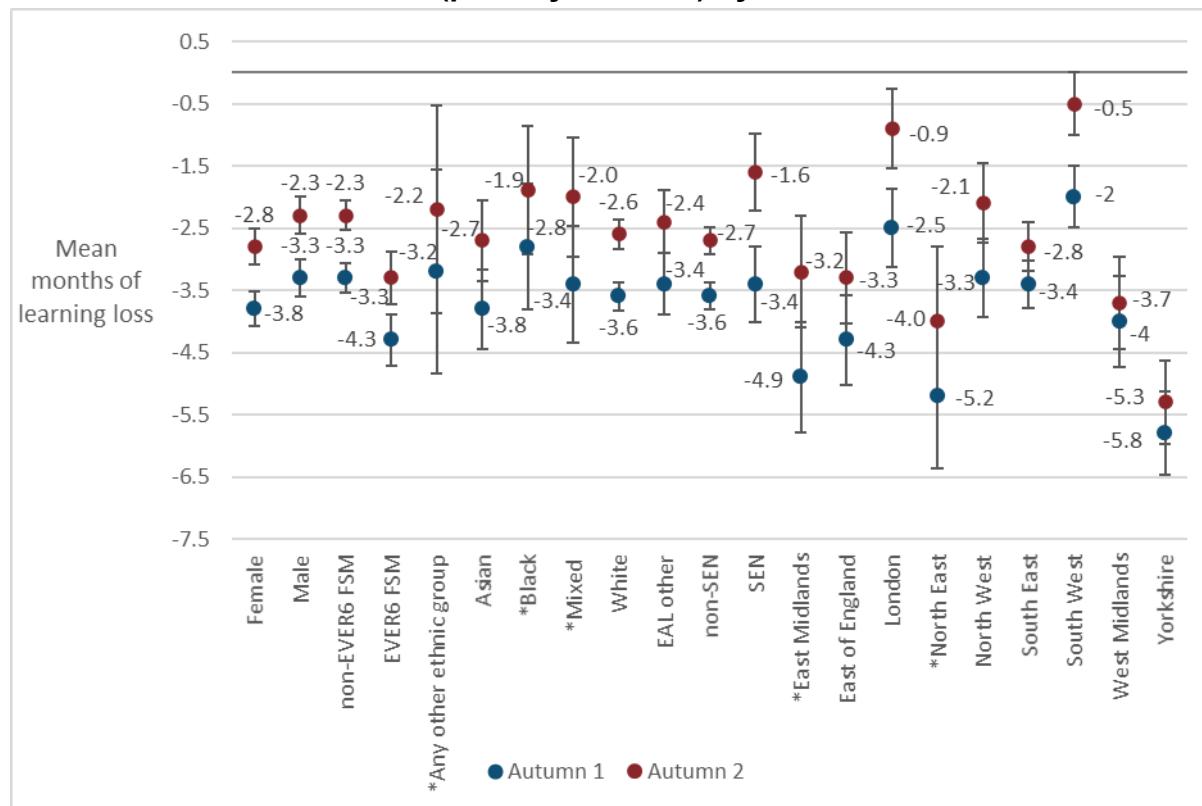
To compare the relative differences in estimated learning loss between autumn 1 and autumn 2 more easily we plot the modelled learning loss in both half-terms against each other in figure 4.9 for characteristic breakdowns and in figure 4.10 by regional breakdowns for primary aged pupils in reading. It is important to note that the estimates of learning loss in these figures do not have confidence intervals attached them and hence merely highlight the general trends in learning loss between autumn 1 and autumn 2 rather than being an indication of statistically significant catch-up.

The diagonal line segments the chart such that:

- points below the diagonal indicate a degree of catch-up;

- points on the diagonal indicate no change in learning loss; and

- points above the diagonal highlights growing degree of learning loss.

For primary reading, all characteristics groups experienced catch-up except from any other ethnic group backgrounds.[17] Non-disadvantaged pupils, female pupils, and non-SEND pupils saw the greatest catch-up in learning by autumn 2. When we look at results by region, we find that all regions in the country experienced catch-up of some form by autumn 2 but the East Midlands, North West and North East experienced less catch-up than other regions.

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[17] It is important to note here that the results for Chinese pupils are from a relatively small sample and also affected by the limitations of a model that does not fully reflect the rates of progress that these pupils make in a year not impacted by the pandemic.

Figure 4.9: Estimated mean learning loss by autumn 1 plotted against autumn 2, in months, in reading (primary aged pupils) by characteristics
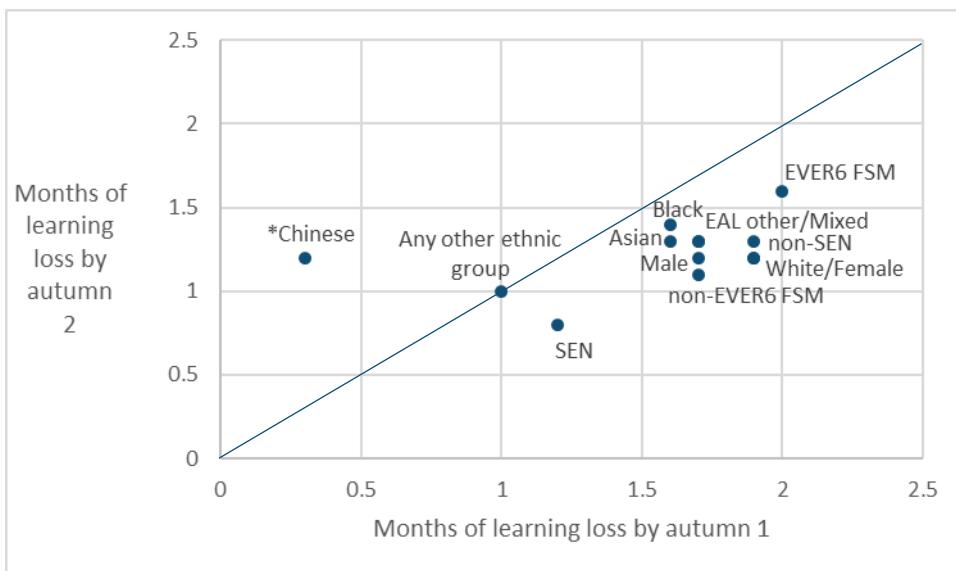
Figure 4.10: Estimated mean learning loss by autumn 1 plotted against autumn 2, in months, in reading (primary aged pupils) by region
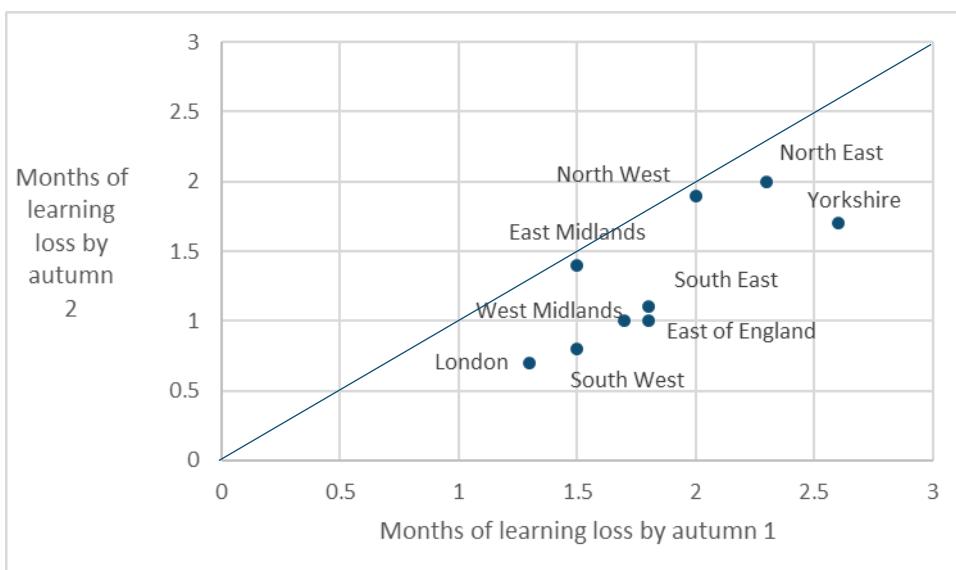
When we look at primary aged pupils in mathematics in figures 4.11 and 4.12, we find that all characteristic groups experienced catch-up with SEND seeing the greatest amount of catch-up. Plotting modelled learning loss for autumn 1 and 2 by region yields the finding that the East Midlands, London and the South West experienced the greatest catch-up.

Figure 4.11: Estimated mean learning loss by autumn 1 plotted against autumn 2, in months, in mathematics (primary aged pupils) by characteristics
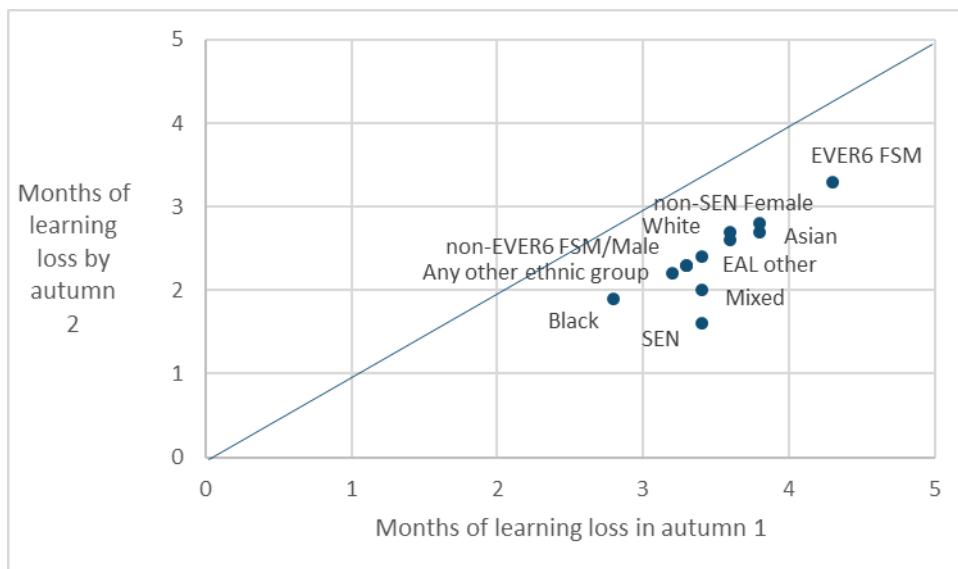
Figure 4.12: Estimated mean learning loss by autumn 1 plotted against autumn 2, in months, in mathematics (primary aged pupils) by region
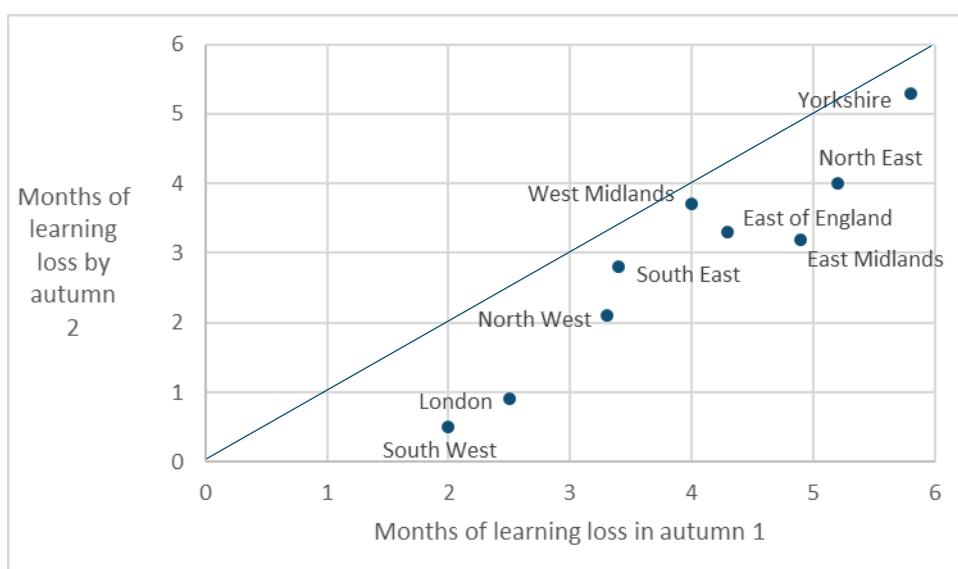
Annex

Table A1 presents the mean scaled scores in reading in the first half-term of the autumn for 2019/20 and 2020/21 for all year groups in our analysis split by pupil characteristics. Table A2 is the equivalent for mathematics. Both tables are table formats of figures 2.1 and 2.2 respectively but with all year groups included for comprehensiveness.

Table A1: Mean scaled scores in reading in the first half of the autumn term 2019/20 – 2020/21 for all year groups by characteristics for figure 2.1

	2019/20							2020/21						
	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
All pupils	304	379	472	567	636	720	771	285	363	458	552	636	715	774
Male	297	370	463	558	624	706	757	279	356	451	545	626	705	762
Female	311	388	481	576	647	734	786	290	370	464	559	646	726	786
Non-FSM Ever 6	312	391	488	589	659	746	800	293	376	474	573	659	740	802
FSM Ever 6	270	339	427	514	583	653	706	250	321	411	498	564	645	704
EAL – recent arrival	278	318	418	493	568	619	678	280	311	394	464	674	619	619
EAL - other	293	369	465	562	628	699	742	275	353	450	547	600	694	762
No identified SEND	311	392	488	587	658	741	798	291	377	474	572	658	736	803
Identified SEND	226	282	363	445	506	581	622	215	263	355	434	507	584	623
Any other ethnic group	279	349	440	542	611	703	760	264	339	430	526	532	692	763
Asian and British Asian	299	379	473	575	640	713	764	285	363	459	558	624	710	767
Black and Black British	309	379	463	569	633	705	769	292	365	459	553	629	711	772
Chinese	346	416	532	632	739	808	831	335	422	530	634	575	793	893
Mixed	315	392	484	578	653	731	787	300	376	477	567	625	726	793
White	304	378	471	565	634	721	771	283	362	456	550	639	716	773

Table A2: Mean scaled scores in mathematics in the first half of the autumn term 2019/20 – 2020/21 for all year groups by characteristics for figure 2.2

	2019/20					2020/21				
	Year 3	Year 4	Year 5	Year 6	Year 7	Year 3	Year 4	Year 5	Year 6	Year 7
All pupils	485	552	626	688	720	451	530	602	667	704
Male	486	557	630	693	705	456	536	609	671	708
Female	483	547	623	684	734	446	524	596	662	701
Non-FSM Ever 6	491	558	635	699	736	457	538	611	679	714
FSM Ever 6	451	528	597	660	673	426	499	572	634	678
EAL - recent arrival	418	524	604	629	601	421	504	551	665	562
EAL - other	483	567	643	702	725	455	533	615	683	677
No identified SEND	491	561	637	701	741	456	539	611	679	727
Identified SEND	420	481	547	607	608	398	462	538	594	609
Any other ethnic group	495	554	651	698	643	439	528	585	680	642
Asian and British Asian	478	580	649	713	699	470	535	617	681	678
Black and Black British	474	543	625	698	797	450	523	600	661	632
Chinese	539	614	681	755	N/A	511	593	713	775	742
Mixed	513	548	626	683	740	458	550	614	674	733
White	483	548	622	684	719	449	528	600	664	717

Modelling approach and outputs

We construct a model of the relationship between outcomes, prior attainment and a range of contextual factors using historic data from 2018/19 and 2019/20. We run regression models for both primary and secondary reading, and for primary mathematics. This is to allow for any different rates of progress in different phases of education from otherwise similar starting points.[18] A full set of regression coefficients for our estimates of learning loss in the first half of the autumn term are provided in tables A3 and A4 for primary and secondary reading respectively, and in table A5 for primary mathematics.

Table A3: Regression coefficients, standard errors, statistical significance tests and 95% confidence intervals for primary reading regression in autumn 1

Current attainment	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
Year group						
4	-0.85	2.00	-0.42	0.67	-4.76	3.07
5	-3.99	2.13	-1.88	0.06	-8.16	0.18
6	-23.14	2.22	-10.42	0.00	-27.49	-18.79
7	-6.11	3.26	-1.87	0.06	-12.51	0.29
Interaction between year group and prior attainment						
3	0.94	0.01	107.20	0.00	0.93	0.96
4	0.89	0.00	216.93	0.00	0.89	0.90
5	0.91	0.00	252.59	0.00	0.90	0.92
6	0.98	0.00	306.98	0.00	0.97	0.98

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[18] Prior to calculating the models, we remove the top and bottom 5 per cent of the prior attainment distribution to minimise the effect of extreme values.

7	0.92	0.01	183.29	0.00	0.91	0.93
Male	1.08	0.48	2.24	0.03	0.13	2.02
Spring born	-1.86	0.59	-3.16	0.00	-3.01	-0.71
Summer born	-3.64	0.58	-6.22	0.00	-4.78	-2.49
Days between tests	0.48	0.01	41.02	0.00	0.46	0.50
Ethnicity minor						
ABAN	9.21	1.97	4.68	0.00	5.35	13.07
AIND	17.06	1.78	9.59	0.00	13.57	20.55
AOTH	15.55	2.16	7.19	0.00	11.31	19.79
APKN	3.48	1.49	2.33	0.02	0.56	6.40
BAFR	9.38	1.59	5.91	0.00	6.27	12.50
BCRB	-8.75	3.00	-2.92	0.00	-14.62	-2.88
BOTH	5.37	3.10	1.73	0.08	-0.70	11.44
CHIN	20.79	3.98	5.23	0.00	13.00	28.59
MOTH	11.15	1.80	6.19	0.00	7.62	14.68
MWAS	9.10	2.14	4.25	0.00	4.90	13.29
MWBA	7.75	2.68	2.89	0.00	2.50	12.99
MWBC	0.39	2.12	0.18	0.85	-3.76	4.54
NOBT	8.25	4.19	1.97	0.05	0.04	16.45
OOTH	2.71	2.13	1.27	0.20	-1.47	6.88

REFU	19.64	3.94	4.98	0.00	11.91	27.37
WIRI	25.65	5.78	4.44	0.00	14.32	36.98
WIRT	-13.04	12.20	-1.07	0.29	-36.95	10.86
WOTH	11.48	1.33	8.67	0.00	8.89	14.08
WROM	-13.00	4.96	-2.62	0.01	-22.73	-3.27
Ever 6 FSM	-11.08	0.99	-11.21	0.00	-13.02	-9.14
Persistent FSM	-8.86	1.50	-5.90	0.00	-11.81	-5.92
SEN	-25.34	0.75	-33.72	0.00	-26.81	-23.86
EAL - other	-6.47	1.08	-6.01	0.00	-8.58	-4.36
EAL - recent arrival	19.81	3.24	6.12	0.00	13.46	26.15
East Midlands	-5.98	1.03	-5.80	0.00	-8.01	-3.96
East of England	-2.07	0.86	-2.41	0.02	-3.75	-0.38
London	0.13	1.06	0.12	0.90	-1.94	2.20
North East	-2.64	1.05	-2.52	0.01	-4.69	-0.59
North West	-2.50	0.92	-2.73	0.01	-4.30	-0.70
South West	-3.30	0.86	-3.84	0.00	-4.98	-1.62
West Midlands	-3.94	0.91	-4.35	0.00	-5.72	-2.17
Yorkshire and the Humber	-4.07	1.09	-3.72	0.00	-6.21	-1.92
Reading KS2 progress (school level)	0.88	0.11	8.15	0.00	0.67	1.10

constant	156.62	1.79	87.63	0.00	153.12	160.12

Table A4: Regression coefficients, standard errors, statistical significance tests and 95% confidence intervals for secondary reading regression in autumn 1

Current attainment	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
Year group						
9	35.67	3.07	11.61	0.00	29.65	41.69
Interaction between year group and prior attainment						
8	0.95	0.00	341.20	0.00	0.95	0.96
9	0.90	0.00	247.86	0.00	0.89	0.90
Male	-2.95	0.85	-3.49	0.00	-4.60	-1.29
Spring born	-1.04	1.04	-1.00	0.32	-3.07	1.00
Summer born	-1.74	1.02	-1.71	0.09	-3.74	0.26
Days between tests	-0.12	0.03	-3.90	0.00	-0.17	-0.06
Ethnicity minor						
ABAN	8.74	3.22	2.72	0.01	2.43	15.05
AIND	12.21	2.89	4.22	0.00	6.53	17.88
AOTH	12.87	3.63	3.54	0.00	5.75	19.99
APKN	-3.70	2.22	-1.67	0.10	-8.06	0.65
BAFR	10.19	2.60	3.92	0.00	5.10	15.28

BCRB	-0.19	4.37	-0.04	0.97	-8.76	8.38
BOTH	4.39	5.56	0.79	0.43	-6.51	15.29
CHIN	43.82	7.81	5.61	0.00	28.52	59.11
MOTH	13.19	3.31	3.98	0.00	6.70	19.68
MWAS	14.50	3.70	3.91	0.00	7.24	21.75
MWBA	5.48	4.80	1.14	0.25	-3.94	14.89
MWBC	-7.59	3.47	-2.19	0.03	-14.40	-0.79
NOBT	8.69	3.77	2.30	0.02	1.29	16.08
OOTH	13.87	3.65	3.79	0.00	6.71	21.03
REFU	11.24	5.02	2.24	0.03	1.40	21.08
WIRI	19.15	8.95	2.14	0.03	1.60	36.69
WIRT	1.94	19.70	0.10	0.92	-36.67	40.55
WOTH	15.62	2.24	6.97	0.00	11.22	20.01
WROM	-22.80	10.22	-2.23	0.03	-42.83	-2.76
Ever 6 FSM	-11.42	1.64	-6.97	0.00	-14.63	-8.21
Persistent FSM	-19.27	2.57	-7.48	0.00	-24.32	-14.22
SEN	-22.84	1.28	-17.87	0.00	-25.35	-20.34
EAL - other	-9.31	1.70	-5.47	0.00	-12.65	-5.97
EAL - recent arrival	27.41	5.35	5.12	0.00	16.93	37.90
East Midlands	1.77	1.70	1.04	0.30	-1.56	5.09

East of England	-2.74	1.66	-1.65	0.10	-6.00	0.51
London	2.26	1.73	1.31	0.19	-1.13	5.65
North East	-5.41	2.06	-2.63	0.01	-9.44	-1.38
North West	-1.78	1.51	-1.18	0.24	-4.74	1.17
South West	2.77	1.60	1.73	0.08	-0.37	5.91
West Midlands	-3.90	1.62	-2.42	0.02	-7.07	-0.74
Yorkshire and the Humber	-1.99	1.67	-1.19	0.23	-5.26	1.29
Progress 8 (school level)	22.21	1.09	20.31	0.00	20.07	24.35
constant	137.80	2.31	59.75	0.00	133.28	142.32

Table A5: Regression coefficients, standard errors, statistical significance tests and 95% confidence intervals for primary mathematics regression in autumn 1

Current attainment	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
Year group						
4	-35.13	10.38	-3.38	0.00	-55.47	-14.78
5	-44.09	11.40	-3.87	0.00	-66.44	-21.74
6	-30.71	11.75	-2.61	0.01	-53.74	-7.69
7	-66.66	23.82	-2.80	0.01	-113.36	-19.96
Interaction between year group and prior attainment						
3	0.64	0.02	31.24	0.00	0.60	0.68
4	0.74	0.02	48.54	0.00	0.71	0.77
5	0.77	0.02	50.08	0.00	0.74	0.80
6	0.78	0.01	53.16	0.00	0.75	0.80
7	0.81	0.03	24.64	0.00	0.75	0.88
Male	8.35	1.24	6.72	0.00	5.91	10.78
Spring born	-1.93	1.52	-1.27	0.20	-4.90	1.05
Summer born	-2.43	1.50	-1.62	0.11	-5.38	0.52
Days between tests	0.40	0.04	11.34	0.00	0.33	0.47

Ethnicity minor						
ABAN	17.36	4.88	3.56	0.00	7.79	26.92
AIND	23.73	5.15	4.61	0.00	13.64	33.82
AOTH	13.01	5.18	2.51	0.01	2.87	23.16
APKN	9.73	4.69	2.08	0.04	0.54	18.92
BAFR	1.93	4.03	0.48	0.63	-5.96	9.82
BCRB	-5.74	7.12	-0.81	0.42	-19.70	8.23
BOTH	5.74	8.68	0.66	0.51	-11.28	22.75
CHIN	26.45	9.27	2.85	0.00	8.29	44.62
MOTH	6.90	4.47	1.54	0.12	-1.86	15.67
MWAS	5.20	5.31	0.98	0.33	-5.21	15.60
MWBA	3.25	6.83	0.48	0.63	-10.14	16.63
MWBC	0.75	5.26	0.14	0.89	-9.56	11.05
NOBT	-8.87	12.58	-0.70	0.48	-33.54	15.80
OOTH	9.42	5.64	1.67	0.10	-1.63	20.47
REFU	14.84	10.38	1.43	0.15	-5.51	35.19
WIRI	33.39	17.13	1.95	0.05	-0.18	66.97
WIRT	-75.75	29.70	-2.55	0.01	-133.97	-17.52
WOTH	6.48	3.40	1.90	0.06	-0.19	13.16
WROM	1.07	14.50	0.07	0.94	-27.36	29.49
Ever 6 FSM	-6.13	2.60	-2.36	0.02	-11.22	-1.03
Persistent FSM	-12.22	4.02	-3.04	0.00	-20.10	-4.35

SEN	-30.03	2.01	-14.92	0.00	-33.97	-26.08
EAL - other	-3.45	2.85	-1.21	0.23	-9.03	2.13
EAL - recent arrival	-17.08	8.03	-2.13	0.03	-32.82	-1.33
East Midlands	-3.14	2.45	-1.28	0.20	-7.94	1.67
East of England	4.29	2.01	2.14	0.03	0.36	8.22
London	-0.85	2.46	-0.34	0.73	-5.67	3.98
North East	4.15	5.26	0.79	0.43	-6.16	14.47
North West	2.30	2.79	0.82	0.41	-3.18	7.77
South West	-0.66	2.11	-0.31	0.75	-4.79	3.47
West Midlands	6.49	2.83	2.29	0.02	0.94	12.04
Yorkshire and the Humber	5.83	3.30	1.77	0.08	-0.63	12.29
Maths KS2 progress (school level)	1.75	0.32	5.53	0.00	1.13	2.38
constant	249.51	7.96	31.36	0.00	233.91	265.11

The regression models give an "expected outcome" for each pupil based on their prior attainment and characteristics, which allows us to calculate an expected progress, which is simply the expected outcome minus the prior attainment score. Our estimates of learning loss in scaled score points terms are the difference between expected progress and actual progress. But we can also convert this into months of learning. Since we are considering the progress from one year to the next this is the expected progress over a 12-month period. Therefore, the learning loss in months is given by:

$$\text{Learning loss in months} = \frac{\text{actual progress} - \text{expected progress}}{\text{expected progress}} \text{X } 12$$

In order to protect our estimates of months of learning loss from extreme cases in our months of lost learning measure we cap predictions at the 1st and 99th percentile for each year group to ensure that extreme values are not overly impacting our learning loss estimates. Tables A6 and A7 present the 1st, 2nd, 98th, and 99th percentile of the distribution of learning loss in months by year group for estimates in autumn 1. This is to illustrate the magnitude of these extreme values and to give an example of where we have capped our estimates.

Table A6: Percentiles of estimated learning loss in autumn 1, in months, in reading

	P1	p2	p98	P99
Year 3	-18.0	-15.1	14.7	17.7
Year 4	-25.1	-21.3	20.5	25.2
Year 5	-28.9	-24.6	25.7	31.1
Year 6	-31.9	-27.2	28.2	34.8
Year 7	-48.7	-39.9	44.2	53.4
Year 8	-54.1	-44.9	43.5	51.4
Year 9	-80.3	-62.1	53.6	65.4

Table A7: Percentiles of estimated learning loss in autumn 1, in months, in mathematics

	P1	p2	p98	P99
Year 3	-24.9	-20.5	12.3	15.0
Year 4	-27.8	-23.4	15.4	18.2
Year 5	-33.8	-29.6	18.1	23.3
Year 6	-37.7	-30.9	19.9	24.5
Year 7	-76.5	-58.6	26.8	41.2

Tables A8 to A13 provide the table format of the figures that present estimates of learning loss and catch-up by characteristics in chapters 3 and 4. Table A8 provides the estimates of learning loss for the first half of the autumn term for primary and secondary reading and primary mathematics in scaled score points. Table A9 is the equivalent for months of learning loss. Tables A10 and A11 provide the estimates of learning loss by the first and second half-terms in autumn in scaled score points for primary reading and primary mathematics respectively.[19] Tables A12 and A13 are the equivalent for months of learning loss.

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[19] When restricting the analysis to only the pupils that undertook assessments in both those half-terms.

Table A8: Estimated learning loss, in scaled score points, and pupil numbers by sub-group for figures 3.3 and 3.4

| | Reading | | | | Mathematics | |
| | Primary | | Secondary | | Primary | |
	Mean scaled score	Count	Mean scaled score	Count	Mean scaled score	Count
Male	-15.8	112,979	-14.1	53,820	-23.8	7,162
Female	-17.8	115,376	-12.1	53,454	-26.0	7,389
non-EVER 6 FSM	-16.4	170,410	-12.3	78,914	-24.2	11,136
EVER 6 FSM	-18.3	57,945	-15.1	28,360	-27.3	3,415
Any other ethnic group	-14.6	3,716	-22.6	1,764	-26.6*	234
Asian	-17.3	23,484	-14.9	9,836	-28.2	1,497
Black	-16.5	9,792	-11.7	4,909	-23.0	603
Chinese	-2.3	873	-6.5*	331	N/A	N/A
Mixed	-15.5	12,500	-9.2	6,018	-23.7	720
White	-16.9	176,138	-12.8	82,250	-24.6	11,347
EAL - other	-17.4	41,594	-21.0	14,593	-24.2	2,590
non-SEN	-17.1	198,987	-13.1	92,101	-25.4	12,780
SEN	-14.8	29,368	-13.0	15,173	-21.7	1,771
East Midlands	-14.8	18,043	-17.1	11,971	-18.6	983
East of England	-17.9	31,871	-11.1	12,797	-27.4	1,330
London	-15.0	20,645	-14.4	10,385	-25.1	2,053
North East	-21.7	16,704	-15.6	4,978	-31.8*	327
North West	-18.3	26,125	-9.4	13,475	-23.4	1,340

South East	-16.6	40,145	-9.4	21,526	-24.3	4,235
South West	-12.7	33,839	-14.2	11,779	-13.2	1,913
West Midlands	-15.1	25,700	-13.0	9,837	-27.4	1,162
Yorkshire and the Humber	-24.8	15,283	-19.2	10,526	-45.3	1,208

Note: Asterisks indicate sub-groups where the sample is less than 500 pupils and as a result some caution should be taken with interpreting the estimate.

Table A9: Estimated learning loss, in months, and pupil numbers by sub-group for figures 3.5 and 3.6

| | Reading | | | | Mathematics | |
| | Primary | | Secondary | | Primary | |
	Months of learning loss	Count	Months of learning loss	Count	Months of learning loss	Count
Male	-1.7	112,979	-1.8	53,820	-3.4	7,162
Female	-1.9	115,376	-1.5	53,454	-3.9	7,389
non-Ever 6 FSM	-1.7	170,410	-1.5	78,914	-3.4	11,136
Ever 6 FSM	-2.2	57,945	-2.2	28,360	-4.5	3,415
Any other ethnic group	-1.6	3,716	-2.7	1,764	-4.0*	234
Asian	-1.8	23,484	-1.8	9,836	-3.6	1,497
Black	-1.8	9,792	-1.5	4,909	-3.7	603
Chinese	-0.2	873	-0.6*	331	N/A	N/A
Mixed	-1.7	12,500	-1.2	6,018	-3.6	720
White	-1.9	176,138	-1.7	82,250	-3.7	11,347
EAL - other	-1.8	41,594	-2.3	14,593	-3.3	2,590
non-SEN	-1.8	198,987	-1.6	92,101	-3.6	12,780
SEN	-1.8	29,368	-1.8	15,173	-3.8	1,771
East Midlands	-1.7	18,043	-2.1	11,971	-3.2	983
East of England	-1.9	31,871	-1.5	12,797	-4.0	1,330
London	-1.6	20,645	-1.7	10,385	-3.6	2,053
North East	-2.4	16,704	-2.3	4,978	-5.0*	327
North West	-2.0	26,125	-1.2	13,475	-3.5	1,340

South East	-1.8	40,145	-1.2	21,526	-3.8	4,235
South West	-1.5	33,839	-1.7	11,779	-2.1	1,913
West Midlands	-1.7	25,700	-1.7	9,837	-3.7	1,162
Yorkshire and the Humber	-2.6	15,283	-2.4	10,526	-5.5	1,208

Note: Asterisks indicate sub-groups where the sample is less than 500 pupils and as a result some caution should be taken with interpreting the estimate.

Table A10: Estimated learning loss, in scaled score points, and pupil numbers for reading by sub-group for figures 4.5

	Primary		
	Autumn 1	Autumn 2	Count
	Scaled score learning loss		
Male	-15.1	-11.2	55,504
Female	-17.8	-10.7	57,467
non-EVER 6 FSM	-16.4	-10.4	84,938
EVER 6 FSM	-16.8	-12.6	28,033
Any other ethnic group	-9.2	-8.9	1,737
Asian	-15.3	-12.1	11,502
Black	-14.7	-13.4	4,448
Chinese	-3.6*	-13.5*	454
Mixed	-15.6	-12.5	6,032
White	-16.9	-10.6	87,948
EAL - other	-16.1	-12.1	20,328
non-SEN	-17.5	-11.7	99,380
SEN	-9.1	-5.7	13,591
East Midlands	-12.8	-12.8	8,638
East of England	-17.3	-8.5	14,390
London	-12.2	-6.1	8,177
North East	-20.6	-17.8	9,060
North West	-18.1	-17.0	12,788
South East	-16.4	-10.4	21,570

South West	-13.5	-6.8	16,778
West Midlands	-15.0	-8.0	12,740
Yorkshire and the Humber	-24.3	-15.1	8,830

Note: Asterisks indicate sub-groups where the sample is less than 500 pupils and as a result some caution should be taken with interpreting the estimate.

Table A11: Estimated learning loss, in scaled score points, and pupil numbers for mathematics by sub-group for figure 4.6

	Primary		
	Autumn 1	Autumn 2	Count
	Scaled score learning loss		
Male	-22.4	-15.7	4,294
Female	-25.0	-18.7	4,576
non-EVER 6 FSM	-23.0	-16.0	6,748
EVER 6 FSM	-26.2	-21.2	2,122
Any other ethnic group	-21.6*	-14.0*	139
Asian	-31.1	-21.1	902
Black	-17.1*	-14.4*	362
Mixed	-20.7*	-11.9*	422
White	-23.4	-17.1	6,951
EAL - other	-25.5	-18.2	1,541
non-SEN	-24.4	-18.2	7,879
SEN	-18.6	-10.0	991
East Midlands	-27.0*	-19.6*	480
East of England	-29.4	-23.2	708
London	-17.0	-8.0	948
North East	-31.7*	-21.7*	270
North West	-22.1	-11.3	944
South East	-21.1	-16.9	2,488
South West	-12.3	-3.0	1,500

West Midlands	-28.2	-25.4	692
Yorkshire and the Humber	-48.7	-46.5	840

Note: Asterisks indicate sub-groups where the sample is less than 500 pupils and as a result some caution should be taken with interpreting the estimate.

Table A12: Estimated learning loss, in months, and pupil numbers for reading by sub-group for figures 4.7

	Primary		
	Autumn 1	Autumn 2	Count
	Mean months of learning loss		
Male	-1.7	-1.2	55,504
Female	-1.9	-1.2	57,467
non-EVER 6 FSM	-1.7	-1.1	84,938
EVER 6 FSM	-2.0	-1.6	28,033
Any other ethnic group	-1.0	-1.0	1,737
Asian	-1.6	-1.3	11,502
Black	-1.6	-1.4	4,448
Chinese	-0.3*	-1.2*	454
Mixed	-1.7	-1.3	6,032
White	-1.9	-1.2	87,948
EAL - other	-1.7	-1.3	20,328
non-SEN	-1.9	-1.3	99,380
SEN	-1.2	-0.8	13,591
East Midlands	-1.5	-1.4	8,638
East of England	-1.8	-1.0	14,390
London	-1.3	-0.7	8,177
North East	-2.3	-2.0	9,060
North West	-2.0	-1.9	12,788
South East	-1.8	-1.1	21,570

South West	-1.5	-0.8	16,778
West Midlands	-1.7	-1.0	12,740
Yorkshire and the Humber	-2.6	-1.7	8,830

Note: Asterisks indicate sub-groups where the sample is less than 500 pupils and as a result some caution should be taken with interpreting the estimate.

Table A13: Estimated learning loss, in months, and pupil numbers for mathematics by sub-group for figure 4.8

| | Primary | | |
| | Autumn 1 | Autumn 2 | Count |
	Mean months of learning loss		
Male	-3.3	-2.3	4,294
Female	-3.8	-2.8	4,576
non-EVER 6 FSM	-3.3	-2.3	6,748
EVER 6 FSM	-4.3	-3.3	2,122
Any other ethnic group	-3.2*	-2.2*	139
Asian	-3.8	-2.7	902
Black	-2.8*	-1.9*	362
Mixed	-3.4*	-2.0*	422
White	-3.6	-2.6	6,951
EAL - other	-3.4	-2.4	1,541
non-SEN	-3.6	-2.7	7,879
SEN	-3.4	-1.6	991
East Midlands	-4.9*	-3.2*	480
East of England	-4.3	-3.3	708
London	-2.5	-0.9	948
North East	-5.2*	-4.0*	270
North West	-3.3	-2.1	944
South East	-3.4	-2.8	2,488
South West	-2.0	-0.5	1,500

West Midlands	-4.0	-3.7	692
Yorkshire and the Humber	-5.8	-5.3	840

Note: Asterisks indicate sub-groups where the sample is less than 500 pupils and as a result some caution should be taken with interpreting the estimate.

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