Education Endowment Foundation

Impact of school closures and subsequent support strategies on attainment and socio-emotional wellbeing in Key Stage 1: Interim Paper 1

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Summary

On 20 March 2020, as a result of the Covid-19 pandemic, schools in England closed to all pupils apart from vulnerable pupils and the children of keyworkers. Early studies predicted a 'learning loss' and widening of the disadvantage gap in attainment. This study is part of a series of analyses being conducted by statisticians and assessment researchers at the National Foundation for Educational Research (NFER). It is funded by the Education Endowment Foundation.

This study estimates the impact on attainment of pupils in Key Stage 1 in England following this disruption to schooling during the spring and summer terms of 2020. It also aims to determine the parts of the curriculum that children are struggling with. In addition, another strand of the work looks at the development of pupils' social skills and wellbeing.

This interim paper provides the first insight into two of the study's research questions:

> RQ1 – To what extent has pupils' attainment in reading and maths been impacted by school closures in 2020? This is referred to as the 'Covid-19 gap'.
>
> RQ3 – Were children eligible for free school meals (FSM) disproportionately affected? This is referred to as the 'disadvantage gap' in attainment between pupils who are eligible and not eligible for free school meals.

The results focus on assessments taken by Year 2 pupils (aged 6-7 and in their final year of Key Stage 1) in autumn term 2020 sat by nearly 6000 pupils in 168 schools. There will be further data sweeps in the spring and summer terms.

Key findings

- Year 2 pupils' attainment in reading was significantly[1] lower in autumn 2020 compared to a standardised sample from 2017; representing a Covid-19 gap of around two months' progress.
- Year 2 pupils' attainment in mathematics was significantly lower in autumn 2020 compared to a standardised sample from 2017; representing a Covid-19 gap of around two months' progress.
- The disadvantage gap in reading is around seven months' progress, which represents a widening as compared to Key Stage 1 in 2019.
- The disadvantage gap in mathematics is around seven months' progress, which represents a widening as compared to Key Stage 1 in 2019.

This study confirms that children in this age group have fallen behind and that disadvantage gaps have widened and it quantifies the scale of this learning loss. It reinforces the importance of continuing to invest in catch-up activities to enable children to recover the learning they have lost.

[1] Where we use the word 'significantly' to refer to the Covid-19 gap, we mean that the confidence interval does not overlap 100 i.e. the difference can be regarded as statistically significant.

Limitations

The Covid-19 gap estimates are liable to biased sampling. We have attempted to correct for this in the 2020 sample using school-level weighting by attainment and we checked the 2017 standardisation sample itself for representativeness at the time. The disadvantage gap estimates are relative measures within the autumn 2020 sample so are less vulnerable to bias. For both gaps, conversion of mean standardised score differences into months progress is limited by the unreliability of the conversion table itself, or the inherent uncertainty in reading/maths ages.

Method

To establish the Covid-19 gap we needed a counterfactual: what would children have learned had they not been subject to school closures? Although impossible to measure for real, for a standardised test this can be estimated from the standardisation sample, which in this case was obtained in 2017. As the standardisation was done on a nationally representative sample of schools and assuming limited change over time in terms of the ability of different cohorts, we can compare the mean standardised score in our sample to the standardisation mean (in this case 100). Furthermore, we can construct confidence intervals to represent the uncertainty around the mean score and, should we wish to explore whether any difference is genuine, we can see whether it overlaps 100.

There are limitations in comparing the current sample to a different sample of pupils and schools. We address this limitation through weighting. There are also likely to be limits in the extent to which the standardisation sample is completely representative of all children and there could be non-pandemic related changes in academic performance over time. Furthermore, standardised scores typically generate an artificial floor and/or ceiling effect as a minimum score is assigned. A more rigorous method of comparing the two samples would be to match them both to the National Pupil Database and construct a multi-level regression of raw score on time controlling for appropriate school and pupil-level factors. However, GDPR and time limitations dictate the simpler approach presented here.

Context

Schools closed to the majority of pupils on 20 March 2020, opening only for vulnerable pupils and the children of keyworkers. Remote learning was introduced and projects such as the Oak National Academy were launched to aid pupils in learning from home. The partial reopening of schools took place from 1 June 2020 to pupils in Years 1 and 6, and GCSE and A Level students. However, most pupils remained at home until schools fully reopened in September 2020.

Despite the introduction of remote learning to the majority of pupils, early estimates by teachers of the Covid-19 gap was an average of three months for all pupils and four months for pupils in the most disadvantaged schools[2], whilst the disadvantage gap was projected to widen by 36% during

[2] https://www.nfer.ac.uk/media/4119/schools_responses_to_covid_19_the_challenges_facing_schools_and_pupils_in_september_2020.pdf

the first lockdown by EEF[3]. Concerns were widely shared and debated with regards to a 'digital divide' caused by the lack of devices and access to broadband for some pupils, and the differing levels of engagement in remote learning. The government-funded but sector-led National Tutoring Programme was introduced in the 2020/21 school year to provide additional support to help pupils who had missed out the most as a result of school closures.

All schools in England who are current customers of the NFER's primary suite of assessments were invited to take part in the study. Schools that agreed to participate administered Year 2 assessments in November 2020. A target of 158 schools was set for the study. A self-selecting sample of 168 schools took part in the autumn 2020 assessment. The test window for schools was open between 1st and 30th November 2020. Schools were asked to administer the tests to all Year 2 pupils. Schools were provided with autumn Year 2 test papers from the NFER Key Stage 1 suite of assessments. All tests were marked by NFER. Coded marking, which identifies the type of response rather than simply whether it was correct, was used in order to be able to provide diagnostic information to schools.

The Year 2 mathematics assessments consisted of two papers, one in arithmetic and the other in reasoning. Both papers are suitable for all pupils and should be taken by all. Pupils needed to sit both papers in order to be included within the study. The total number of pupils included in the mathematics analysis was 5936 from 168 schools.

The Year 2 reading assessments also consisted of two papers. Following the model of Key Stage 1 national assessment, both papers are intended for all pupils. However, as it is slightly higher in difficulty, it is expected that paper 2 may be unsuitable for some pupils and the NFER teacher guide advises that it is not suitable to administer this paper in such cases. The majority of pupils sat both papers, however, a small number of pupils who sat only paper 1 were also included in the study. The total number of pupils included in the reading analysis was 5931 from 168 schools.

NFER Standardised Tests

NFER autumn assessments for Year 2 in reading and maths were standardised in autumn 2017 with a sample of schools from across England. The standardisation sample was representative of all schools in England in terms of attainment (Key Stage 2), school type, governance and region.

At standardisation, schools were randomly selected from the population of schools but not all agreed to take part. To check the schools included in the achieved standardisation sample were representative of all schools, the above school-level characteristics were compared with the national population and all yielded non-significant chi-squared tests. The achieved samples were therefore judged representative of the national population in all four of the above stratification characteristics at the school level.

[3] https://educationendowmentfoundation.org.uk/public/files/REA_-_Impact_of_school_closures_on_the_attainment_gap_summary.pdf

The average standardised score is set at 100 with a standard deviation of 15 based on the nationally representative sample. Based on a normal distribution, this would mean that approximately two-thirds of pupils will have a standardised score between 85 and 115.

It is expected that under the normal distribution almost all pupils would fall within the range of two standard deviations above and below the mean, i.e. 70 to 140. Scores falling outside of this range would be considered exceptional and cannot be scored with the necessary reliability. Where an exact score is needed for these pupils, for example in order to calculate a mean, a value of 69 or 141 is used.

Analysis of assessment data from autumn 2020

Pupils' raw scores from the autumn 2020 assessments were converted into standardised scores using the NFER conversion table, which was created during the 2017 standardisation. This enables their performance to be compared to the standardised sample.

The data from pupils taking assessments in autumn 2020, as part of this study, was weighted using KS2 attainment quintiles. This was done to ensure the sample in autumn 2020 was representative of the population quintiles at school level. This was the best attainment variable we could use to weight the data but it was limited by being for a different year group and by not being at pupil level.

Table 1 Summary of results for autumn 2020

Measure	**Reading**		**Maths**	
	Standardisation sample 2017	Autumn term 2020	Standardisation sample 2017	Autumn term 2020
Mean	100.06	97.53	100.16	98.06
95% Confidence Interval	99.47-100.65	97.14-97.92	99.57-100.75	97.71-98.41
Standard deviation	14.73	15.52	14.77	13.95
N pupils	2408	5931	2446	5936

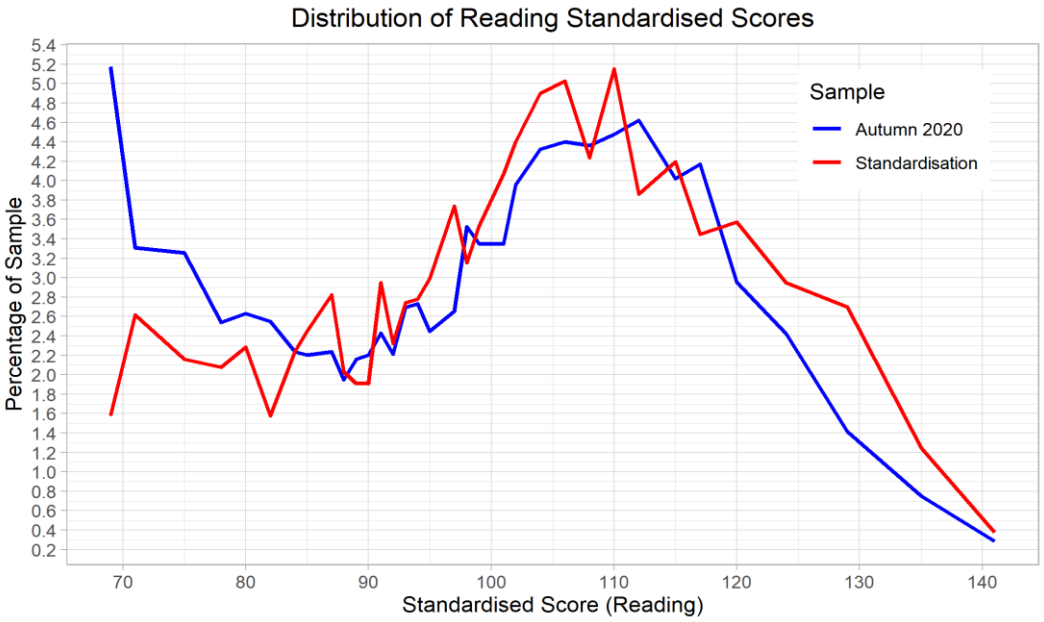
Attainment in reading and mathematics – Covid-19 gap

Reading

The overall performance of pupils in reading in autumn 2020 was significantly lower than the standardised sample. The mean standardised score across the autumn 2020 sample was 97.53 and this equates to an effect size of -0.17[4] or around -2 months' progress using EEF's conversion table[5].

The standard deviation of the study sample is slightly larger at 15.52 than that of the standardisation sample. This is due in part to a larger proportion of pupils scoring at the lower end of the range.

Figure 1: Distributions of reading standardised scores for standardisation sample and autumn 2020 sample



[4] Covid-19 gap effect sizes were calculated by dividing the difference in standardised score points between the samples by the standard deviation of the standardisation sample.

[5] https://educationendowmentfoundation.org.uk/evidence-summaries/about-the-toolkits/attainment/

Figure 2: Distribution of cumulative reading standardised scores for standardisation sample and autumn 2020 sample

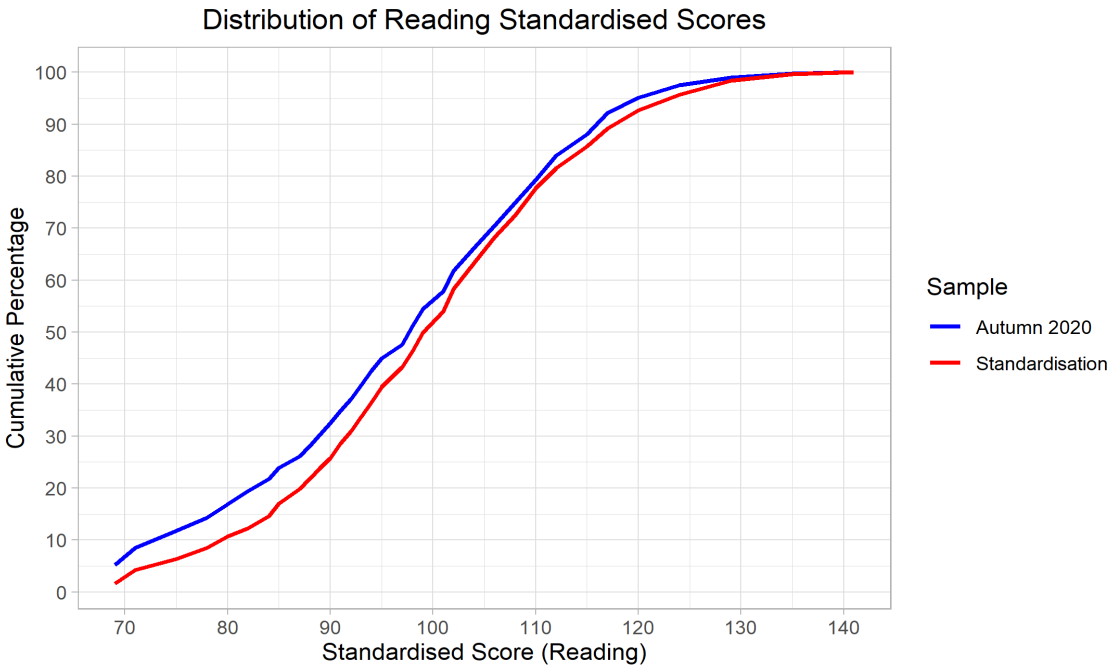


Figure 1 shows a smaller proportion of pupils scoring above 115 and a larger proportion scoring below 85.

As explained earlier, scores falling outside of the expected range of standardised scores (70 to 140) are considered exceptional. In the reading test, pupils who gained less than 2 marks were awarded a score of 69 and pupils who scored more than 33 marks out of 35 were awarded a score of 141.

It is noteworthy that a higher than expected proportion of pupils (307 or 5.2%) scored fewer than two marks on the reading test resulting in a standardised score of 69. This indicated that a large number of pupils were unable to engage effectively with the tests. In the standardised sample, the percentage of pupils being awarded this score was 1.6%.

Figure 3: Distribution of reading standardised scores for the autumn 2020 sample

In Figure 3 the blue line represents the expected mean if the sample performed exactly as the standardisation sample, and the red dotted line represents the observed mean for the sample in autumn 2020. The distribution shows a positive skew, i.e. more lower scores and fewer higher scores than expected, compared to the 2017 standardisation sample.

Mathematics

The overall performance of pupils in mathematics in November 2020 was also significantly lower than the standardisation sample. The mean standardised score across the autumn 2020 sample was 98.06 and this equates to an effect size of -0.14 or around -2 months' progress.

The standard deviation of the study sample is smaller at 13.95 than that of the standardisation sample indicating a narrower range of scores.

Figure 4: Distributions of mathematics standardised scores for standardisation sample and autumn 2020 sample

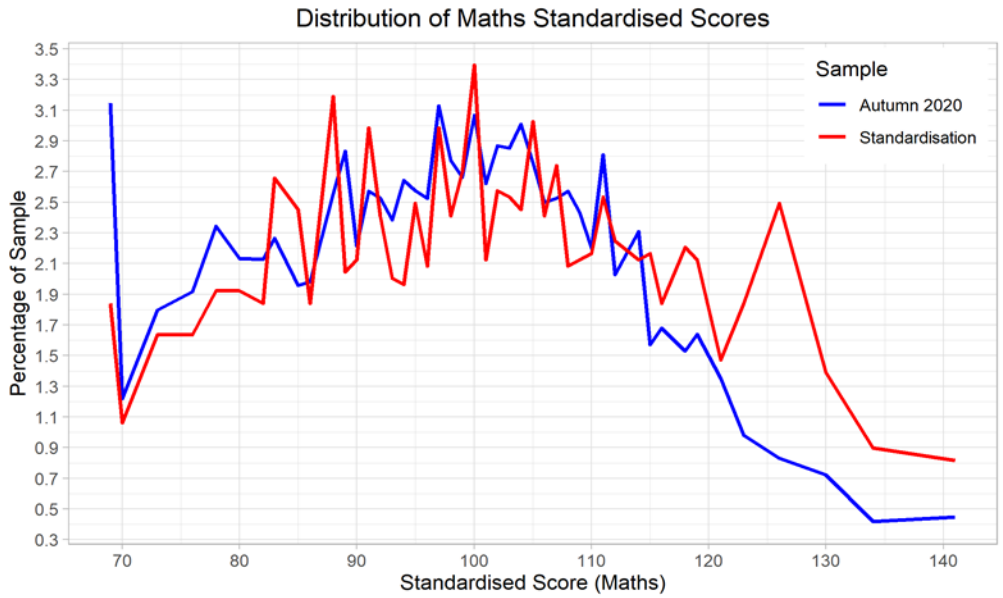


Figure 5: Distribution of cumulative mathematics standardised scores for standardisation sample and autumn 2020 sample

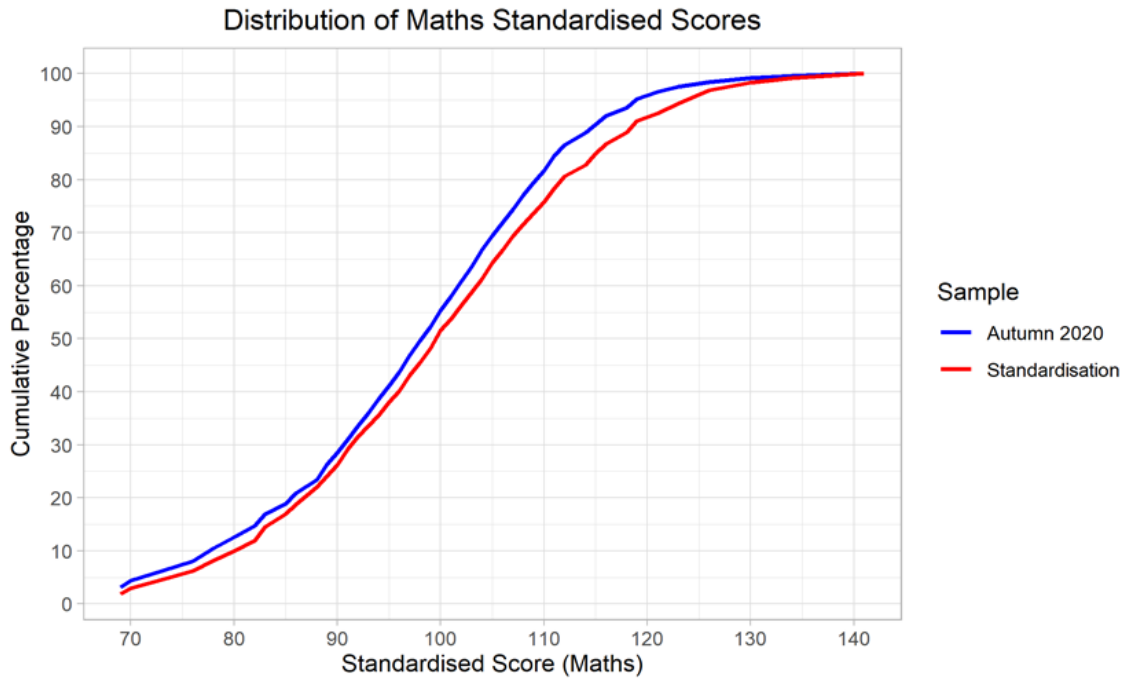
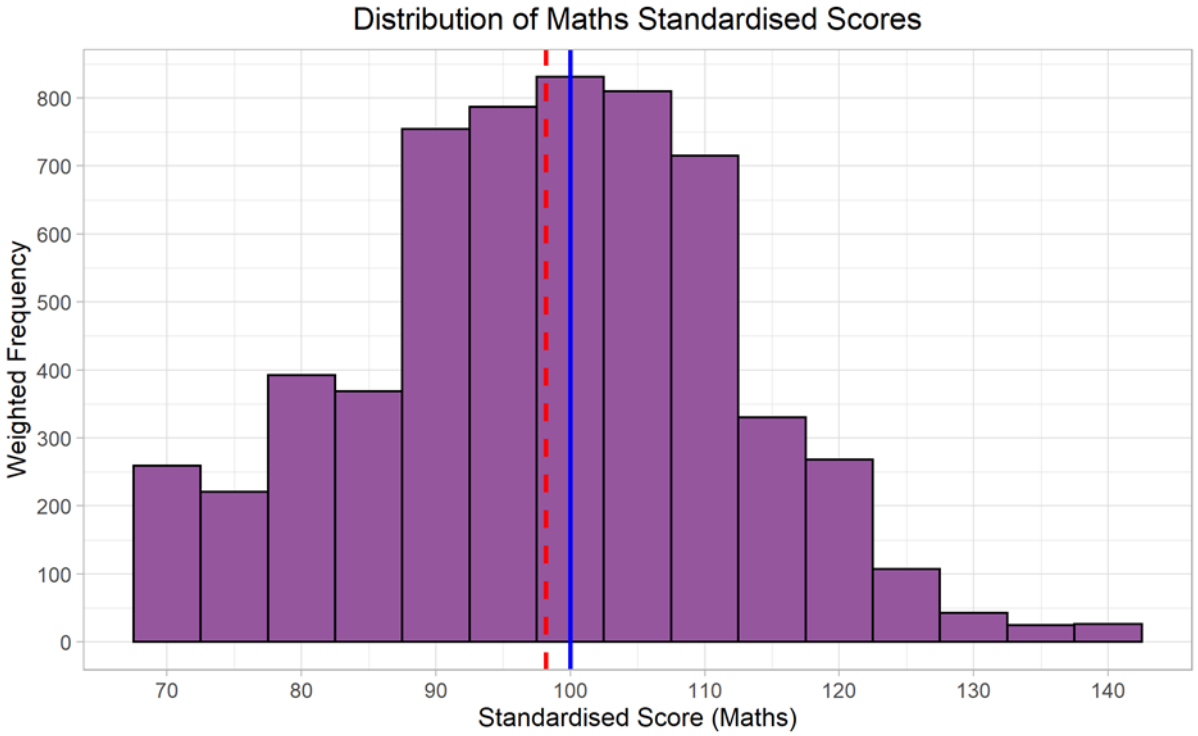


Figure 4 shows a smaller proportion of pupils scoring above 115 and a higher proportion scoring below 85.

All pupils included in the study had shown evidence of having engaged with both mathematics papers since those pupils who sat only one paper have been excluded. As explained earlier, scores falling outside of the expected range of standardised scores (70 to 140) are considered exceptional. In the mathematics test, pupils who gained fewer than 5 marks were awarded a score of 69 and pupils who scored more than 48 marks out of 50 were awarded a score of 141.

As in the reading test, a higher than expected proportion of pupils (187 or 3.1%), scored fewer than five marks on the mathematics test resulting in a standardised score of 69. A large number of pupils were therefore unable to engage effectively with the content of the tests. In the standardisation sample, the percentage of pupils being awarded this score was lower at 1.8%.

Figure 6: Distribution of mathematics standardised scores for the autumn 2020 sample



In figure 6 the blue line represents the expected mean if the sample performed exactly as the standardisation sample and the red dotted line represents the observed mean for the sample in autumn 2020. The distribution shows a positive skew, i.e. more lower scores and fewer higher scores than expected, compared to the 2017 standardised sample.

Attainment in reading and mathematics – Disadvantage gap

Within the autumn 2020 sample, approximately 18% of the pupils were classed as disadvantaged in September 2020 (i.e. eligible for FSM as reported by schools). For a very small number of pupils (9 pupils in reading and 12 pupils in mathematics), no FSM data was provided and these pupils have been excluded from the following calculations until further data can be obtained. The standardisation sample does not provide data on the performance of disadvantaged and non-disadvantaged pupils. Further analysis on this area will be carried out following the assessment points in March 2021 and June 2021 to examine whether the gap narrows, widens or remains stable.

Reading

The following table shows a summary of the performance of disadvantaged pupils compared to those pupils who are not disadvantaged.

Table 2 Performance of disadvantaged pupils in reading for Autumn 2020

Measure	Standardisation sample 2017	Autumn 2020 all pupils	Autumn 2020 FSM	Autumn 2020 Non- FSM
Mean	100.06	97.53	90.75	99.03
95% Confidence interval	99.47-100.65	97.14-97.92	89.82-91.67	98.60-99.45
Standard deviation	14.73	15.52	15.35	15.15
N pupils	2408	5931	1061	4861

The difference between the mean standardised scores of disadvantaged pupils and non-disadvantaged pupils is large at 8.28 standardised score points and, using NFER's table of age standardised scores represents a gap of eight months of learning. The effect size for this data is 0.53[6] which, using EEF's table[7], equates to seven months of learning. Both of these calculations indicate a large gap but the results, expressed in terms of months of learning, should be interpreted with caution due to the unreliability of the conversion table itself, or the inherent uncertainty in reading/maths ages.

To put this in context, the 2019 Key Stage 1 disadvantage gap for reading, as measured by test-guided teacher assessments regarding children working at the expected standard, was 17

[6] Disadvantage gap effect sizes were calculated by dividing the standardised score point difference between FSM and non-FSM by the overall autumn 2020 standard deviation.

[7] https://educationendowmentfoundation.org.uk/evidence-summaries/about-the-toolkits/attainment/

percentage points[8]. By assuming a normal distribution of test scores, we can convert the percentages for disadvantaged/other pupils (62% and 78% respectively) into an effect size of 0.47. This converts to six months' progress using the EEF table so by this metric the disadvantage gap, now 0.53 or seven months, has widened from what might be predicted without school closures. Given the forecast[9] that the disadvantage gap might increase by 0.022 standard deviations per month of closures, our findings on the disadvantage gap are not unexpected given the uncertainties in these measures.

Mathematics

The following table shows a summary of the performance of disadvantaged pupils compared to those pupils who are not disadvantaged.

Table 3 Performance of disadvantaged pupils in mathematics for Autumn 2020

Measure	Standardisation sample 2017	Autumn 2020 all pupils	Autumn 2020 FSM	Autumn 2020 Non- FSM
Mean	100.16	98.06	91.43	99.57
95% Confidence interval	99.57-100.75	97.71-98.41	90.64-92.22	99.18-99.95
Standard deviation	14.77	13.95	13.27	13.65
N pupils	2446	5936	1085	4839

The difference between the mean standardised scores of disadvantaged pupils and non-disadvantaged pupils is large at 8.14 standardised score points and, using NFER's table of age standardised scores, represents a gap of eight months of learning. The effect size for this data is 0.58 which, using EEF's table, equates to seven months of learning. Both of these calculations indicate a large gap but the results, expressed in terms of months of learning, should be interpreted with caution due to the unreliability of the conversion table itself, or the inherent uncertainty in reading/maths ages.

To put this in context, the 2019 Key Stage 1 disadvantage gap for maths, as measured by test-guided teacher assessments regarding children working at the expected standard, was 17

[8] Phonics_screening_check_and_key_stage_1_assessments_in_England_2019.pdf (publishing.service.gov.uk)
[9] EEF_(2020)_-_Impact_of_School_Closures_on_the_Attainment_Gap.pdf (educationendowmentfoundation.org.uk)

percentage points[10]. By assuming a normal distribution of test scores, we can convert the percentages for disadvantaged/other pupils (62% and 79% respectively) into an effect size of 0.50. This converts to six months' progress using the EEF table so by this metric the disadvantage gap, now 0.58 or seven months, has widened from what might be predicted without school closures. Given the forecast[11] that the disadvantage gap might increase by 0.022 standard deviations per month of closures, our findings on the disadvantage gap are not unexpected given the uncertainties in these measures.

Conclusion

This study confirms that, following the disruption to schooling in the 2020 spring and summer terms, Year 2 pupils had significantly lower achievement in both reading and maths in autumn 2020 when compared to performance seen in Year 2 in the autumn term of 2017. This represents a Covid-19 gap of around two months' progress for both reading and maths.

It also shows that there is a large and concerning attainment gap between disadvantaged and non-disadvantaged pupils: seven months for both reading and maths amongst Year 2 pupils. It seems that the disadvantage gap is wider than earlier estimates, and will likely be further exacerbated by school closures in early 2021.

NFER is now conducting more granular analysis on performance on individual questions to provide diagnostic information for teachers.

The next data collection is due in March 2021 which will involve Year 1 and Year 2 spring term assessments. If school closures continue, we may have to collect data from summer term assessments instead.

[10] Phonics_screening_check_and_key_stage_1_assessments_in_England_2019.pdf (publishing.service.gov.uk)
[11] EEF_(2020)_-_Impact_of_School_Closures_on_the_Attainment_Gap.pdf (educationendowmentfoundation.org.uk)

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