The ongoing impact of school closures on children from disadvantaged backgrounds

An analysis of attainment in autumn 2022 and change in attainment over the course of the COVID-19 pandemic among pupils at mainstream state primary schools in England.

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"The scale and coverage of the Hodder Education test data make it an invaluable resource for documenting changes in attainment of primary school pupils over the last three years"

Simon Burgess, Professor of Economics, University of Bristol

Introduction

This paper analyses **attainment** tests sat by primary pupils in England during the autumn term of the 2022-2023 school year. These tests include New Progress in Reading Assessment (**New PiRA**), New Progress in Understanding Mathematics Assessment (**New PUMA**) and Progress in Grammar, Punctuation and Spelling Assessment (**GAPS**), provided by Hodder Education. Aggregate results from approximately 400,000 primary school tests taken at more than 1,500 schools in autumn 2022 were compared to the results from the corresponding terms in the previous school years (from autumn 2019 onwards). A total of over 1.4 million tests were used in this analysis.

In addition to the attainment analysis, this paper also presents the **change in attainment** among primary pupils in England who sat two consecutive tests between spring 2019 and spring 2022. To allow direct comparison of change in attainment across the pandemic period, these tests include Progress in Reading Assessment (**PiRA**), Progress in Understanding Mathematics Assessment (**PUMA**) and Progress in Grammar, Punctuation and Spelling Assessment (**GAPS**). Aggregate results from approximately 215,000 primary school tests taken at approximately 500 schools between spring 2019 and spring 2022 were compared.

Although the old and new reading (**PiRA** and **New PiRA**) and maths (**PUMA** and **New PUMA**) assessments are similar, New PIRA and New PUMA were both updated and re-standardised between 2019 and 2021 to reflect current teaching practices and have since replaced PIRA and PUMA tests. This means that, in some cases, a direct comparison of results is not appropriate. GAPS remained unchanged throughout this period. Please see Appendix (page 37) for a more detailed explanation.

To provide more meaningful comparisons between different groups, and across time periods, **effect sizes** are used to compare attainment levels. The more negative the effect size, the larger the impact on learning caused by pandemic school closures appears to be. Conversely, the more positive the effect size, the more the attainment gap has been reduced.

The analysis focuses on the current attainment, changes to attainment over time and the continuing impact of school disruption across regions and areas of disadvantage in England.

The analysis of attainment test results at a national level provides a valuable opportunity to understand broad disparities in learning and helps to direct the focus of educators and policymakers in their remediation efforts. We acknowledge that attainment tests are only one measure of a child's development and intend this analysis to be considered alongside other research in this area, not least the impact on their social development, wellbeing and mental health.

This paper is the latest in a series of research reports investigating the impact of the pandemic on primary pupils, the last of which was published in November 2022. That paper, '*The academic wellbeing and attitudes to learning of Key Stage 2 pupils following the pandemic*', highlighted changes in Key Stage 2 children's wellbeing between 2020 and 2022. Previous papers in the series, including papers on attainment, can be found at **Risingstars-uk.com/Nuffield**.

The work presented in this paper has been funded by the Nuffield Foundation.

Key Findings

The key findings from this paper are split into two sections: attainment results from autumn 2022, and the change in attainment over the course of the pandemic.

Attainment in autumn 2022

- In **grammar, punctuation and spelling (GPS)** pupils in **all primary year groups remain roughly 2 months** behind the pre-pandemic cohort.
- Between autumn 2021 and autumn 2022 there was little change in Key Stage 2 pupils' average attainment level in **reading and maths**. This suggests children in upper **Key Stage 2** may have **caught up to pre-pandemic attainment** levels while children in Key Stage 1 and lower Key Stage 2 (who were in Key Stage 1 at the beginning of the pandemic) may still be catching up.
- **The disadvantage gap** between children eligible for the pupil premium and their peers in **GPS has reduced relative to 2021**. However, it **remains wider than prior to the pandemic in 2019**.
- For both **reading and maths**, the **disadvantage gap** between children eligible for the pupil premium and their peers has, on average**, widened for Year 6 pupils each autumn since 2020.** Further support for children eligible for the pupil premium may be required to assist with closing the gap at this crucial juncture of their schooling.

Change in attainment over time

- Over the course of the spring terms from spring 2019 to spring 2022, **two thirds of pupils** stayed in the same performance indicator band in all three subjects. For these children their attainment while transitioning between year groups (eg: Year 1 to Year 2) remained constant.
- For all three subjects:
  - During the **pre-pandemic period** (spring 2019–spring 2020) attainment **declined for a higher proportion of children** attending schools with **high levels of in-school disadvantage** than at other schools.
  - In the **mid-pandemic period** (spring 2020–spring 2021) there was in increase in the proportion of children whose attainment declined at all types of school. However, the **largest declines** were seen by children attending schools with **high levels of in-school disadvantage**.
  - By the **post-pandemic period** (spring 2021–spring 2022) there was an increase in the proportion of children whose attainment increase in all types of school. However, a much higher proportion of children attending schools with **high levels of in-school disadvantage increased** their attainment compared to children at other schools.
- The **mean standardised score** of children at schools with **high levels of in-school disadvantage was lower** than their peers' in spring 2019 for all three subjects.
- The **mean standardised score** of children at schools with high levels of in-school disadvantage **remained lower than their peers** in spring 2022 for all three subjects. Children attending schools with high levels of in-school disadvantage had larger decreases in attainment than their peers between spring 2019 and spring 2022, indicating that the attainment of this group of children was more affected by pandemic school closures than their peers. Additional support may be required at schools with high levels of in-school disadvantage to assist children with their post–pandemic recovery.

Part One: Attainment in autumn 2022

For reading and maths, where it seemed that children had caught up to pre-pandemic attainment levels by autumn 2021, there was little change in overall attainment between autumn 2021 and autumn 2022, which is not concerning. However, the same trend (little change in overall attainment between autumn 2021 and autumn 2022) in GPS **is** concerning. Children were still behind pre-pandemic attainment levels in autumn 2021, so the lack of relative attainment means that pupils in all year groups remain behind in GPS attainment.

Grammar, Punctuation and Spelling

Performance to date indicates that all children are still behind in GPS

GPS remains an area in which children in all primary school years are behind pre-pandemic (autumn 2019) levels. To help understand how differences in mean standardised score correspond to time spent learning, effect sizes were translated to months' difference using a method developed by the Education Endowment Foundation (EEF)[1]. On average, children sitting GPS (GAPS) tests in autumn 2022 are 2 months behind the pre-pandemic cohort from autumn 2019. The full breakdown of month's difference by school year can be seen in Figure 1. The larger the negative change in effect size, the larger the attainment gap caused by pandemic school closures appears to be. Month's difference (also defined by the EEF as month's progress) is a relative measure of attainment which is used to gauge how far behind or ahead a particular year group is compared to another cohort (from an earlier school year). It is not a measure of absolute academic progress.

	Autumn 2021-22		Autumn 2019-22	
School Year	Effect Size	Months' Difference	Net Effect Size	Net Months' Difference
Year 1	0.06	1	-0.12	-2
Year 2	0.03	0	-0.12	-2
Year 3	0.02	0	-0.14	-2
Year 4	-0.03	0	-0.17	-2
Year 5	-0.02	0	-0.10	-2
Year 6	-0.03	0	-0.13	-2

Figure 1: Effect sizes and months' difference for GPS (GAPS) between autumn 2019 and autumn 2022

The change in effect size for each school year can be seen in Figure 2. The grey bars show the effect size for the autumn 2019 to autumn 2020 terms, the orange bars show autumn 2020 to autumn 2021, while the blue bars show the effect size for autumn 2021 to autumn 2022. The grey bars show

1 Effect sizes were calculated by dividing the difference in standardised score points between prior and current cohorts by the standard deviation of the prior cohort. These were converted to months difference using the EEF table, see: Education Endowment Foundation (EEF), (September 2021), "Teaching and Learning: Early Years Toolkit Guide", EEF, London, pp. 6.

the initially large impact of pandemic-related school closures on GPS attainment while the orange and blue bars show the change in attainment over the subsequent years. Some improvement has occurred between autumn 2021 to autumn 2022 (where the blue bars are above zero), for Key Stage 1. Despite this, overall children in all school years are still behind pre-pandemic attainment in GPS.

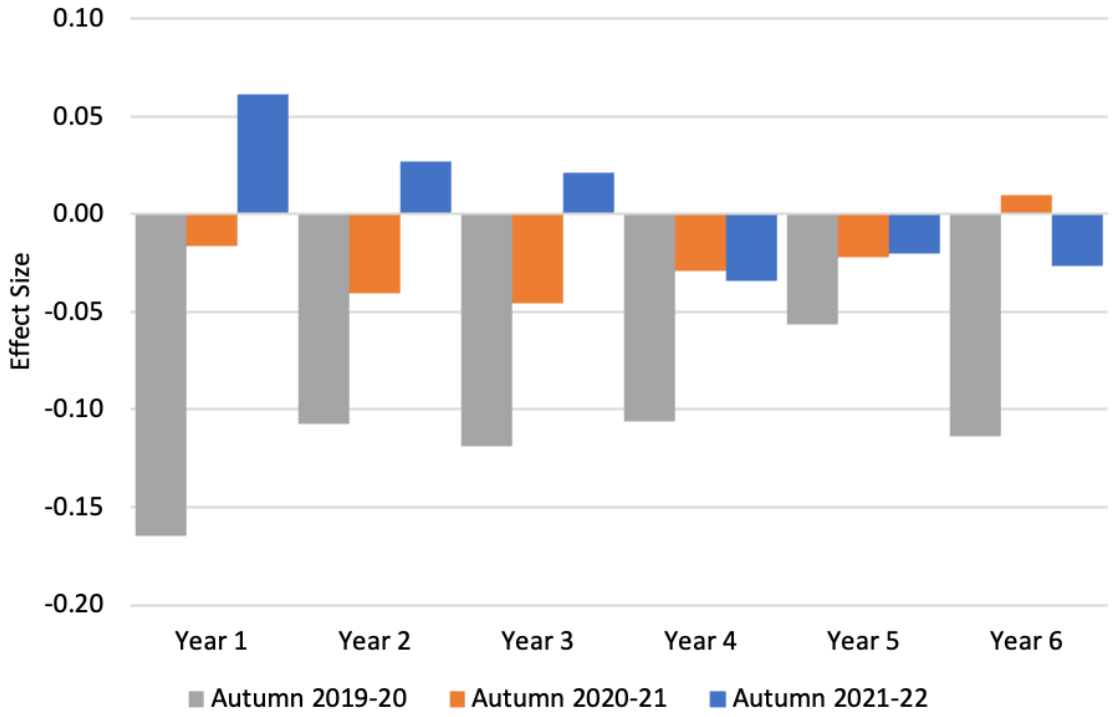

Figure 2: Effect sizes for GPS (GAPS) for autumn to autumn tests in 2019-20, 2020-21 and 2021-22

Children eligible for pupil premium still behind their peers in GPS

As seen in previous reports, even within each year group, not all children are affected equally. The same effects can also be seen in this most recent analysis. Figure 3 shows that the disadvantage gap[2] between children eligible for the pupil premium[3] and their peers remains substantial. However, on average it fell for the first time in autumn 2022 (blue bars) compared to previous autumn terms. The disadvantage gap from autumn 2021 is shown in orange, autumn 2020 is shown in grey, and the pre-pandemic disadvantage gap for autumn 2019 is shown in yellow.

In almost all year groups the gap was larger in autumn 2022 than before the pandemic. However, it reduced in most school year groups between autumn 2021 and autumn 2022. On average children eligible for pupil premium achieve scores 6.5 standardised score points lower than their peers in GPS. When converted to effect sizes, this corresponds to approximately 5 months' difference. The largest difference was for Year 2, where the gap was smaller than before the pandemic. This is encouraging because the difference between children eligible for the pupil premium and other children appears to have reduced. Although further support will likely still be needed to ensure that this trend continues.

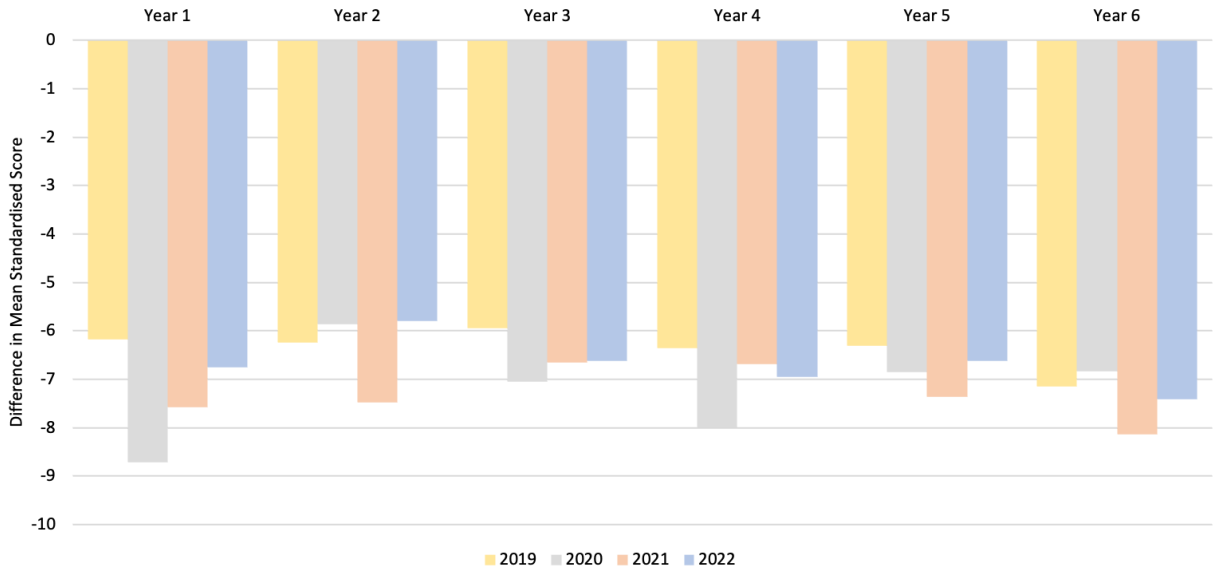

Figure 3: Difference in mean standardised score in GPS (GAPS) between children eligible for pupil premium funding and their peers for autumn 2019, 2020, 2021 and 2022

2 The disadvantage gap is defined as the difference in test scores between children who are disadvantaged (based on their pupil premium status or the high percentage of free school meal eligibility at their school) compared to children who are not disadvantaged.

3 Only pupils attending schools with overall Pupil Premium percentages in MARK that were broadly consistent with the proportion reported publicly for that school by the Department for Education were included in this analysis. Pupils with unknown Pupil Premium status were also excluded.

To look at the level of in-school disadvantage, pupils' attainment results were grouped by the percentage of children receiving Free School Meals (FSM) at their school. This can be seen in Figure 4. The blue bars represent children at schools where in-school disadvantage was low (low FSM %); the orange bars represent a medium level of in-school disadvantage (medium FSM %) and the grey bars indicate a high level of in-school disadvantage (high FSM %). For more details on this please see Appendix (page 39).

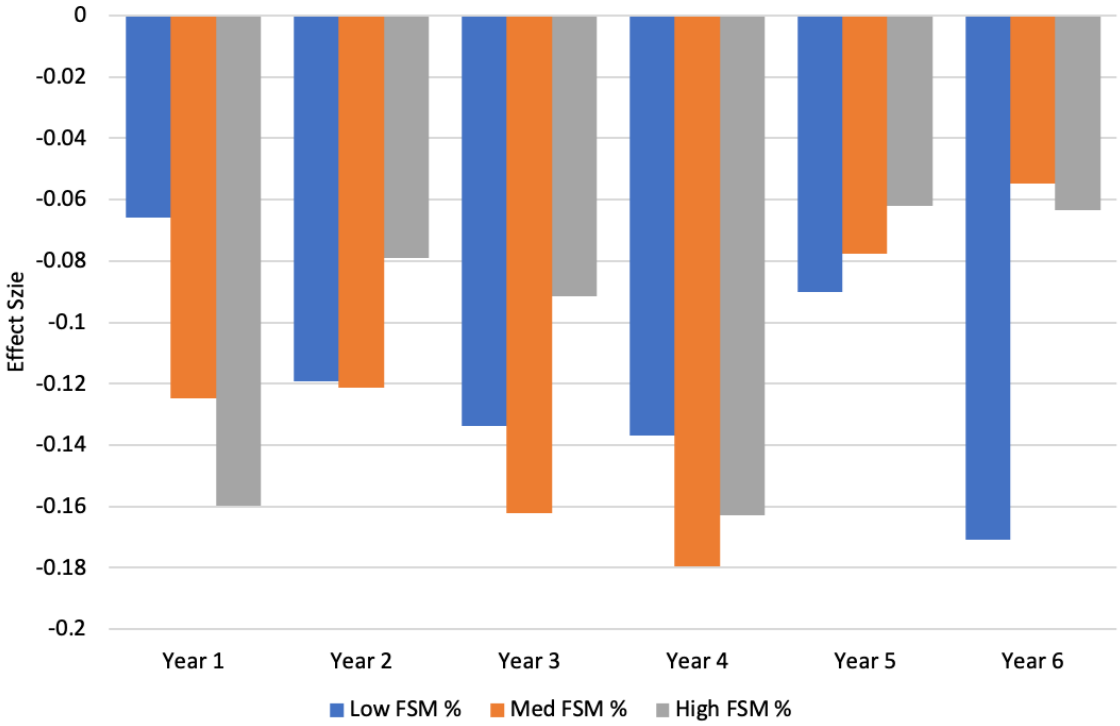

Figure 4: Effect size in GPS (GAPS) by level of in-school disadvantage between autumn 2019 and autumn 2022

Figure 4 shows that on the whole children at medium and low FSM percentage schools in autumn 2022 appear to be more behind their pre-pandemic counterparts than children at high FSM percentage schools. The mean standardised score for children at low FSM schools dropped more between autumn 2019 and 2022 than for children at other types of school. Despite this, their mean scores were still higher than children at high FSM percentage schools.

In additional analysis of mean standardised scores between autumn 2021 and autumn 2022, children at high FSM percentage schools showed the largest improvement in attainment. The difference between children at high and low FSM percentage schools remained at 5 standardised score points on average. When converted to effect sizes, this corresponded to children at schools with high levels of in school disadvantage being approximately 4 months behind their peers.

Children in the North of England are further behind their peers in GPS

There is also regional variation in pupils' attainment. Figure 5 shows GPS effect sizes for regional groups between autumn 2019 (pre-pandemic) and autumn 2022. The three regional groups are North (comprising schools in the North East, North West and Yorkshire and The Humber), Midlands (East Midlands and West Midlands) and South (East of England, London, South East and South West). This chart indicates that, on average, pupils in the North remain further behind their peers while children in Year 2 in the Midlands appears to be almost back at pre-pandemic attainment levels.

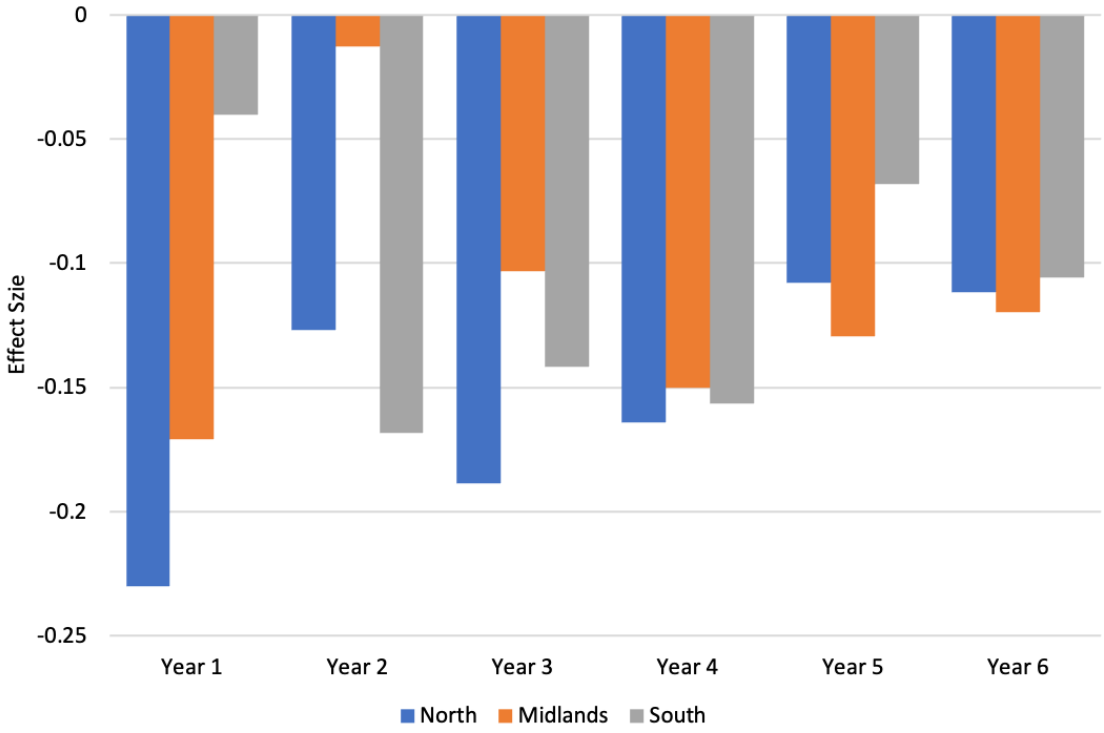

Figure 5: Effect size in GPS (GAPS) by region between autumn 2019 and autumn 2022

Reading

Key stage 2 pupils' reading attainment has improved since autumn 2020

There was little change in performance for children in all primary school years between autumn 2021 and autumn 2022 in reading. This indicated that they remained at the same level of attainment in autumn 2022 as they were in autumn 2021. On average, children sitting reading (New PiRA) tests in autumn 2022 were less than a month ahead of the cohort from autumn 2020. This does not take into account the initial impact of pandemic related school closures in the spring 2020 term, but instead indicates the change in attainment made by children since the pandemic. The full breakdown of months' difference by school year can be seen in Figure 6. Key Stage 2 showed more improvement than Key Stage 1.

	Autumn 2021-22		Autumn 2020-22	
School Year	Effect Size	Months' Difference	Net Effect Size	Net Months' Difference
Year 1	0.01	0	0.00	0
Year 2	0.02	0	0.00	0
Year 3	0.03	0	0.08	1
Year 4	0.03	0	0.07	1
Year 5	0.00	0	0.07	1
Year 6	-0.03	0	0.03	0

Figure 6: Effect sizes and months' difference for reading (New PiRA) for autumn 2020 to autumn 2022

The change in effect size for each school year can be seen in Figure 7. The left hand side of Figure 7 shows PiRA reading tests to show the pre-pandemic effect size for the autumn 2019 to autumn 2020 terms in grey. The right hand side of Figure 7 shows the New PiRA reading tests to show the effect sizes in orange for autumn 2020 to autumn 2021 and blue for autumn 2021 to autumn 2022. Although these tests are similar, and allow for comparisons in overall trends, New PiRA was updated and re-standardised to reflect current teaching practices. For more information, please see the Appendix (page 37).

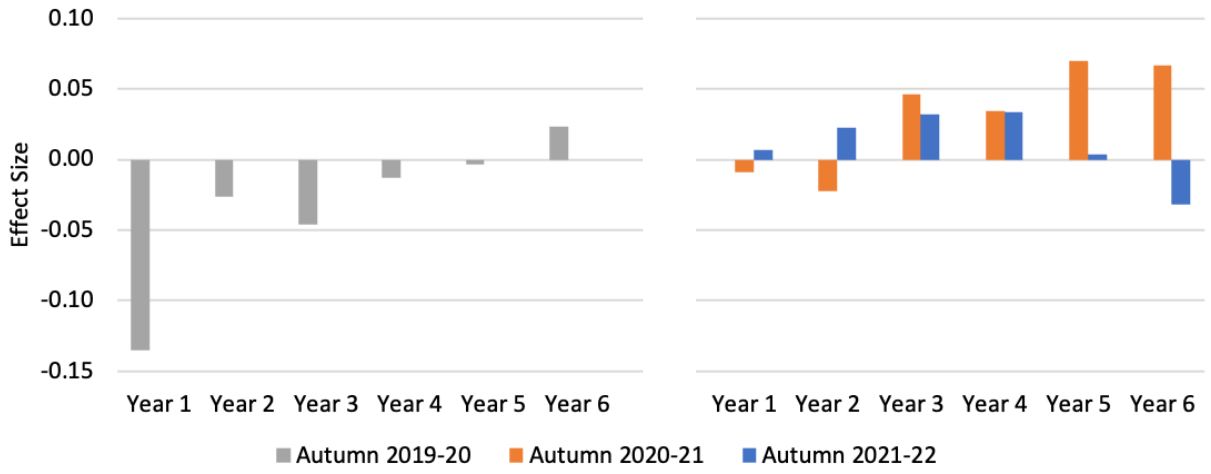

Figure 7: Effect sizes for reading (PiRA) for autumn 2019 to autumn 2020 (left) and for reading (New PIRA) for autumn to autumn tests in 2020-21 and 2021-22 (right)

The grey bars show the initially large impact of pandemic-related school closures on reading attainment, with the orange and blue bars indicating the improvement in attainment over the subsequent years. Figure 7 shows that the largest decrease in attainment was felt by Key Stage 1 and in particular Year 1 between autumn 2019-20. Children who were in Key Stage 1 in autumn 2020 are in Years 3 and 4 in autumn 2021 and 2022. The right hand side of Figure 7 shows that there is a small positive effect size for these children. This indicates that only modest improvement had occurred for these pupils. Although a direct comparison of results is not appropriate given the change in reading tests, it is likely that these children in lower Key Stage 2 may still be behind the attainment level expected prior to the pandemic.

Children in Key Stage 1 in autumn 2021 and 2022 were not in school during the pandemic and their attainment over the course of autumn 2021 to autumn 2022 has stayed broadly similar. Monitoring the attainment levels of these year groups over time will show whether national lockdowns, which prevented face-to-face teaching and socialisation with peers, have impacted reading attainment for these cohorts in the longer term.

Disadvantage gap increases for Year 6 pupils in reading

The reading disadvantage gap between children eligible for pupil premium and their peers remains substantial. On average it stayed the same in autumn 2021 and autumn 2022 but remains smaller than it was in autumn 2020 (shown as grey bars in Figure 8). The disadvantage gap from autumn 2021 is shown in orange and autumn 2022 is shown in blue.

Figure 8 shows that, in almost all year groups, the disadvantage gap was smaller in autumn 2022 than in autumn 2020. On average children eligible for pupil premium achieve scores 7 standardised score points in reading lower than their peers. When converted to effect sizes, this corresponds to being approximately 6 months behind them. Concerningly, however, the difference has increased in each consecutive year for Year 6. The difference between children eligible for pupil premium and children who are not is now largest for Year 6. Although the cohorts of children are different in each year, and the increase in the gap may be due to this or the effect of having national tests in reading at the end of Year 6, additional support may be needed to close this gap and assist Year 6 children eligible for pupil premium at this crucial juncture.

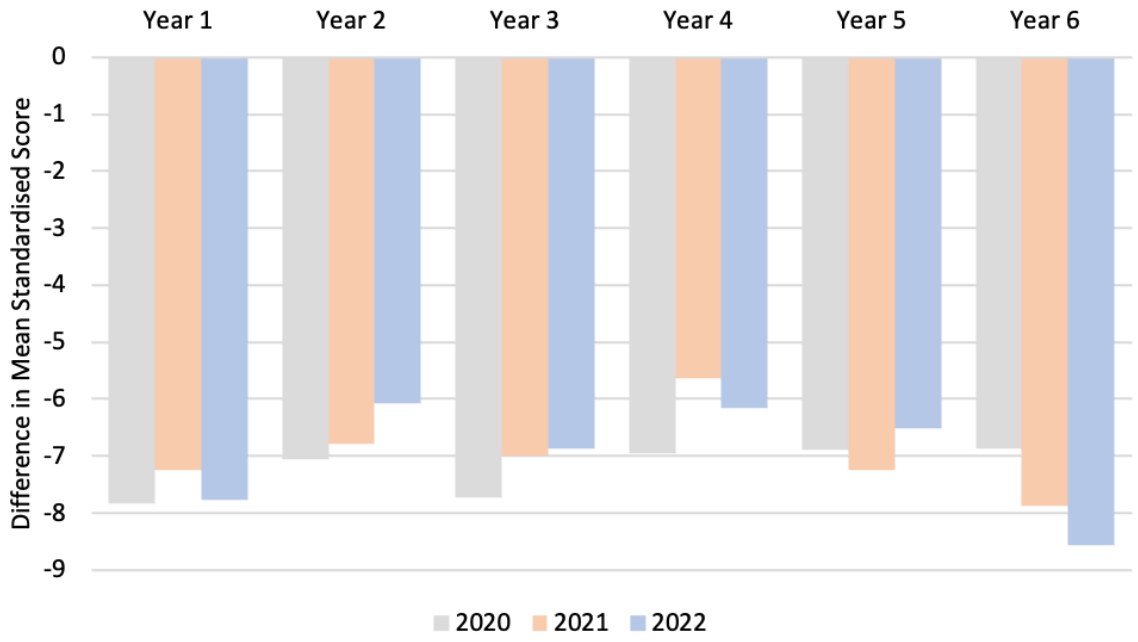

Figure 8: Difference in mean standardised score in reading (New PiRA) between children eligible for pupil premium and their peers for autumn 2020, 2021 and 2022

To look at the current level of in-school disadvantage, pupils' attainment results were grouped by the percentage of children receiving Free School Meals (FSM) at their school. This can be seen in Figure 9 which looks at data from autumn 2020 to autumn 2022 using the New PiRA tests. Due to the change in reading tests (Appendix page 37), this figure does not take into account the initial impact of the pandemic from spring 2020 but instead looks at changes from the middle of the pandemic. The blue bars represent children at schools where in-school disadvantage was low, orange bars indicate a medium level and grey bars indicate a high level of in-school disadvantage. Please note that children in Year 6 at low FSM schools showed an effect size of zero.

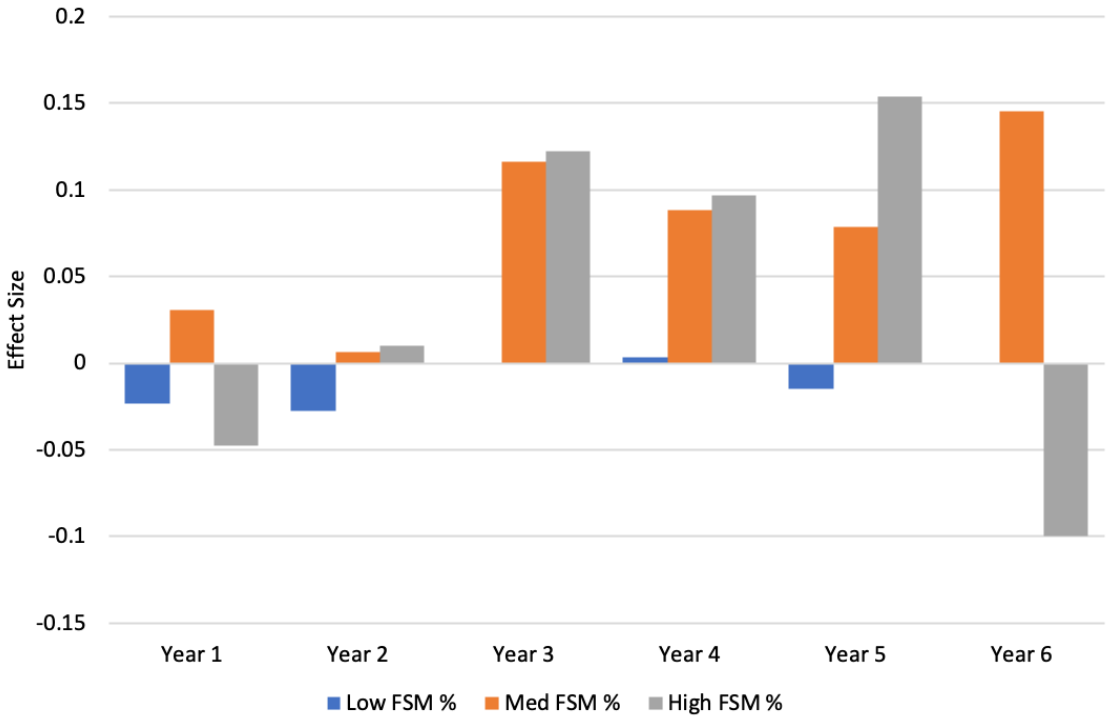

Figure 9: Effect size in reading (New PiRA) by level of in-school disadvantage between autumn 2020 and autumn 2022

Figure 9 generally shows that children at high and medium FSM percentage schools in autumn 2022 obtained higher test results than their autumn 2020 counterparts (indicated by large positive effect sizes) than children at low FSM percentage schools achieved against their 2020 counterparts. In contrast, children at low FSM percentage schools appear to have broadly consistent attainment (small effect sizes) between autumn 2020 and 2022.

While the improvement (large positive effect size) of pupils at schools with high and medium FSM percentages is encouraging, additional analysis revealed that these children still consistently have lower mean standardised scores on average than children at schools with low FSM percentage by 4 standardised score points. When converted to effect sizes, this corresponding to 4 months behind. They also have lower mean standardised scores than children attending schools with medium FSM percentage by 1 standardised score point. When converted to effect sizes, this corresponds to 1 month behind. Therefore, further improvement is necessary for them to be attaining at similar levels.

Key Stage 1 children in the North of England are behind their peers in reading

There is also regional variation to pupils' attainment. Figure 10 shows reading effect sizes for regional groups between autumn 2020 and autumn 2022. As with the disadvantage data, this data is from autumn 2020 to autumn 2022 using the New PiRA tests. Due to the change in reading tests (Appendix page 37), this figure does not take into account the initial impact of the pandemic from spring 2020 but instead looks at changes from the middle of the pandemic. The three regional groups are shown in blue for the North, orange for the Midlands and grey for the South. This chart indicates that, on average, Key Stage 1 pupils at schools in the North remain further behind their peers, particularly in Year 1. Pupils in the South have shown improvement across all year groups.

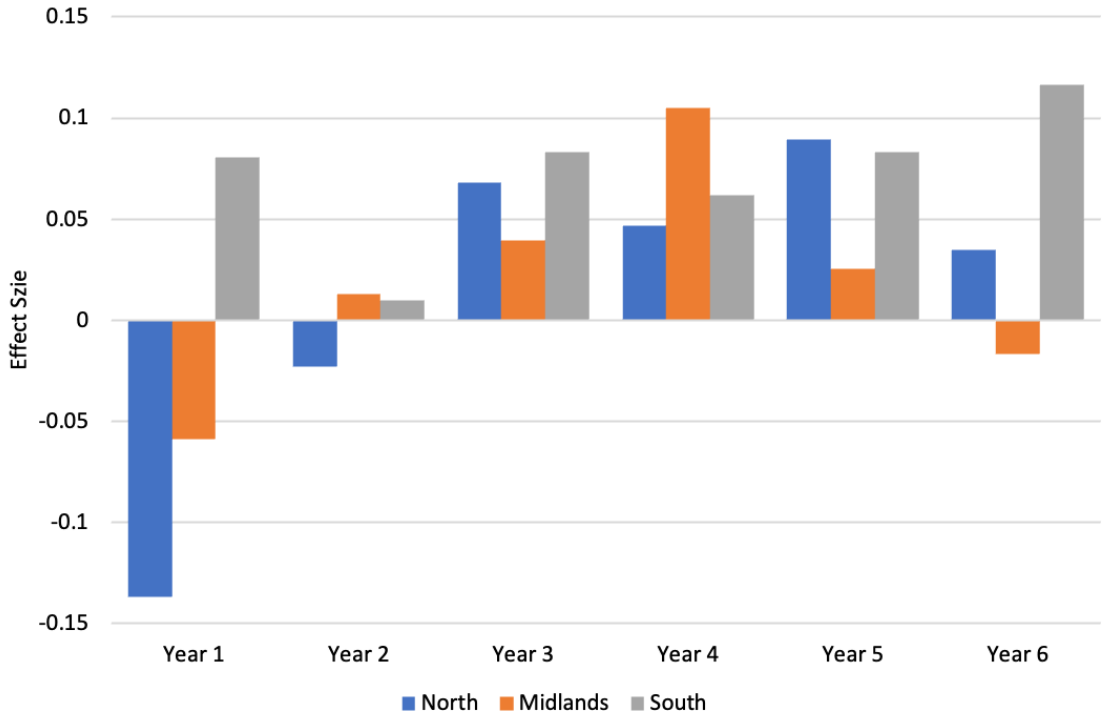

Figure 10: Effect size in reading (New PiRA) by region between autumn 2020 and autumn 2022

Maths

Key stage 2 children's maths attainment has improved since autumn 2020

Children in Year 3 and 4 made 1 month's improvement in attainment autumn 2022 compared to the same years in autumn 2021. Other year groups remained at the same level of attainment in autumn 2022 as they were in autumn 2021.

Children most affected by pandemic school closures were in Key Stage 1 in autumn 2020. These children were in Years 3 and 4 in autumn 2021 and 2022 and the change in their attainment between autumn 2021 and autumn 2022 likely reflects the reversal of learning loss caused during the pandemic. On average, children sitting maths (New PUMA) tests in autumn 2022 were just over a month ahead of the autumn 2020 cohort. Key Stage 2 showed more improvement than Key Stage 1. The larger the positive change in effect size, the more the attainment gap has been reduced. This does not take into account the initial impact of pandemic related school closures in the spring 2020 term, but instead indicates the changes in attainment made by children since the pandemic. The full breakdown of month's difference by school year can be seen in Figure 11.

	Autumn 2021-22		Autumn 2020-22	
School Year	**Effect Size**	**Months' Difference**	**Net Effect Size**	**Net Months' Difference**
Year 1	0.00	0	0.00	0
Year 2	0.05	0	0.07	1
Year 3	0.06	1	0.10	2
Year 4	0.06	1	0.08	1
Year 5	0.04	0	0.07	1
Year 6	0.04	0	0.09	1

Figure 11: Effect sizes and months' difference for maths (New PUMA) for autumn 2020 to autumn 2022

The change in effect size for each school year can be seen in Figure 12. The left hand side of Figure 12 shows PUMA maths tests to show effect sizes for the autumn 2019 to autumn 2020 terms in grey. The right hand side of Figure 12 the New PUMA maths tests to show the effect sizes in orange for autumn 2020 to autumn 2021 and blue for autumn 2021 to autumn 2022. Although these tests are similar, and allow for comparisons in overall trends, New PUMA was updated and re-standardised to reflect current teaching practices. For more information, please see the Appendix (page 37).

The grey bars show the initially large impact of pandemic-related school closures on reading attainment, with the orange and blue bars showing the improvement in attainment over the subsequent years. Figure 12 shows that large decreases in attainment were visible across all primary year groups between autumn 2019 and 2020. It can be seen from the orange and blue bars on the right hand side of Figure 12 that the changes were positive for children in Year 2 and above, and that between autumn 2021 and autumn 2022 the largest effect sizes were for Years 3 and 4.

Children in Year 1 in autumn 2022 were not in school during the pandemic. However, the right hand side of Figure 12 shows that the attainment of children starting Key Stage 1 in autumn 2021 (towards the end of the pandemic period) and autumn 2022 has stayed broadly consistent. Monitoring the attainment levels of Key Stage 1 pupils over time will show whether national lockdowns that prevented early-years socialisation have impacted later maths attainment at Key Stage 1.

Although a direct comparison of results is not appropriate given the change in maths tests, it is likely that these children in Key Stage 2 caught up to approximately pre-pandemic levels of attainment.

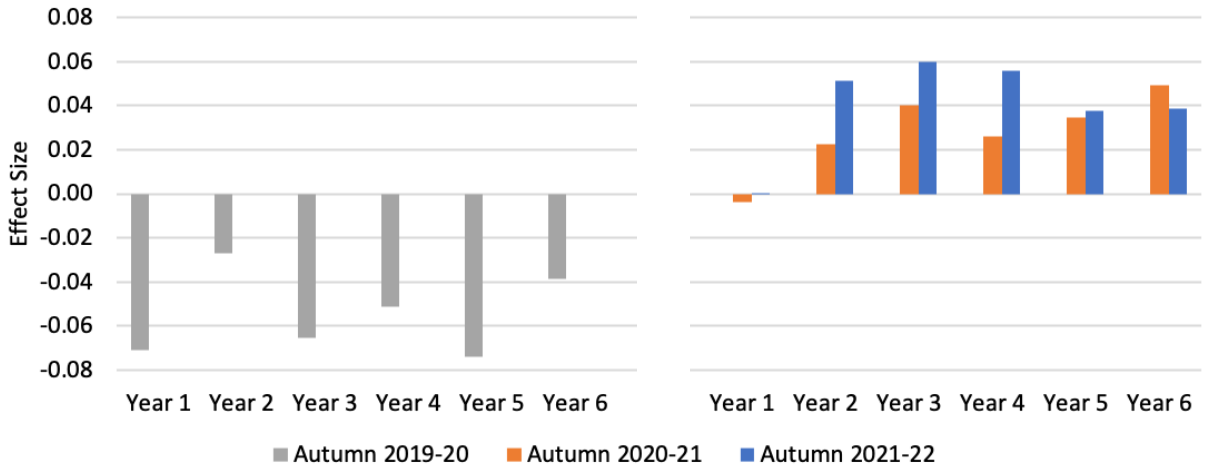

Figure 12: Effect sizes for maths (PUMA) for autumn 2019 to autumn 2020 (left)) and for maths (New PUMA) for autumn to autumn tests in 2020-21 and 2021-22 (right)

Disadvantage gap in maths increased for children in Year 1 and Year 6

The maths disadvantage gap between children eligible for the pupil premium and their peers also remained substantial. On average, the gap was larger in autumn 2021 and autumn 2022 than it was in autumn 2020 (shown as grey bars in Figure 13). The disadvantage gap in autumn 2021 is shown in orange and autumn 2022 is shown in blue.

Figure 13 shows that, for Years 2 to 5, the gap was smaller in autumn 2022 than in autumn 2020. On average children eligible for pupil premium scored 7 standardised score points in maths lower than their peers. When converted to effect sizes, this corresponds to being approximately 6 months behind them. Concerningly, however, it has increased in each consecutive year for both Year 1 and Year 6. The difference between children eligible for pupil premium and children who are not is almost two standardised score points larger for Year 1 and Year 6 than for other years, and it is largest for Year 6. Although the cohorts of children are different in each year, and the increase in the gap may be due to this or the effect of having national tests in maths at the end of Year 6, additional support may be needed to close this gap and assist children eligible for pupil premium at this crucial juncture.

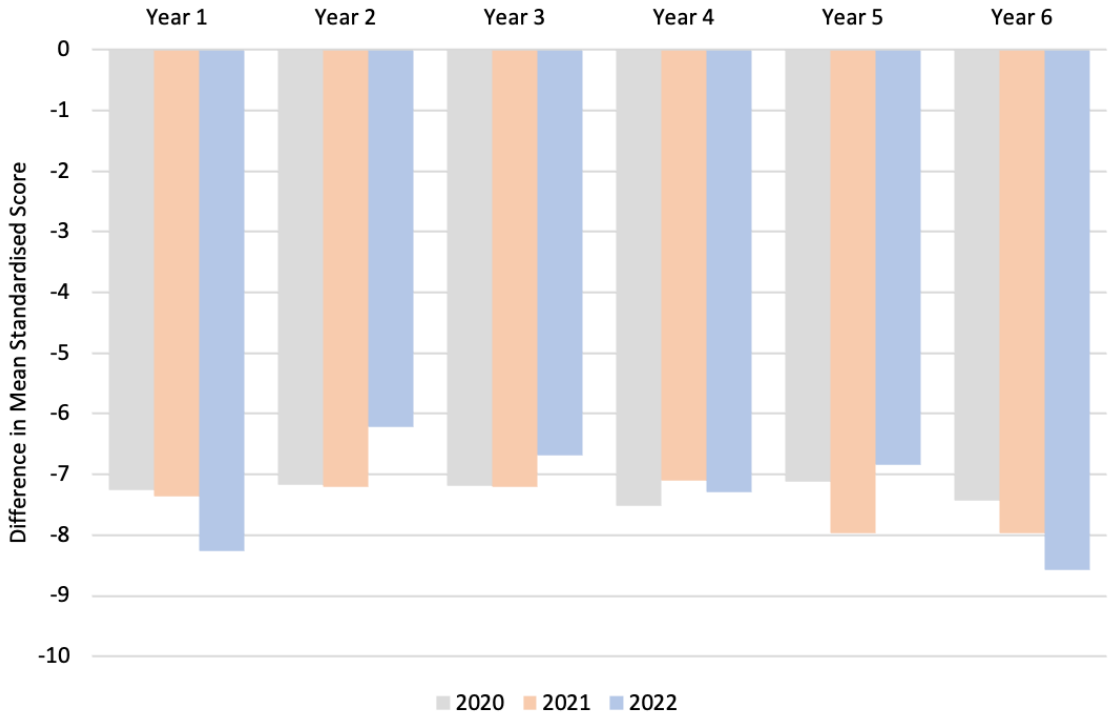

Figure 13: Difference in mean standardised score in maths (New PUMA) between pupil premium children and their peers for autumn 2020, 2021 and 2022

Looking at the level of in-school disadvantage, pupils' attainment results were grouped by the percentage of children receiving Free School Meals (FSM) at their school. This can be seen in Figure 14. In contrast to GPS, this data is from autumn 2020 to autumn 2022 using the New PUMA tests. Due to the change in maths tests (Appendix page 37), this figure does not take into account the initial impact of the pandemic from spring 2020 but instead looks at changes from the middle of the pandemic The blue bars represent children at schools where in-school disadvantage was low, orange bars represent those with a medium level of disadvantage and grey bars show those with a high level of in-school disadvantage.

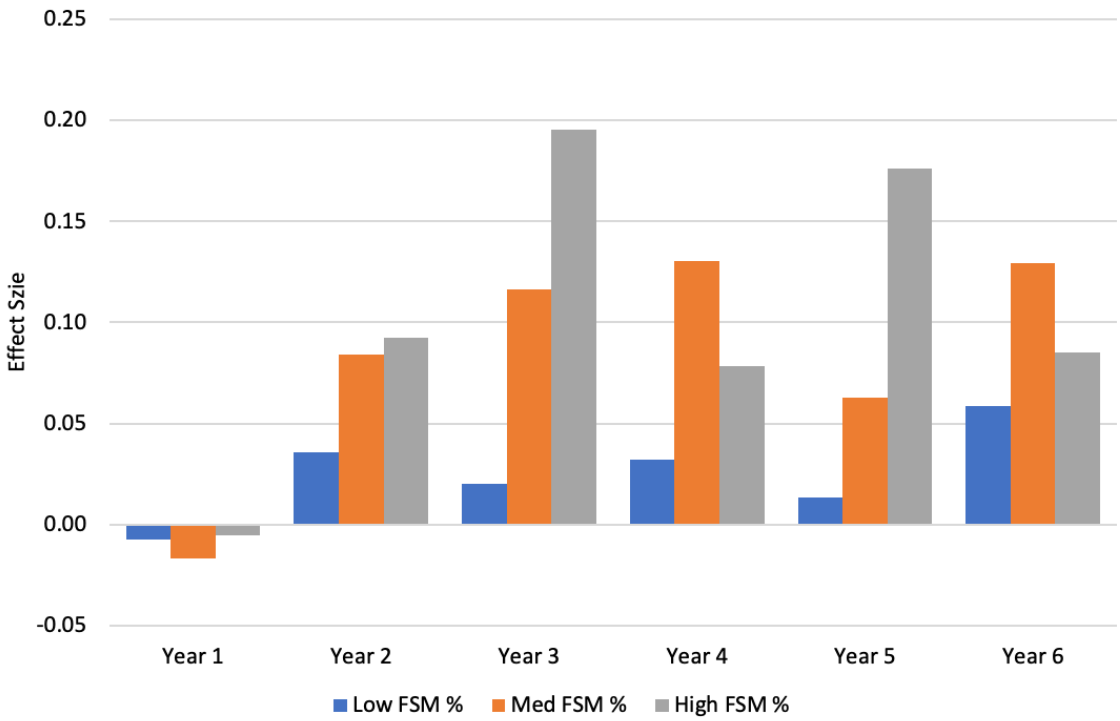

Figure 14: Effect size in maths (New PUMA) by level of in-school disadvantage between autumn 2020 and autumn 2022

Figure 14 shows a similar story to that for reading: children at high and medium FSM percentage schools in autumn 2022 obtained higher test results than their autumn 2020 counterparts (indicated by large positive effect sizes) than children at low FSM percentage schools achieved against their 2020 counterparts. This was most noticeable for pupils in Year 3. As mentioned previously, Year 3 was one of the year groups most affected by pandemic-related school closures in autumn 2020. Year 1 children in all school types appeared to maintain consistent test results (i.e., the effect sizes were small). By contrast, children at low FSM schools have small effect sizes indicating not many months' difference in attainment between autumn 2020 and autumn 2022.

While the improvement of pupils at schools with high and medium FSM percentages is encouraging, additional analysis indicated that children at high FSM percentage schools still had lower mean standardised scores than children at schools with low FSM percentages by 6 standardised score points, which corresponds to being 5 months behind when converted to effect sizes. Compared to children at medium FSM percentage schools, children at high FSM percentage schools had means 2 standardised score points lower which, when converted to effect sizes, corresponds to 2 months behind. This was larger than the gap for reading. Further improvement in attainment is necessary for children in high FSM schools to reach similar attainment levels as their peers at low FSM schools.

Regional differences in attainment

There is also regional variation in maths attainment. Figure 15 shows maths effect sizes for regional groups between autumn 2020 and autumn 2022. As with the disadvantage data, this data is from autumn 2020 to autumn 2022 using the New PUMA tests. Due to the change in maths tests (Appendix page 37), this figure does not take into account the initial impact of the pandemic from spring 2020 but instead looks at changes from the middle of the pandemic. The three regional groups are shown in blue for the North, orange for the Midlands and grey for the South. Figure 15 indicates that children at schools in the Midlands made the least improvement between autumn 2020 and autumn 2022, particularly in Year 1 and Year 5, where attainment in autumn 2022 was below that in autumn 2020. In contrast to reading and GPS, children at schools in the North made the largest improvement in maths over this period.

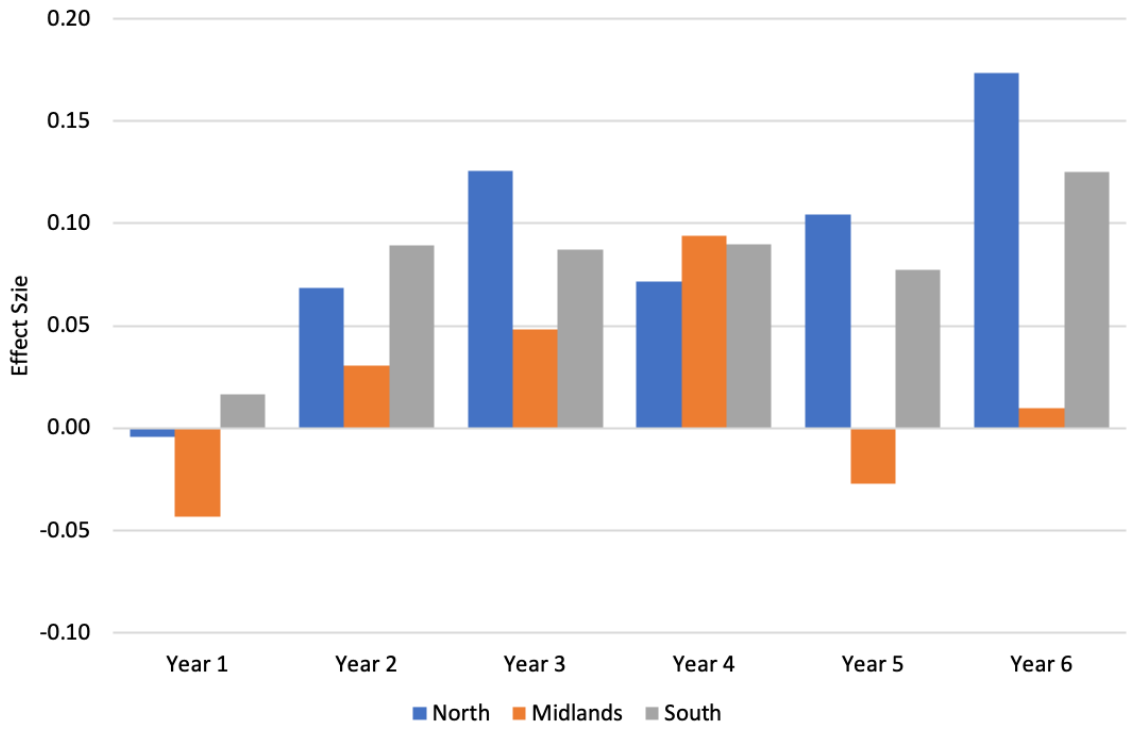

Figure 15: Effect size in maths (New PUMA) by region between autumn 2020 and autumn 2022

Part Two: Change in attainment over time

The analysis in the first part of this paper focused on termly attainment data. The second part of this paper looks at the change in attainment over the period of the pandemic. It uses results from approximately 215,000 primary school tests taken at about 500 state primary schools in England between spring 2019 and spring 2022 To ensure consistency across the years being compared, the reading and maths results used in this analysis were the 'old' unchanged versions of PUMA for maths and PiRA for reading. The GPS tests (GAPS) used are the same as in the first part of this paper.

The spring term tests were used because these provide the largest and most consistent data across all three core time periods considered. These were:

- Pre-pandemic – spring 2019 to spring 2020
- Mid-pandemic – spring 2020 to spring 2021
- Post-pandemic – spring 2021 to spring 2022

In calculating changes from one year to the next, only results from pupils who had sat a test in both spring terms were included. For example, for data to be included in the pre-pandemic period, the pupil must have valid test results in both spring 2019 and spring 2020. This meant that children's progress in transitioning between years (for example Year 1 to Year 2) could be tracked.

Additionally, to enable consistent analysis of progress from year to year, all test results (standardised scores) were allocated a **performance indicator (PI) band**. The PI bands provide schools with an indicator of likely success in national Standardised Assessment Tests (SATs). The PI band thresholds were derived from statistical correlations between pupils' test scores and their actual national test results. The bands are:

- Working towards the expected standard
- Working at the expected standard
- Working at greater depth

Progress groups were assigned using each pupils' PI band across the two spring tests for each period. For example, for the pre-pandemic period, each pupil included in analysis would have a performance indicator for spring 2019 and spring 2020, and these would be used to allocate them to a progress group. Three overall progress groups were defined based on PI bands in consecutive spring terms:

- Growth – where children moved up from one PI band to a higher one
- Continuity – where children remained in the same PI band
- Decline – where children dropped down from one PI band to a lower one

Using progress groups instead of performance indicators or standardised scores (and hence effect sizes) allows for comparison across year groups since, unlike the other metrics, PI levels are consistent for each subject across primary school year groups. Please see Appendix (page 39) for additional information about this.

The following analysis takes the distribution of progress groups in each time period (pre-, mid- and post-pandemic) and then looks at the change in distribution from pre- to mid-pandemic and mid- to post-pandemic, by year group and disadvantage status.

Grammar, Punctuation and Spelling

The majority of children maintained consistent attainment throughout the pandemic in GPS

The pre-pandemic period was used as a baseline to indicate typical progress on a term-to-term basis. Compared to this, there was an increase in the proportion of pupils in the decline group during the mid-pandemic, then an increase in the proportion of pupils in the growth group during the post-pandemic period. This can be seen in Figure 16.

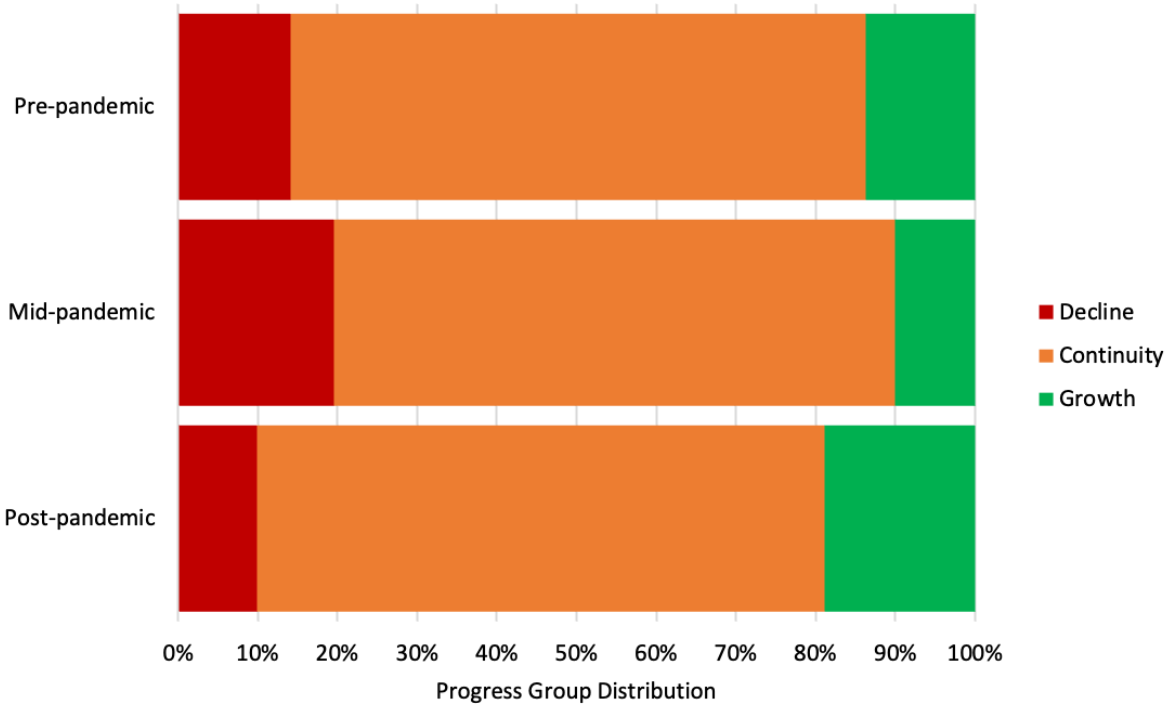

Figure 16: Distribution of progress groups throughout the pandemic for GPS (GAPS)

The changes in progress group distribution correspond to the drops in attainment seen at the start of the pandemic and during school closures, with a subsequent recovery in attainment since the end of the pandemic-related school closures. The largest changes occurred in the growth and decline groups. In contrast, the proportion of children in the continuity group remained relatively stable throughout the pandemic periods and averaged 71.2 %, fluctuating by only 1-2 percentage points over time.

Children sitting GPS tests in the post-pandemic period had lower mean standardised scores than children sitting GPS tests in the pre-pandemic period. When converted to effect sizes, this drop corresponds to children being approximately 2 months behind in spring 2022 compared to spring 2019.

There are differences in the change in attainment for children transitioning between different school years in GPS

Figure 17 shows that, in the pre-pandemic period, pupils progressing from Year 1 to Year 2, through to Year 5 to Year 6, had similar distributions between the three progress groups for GPS. The growth group is presented in green, continuity in orange and decline in red. The most notable exception is a higher proportion of pupils in the decline group who were transitioning from Year 5 to Year 6 in the mid-pandemic period. In the post-pandemic period, there is no corresponding growth in percentage of children whose performance improved for the group transitioning from Year 5 to Year 6.

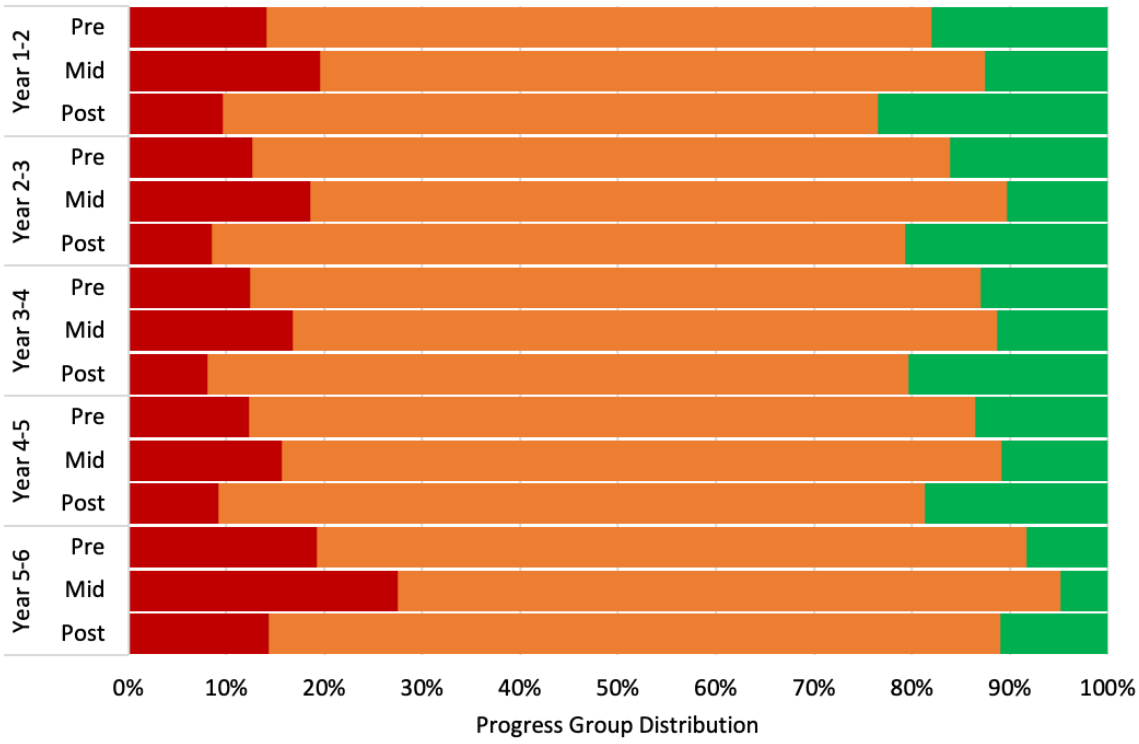

Figure 17: Distribution of progress groups for GPS (GAPS) by year group transition throughout the pandemic

Children at schools with high levels of in-school disadvantage saw larger fluctuations in attainment over the course of the pandemic in GPS

The change in progress group distribution by level of in-school disadvantage (by using percentage of children eligible for free school meals (FSM) as a proxy) was also considered. Figure 18 shows that, similar trends to those seen for year groups. The proportion of pupils in the decline group increased in the mid-pandemic period and then decreased in the post-pandemic period. By contrast, the proportion of pupils in the growth group decreased in the mid-pandemic period and then increased in the post-pandemic period.

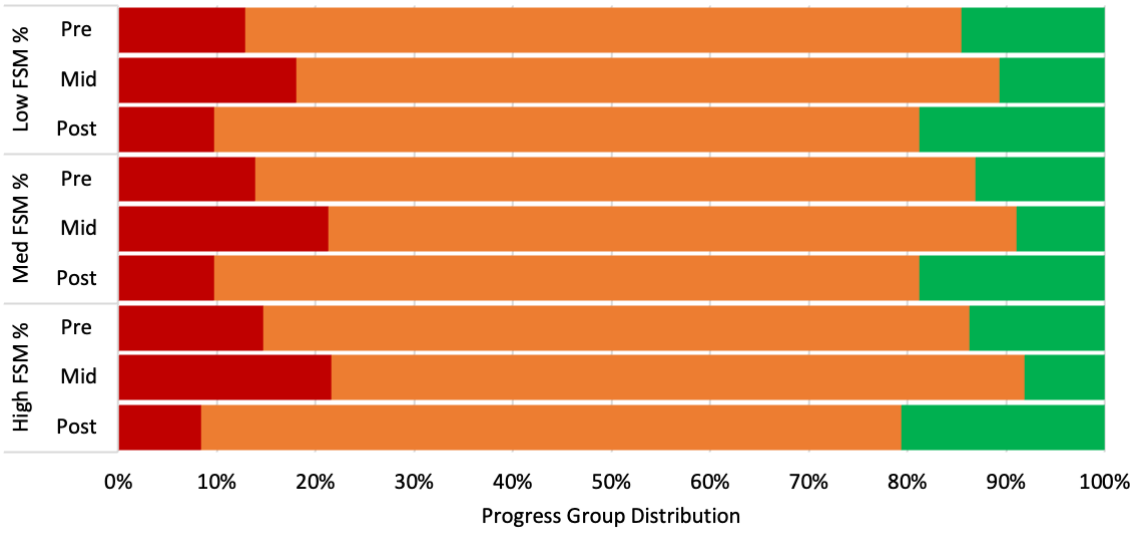

Figure 18: Distribution of progress groups for GPS (GAPS) by in-school disadvantage level throughout the pandemic

Figures 19 and 20 illustrate the changes in progress group distribution from Figure 18 more clearly. They highlight the year-on-year changes by level of in-school disadvantage. For instance, Figure 19 shows the changes in the distributions of pupils who moved into the decline, continuity or growth groups from pre- to mid-pandemic. It shows that schools with the highest levels of disadvantage had the most pupils who dropped from the growth group, the highest number of pupils who moved into the decline group during the first part of the pandemic, but also the highest proportion of pupils who reversed that trend between the mid- to post-pandemic periods, as shown in Figure 20.

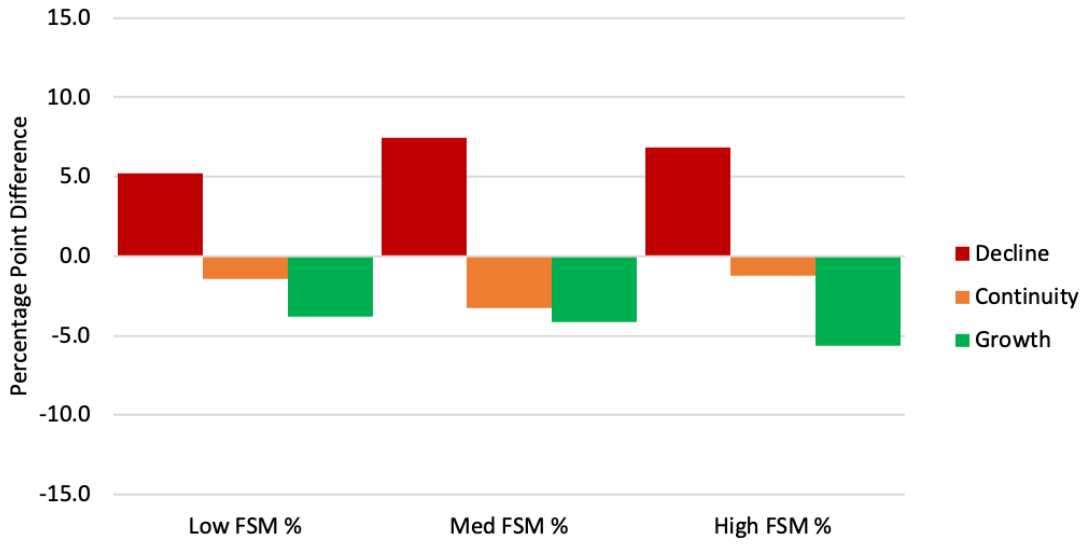

Figure 19: Changes in progress groups by in-school disadvantage level for GPS (GAPS) from pre-pandemic to mid-pandemic

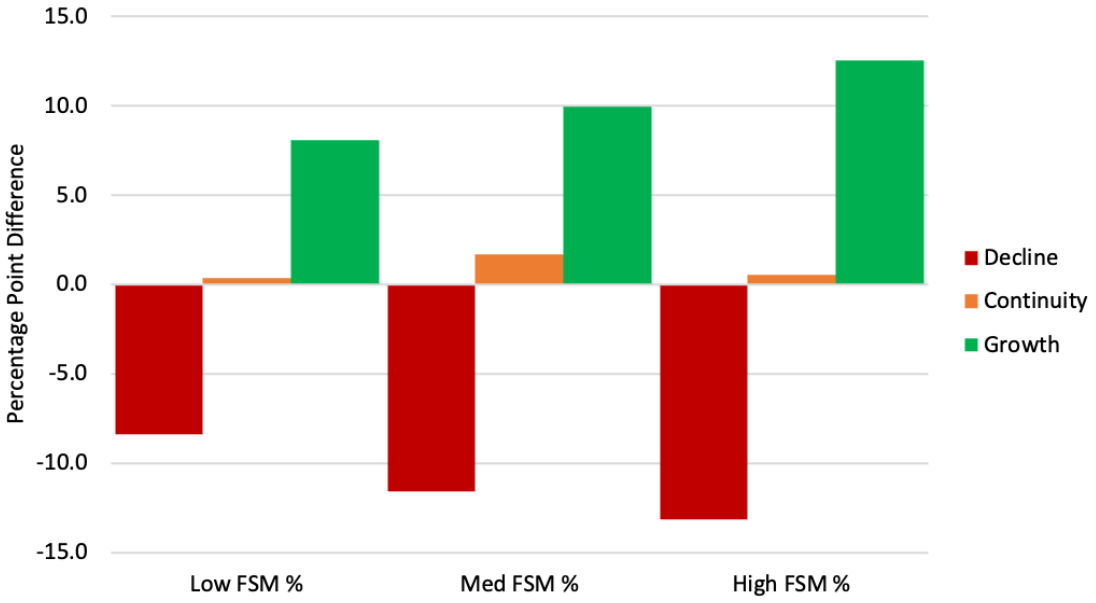

Figure 20: Changes in progress groups by in-school disadvantage level for GPS (GAPS) from mid-pandemic to post-pandemic

When looking at in-school disadvantage by progress group, the increase in the number of pupils in the growth progress group post-pandemic as seen in Figure 20 masks the fact that the attainment of these children is often below their peers to begin with. Despite the increase in attainment between autumn 2021 and autumn 2022, and the increase in the number of pupils in the growth progress group, children at schools with high levels of in-school disadvantage are still obtaining lower standardised scores than children at schools with low levels of disadvantage. This is true even in the growth progress group and can be seen across all time periods.

Analysis of mean standardised scores showed that children at all types of schools had lower GPS standardised scores in spring 2022 than spring 2019. Children at schools with high FSM percentage had the largest decrease in mean standardised score over the period. These children were approximately 3 standardised score points behind the spring 2019 attainment level. When converted to effect size, this corresponds to being approximately 3 months behind.

Reading

The majority of children maintained consistent attainment throughout the pandemic in reading

There was an increase in the proportion of pupils in the decline group during the mid-pandemic period compared to the pre-pandemic period, followed by an increase in the proportion of pupils in the growth group during the post-pandemic period. This can be seen in Figure 21. The largest changes occurred in the growth and decline groups. By contrast, the proportion of pupils in the continuity group throughout the three time periods remained relatively stable, starting at 65.4 % pre-pandemic and fluctuating approximately 1 percentage point over time.

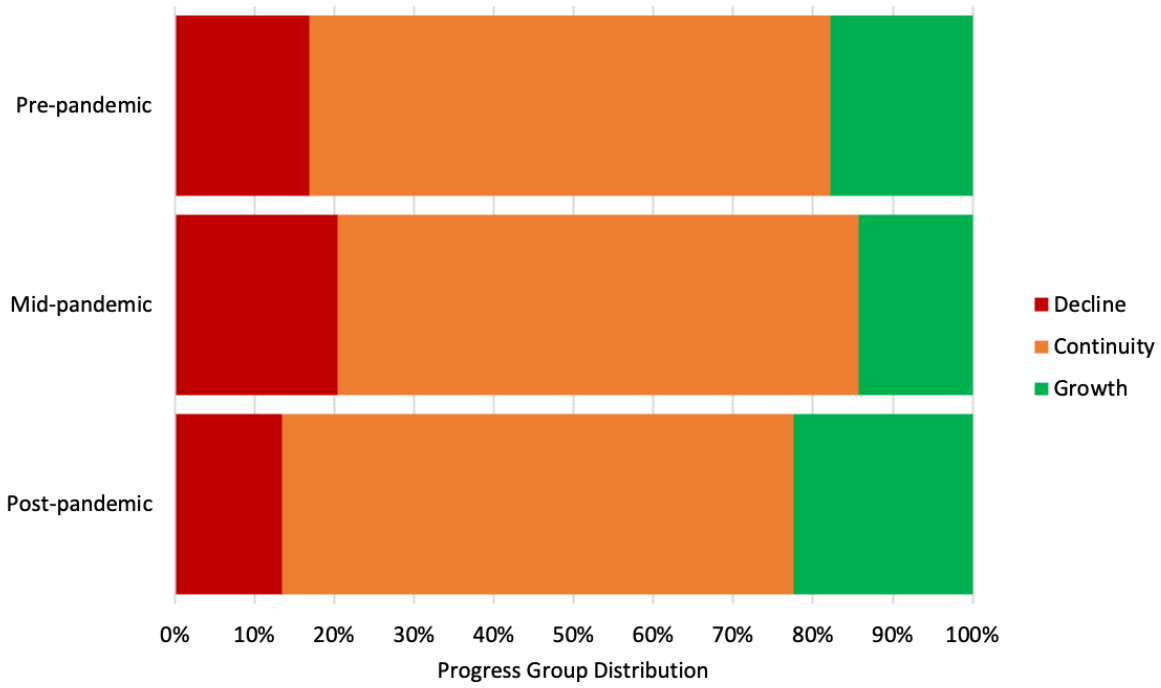

Figure 21: Distribution of progress groups throughout the pandemic for reading (PiRA)

The impact of the pandemic on reading was smaller overall than for GPS, this is due to uneven distribution across the year groups. Children in Key Stage 1 had lower standardised scores in the post-pandemic period compared to pre-pandemic and when converted to effect size, were approximately 1 month behind in spring 2022 compared to spring 2019. By contrast children in Key Stage 2 had higher standardised scores in spring 2022 compared to spring 2019 and were approximately 2 months ahead, when converted to effect size, in spring 2022 compared to spring 2019.

Children transitioning from Year 1 to Year 2 in 2021 showed the smallest post-pandemic recovery in reading

Reading had similar distributions between the three progress groups for all subjects and year groups. The increase in proportions of pupils in the growth group was particularly large for those transitioning from Year 5 to Year 6. The breakdown of progress groups in reading by year group transition can be seen for each time period in Figure 22. Figure 22 also shows that the Year 1 to Year 2 transition had the smallest post-pandemic recovery (the cohort of pupils who transitioned from Year 1 to Year 2 in 2021). This is a group whose reading instruction was most disrupted in the early reading phase[4]. By contrast, pupils in the Year 5 to Year 6 transition group showed a large post-pandemic recovery (largest increase in the growth category). These pupils were facing their SATs and, these results suggest that they may have received additional effective support in anticipation of their national tests. In addition, the majority of these children will likely have had a secure reading foundation in place before the pandemic hit.

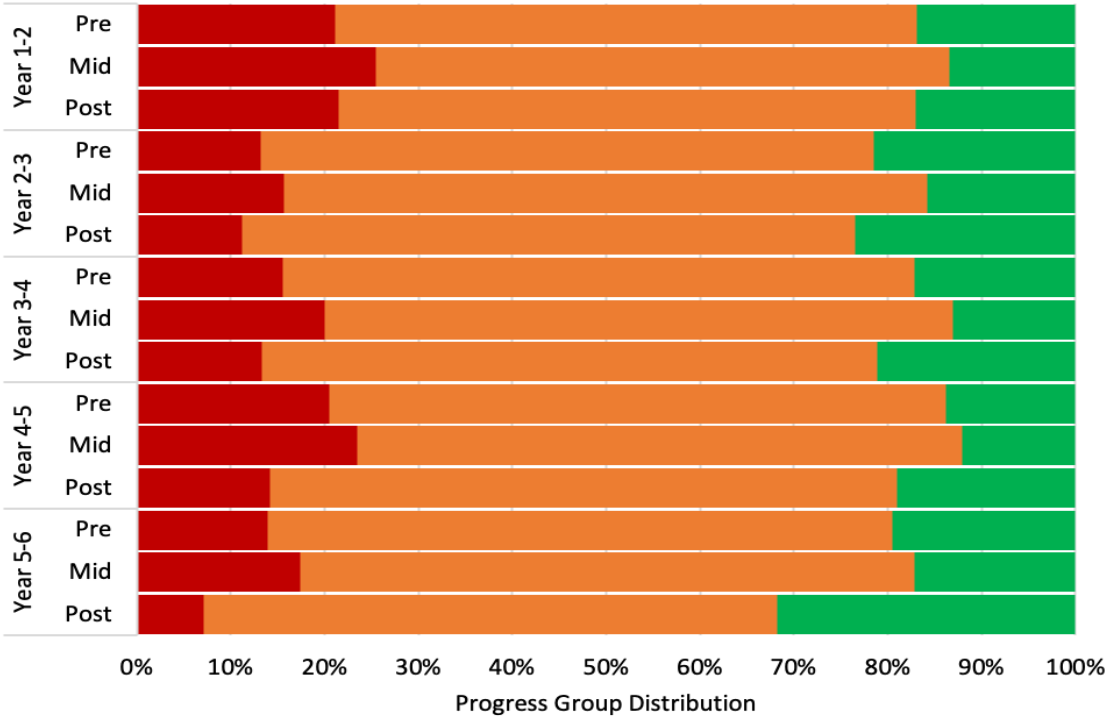

Figure 22: Distribution of progress groups for reading (PiRA) by year group transition throughout the pandemic

4 For further reading download our report *'The residual impact of educational disruption on primary school attainment by spring 2022'* at Risingstars-uk.com/Nuffield.

Children at schools with high levels of in-school disadvantage have largest change in reading attainment over the course of the pandemic

Figure 23 shows the same pattern across year groups as seen with GPS, regardless of the proportion of FSM pupils: an increase in the proportion of children in the decline group during the mid-pandemic period, followed by an increase in the number of children in the growth group during the post-pandemic period.

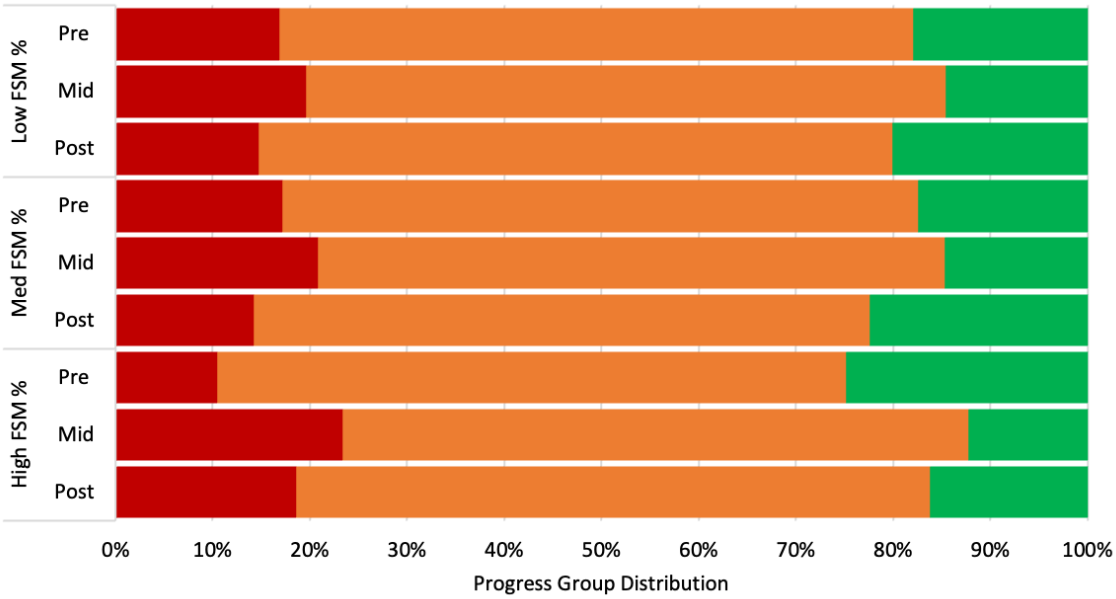

Figure 23: Distribution of progress groups for reading (PiRA) by in-school disadvantage level throughout the pandemic

Looking now at the effect of in-school disadvantage on changes in reading progress groups, the same patterns are evident in Figures 24 and 25 as they were for GPS (Figures 19 and 20). At schools with the highest levels of disadvantage, higher proportions of children dropped from the growth group into the decline group during the pandemic (Figure 24), but the trend was reversed during the post-pandemic period (Figure 25).

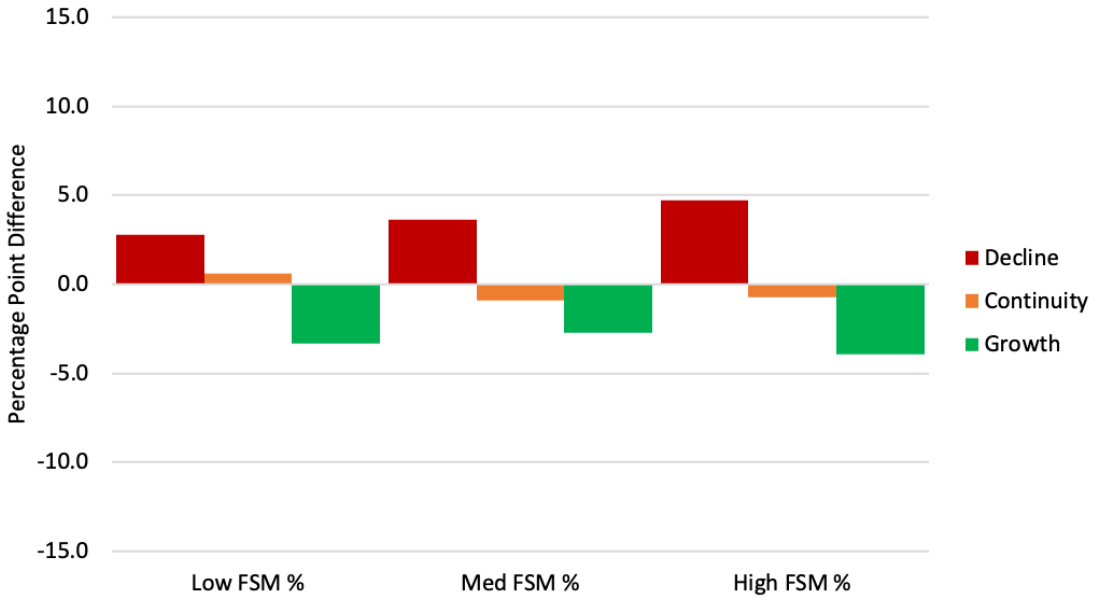

Figure 24: Changes in progress groups by in-school disadvantage level for reading (PIRA) from pre- to mid-pandemic

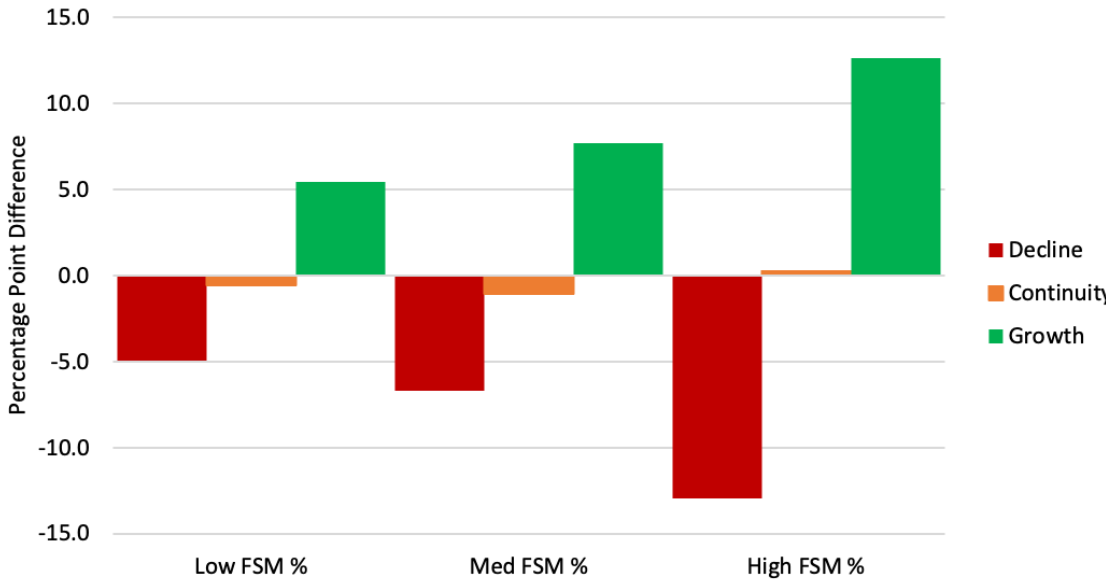

Figure 25: Changes in progress groups by in-school disadvantage level for reading (PiRA) from mid- to post-pandemic

Once again, the recent improvement (increase in number of pupils in the growth progress group) among pupils attending high-FSM schools in Figure 25 masks the fact that these children were far behind their peers to begin with. Despite the increase in attainment between autumn 2021 and autumn 2022, and the increase in the number of pupils in the growth progress group, children at schools with high levels of in-school disadvantage were still obtaining lower standardised scores than children at schools with low levels of disadvantage in reading.

Children at schools with high FSM percentage had the largest decrease in reading mean standardised score from spring 2019 to spring 2022. By spring 2022, these children were approximately 2 standardised score points behind children at schools with low or medium FSM percentage. When converted to effect size, this corresponds to being approximately 2 months behind.

Maths

The majority of children maintained consistent attainment throughout the pandemic in maths

Moving to maths, Figure 26 once again shows a very similar pattern to GPS and reading. There was an increase in the proportion of pupils in the decline group during the mid-pandemic period compared to the pre-pandemic period and then a corresponding increase in the proportion of pupils in the growth group during the post-pandemic period. The largest changes occurred in the growth and decline groups. By contrast, the proportion of children in the continuity group remained relatively stable, starting at 68.6 % pre-pandemic and fluctuating approximately 2.5 percentage points over time. More children stayed in the continuity group for maths than for reading, but there were fewer were in the continuity group than for GPS.

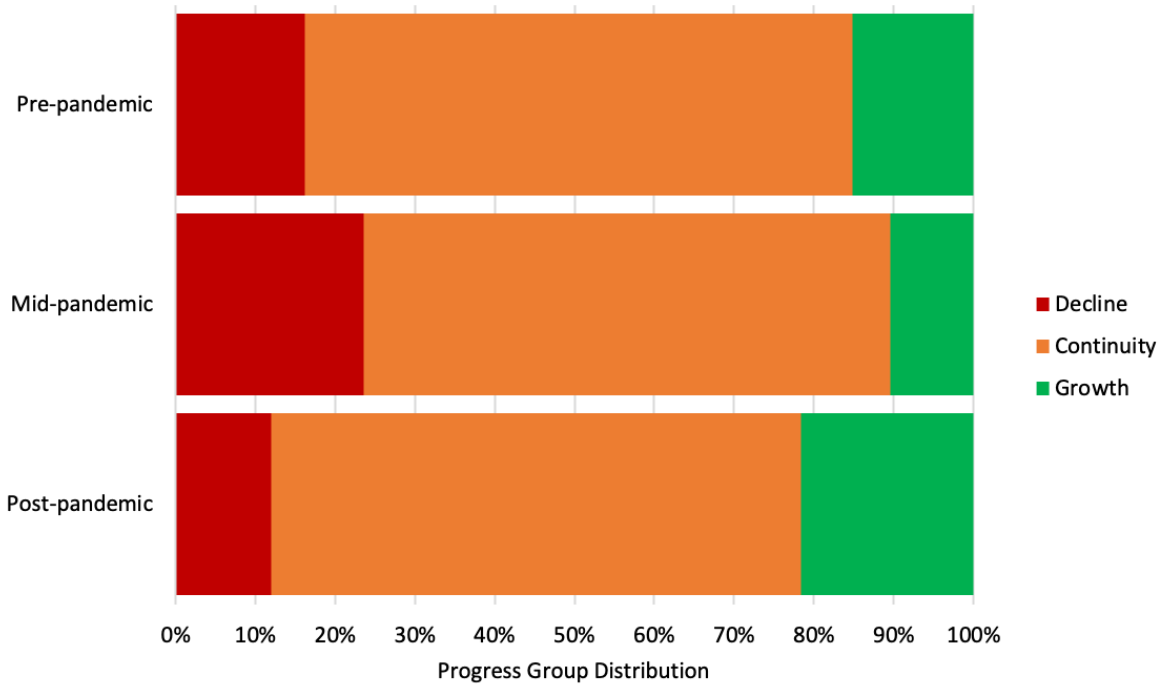

Figure 26: Distribution of progress groups throughout the pandemic for maths (PUMA)

The impact of the pandemic on maths was larger than reading but smaller than GPS. Like with reading, there was an uneven distribution across the year groups. Children in Key Stage 1 had lower standardised scores in the post-pandemic period compared to pre-pandemic and, when this difference was converted to effect size, were approximately 1 month behind in spring 2022 compared to spring 2019. By contrast children in Key Stage 2 had higher standardised scores in spring 2022 compared to spring 2019 and, when converted to effect size, were attaining results at approximately the same level in spring 2022 compared to spring 2019.

Children transitioning from Year 5 to Year 6 have largest mid-pandemic decrease in maths attainment

Like the other subjects analysed in this paper, maths also had similar distributions between the three progress groups and year groups as GPS and reading Like with GPS, Figure 27 shows that children transitioning from Year 5 to Year 6 have the highest proportion in the decline group in the mid-pandemic period and then no correspondingly large increase in the growth group in the post-pandemic period. This suggest that in the post-pandemic period these children have not made up the losses in attainment from the mid-pandemic period.

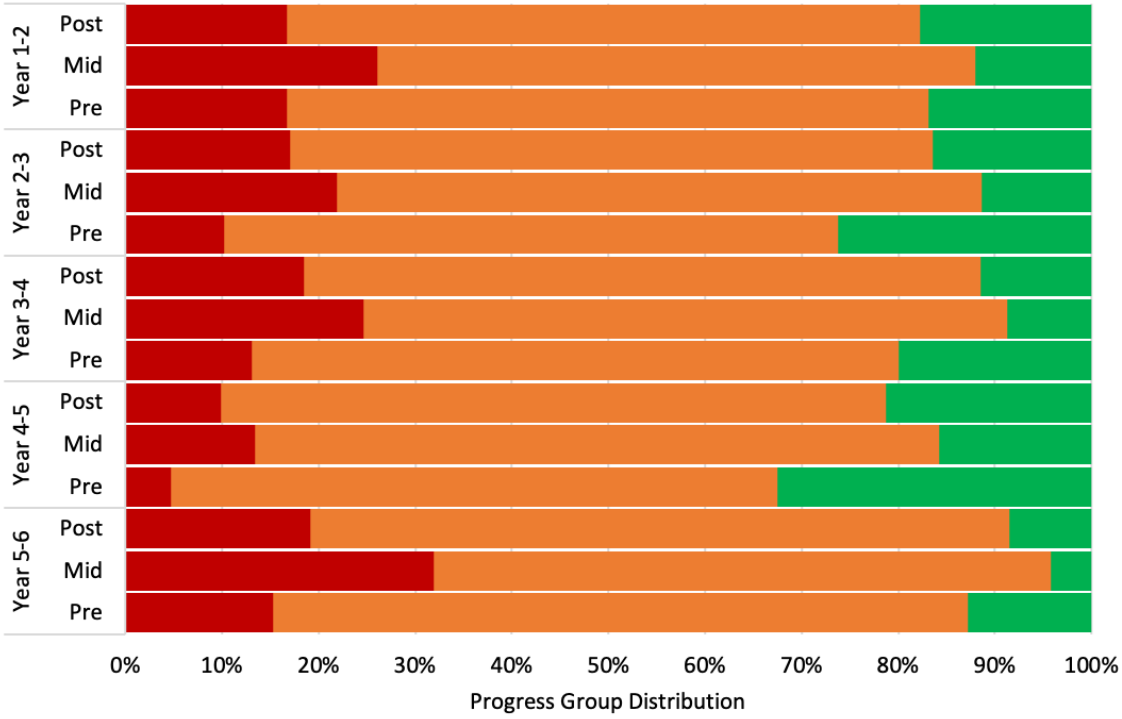

Figure 27: The distribution of progress groups for maths (PUMA) by year group transition by time period

Children at schools with high levels of in-school disadvantage have largest change in maths attainment over the course of the pandemic

Looking at the progress groups by level of in-school disadvantage, similar patterns were seen for maths as GPS and reading. Figure 28 shows an increase in the number of pupils in the decline group during the mid-pandemic period followed by an increase in the number of pupils in the growth group during the post-pandemic period.

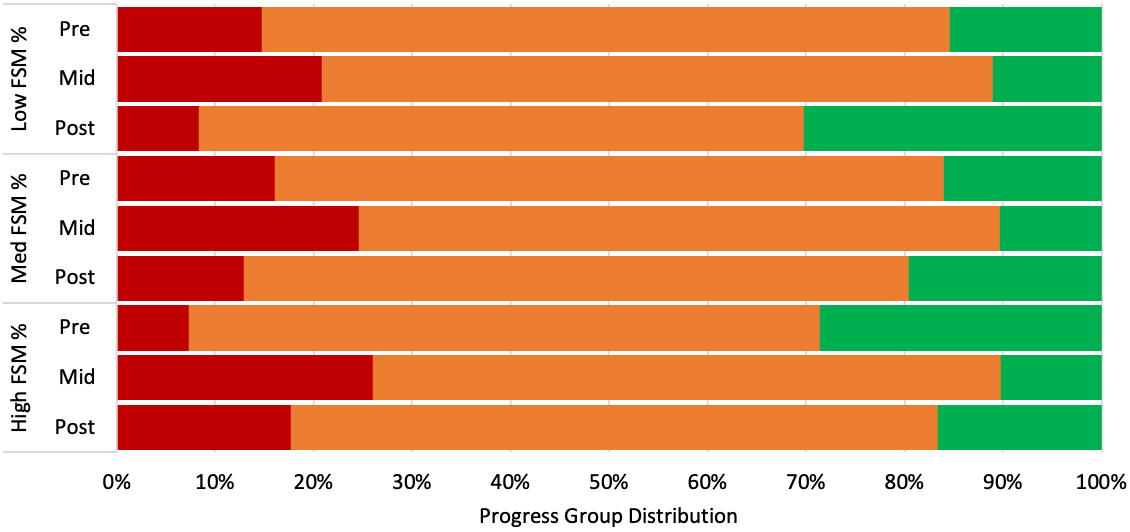

Figure 28: The distribution of progress groups for maths (PUMA) by in-school disadvantage level throughout the pandemic

In schools with the highest levels of disadvantage larger proportions of children who dropped from the growth progress group into the decline group during the mid-pandemic period (Figure 29), but higher proportions also showed the reverse movement during the post-pandemic period (Figure 30). Schools with low levels of in-school disadvantage also showed large increases in the growth progress levels between the mid- to post- pandemic periods (Figure 30).

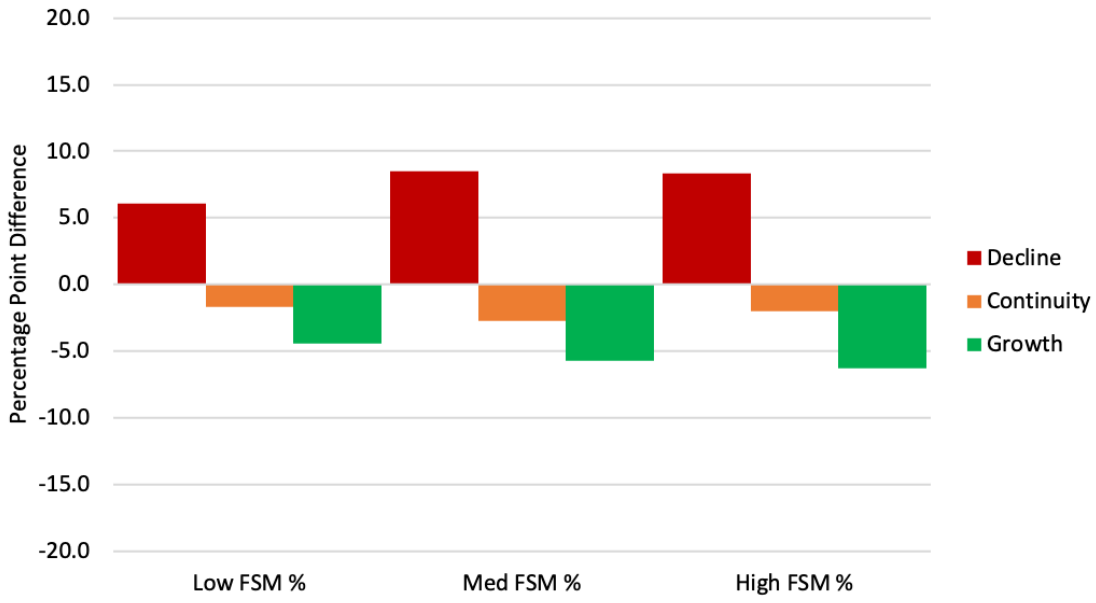

Figure 29: Changes in progress groups by in-school disadvantage level for maths (PUMA) from pre-pandemic to mid-pandemic

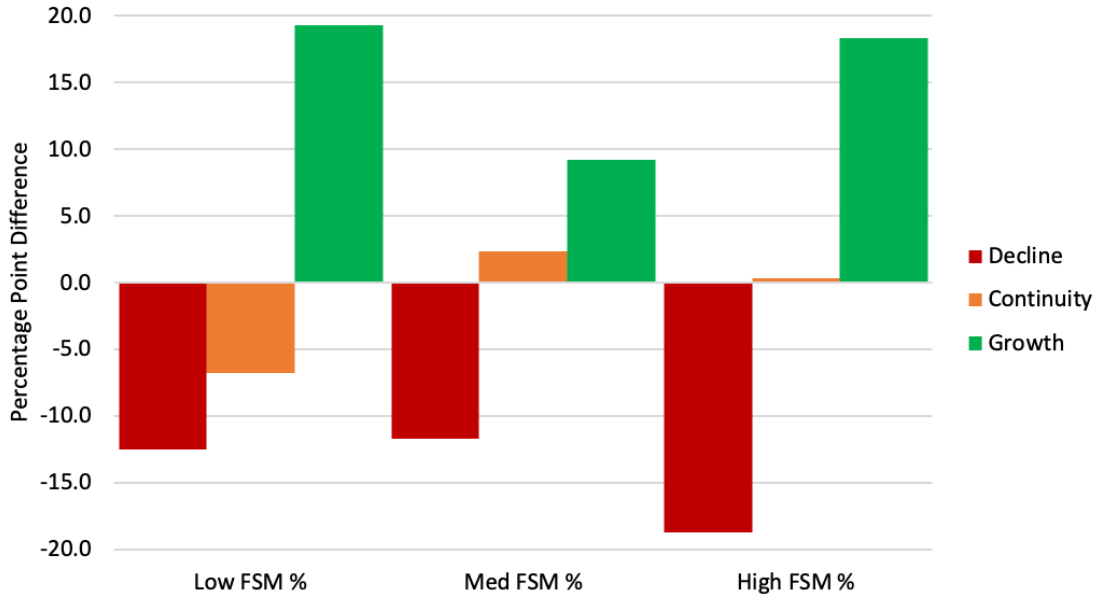

Figure 30: Changes in progress groups by in-school disadvantage level for maths (PUMA) from mid-pandemic to post-pandemic

Once again, the recent improvements (increases in proportions of children in the growth progress group) mask the fact that these children were far behind their peers in terms of attainment to begin with. Despite the increase in attainment in the 2021-22 school year, and the increase in proportion of pupils in the growth progress group, children at school with high levels of in-school disadvantage are still obtaining lower standardised scores than children at schools with low levels of disadvantage.

Children at schools with high FSM percentage had the largest decrease in maths mean standardised score from spring 2019 to spring 2022. The decrease was larger than that for both reading and GPS. By spring 2022, children attending schools with high FSM percentage were approximately 5 standardised score points behind children at schools with low or medium FSM percentage. When converted to effect size, this corresponds to being approximately 4 months behind their peers at other schools.

Summary

While pupils in all year groups and regions need to be supported in order to maintain or improve their attainment, particular attention must be paid to supporting Year 6, where disadvantage gaps appear to have widened in maths and reading. Furthermore, disadvantaged children in that year group are likely to have fallen further behind their peers than in previous years and will need additional support as they approach their national tests in the summer 2023 term.

Between the autumn 2021 and autumn 2022 terms attainment was broadly consistent across reading and maths. This is encouraging because the majority of pupils in Key Stage 2 are likely to be at the same level of attainment as the pre-pandemic cohort. However, children in Key Stage 1 in these subjects may still be behind. They should continue to be supported as they move through primary school to prevent longer term impact of the pandemic school closures.

There was also little improvement in attainment between autumn 2021 and autumn 2022 in GPS. In contrast, this is concerning as pupils in all year groups remained behind the pre-pandemic cohort by approximately 2 months. GPS will require further support in the future for children of all ages in order for them to get back to the same level of attainment as before the pandemic.

Pupils' average attainment often varies depending on their level of disadvantage. It can be seen at both pupil level (based on pupil premium status) and school level (based on free school meal eligibility), that children in these groups have lower attainment than their peers. These children also saw the largest changes in attainment during the course of the pandemic – both the largest decline and subsequent growth. Despite improvement in attainment in all three subjects between autumn 2021 and autumn 2022, as well as in the post-pandemic period (spring 2021 to spring 2022), the disadvantage gap remains substantial and children who are eligible for pupil premium and in schools with high levels of in-school disadvantage have consistently lower standardised scores than their peers. It appears that pandemic related school closures may have increased the disadvantage gap as it has grown with respect to its pre-pandemic size.

Appendix

About us

Hodder Education is a leading provider of assessment for Early Years through to KS3 and beyond (currently published under the RS Assessment from Hodder Education imprint). Its standardised termly tests – GAPS, New PiRA, New PUMA and NTS Assessments – are trusted by more than 6,000 primary schools to accurately measure and predict pupil progress. SchoolDash is an education data analytics company, providing dashboards, maps, analysis and other statistics about schools in England. Hodder Education and SchoolDash have collaborated to prepare these papers to help understand what impact school disruption may have had on attainment across the country.

About the paper

In considering differences between groups of schools or pupils it is important to bear in mind that the variation within each group is invariably much greater than any differences between groups. As a result, simply knowing (for example) the region in which a pupil attends school, or their pupil premium status, provides little indication about their likely performance. Nevertheless, these aggregate trends are important in assessing the overall effectiveness and equity of our education system, and we hope that they prove useful in informing priorities and policies.

We have previously analysed aggregate, anonymous data to reveal national attainment trends across schools in England, including variations by pupil age, season of birth and gender, as well as by subject and even individual topics within each subject. Go to **Risingstars-uk.com/whitepapers** to read these previous analyses. In order to protect the confidentiality of the institutions and individuals concerned, results have been analysed and presented in an anonymised, aggregate form.

All data has been processed in line with MARK terms and conditions, which can be found at **Risingstars-uk.com/markterms**.

About the authors

This report was written by Dr Kristina Milanovic, Research Data Scientist at Hodder Education, in collaboration with Dr Timo Hannay, founder of SchoolDash, and Katie Blainey, Director of Learning Design, Assessment and Professional Development at Hodder Education.

Coverage and representativeness

This analysis is limited to mainstream state primary schools in England. In order for us to have confidence in our statistical analysis it is vital we have a large and representative sample. For this reason, Reception in the spring term has been excluded. For the period of autumn 2020 to autumn 2022, the smallest sample size considered during subject level analysis was for Year 6 New PUMA tests with more than 7,000 pupils. There was an average of over 16,000 test results in all other maths year groups and in all GPS and reading year groups. For any other analysis of pupil, regional or school groups the minimum number of test results in any group was 1,000.

An analysis of the coverage of types of schools included in all cohorts was broadly similar in that all regions and major school types were included. However, in recent years we had an over-representation of schools in the lowest attainment bands. That is to say more schools than average with lower

proportions of children achieving the expected standard in reading, maths and writing in Key Stage 2 in 2019. However, the similar levels of over-representation in all groups considered mean that this bias is unlikely to account for year-on-year differences in attainment.

Additional details on coverage and representativeness for our earlier white paper can be found at **Rsingstars-uk.com/Nuffield**.

Data

The data used in this report comes from standardised, termly tests PiRA, PUMA, New PiRA, New PUMA and GAPS. The tests were taken in 2019-2022 and pupils' results were entered into MARK, a free marksheet and reporting service provided with these assessments. The termly tests are marked by teachers using a robust mark scheme, and raw scores are converted to standardised scores automatically in MARK. Standardised scores are derived from extensive trialling of each termly maths, reading and GPS test. They are derived from the scores of a normal distribution of representative children sitting each test. We have only analysed results from fully completed tests, with non-zero scores sat by a pupil within the correct age range. Tests sat at the wrong time of year have been omitted. For academics and researchers, additional data can be accessed through an online dashboard. Please visit **Risingstars-uk.com/Nuffield** for more information.

New PUMA and New PiRA tests

The 'old' PUMA tests for maths and PiRA tests for reading used in prior white papers were updated and revised between 2019 and 2021 to adapt to changes in teaching that had occurred since their initial standardisation and publication. The spring papers for the New PUMA and New PiRA tests were standardised on a nationally representative sample in spring 2020 prior to the first national lockdown and were used in schools in spring 2021. Before this time, only 'old' PUMA and PiRA were available for analysis of pupils' attainment. Since autumn 2022 only New PUMA and PiRA have been available for testing in schools.

Differences in the **maths tests,** between the 'old' PUMA and New PUMA, include additional questions and changes in the order of the topics that are tested throughout the year, meaning many questions moved between terms. For this reason, further analysis is needed before drawing conclusions about children's attainment in maths from pre-pandemic to now across the two different test suites.

By contrast, for the **reading tests** there were far more 'old' PiRA questions in the same termly New PiRA tests (approximately 80 % of questions were unchanged), along with some new questions added. Since the content is not the same each term, this means that it is not advisable to directly compare results of children across the 'old' and new versions of PiRA, but we can compare trends.

During the transition period where data is available for both the 'old' PiRA tests and New PiRA tests, we have compared pupils' performance and the sample representativeness across all primary school years between the two versions of the tests for the period spring 2020 to spring 2022. Representativeness was checked against national levels of in school disadvantage (pupil premium percentage), Key Stage 2 attainment (from the last publicly available data in 2019) and regional spread.

In this paper therefore, the attainment data shown for maths and reading is split into analysis of attainment going into the pandemic (autumn 2019 to autumn 2020) based on 'old' PUMA and PiRA data and analysis of attainment coming out of the pandemic (autumn 2020 to autumn 2022) based on New PUMA and New PiRA data. While it is not possible to aggregate this data, analysis of

both versions of the paper were conducted on large nationally representative sample sizes and the overarching trends can be considered together.

For consistency in the change in attainment analysis, only 'old' PUMA and PiRA data is considered for reading and maths between spring 2019 and spring 2022.

Previous papers can be found at **Risingstars-uk.com/Nuffield**.

In-school disadvantage

The percentage of children eligible for free school meals (FSM) at each school were used as a proxy for in-school disadvantage. The groups were defined as:

- Low in-school disadvantage corresponds to low FSM % (FSM <20 %)
- Medium in-school disadvantage corresponds to medium FSM % (FSM 20-35 %)
- High in-school disadvantage corresponds to high FSM % (FSM >35 %)

Change in attainment analysis

Pupils were not the same across all time periods, however they were drawn from the same sample and representativeness and coverage analysis was conducted to ensure the groups were similar.

The number of tests used to conduct progress analysis for each subject can be seen in Table 1. It shows the number of tests sat by the same pupils in the pre-, mid- and post- pandemic periods for progress analysis for each subject.

	GPS	Reading	Maths	All tests
Period	**No. pupils**	**No. pupils**	**No. pupils**	**No. Schools**
Pre-pandemic	18,700	49,500	44,500	600
Mid-pandemic	17,200	19,300	19,300	400
Post-pandemic	38,200	4,600	4,600	500

Table 1: Number of pupils for each period and each subject used in progress analysis

Attainment results were grouped into one of three performance indicator bands for each test. The performance indicator (PI) thresholds for PUMA, PiRA and GAPS are shown in Table 2.

Performance Indicator	standardised score (Lower Limit)	standardised score (Upper Limit)
Working towards	Minimum SS possible for test	90
Working at	91	114
Working at greater depth	115	Maximum SS possible for test

Table 2: Performance indicator band thresholds for attainment tests used in progress analysis

PI bands are designed to be consistent across year groups. Since the bands are constant, they allow for comparison between different year groups in a way that is not normally possible when looking at standardised scores themselves.

Progress groups

Progress groups were determined by comparing the PI band from two consecutive tests for each individual child. This can be seen in Table 3. The tests had to have been taken in the same term in consecutive years, for example spring PiRA 2020 and spring PiRA 2021. Reception tests were excluded from this analysis as they have different structures to the other tests. Analysis showed that 99.6 % of pupils who sit two sequential termly tests move onto the next test level in the following year, for example: spring PiRA Year 1 to spring PiRA Year 2. The remaining 0.4 % of children either sit the same test again or sit a test at the next level up beyond that (as a stretch). There are so few cases of these that it does not impact the results reported here.

Performance Indicator (Time Period 1)	Performance Indicator (Time Period 2)	Type of change	Progress Group
Working towards	Working towards	Stable	Continuity
	Working at	Increase	Growth
	Working at greater depth	Increase	Growth
Working at	Working towards	Decrease	Decline
	Working at	Stable	Continuity
	Working at greater depth	Increase	Growth
Working at greater depth	Working towards	Decrease	Decline
	Working at	Decrease	Decline
	Working at greater depth	Stable	Continuity

Table 3: Progress group derivation for each pupil based on their performance indicator band

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Contact us

To discuss the findings of this report or to find out about further research, please contact **katie.blainey@rsassessment.com**.

To find out more about the assessments used in this research please contact your local Assessment Consultant. Contact details can be found at **Risingstars-uk.com/consultants**.

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