



The longer-term impact of COVID-19 on pupil attainment and wellbeing

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RS Assessment from Hodder Education is a leading provider of assessments, surveys and diagnostic profilers for Early Years, through to KS3 and beyond. In addition to providing the *Wellbeing and Attitudes to Learning Survey and Strategies*, 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.

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Nottingham Trent University is *The Times* and *The Sunday Times* Modern University of the Year (2023), with six campuses across Nottingham, Nottinghamshire and London, supporting more than 33,000 students.

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Executive summary

Due to the COVID-19 pandemic, primary schools in England suffered multiple closures during 2020 and 2021, and National Testing was cancelled for two years. The combination of school closures and cancelled examinations compromised the ability to compare current attainment with prior years, and therefore to help inform policy and practice. This report provides evidence of the impact of the closures due to COVID-19 on children's attainment and wellbeing over this period, from a new data source. It is one of the first longitudinal studies to examine the impact on primary school children's academic progress alone, as well as in combination with academic wellbeing data.

Data

Attainment data from commercial curriculum-based termly tests¹ used in primary schools was used to investigate trends in grammar, punctuation and spelling (GPS), reading and maths attainment between 2019–2022. The attainment analysis focused on the continuing impact of school disruption, changes to attainment, and the different impact across regions and levels of disadvantage in England. Analysis used aggregate results from more than 3 million primary school tests taken at more than 2,800 schools, entered into a proprietary online platform. GPS tests remained unchanged over this period, however reading and maths tests were both updated and re-standardised during 2020 and 2021 to reflect current teaching practices. Although the tests are similar, and allow for comparison of overall trends, the changes meant that, in some cases, a direct comparison of results was not appropriate.

The **academic wellbeing** of Key Stage 2 children throughout the period was investigated using results from an online survey, *Wellbeing and Attitudes to Learning: Survey and Strategies*, done in schools in England. Responses were analysed across three time periods: 2018 (pre-pandemic, trial period), 2020–21 (mid-pandemic) and 2021–22 (post-pandemic). Sample sizes across the period ranged between 4000 and 10,000 pupils. The survey consisted of 41 Likert scale questions that assessed four dimensions: positivity, motivation, self-efficacy, and resilience and persistence.

The final analysis was of the **impact that children's academic wellbeing may have had on their attainment**. Focusing on the 2020–21 and 2021–22 school years, only children who had sat two sequential attainment tests and two sequential wellbeing surveys were included, resulting in a smaller sample of 522 unique pupils.

¹ Standardised tests PiRA, New PiRA, PUMA, New PUMA and GAPS, published by RS Assessment from Hodder Education.

Key findings and implications

Putting together all areas of the research, the key takeaways from this project are summarised below:

- 1 In **GPS**, as of autumn 2022, children in all years of primary school remained approximately 2 months behind the pre-pandemic attainment level. Further support in GPS is needed to help children improve these core skills.
- 2 In **reading**, children in Key Stage 1 were approximately 1 month behind in spring 2022 compared to spring 2019. In contrast, children in Key Stage 2 are likely to be attaining similar levels to their pre-pandemic peers.
- 3 In **maths**, children in Key Stage 1 were approximately 1 month behind in spring 2022 compared to spring 2019. In contrast, children in Key Stage 2 were attaining at approximately the same level in comparison with spring 2019.
- 4 In reading and maths, children who were in **Key Stage 1 during the school closures in 2020 and 2021 had the largest drops in attainment** compared to their pre-pandemic cohorts. There was also very little improvement in attainment for children in Key Stage 1 between autumn 2020 and autumn 2022. Given this, these children may still be behind the pre-pandemic cohort. Monitoring their attainment over time will be necessary to see if there is improvement in the future. These children were in Lower Key Stage 2 (Years 3 and 4) in autumn 2022, and may need additional support as they approach their end-of-primary-school National Tests in 2026 and 2025 respectively.
- 5 Children who were in **Key Stage 2 in autumn 2022 appeared to have made up the losses in reading attainment seen during the 2020 and 2021 school closures**. It is likely that on average, by autumn 2022, these primary children had caught up with their pre-pandemic counterparts in reading.
- 6 Children who were in **Key Stage 2 in autumn 2022 appeared to have made up the losses in maths attainment seen during the 2020 and 2021 school closures**. It is possible that on average, by autumn 2022, these primary children had caught up with their pre-pandemic counterparts in maths.
- 7 Over the course of school closures, the average **attainment in all three subjects dropped in schools with high levels of in-school disadvantage**. These drops were larger than for schools with lower disadvantage levels. The average standardised scores for children attending schools with high in-school disadvantage were also lower than their peers, in all subjects and years. This analysis indicates more investment may be required in schools with high disadvantage.
- 8 The **disadvantage gap between children eligible for pupil premium funding and their peers remained large** for all subjects and year groups. It also increased each autumn between 2020 and 2022 for Year 6 reading and maths. Additional support remains critical for children from disadvantaged backgrounds, in particular for those in Year 6, to assist them with the transition between primary and secondary school.
- 9 **Children who were starting Year 3 in autumn 2020 and autumn 2021 had larger decreases in academic wellbeing than any other year group in Key Stage 2**. These children were in Year 1 and 2 at the beginning of the pandemic and had the most disruption to their schooling (the largest impact on their attainment). Further support may be required in terms of academic wellbeing for these children as they progress through primary school.

10 The majority of children in Key Stage 2 reported some vulnerability in self-efficacy (i.e.: how capable they felt in school) in the 2021–22 school year. This can be seen in Figure 1. Two simple strategies that can be used to address this in a school context include setting achievable goals and sharing positive academic experiences.

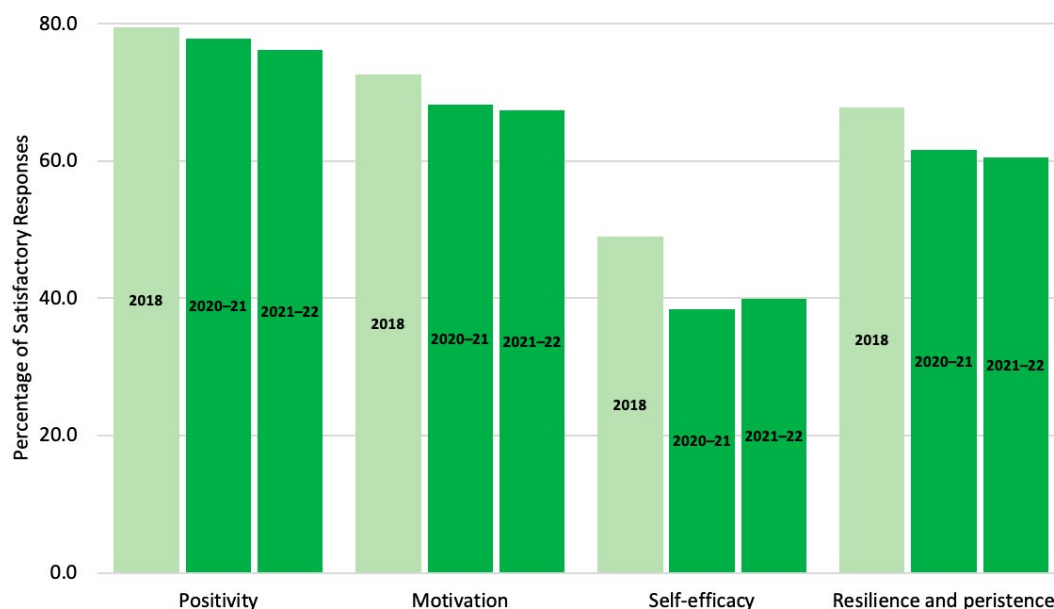


Figure 1: Change in the proportion of responses in the green zone for each dimension over time

11 There is some evidence that children’s positivity and self-efficacy may impact their attainment at Key Stage 2. While there was no significant relationship over time for reading, there was an effect of academic wellbeing on both GPS and maths across 2020–21. Children’s academic positivity was able to account for significant growth in GPS attainment, and children’s academic self-efficacy was able to account for significant growth in maths attainment. Implementation of strategies to improve and maintain positivity and self-efficacy in school may assist with improving children’s attainment in maths and GPS. Strategies that can be used to address positivity in a school context included tackling bullying and fostering a positive and safe class climate.

Recommendations for policy and practice

Putting together the four key areas of research, some recommendations for policy and practice are summarised below:

- School closures due to COVID-19 had an effect on primary school children's attainment and academic wellbeing. The impact, and ability to reach pre-pandemic levels, has varied by school group, pupil group and subject. Although the average attainment in reading in upper Key Stage 2 appears to be back to pre-pandemic levels, younger pupils (Key Stage 1 and lower Key Stage 2) may still be behind in both reading and maths. All children require further assistance with grammar, punctuation and spelling.
- Children from disadvantaged backgrounds remain likely to need more support than others at a national level. Continuing to implement policies to improve support for children eligible for free school meals remains a key recommendation.
- A large proportion of children report some vulnerability in self-efficacy, and this proportion has increased over the course of the pandemic. Children would benefit from strategies to help improve their belief in themselves to succeed.
- Year 3s in 2021–22 reported the largest drop in academic wellbeing. Implementing strategies to improve academic wellbeing in Key Stage 2, and monitoring this trend, is recommended.
- There is some evidence that children's positivity at school appeared to have impacted their grammar, punctuation and spelling attainment between autumn 2020 and autumn 2021, and their self-efficacy impacted their maths attainment between autumn 2020 and autumn 2021. Further research is required to monitor this trend on a larger scale, and may also help to understand the impact of academic wellbeing strategies in improving children's academic wellbeing.

All prior publications that show the additional impacts of the pandemic school closures on attainment, progress and wellbeing can be found at: risingstars-uk.com/nuffield.

Introduction

Due to the COVID-19 pandemic, primary schools in England suffered multiple closures during 2020 and 2021, and National Testing was cancelled for two years. National Testing data would normally be used to inform practice and to evaluate the effectiveness of interventions, but the combination of school closures and cancelled examinations compromised the ability to compare current attainment with that of prior years. Therefore, evidence of the impact of the closures due to COVID-19 on children's attainment and wellbeing over this period needed to come from new sources, one of which was through the analysis of data held by commercial companies. Although some studies began during the 2020–21 period, analysis needed to continue in order to inform evidence-driven school improvement, which this project is well-placed to deliver.

This report is one of the first longitudinal studies to examine the impact of closures on primary school children's academic progress alone, as well as in combination with wellbeing data, from multiple time points. It aimed to better understand the ongoing, longer-term impact of COVID-related school closures on attainment and wellbeing, and to highlight the variation in progress, based on pupil and context-based factors, in getting back to pre-COVID attainment levels.

Background

Concern about the potential impact of school closures on children's educational attainment and wellbeing led to the launch of a number of studies based on commercial data collected over the course of 2020 and 2022. Many of these studies focused on attainment during the first year of the pandemic (the 2020–21 school year), and were summarised by the Education Endowment Foundation (EEF) on their website (Education Endowment Foundation, 2021a). Research conducted on the second year of the pandemic (2021–22 school year) is in the process of being published.

Research from the first year of the pandemic found that there were seasonal patterns to learning loss over the course of the school year, and that both reading and maths were impacted. Research commissioned by the Department for Education (DfE) focused on Years 3 to 9 using interactive test data from Renaissance Learning. It found that there were attainment losses in primary school children over the course of the 2020–21 school year compared to the pre-pandemic cohort. The trends showed that children demonstrated some catch-up in the autumn 2020 term, followed by increased attainment losses by the spring 2021 term, and then further catch-up by the summer term. By the end of the summer 2021 term, primary school children were found to be approximately one month behind their pre-pandemic peers in both reading and maths (Renaissance Learning & Education Policy Institute, 2021). Four studies conducted over this same period by RS Assessment from Hodder Education on RS Assessment test data corroborated this trend of increased attainment losses in reading, maths and GPS over the spring 2021 term compared to the autumn 2020 term, followed by some catch up by the summer 2021 term (Blainey et al., 2020; Blainey & Hannay, 2021a; Blainey & Hannay, 2021b; Blainey & Hannay, 2021c).

A number of factors were found to have impacted attainment losses. Primary school children from disadvantaged backgrounds and from the north of England had more learning loss than their counterparts from less disadvantaged backgrounds or other regions (Renaissance Learning & Education Policy Institute, 2021). Differences in attainment based on disadvantage (eligibility for pupil premium funding) were also found by RS Assessment from Hodder Education (Blainey & Hannay, 2021c). The increase in the attainment gap between children from disadvantaged backgrounds and their peers was also found in secondary school children in both 2020 and 2021 (Hunt et al., 2022; Tuckett et al., 2022).

In addition to the impact of region and disadvantage, it was found that younger primary children (those in Key Stage 1) had larger attainment losses than older primary school children. The National Foundation for Educational Research (NFER)'s 2021 study reviewed the impact of COVID-19 on children in Key Stage 1. These reports corroborated other findings and found that children in Year 1 and Year 2 did less well in spring 2021 compared to the pre-pandemic cohort in both reading and maths. It additionally found that children from disadvantaged backgrounds performed less well than their non-disadvantaged counterparts (NFER Classroom & Education Endowment Foundation, 2021a; NFER Classroom & Education Endowment Foundation, 2023). A study focusing on primary school pupils in the 2020–21 school year, run by the Fischer Family Trust (FFT) and TeacherTapp using a smaller sample of RS Assessment attainment data, also discovered disadvantage gaps. It found that the attainment gap between disadvantaged children and their peers for maths was approximately one month greater by summer 2021 compared to autumn 2019. There was no discernible difference for reading (Weidmann et al., 2022).

Research from the second year of the pandemic, the 2021–22 school year, highlighted that the disadvantage attainment gap persisted into the 2021–22 school year, and while Year 3 may be getting back to pre-COVID levels of attainment for reading and maths, Year 2 is still behind in reading (Wheater et al., 2022). There is mixed evidence on the return to pre-pandemic levels. Some studies have found that on a whole school level, primary school attainment in reading and maths appears to almost be back to pre-pandemic levels (GL Assessment, 2022). However, others have noted that while Key Stage 2 reading may have returned to pre-pandemic levels, Key Stage 2 maths may still be behind (Andrews, 2023). Differences between the reports may be due to differences in sample sizes and compositions, or due to different test content. The gradual return to pre-pandemic attainment, in particular for reading, was corroborated by research published as part of this project (Milanovic, Blainey, & Hannay, 2022; Milanovic et al., 2023).

Most of the research to date has focused on attainment. However, there has also been interest in investigating the impact of school closures on pupils' academic wellbeing, as there are few studies that have been done on this. A key finding from one report was, *'Schools identified a real risk of "lost" children: those pupils who had struggled the most during lockdown were not always those previously identified as vulnerable'* (ImpactEd, 2021). A report on wellbeing, published as part of this project, found that academic wellbeing decreased over the course of 2020–22 compared to 2018 (Milanovic, Blainey, Minty, et al., 2022). It was the first time RS Assessment's *Wellbeing and Attitudes to Learning Survey* data had been analysed since it launched.

The potential for wellbeing to impact attainment has been acknowledged (van Lancker & Parolin, 2020), and prior research has demonstrated links between attainment and pupil wellbeing (Collie et al. 2015; Fernandez-Rio et al. 2017; Herndon and Bembenutty 2017; Lindorff, 2021). However, to the best of our knowledge, to date, no study has considered how aspects of children's academic wellbeing may mitigate or exacerbate the impact of school closures on their attainment in basic skills. This project is the first time that RS Assessment attainment data has been analysed in this manner and over this time period.

Project objectives

This project aimed to answer the following seven research questions:

1. To what extent have primary school children been able to get back to prior levels of attainment?
2. How does progress in maths and English compare to prior years?
3. What factors and characteristics of schools have the biggest impact on pupil attainment?
4. Are there patterns of learning loss that could be described and mitigated?
5. How have school closures impacted Key Stage 2 pupils' wellbeing?
6. Can the trajectory of recovery be identified and predicted through analysis of historic data?
7. Have aspects of children's wellbeing mitigated or exacerbated the impact of school closures on attainment?

Based on these questions, and building on the prior research, the key objectives for the project were to:

- highlight the impact of COVID-19 on primary school attainment to policy makers, school leaders, teachers and parents
- highlight the differences between different pupil and school groups and identify which groups may need more support to get back to pre-COVID-19 attainment levels
- review the impact of COVID-19 on Key Stage 2 wellbeing
- examine the interrelation between attainment and wellbeing in Key Stage 2 children
- create easily digestible analysis that can be used by policy makers and school leaders to help support children in their learning
- provide analysis to understand trends at a national level, looking for any evidence of strengths in pupil groups or school groups that could be further explored by educators
- add further insight that could positively impact any policy decisions at local and national level
- share analysis for all year groups to add to the National Test analysis for Year 2 and 6 pupils already carried out by the Department for Education
- promote findings alongside that of other research papers and studies, to add to the body of evidence on the topic.

The impact of COVID-19 on attainment

The first section of this report looks at attainment data and the trends in grammar, punctuation and spelling (GPS), reading and maths between 2019–22. The attainment analysis focused on the continuing impact of school disruption, changes to attainment and the different impact across regions and levels of disadvantage in England. The changes in attainment over the course of the pandemic were summarised for the most recent term available (autumn 2022). Primary school pupils' attainment results by this point were, encouragingly, showing trends of improvement after the main educational disruption.

Additional interim analysis of attainment was reported previously in Milanovic, Blainey, & Hannay (2022), Milanovic & Hannay (2022), Milanovic & Blainey (2022b), Milanovic & Blainey (2022a) and Milanovic et al. (2023). All prior publications can be found at: risingstars-uk.com/nuffield.

The attainment tests

The standardised termly tests published by RS Assessment from Hodder Education used over the course of this project, the number of tests and their periods of usage in schools are outlined in Table 1.

Subject	Test name	Period of analysis	No. tests
Grammar, punctuation and spelling (GPS)	Progress in Grammar, Punctuation and Spelling Assessment (GAPS)	2019–present	922,000
Reading	Progress in Reading Assessment (PiRA)	2019–2020	336,000
	New Progress in Reading Assessment (New PiRA)	2020–present	828,000
Maths	Progress in Understanding Mathematics Assessment (PUMA)	2019–2020	478,000
	New Progress in Understanding Mathematics Assessment (New PUMA)	2020–present	795,000

Table 1: Tests used for analysis of the impact of COVID-19 on attainment

The attainment analysis between 2019–22 used aggregate results from more than 3 million primary school tests taken at more than 2,800 schools. Tests were sat in schools and the results were entered by teachers into MARK, a free marksheet and reporting service. The average year-group size was 17,000 pupils, while the minimum year-group size used for analysis was 1,000 pupils. To protect the confidentiality of the institutions and individuals concerned, results have been analysed and presented in an anonymised, aggregate form.² The breakdown of tests by calendar year can be seen in the Appendix (page 43).

Analysis compared each term's mean standardised score per year group to the results from the corresponding term in previous school years (i.e.: Year 2 in autumn 2022 compared to Year 2 in

² All data has been processed in line with MARK terms and conditions, which can be found at risingstars-uk.com/markterms.

autumn 2020). To provide more meaningful comparisons, effect sizes were used to compare attainment levels between different groups and across time periods. 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.

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) (Education Endowment Foundation, 2023). 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. Months' difference (also defined by the EEF as months' 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.

In order to investigate how children's attainment was impacted by pandemic school closures, and to provide context for the attainment results presented here, data from autumn 2019 (prior to the onset of pandemic school closures) to autumn 2022 was used. GPS tests remained unchanged in this period. However, reading and maths tests were both updated and re-standardised during 2020 to reflect current teaching practices. This meant that results from PiRA (reading) and PUMA (maths) tests taken between autumn 2019 and autumn 2020 were used to provide pre-pandemic context. Both sets of tests were available in autumn 2020, but PUMA and PiRA were withdrawn from publication in autumn 2021. From autumn 2020 onwards, test results from New PUMA and New PiRA were used to show changes in attainment to the most recent term available. Although the PiRA and New PiRA, and PUMA and New PUMA tests are similar, and allow for comparison of overall trends, the updated New PiRA and New PUMA meant that in some cases a direct comparison of results was not appropriate. Reading and maths attainment was therefore split between performance between autumn 2019 and autumn 2020 using PiRA or PUMA tests, and performance from autumn 2020 to autumn 2022 using New PiRA or New PUMA tests. Please see Appendix (page 43) for a detailed explanation on the difference between the tests.

Attainment trends

Grammar, punctuation and spelling

GPS remains an area in which children in all primary school years are behind pre-pandemic levels. Table 2 shows the full breakdown of months' difference by school year for termly tests for autumn 2020, spring 2021 and summer 2021, as compared to pre-pandemic (the 2019–2020 school year). There were sustained decreases in attainment across all three terms. Table 3 shows the full breakdown of months' difference by school year for termly tests from autumn 2021, spring 2022, summer 2022 and autumn 2022, as compared to the 2020–2021 school year. Over this period there was some improvement in the spring 2022 term, however little improvement in attainment was seen in other terms. Since the GPS tests have been unchanged since they launched in 2017, it is possible to calculate the net effect size and months' difference from before the pandemic until autumn 2022. This can be seen in the Appendix (page 43). Children in all school years remain 2 months behind the pre-pandemic cohort as of autumn 2022.

GPS (GAPS)						
	Autumn 2019–20		Spring 2020–21		Summer 2019–21 ³	
School year	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference
Year 1	-0.17	-2	-0.33	-4	-0.26	-3
Year 2	-0.11	-2	-0.31	-4	-0.23	-3
Year 3	-0.12	-2	-0.22	-3	-0.18	-2
Year 4	-0.10	-2	-0.21	-3	-0.15	-2
Year 5	-0.05	0	-0.19	-3	-0.16	-2
Year 6	-0.10	-2	-0.30	-4	-0.37	-4

Table 2: Effect sizes and months' difference for GPS (GAPS) showing the initial impact of the pandemic from autumn 2019 to summer 2021

GPS (GAPS)								
	Autumn 2020–21		Spring 2021–22		Summer 2021–22		Autumn 2021–22	
School year	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference
Year 1	-0.02	0	0.16	2	0.07	1	0.06	1
Year 2	-0.04	0	0.08	1	0.01	0	0.03	0
Year 3	-0.05	0	0.09	1	0.03	0	0.02	0
Year 4	-0.03	0	0.09	1	0.03	0	-0.03	0
Year 5	-0.02	0	0.10	2	0.05	0	-0.02	0
Year 6	0.01	0	0.15	2	0.13	2	-0.03	0

Table 3: Effect sizes and months' difference for GPS (GAPS), showing the recovery from the pandemic from autumn 2020 to autumn 2022

³ No tests were sat in summer 2020, due to national lockdowns, so summer 2019 is used instead to provide a pre-pandemic baseline of attainment. This is also applicable to all following tables that show effect size and months' difference for tests taken in summer 2019–21.

The year-on-year change in effect size between autumn 2019 and autumn 2022 can be seen in Figure 2. The grey bars show the effect size for autumn 2019–autumn 2020, the orange bars show the effect size between autumn 2020–21, and the blue bars show the effect size when comparing autumn 2021 and 2022. Although all years are behind pre-pandemic attainment levels, after the initially large negative drop (grey bars) in attainment – the immediate impact of the pandemic – each consecutive year’s results in GPS indicated that children made some improvement in attainment from the previous year. By autumn 2022 (blue bars), the effect size was less negative than autumn 2020 (grey bars) and children in Years 1–3 had higher standardised scores (positive effect sizes) than the cohort before them (orange bars).

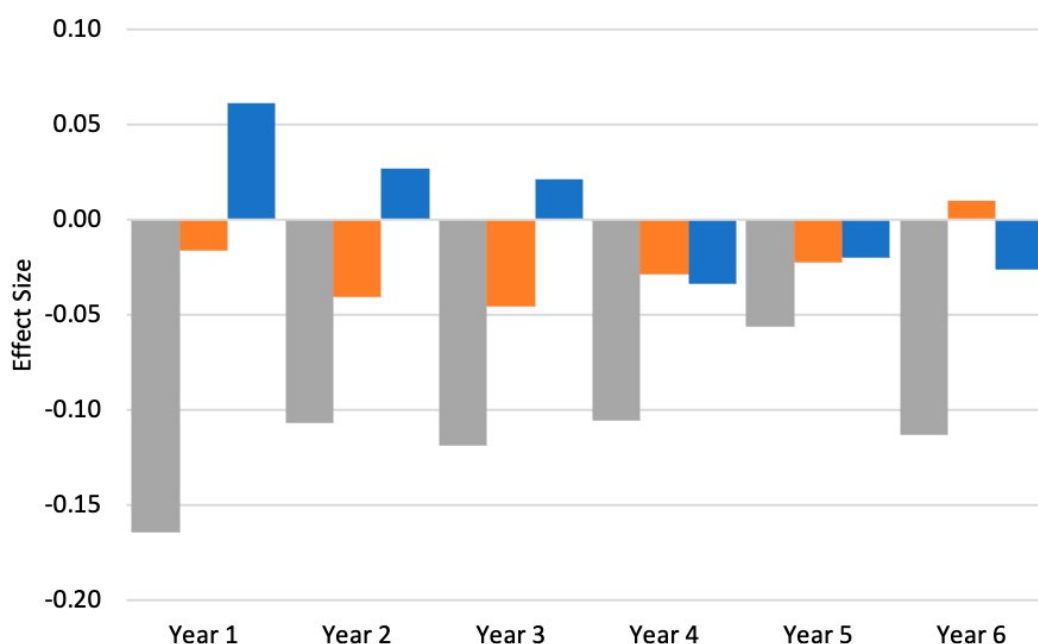


Figure 2: Effect size for GPS (GAPS) for autumn-to-autumn tests between 2019–2022

Reading

Reading shows signs of improvement since the pandemic, especially for Key Stage 2. Table 4 shows the effect sizes and months' difference for each term for the cohort of children in the 2020–21 school year compared to the previous (pre-pandemic) cohort. This shows the drops in attainment caused by school closures over the summer 2020 and spring 2021 terms. Year 1 was the most affected by these closures. Table 5 shows the effect sizes and months' difference from autumn 2020 to autumn 2022. It shows that Key Stage 2 has made improvement over this period.

Reading (PiRA)						
	Autumn 2019–20		Spring 2020–21		Summer 2019–21	
School year	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference
Year 1	-0.14	-2	-0.3	-4	-0.23	-3
Year 2	-0.05	0	-0.2	-3	-0.05	0
Year 3	-0.07	-1	-0.13	-2	-0.08	-1
Year 4	-0.01	0	-0.11	-2	-0.05	0
Year 5	0.01	0	-0.13	-2	-0.05	0
Year 6	0.01	0	-0.17	-2	-0.02	0

Table 4: Effect sizes and months' difference for reading (PiRA) over time

Reading (New PiRA)								
	Autumn 2020–21		Spring 2021–22		Summer 2021–22		Autumn 2021–22	
School year	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference
Year 1	-0.01	0	0.17	2	0.08	1	0.00	0
Year 2	-0.02	0	0.09	1	-0.02	0	0.00	0
Year 3	0.05	0	0.13	2	0.03	0	0.08	1
Year 4	0.03	0	0.14	2	0.04	0	0.07	1
Year 5	0.07	1	0.14	2	0.05	0	0.07	1
Year 6	0.07	1	0.14	2	0.04	0	0.03	0

Table 5: Effect sizes and months' difference for reading (New PiRA) over time

Although Tables 4 and 5 use different tests to measure reading attainment and cannot be combined, (see Appendix beginning on page 43 for details), the trends can be compared. By autumn 2022, children in Key Stage 1 sitting New PiRA tests were obtaining similar results in reading as in autumn 2020. At this point, analysis using PiRA tests indicated that these children may still be behind. It is likely, therefore, that while children in Key Stage 2 in autumn 2022 are obtaining similar results to their pre-pandemic counterparts, children in Key Stage 1 may still require additional support to return to pre-pandemic attainment levels.

Figure 3 shows year-on-year attainment changes in reading for autumn 2019–20 (grey bars on the left), for autumn 2020–21 (orange bars on the right) and for autumn 2021–22 (blue bars on the right).

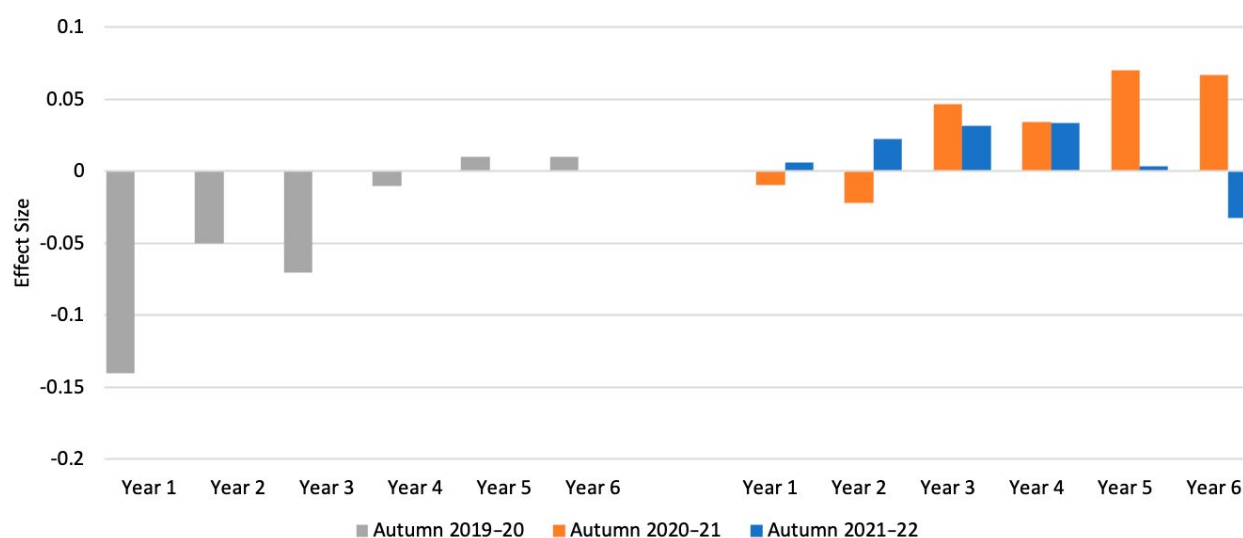


Figure 3: Effect size in reading (PiRA) for autumn 2019 and 2020 (left) and in reading (New PiRA) for autumn-to-autumn tests 2020–21 and 2021–22 (right)

Like in GPS, Figure 3 shows the large initial impact of pandemic school closures on reading attainment. However, unlike in GPS, where all year groups were affected, in reading, the Key Stage 1 was disproportionately affected (large negative effect sizes). Looking at the changes in attainment in subsequent years, improvement in attainment was mainly in Key Stage 2 (positive effect sizes of the orange and blue bars).

Maths

Maths attainment is also showing improvement since the pandemic. Table 6 shows the effect sizes and months' difference for each term for the cohort of children in the 2020–21 school year compared to the previous (pre-pandemic) cohort. This shows the initial drop in attainment caused by school closures over the summer 2020 and spring 2021 terms. The attainment of all year groups was affected by these closures.

Maths (PUMA)						
	Autumn 2019–20		Spring 2020–21		Summer 2019–21	
School year	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference
Year 1	-0.09	-1	-0.26	-3	-0.18	-2
Year 2	-0.04	0	-0.21	-3	-0.21	-3
Year 3	-0.09	-1	-0.19	-3	-0.15	-2
Year 4	-0.09	-1	-0.18	-2	-0.13	-2
Year 5	-0.09	-1	-0.21	-3	-0.11	-2
Year 6	-0.02	0	-0.22	-3	-0.18	-2

Table 6: Effect sizes and months' difference for maths (PUMA) over time

Table 7 shows the effect sizes and months' difference from autumn 2020 to autumn 2022. It shows that on average, children have made improvement in their maths results over this period. Key Stage 1 has shown more termly improvement over this period than Key Stage 2.

Maths (New PUMA)								
	Autumn 2020–21		Spring 2021–22		Summer 2021–22		Autumn 2021–22	
School year	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference
Year 1	0.00	0	0.22	3	0.13	2	0.00	0
Year 2	0.02	0	0.16	2	0.08	1	0.05	0
Year 3	0.04	0	0.19	3	0.1	2	0.06	1
Year 4	0.03	0	0.2	3	0.04	0	0.06	1
Year 5	0.03	0	0.19	3	0.03	0	0.04	0
Year 6	0.05	0	0.25	3	0.17	2	0.04	0

Table 7: Effect sizes and months' difference for maths (New PUMA) over time

As with reading, Tables 6 and 7 use different tests to measure maths attainment and cannot be combined (see the Appendix beginning on page 43 for details), however the change in maths tests was greater than that for reading. While, as with reading, the trends *can* be compared, more caution needs to be applied to the outcome. By autumn 2022, children in Key Stage 1 sitting New PUMA tests were obtaining similar results in reading as in autumn 2020 – there was little improvement in attainment levels over this period. By autumn 2020, analysis using PUMA tests indicated that children may still have been behind. By contrast, children in Key Stage 2 did show an improvement in maths attainment, and in autumn 2022 they were more than a month ahead of the autumn 2020 cohort. While it is possible that children in Key Stage 2 in autumn 2022 may be obtaining similar results to their pre-pandemic counterparts, children in Key Stage 1 are more likely to still require additional support to return to pre-pandemic attainment levels. Additionally, children who were in Years 4 and 5 in summer 2021 showed the least improvement between summer 2021 and summer 2022. These children were in Year 5 and 6 in autumn 2022 and may need more support during upper Key Stage 2, and when sitting National Tests in summer 2023 (Milanovic & Blainey, 2022a).

Figure 4 shows year-on-year attainment changes in maths for autumn 2019–20 (grey bars on the left), for autumn 2020–21 (orange bars on the right) and for autumn 2021–22 (blue bars on the right). Like in GPS, Figure 4 shows the large initial impact of pandemic school closures on all year groups in maths (large negative effect sizes). In subsequent years, improvement in attainment was seen in Years 2–6 (positive effect sizes of the orange and blue bars), but not in Year 1. The effect size for Year 1 in autumn 2021–22 (blue bar) is not visible on Figure 4 because it is zero.

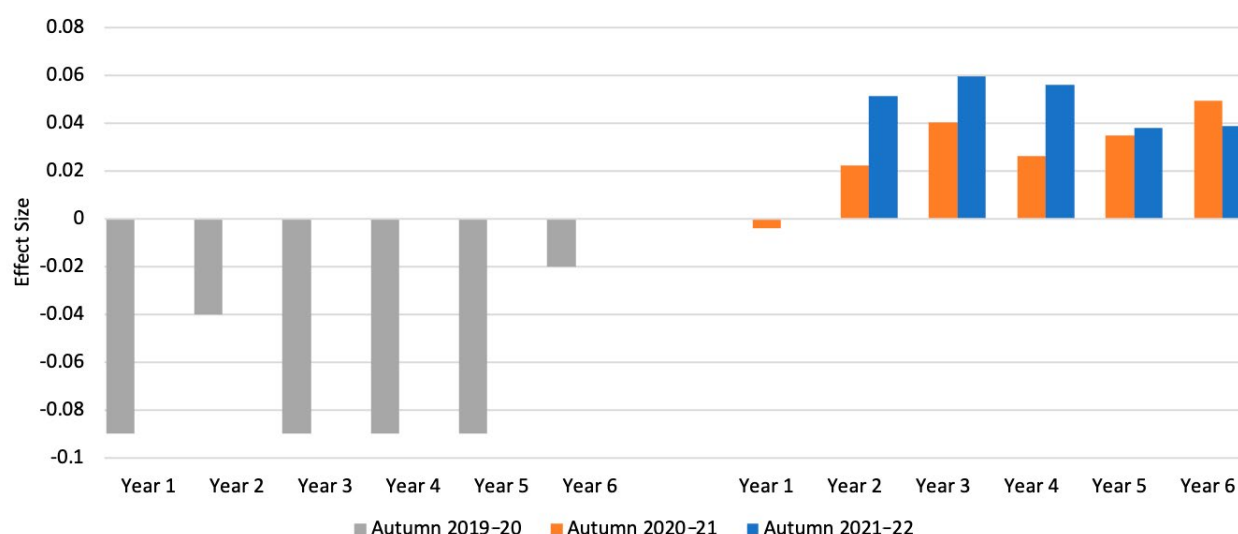


Figure 4: Effect size in maths (PUMA) for autumn 2019 and 2020 (left) and in maths (New PUMA) for autumn-to-autumn tests 2020–21 and 2021–22 (right)

Factors impacting attainment

Previous analyses have shown that school type and other factors can affect attainment levels (Milanovic, Blainey, & Hannay, 2022; Milanovic et al., 2023; Milanovic & Blainey, 2022a; Milanovic & Blainey, 2022b; Milanovic & Hannay, 2022). Factors that were analysed throughout these publications included gender, pupil-level disadvantage (eligibility for pupil premium funding), in-school disadvantage (eligibility for free school meals), local disadvantage (based on the IDACI index), Key Stage 2 attainment, topic and question level differences. The two factors that were found to have the most meaningful consistent impact on attainment were disadvantage and region. The key findings for these factors are summarised here.

Grammar, punctuation and spelling

The impact of disadvantage

Not all children were affected equally by the school closures. A particular concern during the pandemic was the possibility that poorer children might fall even further behind their more affluent peers. To better understand the effect of disadvantage at a pupil level, the mean standardised scores of children eligible for pupil premium funding were compared to their peers across the different year groups and time periods (see the Appendix beginning on page 43 for more information). This difference is shown over time in Figure 5. On average, the disadvantage gap⁴ in GPS widened between autumn 2019 (yellow bars) and autumn 2020 (grey bars). It continued to increase, on average, between autumn 2020 and autumn 2021 (orange bars), but fell in autumn 2022 (blue bars) compared to previous autumn terms. In almost all year groups the gap was larger in autumn 2022 than before the pandemic.

By converting these differences into effect sizes and months' difference, it was found that children eligible for pupil premium were approximately 5 months behind their peers. 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.

⁴ The disadvantage gap is defined as the difference in test scores between children who are disadvantaged (based on their pupil premium status) compared to children who are not disadvantaged.

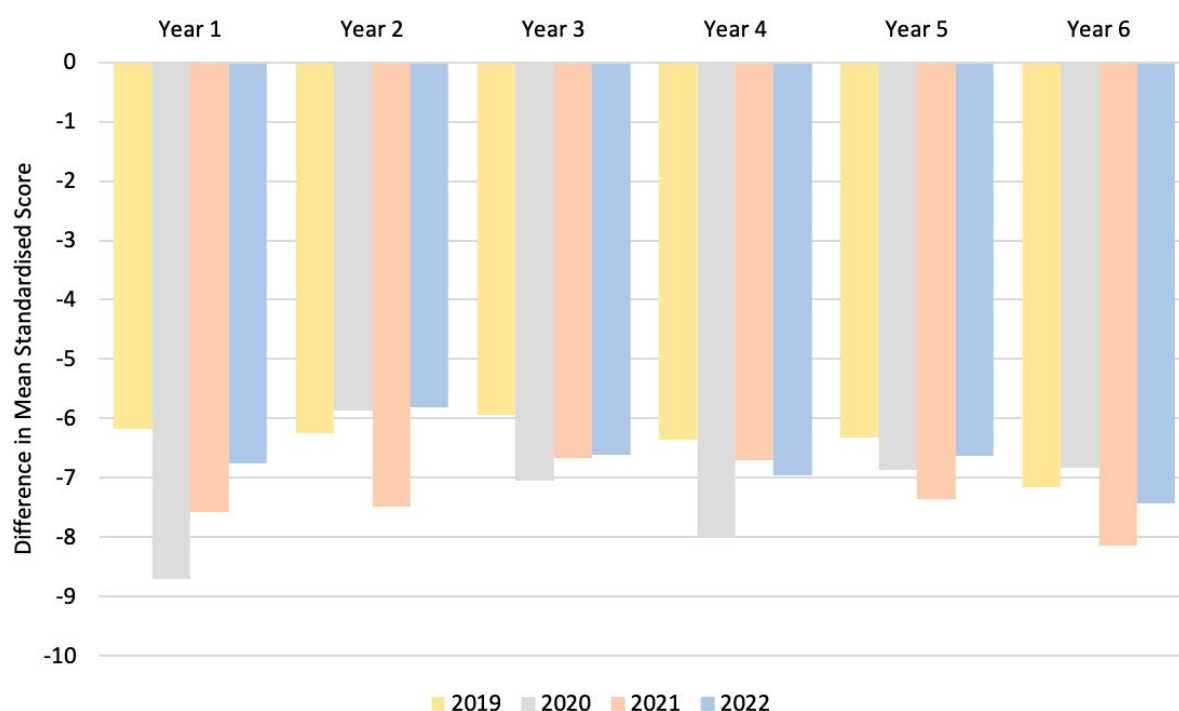


Figure 5: Difference in mean standardised scores between pupil premium and non-pupil premium pupils for GPS (GAPS) for autumn 2019, autumn 2020, autumn 2021 and autumn 2022

The impact of region

Looking at regional differences, Figure 6 groups children's results by where they attend school: the north (blue bars) includes the northeast, the northwest and Yorkshire and the Humber, the Midlands (orange bars) combines the East and West Midlands, and the south (grey bars) consists of the east of England, London, the southeast and the southwest. Figure 6 indicates that, on average, pupils in the north of England remained further behind their peers, while children in Year 2 in the Midlands appear to be almost back at pre-pandemic attainment levels.

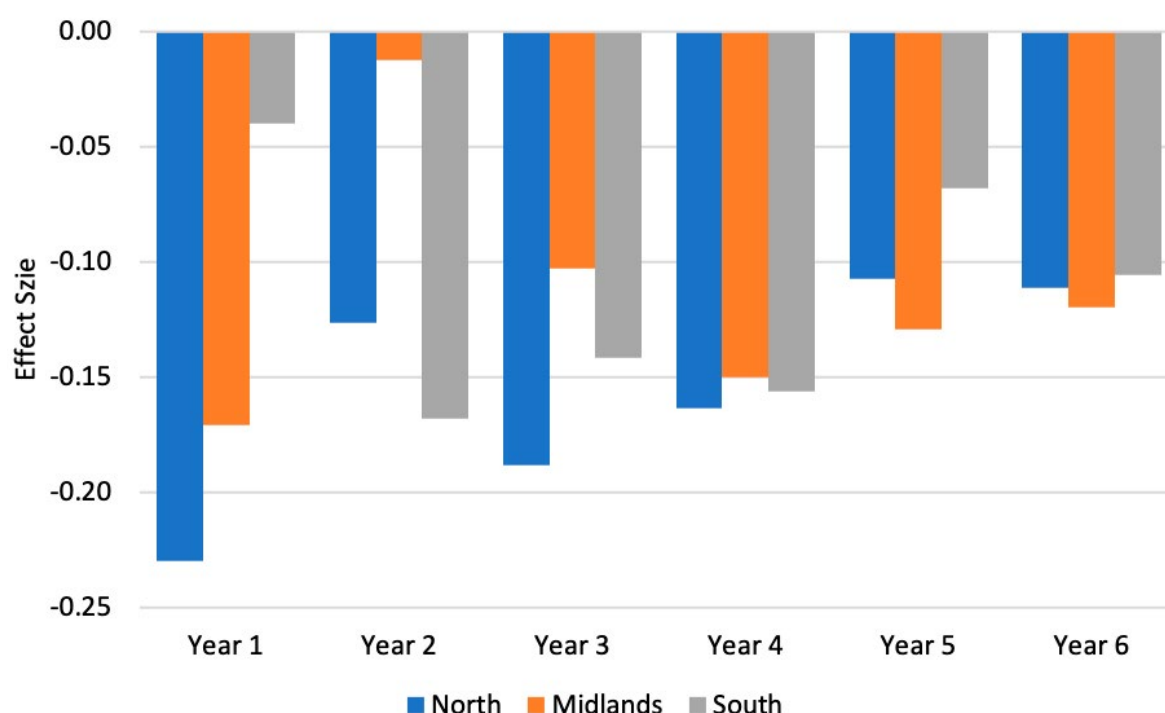


Figure 6: Effect size for attainment across all primary school years in GPS (GAPS) for regions across England for autumn 2019 and autumn 2022

Reading

The impact of disadvantage

In reading, the disadvantage gap between children eligible for pupil premium and their peers remained substantial in autumn 2022. Prior to the pandemic in autumn 2019, analysis was conducted using PiRA tests for reading. Since autumn 2020, New PiRA has been used. As a result, the difference between children with and without pupil premium cannot be directly compared, but the relative changes can be discussed. For more information about the difference between the PiRA and New PiRA tests please see the Appendix (beginning on page 43).

Figure 7 shows that, on average, the disadvantage gap in reading (New PiRA) stayed the same in autumn 2021 (orange bars) and autumn 2022 (blue bars), but remained smaller than it was in autumn 2020 (grey bars). This was still larger than the 2019 gap (using PiRA), shown as yellow bars. The gap appeared to have widened the most between autumn 2019 and autumn 2022 for children in Years 1 and 6.

On average, children eligible for pupil premium achieved scores 7 standardised score points lower in reading than their peers. When converted to effect sizes, this corresponds to being approximately 6 months behind them.

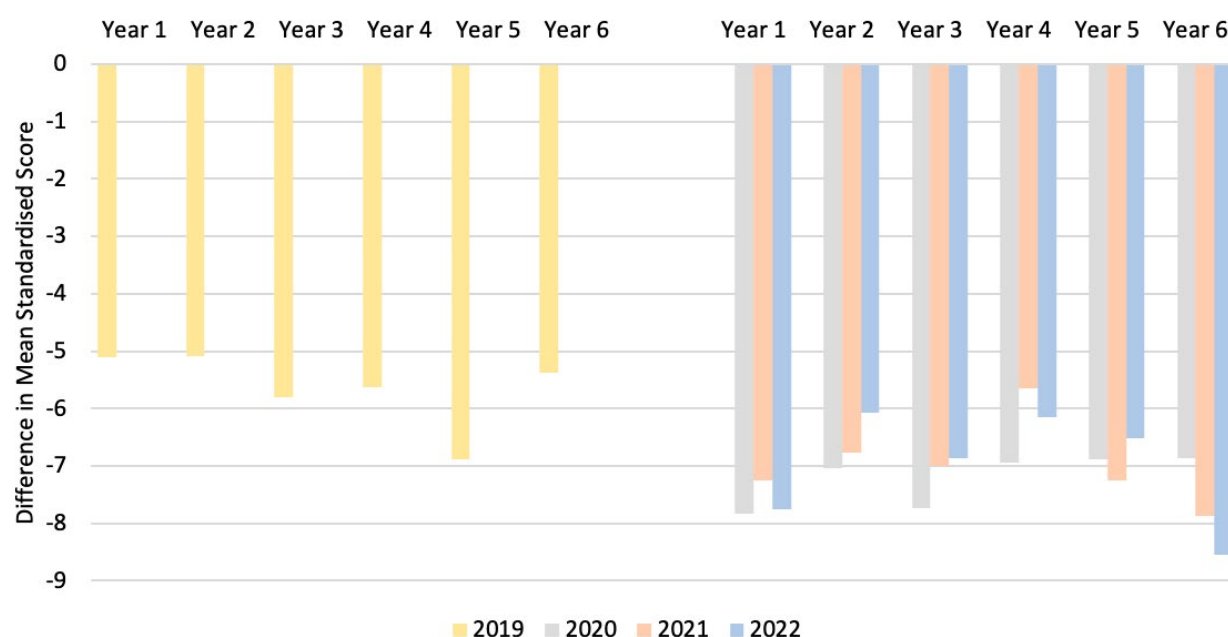


Figure 7: Difference in mean standardised scores in reading (PiRA) between pupil premium children and their peers for autumn 2019 (left), and in reading (New PiRA) between pupil premium children and their peers for autumn 2020, autumn 2021 and autumn 2022 (right)

Concerningly, however, the gap has increased in each consecutive year for Year 6. The difference between children who were eligible for pupil premium and children who were not was 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, additional support may be needed to close this gap, and to assist Year 6 children who are eligible for pupil premium at this crucial juncture in their education.

The impact of region

There is also regional variation to pupils' attainment in reading. Figure 8 shows the reading effect sizes for regional groups between autumn 2019 and autumn 2020 for PiRA (on the left), and between autumn 2020 and autumn 2022 for New PiRA (on the right). The three regional groups are shown in blue for the north, orange for the Midlands and grey for the south. This chart shows that, between autumn 2019 and autumn 2020, children in Key Stage 1 attending schools in the north of England had the largest drops in reading attainment. Children in all year groups in the Midlands also saw declines, but only children in Year 1 in the south of England saw a large decline between autumn 2019 and autumn 2020. Looking at the right-hand side of Figure 8, this does not consider the initial decreases in attainment caused by the pandemic shown in Table 6, but shows the changes in attainment since autumn 2020. On average, Key Stage 1 pupils at schools in the north of England remained further behind their peers, particularly in Year 1. Pupils in the Midlands have shown improvement in most year groups, while pupils in the south have improved between autumn 2020 and autumn 2022 in all year groups. Overall, therefore, it is possible that children in Key Stage 1 in autumn 2022 in the north are still behind the pre-pandemic cohort.

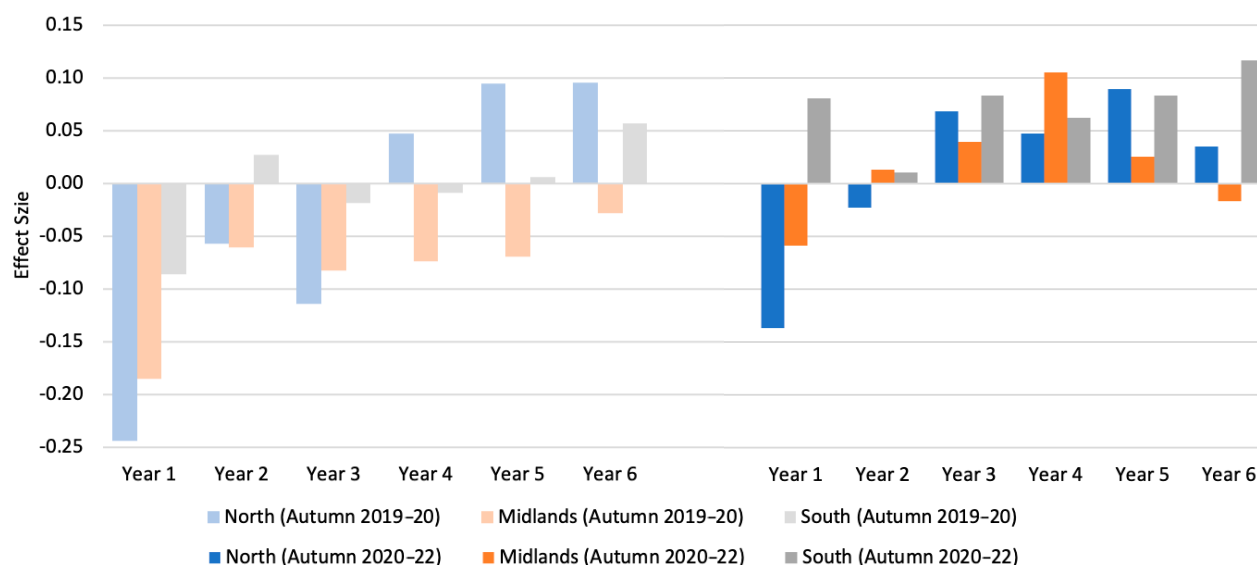


Figure 8: Effect size for attainment in reading (PiRA) across all primary school years in regions across England between autumn 2019 and autumn 2020 (left), and for attainment in reading (New PiRA) in autumn-to-autumn tests 2020–21 and 2021–22 (right)

Maths

The impact of disadvantage

As in other subjects, within each year group not all children have been affected equally by pandemic school closures, and the impact of disadvantage on children's attainment remains a concern. Pupil premium children, on average, obtain lower scores than their peers, which can be seen in Figure 9 for the autumn 2019 period using PUMA tests. The disadvantage gap in maths prior to the onset of the pandemic school closures (in autumn 2019 – yellow bars) was larger in maths than in reading. For autumn 2020 (grey bars), autumn 2021 (orange bars) and autumn 2022 (blue bars), Figure 9 uses New PUMA. For more information about the difference between these tests please see the Appendix (which begins on page 43).

Figure 9 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 these children being approximately 6 months behind their peers. The disadvantage gap has increased in each consecutive year for both Year 1 and Year 6. The difference between children who are eligible for pupil premium and those who are not 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, additional support may be needed to close this gap and assist the children who are eligible for pupil premium at this crucial juncture in their education.

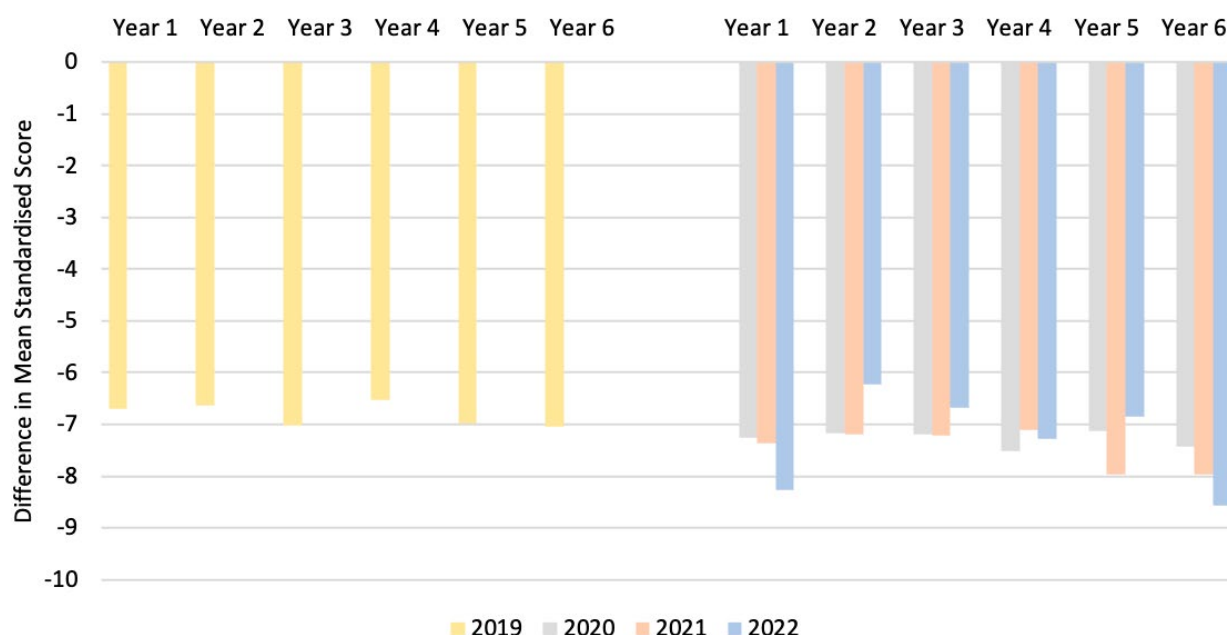


Figure 9: Difference in mean standardised scores in maths (PUMA), between pupil premium children and their peers for autumn 2019 (left), and in maths (New PUMA), between pupil premium children and their peers for autumn 2020, autumn 2021 and autumn 2022 (right)

The impact of region

Figure 10 shows maths effect sizes for regional groups between autumn 2019 and autumn 2020 (left hand side) for PUMA, and autumn 2020 to autumn 2022 for New PUMA (right hand side). Please see the Appendix that begins on page 43 for an explanation of the differences between the PUMA and New PUMA tests. The three regional groups are shown: blue for the north, orange for the Midlands and grey for the south.

As with reading, Figure 10 shows that maths in Year 1 for children attending schools in the north of England declined more than other year groups. The attainment of children in all year groups in the Midlands declined between autumn 2019 and autumn 2020 (large negative effect sizes), but the attainment of children in the south of England only declined a little between autumn 2019 and autumn 2020 (small negative effect sizes). In the autumns following the start of the pandemic, between autumn 2020 and autumn 2022, children's attainment has improved (positive effect sizes).

Although the right-hand side of Figure 10 does not consider the initial decreases in attainment caused by the pandemic, it can be seen that children at schools in the north in Years 2–6 made the most improvement, on average, since autumn 2020. In contrast to reading and GPS, children at schools in the north made the largest improvement in maths over this period. Children in the Midlands made the least improvement between autumn 2020 and autumn 2022, particularly in Years 1 and 5, where attainment in autumn 2022 was below that in autumn 2020 (negative effect sizes). Overall, as with reading, it is possible that children in northern England and the Midlands who were in Key Stage 1 in autumn 2022 are still behind the pre-pandemic cohort.

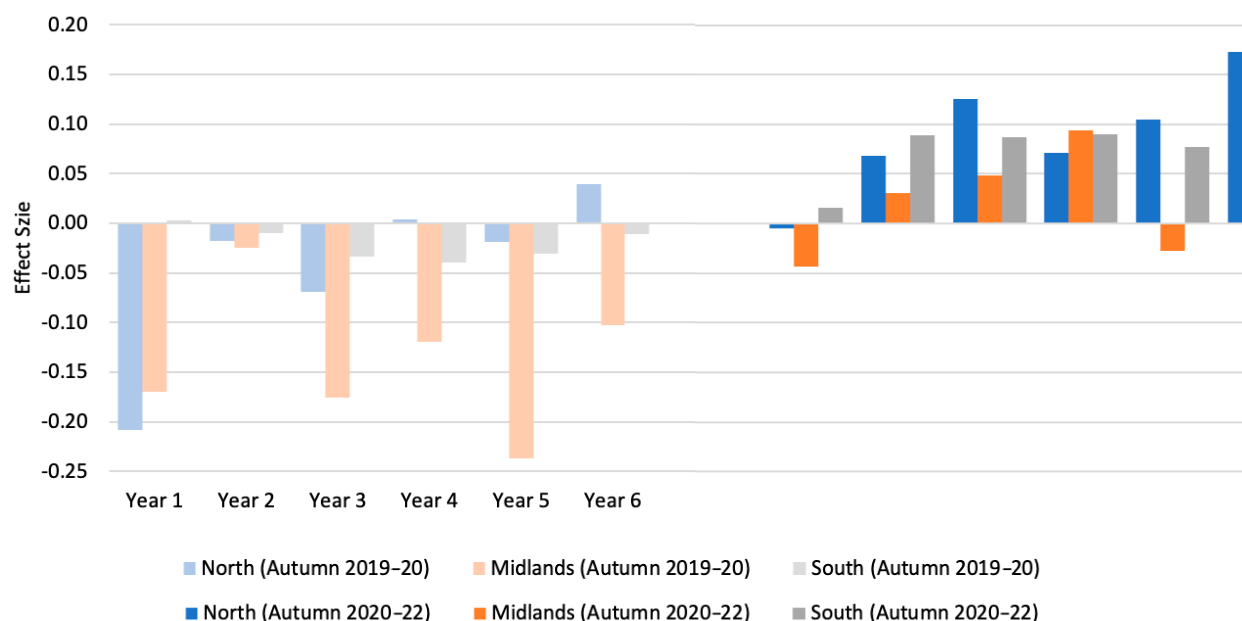


Figure 10: Effect size for attainment across all primary school years for regions across England for maths (PUMA) between autumn 2019 and autumn 2020 (left), and for maths (New PUMA) autumn-to-autumn tests 2020-21 and 2021-22 (right)

Patterns of progress throughout the pandemic

In the following section of the report, progress groups are introduced, and the overarching changes in attainment over the course of the pandemic are discussed for GPS, reading and maths. Additional analysis of progress was reported previously in Milanovic et al. (2023).

Defining progress

Year-on-year progress

The purpose of the longitudinal analysis was to establish what impact the pandemic had on the attainment tests over time. Over 4.4 million tests were reviewed across the three subjects, from approximately 1,500 schools for GPS, 2,300 schools for reading and 2,400 schools for maths. Please see the Appendix (which begins on page 43) for a breakdown by school year. The reading and maths results used in this analysis were the 'old', unchanged versions of PUMA for maths and PiRA for reading. This ensured consistency across the years being compared.

The termly mean standardised scores were reviewed from term-to-term since 2017. Analysis of data prior to the onset of the pandemic school closures (up to spring 2020) revealed seasonality in attainment patterns for all year groups. On average, test scores dipped in the spring term compared to the autumn term, then rose again in the summer term. Year-on-year means and standard deviations of standardised scores showed consistent term-to-term attainment patterns prior to spring 2020 (term-to-term fluctuations of less than 1 %), but a more variable pattern after this time. This corresponds to stable attainment prior to the pandemic school closures, decreases in attainment which are likely due to school closures, and then subsequent increases in attainment after children returned to school.

To provide an analysis of year-to-year changes, spring tests were used, since these provided the largest and most consistent data across all the time periods. The following three periods were compared:

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

Only results from pupils who sat tests in both spring terms in each period were included. For example, for test data to be included in the pre-pandemic period, the pupil must have had valid test results in both spring 2019 and spring 2020. This meant that children's progress in transitioning between years (for example between Year 1 and Year 2) could be tracked. The breakdown of the numbers of pupils used can be seen in the Appendix (which begins on page 43).

Progress groups

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

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

Progress groups were assigned using each pupil's PI band across the two spring tests for each period. For example, for the pre-pandemic period, each pupil included in the analysis had a performance indicator for spring 2019 and spring 2020, and these were 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) allowed for comparison across year groups, since, unlike the other metrics, PI levels are consistent for each subject across primary school year groups. Please see the Appendix (which begins on page 43) for more details.

Factors impacting progress

Once patterns of progress (i.e.: distribution of progress groups in each time period) in the attainment tests had been identified for each subject, the analysis reviewed factors that affected whether or not children made progress from year to year. The results previously reported in Milanovic et al. (2023) are summarised here.

Grammar, punctuation and spelling

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 period, then an increase in the proportion of pupils in the growth group during the post-pandemic period. This can be seen in Figure 11.

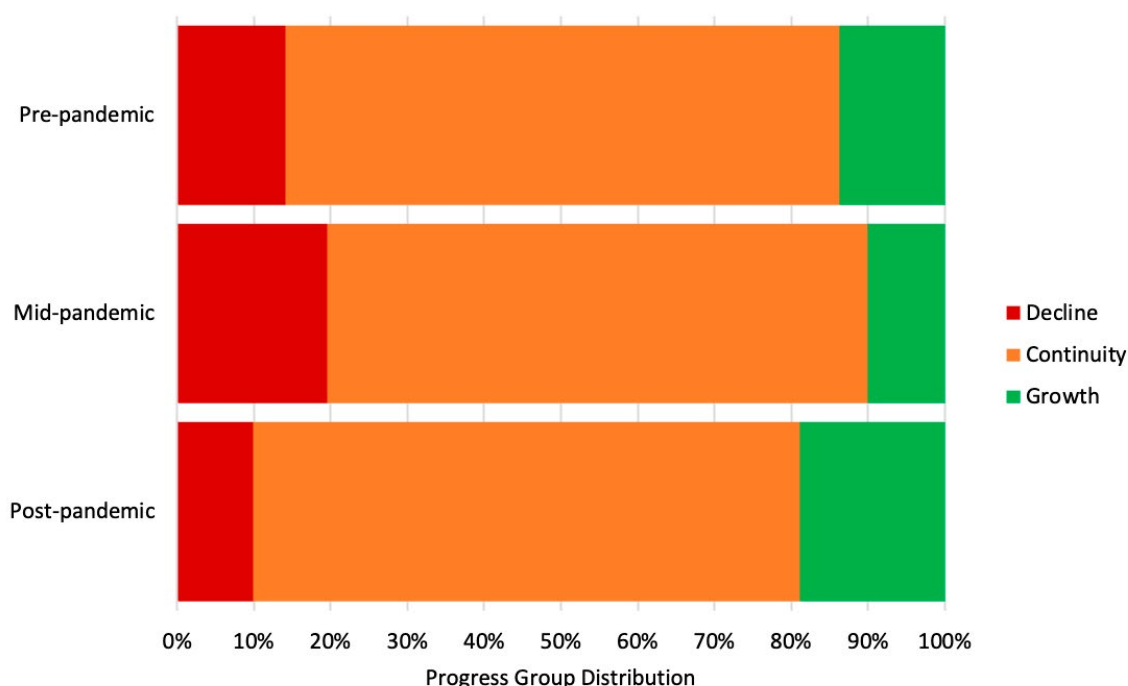


Figure 11: Distribution of progress groups throughout the pandemic for GPS (GAPS)

The changes in progress group distribution corresponded 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 who sat GPS tests in the post-pandemic period had lower mean standardised scores than children who sat GPS tests in the pre-pandemic period. The effect across both Key Stages was similar. When converted to effect sizes, this drop corresponded to children in all year groups being approximately 2 months behind in spring 2022 compared to spring 2019.

The change in progress group distribution by level of in-school disadvantage (by using the percentage of children eligible for free school meals (FSM) as a proxy) was also considered. Figure 12 shows that children at schools with the highest levels of disadvantage had the largest proportion of children who dropped from the growth progress group, the largest proportion who moved into decline during the first part of the pandemic, and the largest proportion who reversed that trend from mid- to post-pandemic.

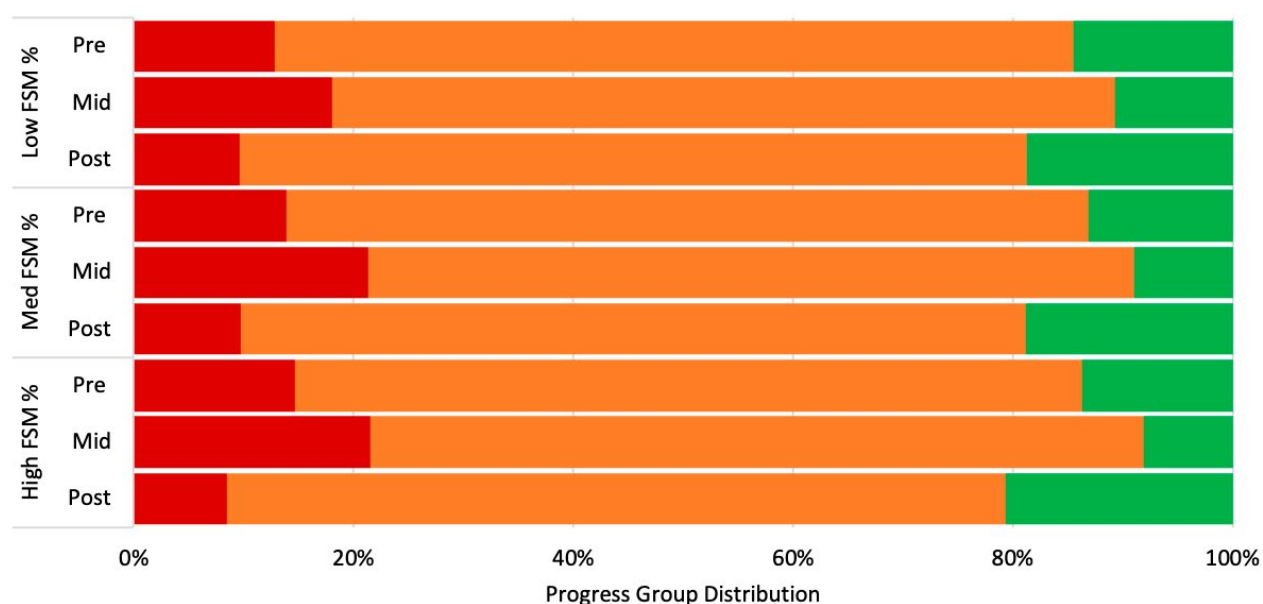


Figure 12: Distribution of progress groups for GPS (GAPS) by in-school disadvantage level throughout the pandemic

When looking at in-school disadvantage by progress group, the increase in the number of children in the growth progress group post-pandemic masks the fact that, on average, the attainment of these children was below their peers to begin with. Despite the increase in children in the growth progress group in the post-pandemic period, children at schools with high levels of in-school disadvantage obtained lower standardised scores than children at schools with low levels of disadvantage.

Reading

As with GPS, 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 13. 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.

The impact of the pandemic on reading was smaller overall than it was for GPS, and 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 the pre-pandemic period, and when converted to effect size, these pupils 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.

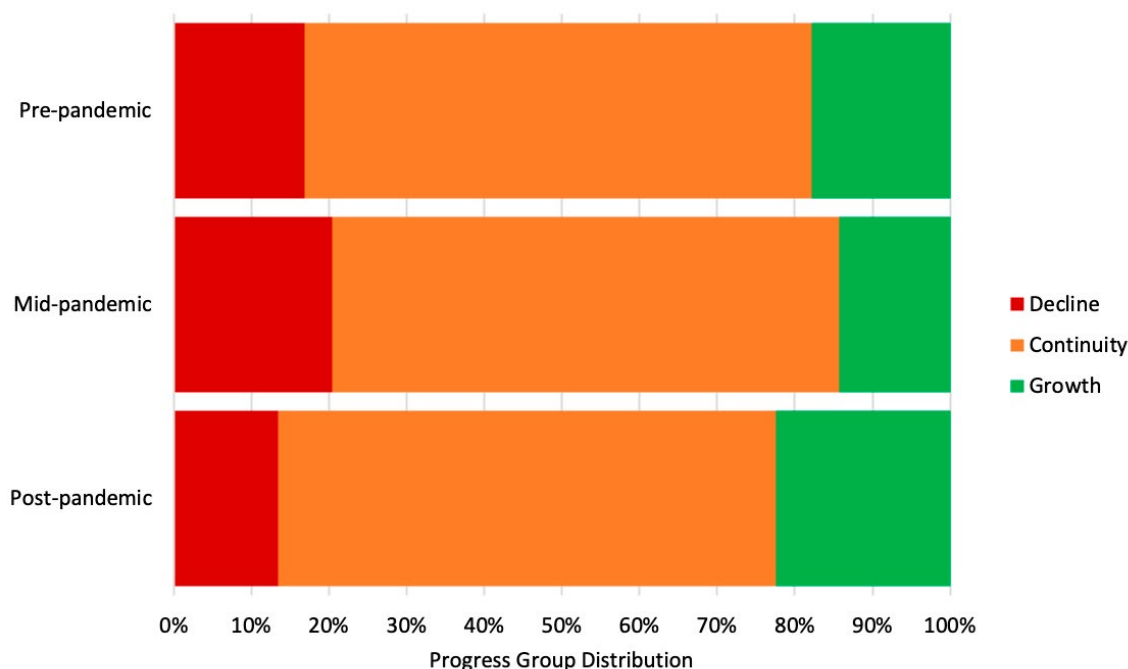


Figure 13: Distribution of progress groups throughout the pandemic for reading (PiRA)

Figure 14 shows the same pattern across schools with different levels of disadvantage 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.

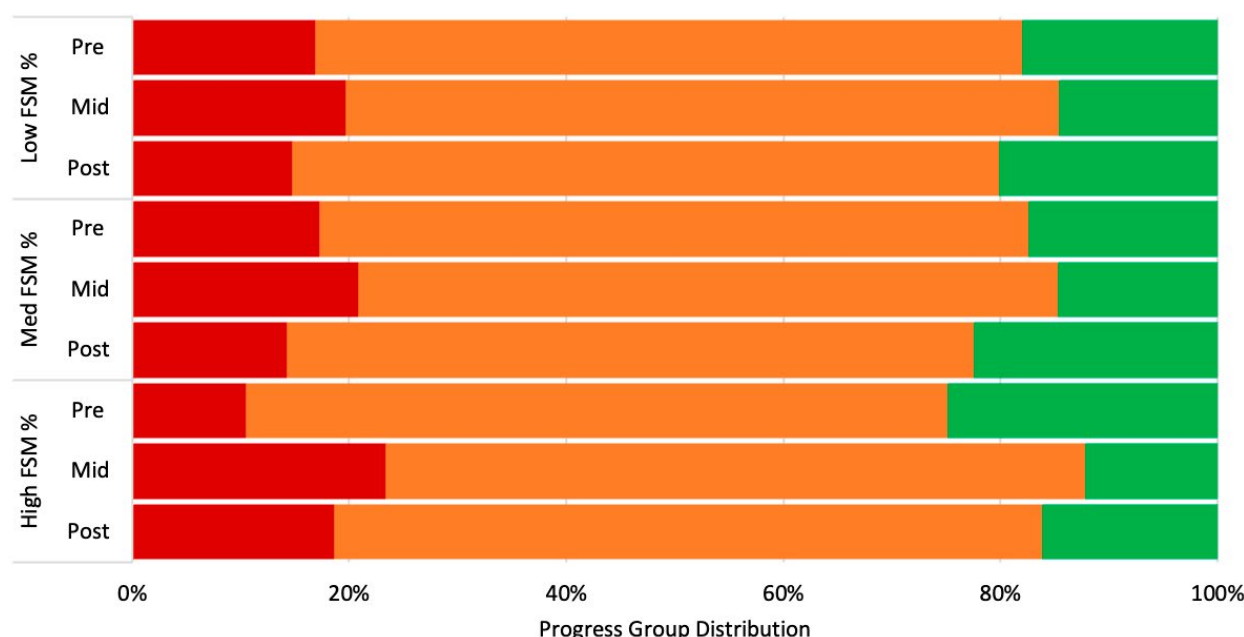


Figure 14: Distribution of progress groups for reading (PiRA) by in-school disadvantage level throughout the pandemic

Once again, the post-pandemic improvement (the increase in the number of pupils in the growth progress group) among pupils attending high FSM schools (i.e., schools with high levels of in-school disadvantage) masked the fact that these children were far behind their peers to begin with. Despite the increase in the proportion of pupils in the growth progress group, children at schools with high levels of in-school disadvantage obtained lower standardised scores than children at schools with low levels of disadvantage in reading. Children at schools with a 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 a low or medium FSM percentage. When converted to effect size, this corresponded to being approximately 2 months behind.

Maths

In maths, Figure 15 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.

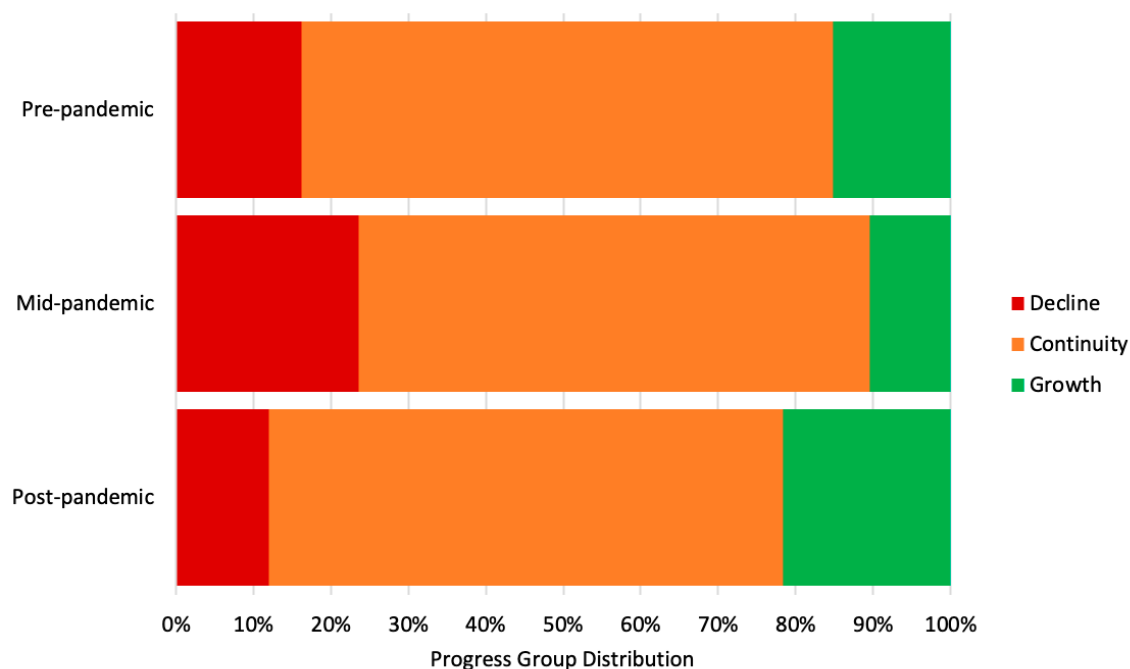


Figure 15: Distribution of progress groups throughout the pandemic for maths (PUMA)

The impact of the pandemic on maths was larger than it was for reading, but smaller than it was for GPS. As 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.

Looking at the progress groups by level of in-school disadvantage, similar patterns were seen for maths as were seen for GPS and reading. Figure 16 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.

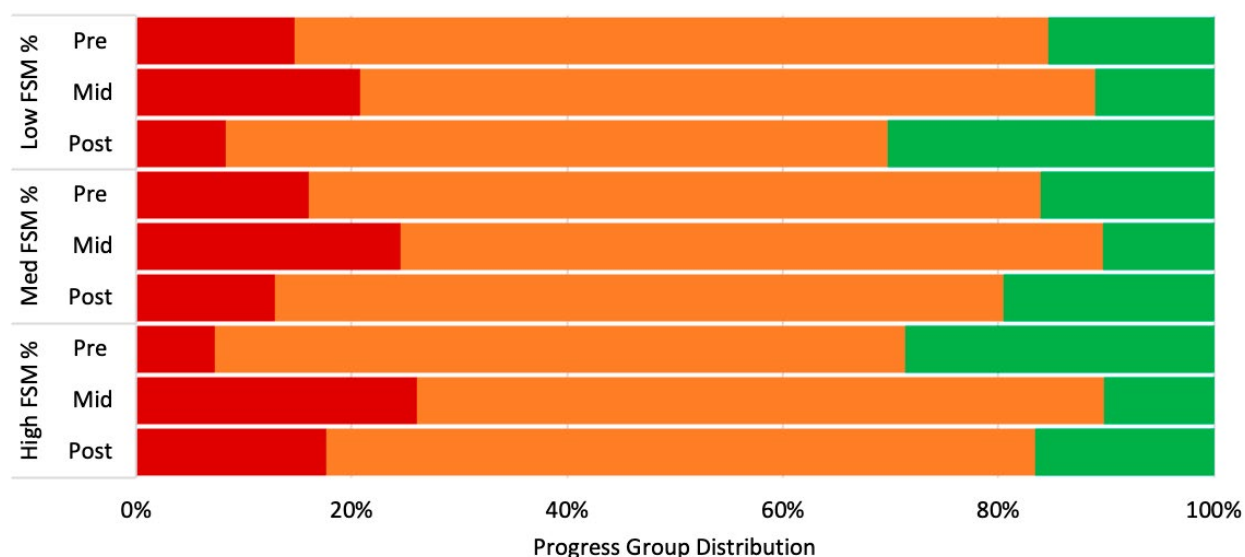


Figure 16: The distribution of progress groups for maths (PUMA) by in-school disadvantage level throughout the pandemic

The post-pandemic improvement (the increase in the proportion of children in the growth group) masked the fact that these children were already behind their peers in terms of attainment. Children at school with high levels of in-school disadvantage obtained lower standardised scores than children at schools with low levels of disadvantage. Children at schools with a high FSM percentage had the largest decrease in maths mean standardised scores from spring 2019 to spring 2022. The decrease was larger than that for both reading and GPS. By spring 2022, children attending schools with a high FSM percentage were approximately 5 standardised score points behind children at schools with low or medium FSM percentages. When converted to effect size, this corresponded to being approximately 4 months behind their peers at other schools.

The impact of COVID-19 on academic wellbeing and attitudes to learning

Many reports showed that children struggled with their mental health during the pandemic (Granada et al., 2022). This section of the report reviews the trends in academic wellbeing and attitudes to learning. Additional analysis, including breakdowns by disadvantage, gender and region was reported previously in Milanovic, Blainey, Minty, et al. (2022).

The Wellbeing and Attitudes to Learning Survey

The *Wellbeing and Attitudes to Learning: Survey and Strategies* was developed by RS Assessment from Hodder Education in collaboration with Coventry and Nottingham Trent Universities. Based on evidence and research into the factors that influence a child's academic wellbeing, the survey was designed with the aim of identifying children's wellbeing at school, and thus helping positively impact their academic wellbeing in the future. Survey responses from Key Stage 2 children in English state primary schools using *Wellbeing and Attitudes to Learning: Survey and Strategies* were analysed across three time periods: 2018 (pre-pandemic), 2020–21 and 2021–22.

The survey was taken online by pupils, and consisted of 41 Likert scale questions which assessed children across 12 sub-dimensions, which built into four dimensions. The dimensions were positivity, motivation, self-efficacy, and resilience and persistence. A child's mean score for each dimension was allocated to one of three zones: green, amber or red. Children whose scores fell into the green zone were demonstrating satisfactory responses for that dimension, those whose scores were in the amber zone may have had some vulnerability in that dimension, and scores in the red zone indicated that these children were most in need of action to support their academic wellbeing.

Analysis reviewed trends in responses for each dimension between groups of children and over time. It focused on large changes (greater than five percentage points) in the percentage of children in each wellbeing zone. Please see Appendix page 47 for a more detailed explanation of the methodology. Overall, since the pre-pandemic period, the percentage of children whose responses are satisfactory for each dimension of academic wellbeing dropped, as shown in Figure 17. Although it is not possible to attribute these drops in satisfaction to the pandemic alone, it is likely to be part of the reason for the reduction in satisfactory responses since the 2018 trial. The changes and trends in academic wellbeing are summarised for each dimension of the wellbeing survey in the following sections.

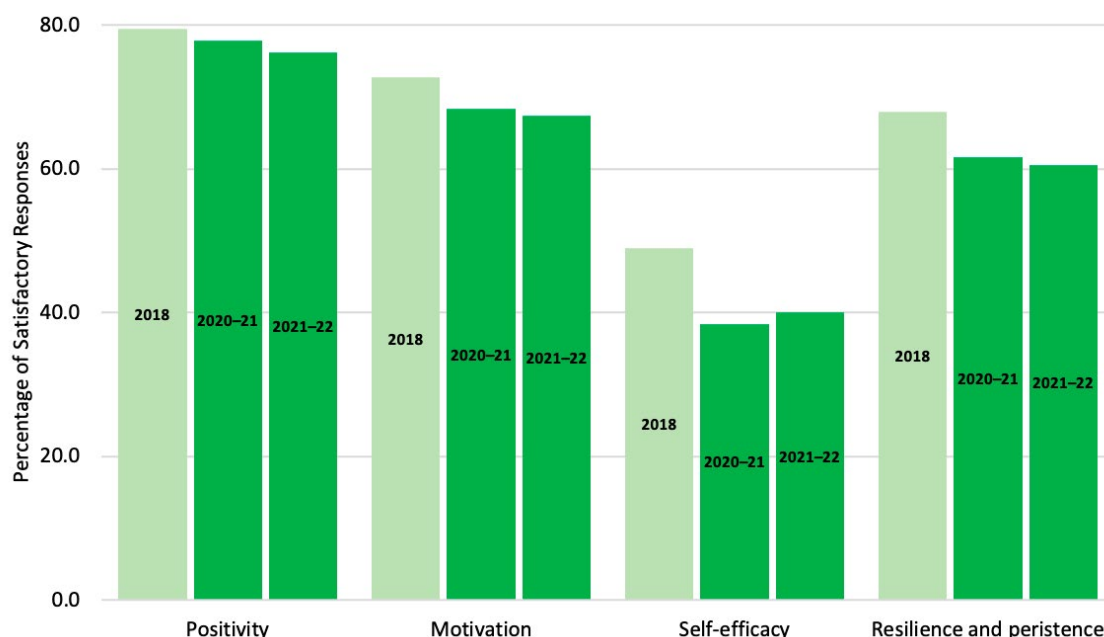


Figure 17: Change in the proportion of responses in the green zone for each dimension over time

Positivity

The positivity dimension covered a child's tendency towards their self-esteem, their satisfaction with the academic/school environment, and their optimism. See Appendix page 47 for more background on this and the other dimensions in the survey. Overall, the majority of children (more than 75 % on average) were positive about school. This number dipped slightly between the 2020–21 and 2021–22 school years, and since the pre-pandemic 2018 trial, however, encouragingly, it remained consistently high and the fluctuation over time was less than 5 percentage points.

Figure 18 shows the distribution of responses across the green zone by year group for the 2018 trial and the 2020–21 and 2021–22 surveys. For all three time periods, the proportion of children who were positive about school decreased as the children progressed through Key Stage 2 (Figure 17). Fewest children felt positively about school in Year 6. This has been seen in other wellbeing research (Marsh et al., 1998). Year 3 showed the highest levels of positivity before the pandemic, but also the largest fall since then. More children reported some vulnerability or not feeling positive about school in 2022 compared to pre-pandemic levels (a rise of 7 percentage points).

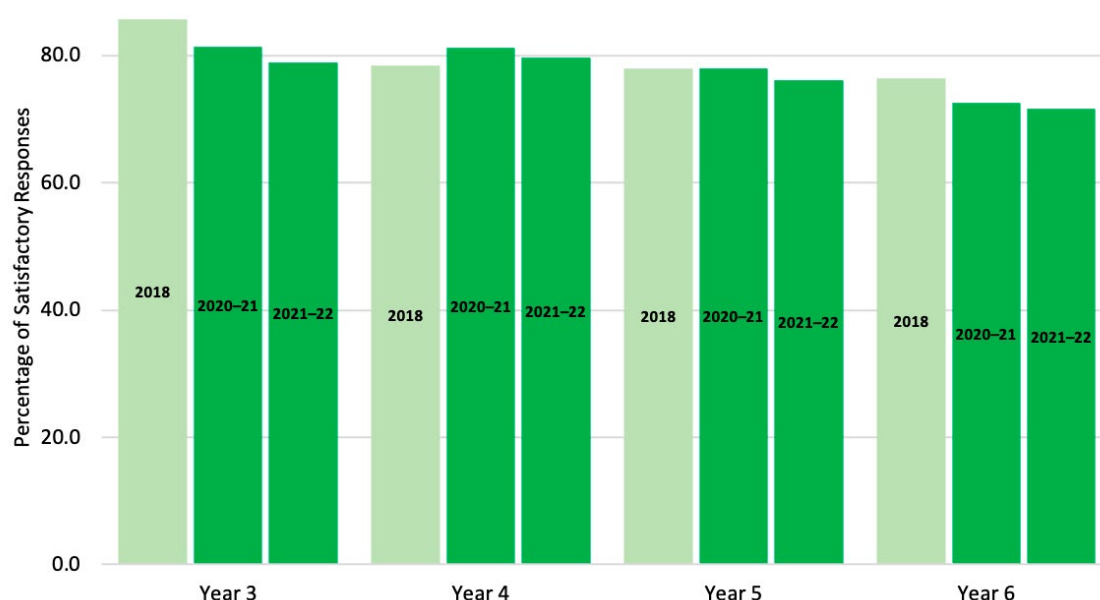


Figure 18: Change in green zone distribution over time, by year group, for positivity

Positivity can be improved in a school setting, and maintaining a high level of positivity has been found to be important for children's overall wellbeing and academic attainment (Zhou et al., 2021). Strategies to maintain and increase positivity in the classroom include tackling bullying, fostering a positive and safe class climate, and building a culture of academic optimism (Milanovic, Blainey, Minty, et al., 2022).

Motivation

The motivation dimension provided information about what drove a child's academic behaviour; it consisted of task value, intrinsic motivation and extrinsic motivation (in the context of academic achievement) and considered the potential impact of support. Overall, the largest proportion of responses fell into the green zone, indicating that the children's responses to questions on motivation were satisfactory, and they felt motivated in school.

Figure 19 shows how the distribution of children's responses to questions about motivation have changed over time by year group. As with positivity, the percentage of children who felt motivated at school consistently dropped as children got older. Fewer upper Key Stage 2 children demonstrated satisfactory responses to the motivation questions in every time period (Figure 17). The difference between the proportion of motivated children in Years 3 and 6 also changed over time. Compared to 2018, fewer children in Year 6 responded that they were motivated.

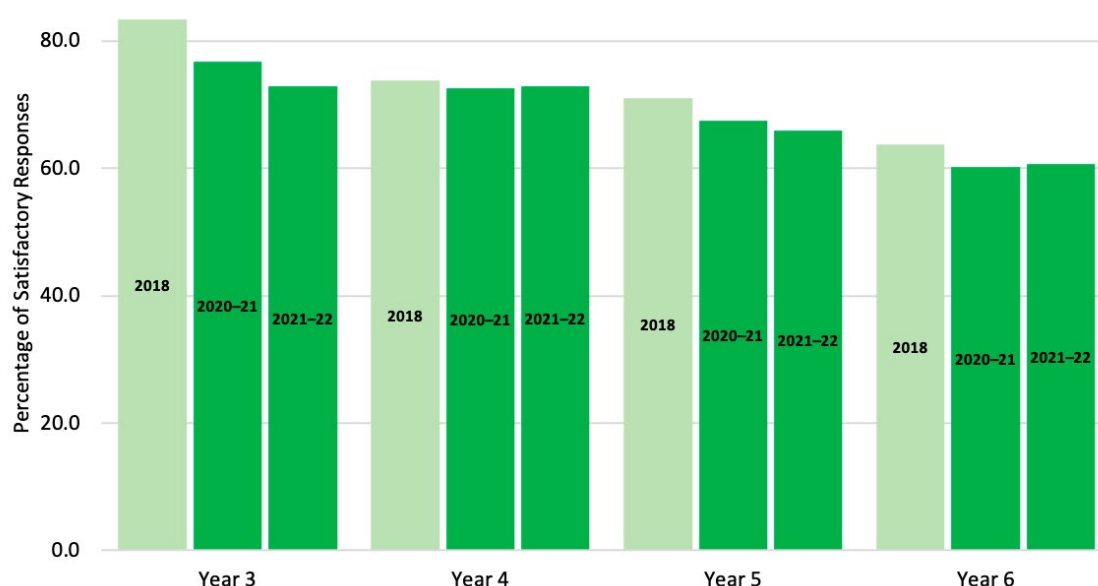


Figure 19: Change in green zone distribution over time, by year group, for motivation

The difference between Years 3 and 6 reduced from 20 percentage points in 2018 to 12 percentage points in 2021-22. This reduction was driven by a fall in reported motivation among Year 3 pupils. Approximately 11 percentage points fewer children in Year 3 said they felt motivated in school in 2021-22 compared to 2018. Motivation can be maintained and improved by reviewing how rewards and praise are used by teachers to encourage learning, setting intermediate tasks for children to achieve and encouraging autonomy in the classroom (Milanovic, Blainey, Minty, et al., 2022).

Self-efficacy

Perceived self-efficacy is defined as a child's belief about their capability to succeed in particular situations and to pursue their goals. This is different from a child's sense of self-esteem, which refers to a child's opinion about their own self-worth, which was incorporated into the positivity dimension discussed earlier. Self-efficacy was assessed by looking at children's academic self-efficacy, emotional self-efficacy and interpersonal self-efficacy.

Figure 20 shows that there were large (greater than 5 percentage point) drops in the proportion of children whose responses were in the green zone for self-efficacy (i.e.: those who reported feeling capable in school) from 2018 to 2022. This is the dimension with the largest decrease in satisfactory responses by children. As mentioned previously, although it is not possible to attribute this drop to the pandemic alone, it is likely to be part of the reason for the reduction in satisfactory responses since the 2018 trial. Fewer children felt capable of managing challenging and difficult situations during and after the pandemic than they did before the pandemic. This may have been driven by the isolation from peers that occurred during lockdown, as peer-modelling of success is thought to influence perceptions of self-efficacy.

Similar to the trends seen for motivation and positivity, Figure 20 shows that there were also fewer Year 6 pupils than Year 3 pupils in the green zone. Year 3 showed the largest decrease, with 11 percentage points fewer children reporting that they felt capable at school in 2021–22 compared to the 2018 trial. The fluctuations between 2020–21 and 2021–22 were small and did not show a consistent trend.

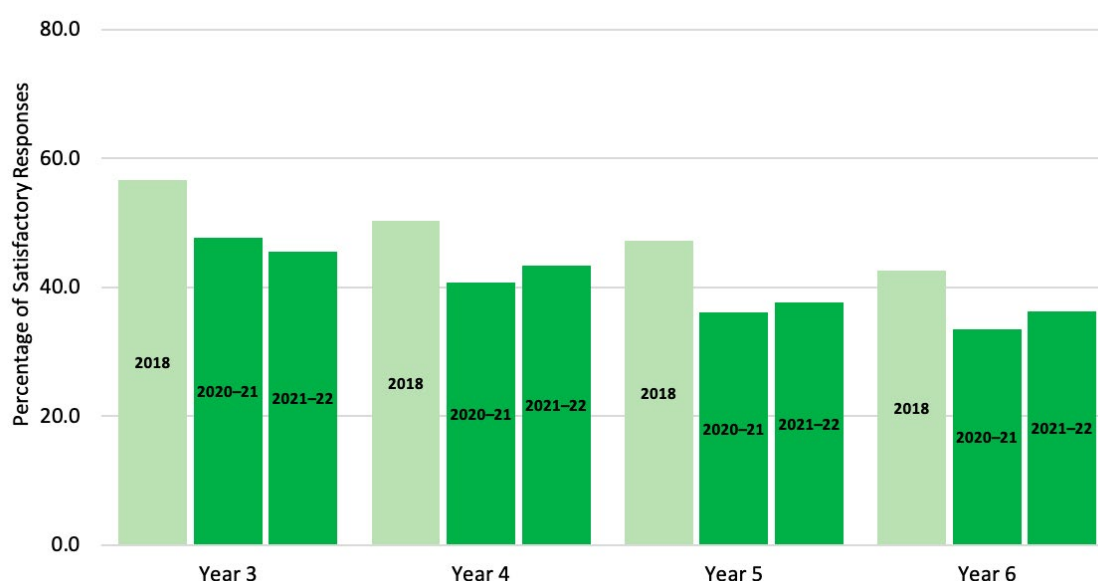


Figure 20: Change in green zone distribution over time, by year group, for self-efficacy

A smaller proportion of children throughout Key Stage 2 responded with satisfactory answers for self-efficacy (Figure 17). Unlike the other three wellbeing dimensions, the majority of responses fell into the amber or red zones, indicating that children collectively showed vulnerability in this dimension. All children could therefore benefit from taking part in strategies to improve self-efficacy. Some strategies that can be used for this in a school context include focusing on strengths, setting achievable goals, sharing positive academic experiences and learning relaxation techniques for when children feel overwhelmed (Milanovic, Blainey, Minty, et al., 2022).

Resilience and persistence

Resilience and persistence explored how well children responded to both success and failure in a school setting, and the emotions that were associated with these experiences.

Figure 21 shows how the green zone distribution of children's responses to questions about resilience and persistence changed over time. As seen in the other dimensions, Year 3 had the highest proportion of children with satisfactory responses, and Year 6 had the lowest proportion. Considering the impact for each year group individually, both Year 3 and Year 6 had fewer children reporting that they felt resilient to academic stresses at school since the trial, although Year 3 dropped by more than Year 6 (11 percentage points compared to 8 percentage points). The fluctuations in Year 4 did not show a consistent trend across the three periods analysed.

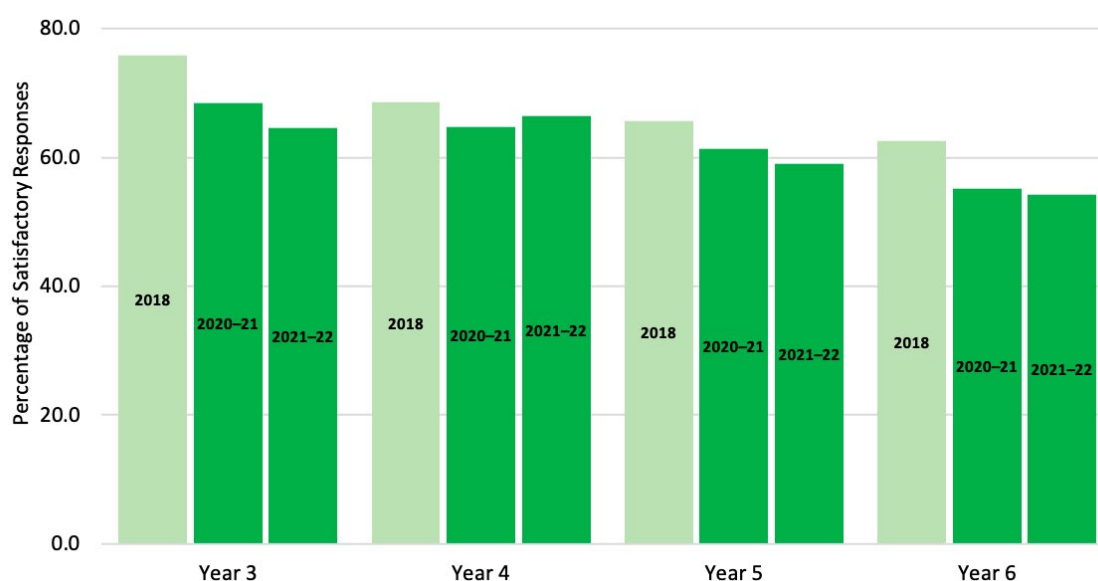


Figure 21: Change in green zone distribution over time, by year group, for resilience and persistence

Although there was a decrease in children feeling resilient since the 2018 trial, changes over 2020-21 and 2021-22 were small, and it was not possible to identify a clear trend (Figure 17). Resilience and persistence can be improved by teaching children relaxation techniques, and by developing secure relationships and a nurturing culture at school (Milanovic, Blainey, Minty, et al., 2022).

The impact of academic wellbeing on attainment

The aim of this part of the research was to better understand whether children's academic wellbeing correlates with their academic attainment and progress. In order to analyse the impact that children's academic wellbeing may have had on their academic attainment over the course of the 2020–21 and 2021–22 school years, only children who had sat two sequential attainment tests and two sequential wellbeing surveys were included. Positivity, self-efficacy and resilience and persistence were found to have some impact on attainment.

Overlap between academic wellbeing and attainment

Over the course of the two school years analysed, on average, 38,000 children sat two sequential attainment tests in autumn 2020 and autumn 2021. By contrast, only approximately 3,600 children sat two sequential wellbeing surveys. Please see Appendix page 47 for more information. There was relatively little overlap between the wellbeing and attainment data sets. When the two datasets were compared to identify children who had completed both types of test, 522 unique pupils were found. There were 186 pupils who had sat GPS tests and wellbeing surveys, 336 children who had sat reading tests and wellbeing surveys, and 229 children who had sat maths tests and wellbeing surveys. Pearson correlation was conducted to check the reliability of the analysis. Correlations between subjects and wellbeing dimensions, and between the tests over time, can be found in the Wellbeing data section of the Appendix, which begins on page 47.

For the 522 children who sat both attainment tests and wellbeing surveys in the 2020–21 and 2021–22 school years, there were slightly more girls than boys. The mean age of children who sat tests in 2020–21 put them in Year 4. The mean age of children who sat tests in 2021–22 is roughly a year older, which put them in Year 5. Please see the Appendix (the Wellbeing data section, beginning on page 47) for more details. Most children were from the south of England (approximately two-thirds), one-fifth of children were from schools in the north, and the remaining children were from schools in the Midlands. The sample had a lower level of in-school disadvantage than nationally, with 17.8 % of children in these schools eligible for free school meals, compared to the national average of 22.5 % for schools in the 2021–22 school year (Department for Education (UK Government), 2022).

Statistical analysis was conducted using Python on standardised scores for attainment, both on the categorical allocation dimension scores to a wellbeing zone (green, amber or red) and the corresponding mean dimension score for the wellbeing survey. One-way ANOVA (at the $p = 0.05$ significance level) was conducted to investigate whether the impact of each wellbeing dimension on the attainment standardised score was significant. It aimed to identify whether there was a significant change in the standardised scores of children based on how they responded to the wellbeing survey.

Additionally, hierarchical regression analysis was conducted on attainment standardised scores in autumn 2020, combined with the wellbeing dimension scores from 2020–21, to see whether the addition of the wellbeing dimension was able to account for any of the change in attainment standardised scores seen over time. This analysis aimed to see if academic wellbeing had an impact on future attainment.

The results for each subject are summarised in the following sections.

Grammar, punctuation and spelling and academic wellbeing

There was no significant effect found for motivation, resilience and persistence and self-efficacy on GPS attainment for autumn 2020. However, positivity did have a significant effect on autumn 2020 GPS attainment. Children who reported feeling positive at school had significantly higher standardised scores in GPS than children who stated they did **not** feel positive in school. Analysis showed that there was no significant effect of any wellbeing dimension on GPS attainment for autumn 2021.

Looking at the relationship between children's academic wellbeing and their GPS attainment over time, found that children's academic positivity in autumn 2020 was able to account for significant growth in GPS standardised scores between autumn 2020 and autumn 2021. This indicated that academic positivity may have a role to play in supporting pupils' ability to catch up on lost learning in GPS.

Reading and academic wellbeing

The results for reading were not consistent. Different wellbeing dimensions impacted reading in autumn 2020 as compared to autumn 2021. Feelings of positivity and capability (self-efficacy) had an impact on reading attainment in autumn 2020, while only resilience had an impact on reading attainment in autumn 2021. Part of the reason for this may have been a change in attitude in how children reacted to the first set of school closures in spring 2020 compared to those in spring 2021.

The effect of positivity on autumn 2020 reading attainment was found to be significant. Children who responded that they did **not** feel positive at school had statistically lower standardised scores in reading in autumn 2020 than children who reported feeling positive and who reported sometimes feeling positive at school. The effect of self-efficacy on autumn 2020 reading attainment was also found to be significant. Children who responded that they felt capable at school had statistically higher standardised scores in reading in autumn 2020 than children who reported **not** feeling capable at school.

Resilience and persistence had a significant impact on reading attainment in autumn 2021. Children who responded that they felt resilient at school had statistically higher standardised scores in reading in autumn 2021 than both children who reported feeling some vulnerability in resilience and children who reported not feeling resilient at school.

Looking at the relationship between children's academic wellbeing and their reading attainment over time did not find any significant impact of any dimension of academic wellbeing on reading standardised scores between autumn 2020 and autumn 2021. The inconsistency of the impact of wellbeing dimensions across this period may have impacted this result.

Maths and academic wellbeing

Analysis showed that the effect of motivation and resilience and persistence on maths attainment was not significant in the autumn 2020 term. However, similar to GPS and reading, there was an effect for positivity. Children who responded that they felt positive at school had statistically higher standardised scores in maths in autumn 2020 than both children who reported feeling some vulnerability in positivity and children who reported **not** feeling positive at school.

The effect of self-efficacy on autumn 2020 maths attainment was found to be significant, as with reading. Children who responded that they felt capable at school had statistically higher standardised

scores in maths in autumn 2020 than both children who reported feeling some vulnerability in their self-efficacy and children who reported **not** feeling capable at school.

The effect of self-efficacy on autumn 2021 maths attainment was also significant. Children who responded that they felt capable at school had statistically higher standardised scores in maths in autumn 2021 than both children who reported feeling some vulnerability in their self-efficacy and children who reported **not** feeling capable at school. No effect was found for the other wellbeing dimensions.

Looking at the relationship between children's academic wellbeing and their maths attainment over time found that children's academic self-efficacy in autumn 2020 was able to account for significant growth in maths standardised scores between autumn 2020 and autumn 2022. This indicated that academic wellbeing may have a role to play in supporting pupils' ability to catch up on lost learning in maths.

Conclusion

The impact of the pandemic on children at English state primary schools was varied. From the research conducted, it appears that Key Stage 1 did not make as much of an improvement in the 2021–22 school year as Key Stage 2. Key Stage 1 pupils are likely still behind their pre-pandemic counterparts in reading and maths, while Key Stage 2 may have caught up.

The disadvantage gap in reading and maths for Year 6 pupils has widened from autumn 2020 to autumn 2022. While this may be a cohort effect, or due to an increase in the number of children who are eligible for free school meals, primarily from lower-income backgrounds (Julius & Ghosh, 2022), it is concerning. Children attending schools with higher percentages of children eligible for free school meals saw larger fluctuations in their attainment over the course of the pandemic (suffering both larger initial declines and subsequent increases in attainment), yet remain behind their peers attending other schools in terms of their mean standardised scores.

Key Stage 2 pupils' academic wellbeing changed over the course of the pandemic for the worse, with the proportion of children who provided satisfactory responses for positivity, motivation, self-efficacy and resilience and persistence at school declining from 2018 to 2022. Older children (Year 6) reported lower levels of satisfaction in all dimensions than younger children (Year 3), but Year 3 had the largest decreases in satisfaction. Self-efficacy overall had the lowest levels of satisfaction for all children, and most children reported feeling some level of vulnerability in self-efficacy (i.e.: their capability at school) by the end of the 2021–22 school year.

In addition, wellbeing appeared to have some impact on Key Stage 2 children's attainment, in particular positivity and self-efficacy. Specifically, children's positivity at school appeared to have impacted their GPS attainment, and their self-efficacy impacted their maths attainment.

Implications

Putting together the four key areas of research, the key takeaways from this project are summarised here:

1. In **GPS**, as of autumn 2022, children in all years of primary school remained approximately 2 months behind the pre-pandemic attainment level. Further support in GPS is needed to help children improve these core skills.
2. In **reading**, children in Key Stage 1 were approximately 1 month behind in spring 2022 compared to spring 2019. In contrast, children in Key Stage 2 are likely to be attaining similar reading levels to their pre-pandemic peers.
3. In **maths**, children in Key Stage 1 were approximately 1 month behind in spring 2022 compared to spring 2019. In contrast, children in Key Stage 2 were attaining at approximately the same level in comparison with spring 2019.
4. In reading and maths, children who were in **Key Stage 1 during the school closures in 2020 and 2021 had the largest drops in attainment** compared to their pre-pandemic cohorts. There was also very little improvement in attainment for children in Key Stage 1 between autumn 2020 and autumn 2022. Given this, these children may still be behind the pre-pandemic cohort. Monitoring their attainment over time will be necessary to see if there is improvement in the future. These children were in Lower Key Stage 2 (Years 3 and 4) in autumn 2022, and may need additional support as they approach their end-of-primary-school National Tests in 2026 and 2025 respectively.

5. Children who were in **Key Stage 2 in autumn 2022 appeared to have made up the losses in reading attainment seen during the 2020 and 2021 school closures**. It is likely that by autumn 2022 these primary children had, on average, caught up with their pre-pandemic counterparts in reading.
6. Children who were in **Key Stage 2 in autumn 2022 appeared to have made up the losses in maths attainment seen during the 2020 and 2021 school closures**. It is possible that by autumn 2022 these primary children, on average, might have caught up with their pre-pandemic counterparts in maths.
7. Over the course of school closures, the average **attainment in all three subjects dropped in schools with high levels of in-school disadvantage**. These drops were larger than for schools with lower disadvantage levels. The average standardised scores for children attending schools with high in-school disadvantage were also lower than their peers, in all subjects and years. This analysis indicates that more investment may be required in schools with high disadvantage.
8. The **disadvantage gap between children eligible for pupil premium funding and their peers remained large** for all subjects and year groups. It also increased each autumn between 2020 and 2022 for Year 6 reading and maths. Additional support remains critical for children from disadvantaged backgrounds, in particular for those in Year 6, to assist them at the transition between primary and secondary school.
9. **Children who were starting Year 3 in autumn 2020 and autumn 2021 had larger decreases in academic wellbeing than any other year group in Key Stage 2**. These children were in Year 1 and 2 at the beginning of the pandemic, and had the most disruption to their schooling (the largest impact on their attainment). Further support may be required in terms of academic wellbeing for these children as they progress through primary school.
10. **The majority of children in Key Stage 2 reported some vulnerability in self-efficacy** (i.e.: how capable they felt in school) in the 2021–22 school year. This can be seen in Figure 1. Two simple strategies that can be used to address this in a school context include setting achievable goals and sharing positive academic experiences.
11. There is **some evidence that children’s positivity and self-efficacy may impact their attainment at Key Stage 2**. While there was no significant relationship over time for reading, there was an effect of academic wellbeing on both GPS and maths across 2020–21. Children’s academic positivity was able to account for significant growth in GPS attainment and children’s academic self-efficacy was able to account for significant growth in maths attainment. Implementation of strategies to improve and maintain positivity and self-efficacy in school may assist with improving children’s attainment in maths and GPS. Strategies that can be used to increase positivity in a school context included tackling bullying and fostering a positive and safe class climate.

Recommendations for policy and practice

Putting together the four key areas of research, some recommendations for policy and practice are summarised below:

- School closures due to COVID-19 had an effect on primary school children's attainment and academic wellbeing. The impact, and ability to reach pre-pandemic levels, has varied by school group, pupil group and subject. Although the average attainment in reading in upper Key Stage 2 appears to be back to pre-pandemic levels, younger pupils (Key Stage 1 and lower Key Stage 2) may still be behind in both reading and maths. All children require further assistance with grammar, punctuation and spelling.
- Children from disadvantaged backgrounds remain likely to need more support than others at a national level. Continuing to implement policies to improve support for children eligible for free school meals remains a key recommendation.
- A large proportion of children report some vulnerability in self-efficacy, and this proportion has increased over the course of the pandemic. Children would benefit from strategies to improve their belief in themselves to succeed.
- Year 3 pupils in 2021–22 reported the largest drop in academic wellbeing. Implementing strategies to improve academic wellbeing in Key Stage 2 and monitoring this trend is recommended.
- There is some evidence that children's positivity at school appeared to have impacted their grammar, punctuation and spelling attainment between autumn 2020 and autumn 2021, and their self-efficacy impacted their maths attainment between autumn 2020 and autumn 2021. Further research is required to monitor this trend on a larger scale, and may also help understand the impact of academic wellbeing strategies in improving children's academic wellbeing.

Further research

As more data becomes available, due to children continuing to sit termly GPS, reading and maths tests and taking the academic wellbeing survey, the impact of school closures on attainment and wellbeing could continue to be tracked over longer time periods. In particular, the attainment of children who were in Years 1 and 2 at the beginning of the pandemic in 2020, and who were most impacted by school closures at the time, could be monitored as they progress through primary school. Additionally, further research could use data from children who have taken an academic wellbeing survey in the 2022–23 school year, and link their attainment tests in GPS, reading and maths to see if the current relationships with positivity and self-efficacy continue in the future.

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Appendix

Attainment data

Additional information about the attainment data analysis can be found in this section.

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. However, attainment tests are only one measure of a child's development, and this analysis needs to be considered alongside other research in this area, not least the impact on children's social development, wellbeing and mental health.

Additionally, 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 the English education system, and it is hoped that they prove useful in informing priorities and policies.

Data sources

The data used in this report comes from the standardised, termly tests PiRA, PUMA, New PiRA, New PUMA and GAPS. The tests were taken between 2016–2022 and entered into MARK, a free marksheet and reporting service. The termly tests are marked by teachers using a robust mark scheme, and raw scores are converted to standardised scores automatically in MARK. Only results from fully completed tests, with non-zero scores, sat by a pupil within the correct age range (i.e.: children of the age the test was intended for) were analysed. Tests sat at the wrong time of year have been omitted.

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

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 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 tests were available for analysis of pupils' attainment. Since autumn 2022, only New PUMA and New 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 present across the two different test suites.

By contrast, for reading 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, it is not advisable to directly compare the results of children across

the 'old' and new versions of PiRA, but trends can be compared.

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

Previous papers can be found on: risingstars-uk.com/nuffield.

Coverage and representativeness

This analysis is limited to mainstream state primary schools in England. In order to have confidence in the statistical analysis, it is vital to have a large and representative sample. For this reason, some year groups in some terms have been excluded from analysis. This is often the case for the Reception year. For any other analysis of pupil, regional or school groups, the minimum number of test results in any group was 1000. A breakdown of the number of termly tests used in analysis throughout the course of this project can be seen in Table A1.

	GAPS	PiRA	New PiRA	PUMA	New PUMA	All tests	All tests
Year	No. pupils	No. pupils	No. pupils	No. pupils	No. pupils	No. pupils	No. schools
2019 ⁵	131,000	188,000	0	342,000	0	661,000	1,300
2020 ⁶	174,000	148,000	134,000	136,000	134,000	588,000	1,300
2021	289,000	0	293,000	0	283,000	1,025,000	1,500
2022	328,000	0	401,000	0	378,000	726,000	1,500
TOTAL	922,000	336,000	828,000	478,000	795,000	3,000,000	2,800

Table A1: Termly test data used to calculate changes in attainment per term between 2019–2022

An analysis of the coverage of types of schools included in both cohorts was broadly similar, in that all regions and major school types were included. However, in both years there was an over-representation of schools in the lowest attainment bands. That is to say, there were more schools than average with lower proportions of children achieving the expected standard in reading, maths and writing in KS2 in 2019. However, the similar levels of over-representation in both groups mean that this bias is unlikely to account for year-on-year differences in attainment.

⁵ Summer and autumn terms only in 2019, to get pre-pandemic attainment levels.

⁶ Spring and autumn terms only in 2020, as there were no results for summer 2020 due to school closures caused by the pandemic.

Grammar, punctuation and spelling attainment

GPS (GAPS) termly tests were unchanged over the period analysed in this report, as a result it is possible to show the net changes to GPS from pre- to post-pandemic. This can be seen in Table A2.

GPS (GAPS)						
	Spring 2020–22		Summer 2019–22 ⁷		Autumn 2019–22	
School year	Effect size	Months' difference	Effect size	Months' difference	Effect size	Months' difference
Year 1	-0.17	-2	-0.19	-3	-0.19	-2
Year 2	-0.23	-3	-0.21	-3	-0.21	-2
Year 3	-0.13	-2	-0.15	-2	-0.15	-2
Year 4	-0.12	-2	-0.12	-2	-0.12	-2
Year 5	-0.09	-1	-0.11	-2	-0.11	-2
Year 6	-0.15	-2	-0.22	-3	-0.22	-2

Table A2: GPS net termly attainment from autumn 2019 to autumn 2022

Pupil premium

Pupil premium funding is provided to schools in England based on certain eligibility criteria. It is used as a proxy for disadvantage, and is similar to analysis of children with free school meals. The data used for this analysis is entered by teachers into MARK on a pupil-by-pupil basis. Only pupils attending schools with overall pupil premium percentages (in MARK) that were broadly consistent with the proportion reported publicly for that school (within 10 %) by the Department for Education were included in this analysis. Pupils with unknown pupil premium status were excluded. This cross-referencing, in addition to the large sample sizes (more than 1000 per group), should mitigate for cohort effects which may occur due to the FSM6 definition (i.e.: that there is a one-way flow of children from the non-pupil premium to the pupil premium categories over time).

Free school meals

In-school disadvantage uses free school meals eligibility as a proxy for disadvantage. Free school meal (FSM) groups were based on the percentage of children at each school eligible for free school meals. The groups were defined as:

- Low (FSM <20 %)
- Medium (FSM 20–35 %)
- High (FSM >35 %).

⁷ No tests were taken in summer 2020 due to national lockdowns, so summer 2019 is used instead to provide a pre-pandemic baseline of attainment.

Progress analysis

Although the students were not the same between the periods, 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 A3. 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 A3: Number of pupils for each period and each subject used in progress analysis

Progress groups

The performance indicator (PI) thresholds for PUMA, PiRA and GAPS are shown in Table A4. Similar thresholds (+/- 1 standardised score) were used for New PUMA and New PiRA, with slight adjustments to take into account the updates to the tests.

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 A4: Performance indicator band thresholds for attainment tests used in progress analysis

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

PI bands are designed to be consistent across year groups, which allows for comparison between different year groups in a way that is not normally possible when looking at standardised scores themselves. Progress groups were assigned using each child's PI band across two time periods, as seen in Table A5.

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 A5: Progress group derivation for each pupil based on their performance indicator band

Online dashboard

As part of the project, RS Assessment from Hodder Education, in collaboration with SchoolDash, have created RS Assessment Analysis. RS Assessment Analysis is an online dashboard that is free to use and is available for one year after the end of the project (up to April 2024).

MARK from RS Assessment provides a valuable service for schools seeking to track and analyse pupil progress. During the COVID-19 pandemic and accompanying national lockdowns, this aggregated dataset has proved valuable in providing insights into attainment trends among primary school children, and a number of white papers have been published on the topic.

RS Assessment Analysis is intended to accompany the research reports written as part of this project, and to provide academics, researchers, school leaders and policy makers with an easy-to-use illustrative series of analyses and visualisations, through which to further understand the impact of school closures on attainment.

For more information, and to request access please see: risingstars-uk.com/nuffield.

Wellbeing data

Additional information about the wellbeing data analysis can be found in this section.

As with attainment, when 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 the percentage of children receiving free school meals at their school, provides little indication about his or her academic wellbeing. Nevertheless, these aggregate trends are important in order to understand the education system.

Background to Wellbeing and Attitudes to Learning: Survey and Strategies

In 2012, the Department for Education in the UK published research (Morrison, Gutman & Vorhaus, 2012) that examined how dimensions of children's wellbeing at ages 7–13 are linked to concurrent and later educational outcomes at ages 11–16. They found that, on average, children with higher levels of emotional, behavioural, social and school wellbeing have higher levels of academic achievement and are more engaged in school.

Improving academic attainment goes hand in hand with improving and monitoring pupil wellbeing. As a result, RS Assessment worked with Coventry and Nottingham Trent Universities to design a product to focus on those children in upper primary, aged 7–11, with the aim of supporting their wellbeing at school and thus positively affecting their academic attainment in the future. The *Wellbeing and Attitudes to Learning: Survey and Strategies* was launched in 2019, and the product is made up of a pupil survey, reporting and evidence-based strategies. The survey looks at pupils' positivity, motivation, self-efficacy and resilience and persistence, and each dimension is comprised of multiple sub-dimensions, bar resilience and persistence. For every sub-dimension there are either 3 or 4 survey items with five responses on a scale, from 'strongly disagree' to 'strongly agree'. A child's score for each of the sub-dimensions is the mean of all the corresponding item responses. The dimension score is the mean of the sub-dimension scores.

The survey was trialled on a representative sample in spring 2018, and based on the data collected, three zones were derived: red, amber and green zones. For each dimension, each pupil's mean score can be allocated to one of these three zones. Responses which fall in the green zone indicate satisfactory responses, amber responses indicate some vulnerability, and red responses are a cause for concern. These zones allow teachers to identify the different wellbeing needs in their school. It allows them see how their pupils' scores compare, relative to our sample of schools, as well as allowing them to look at how their year groups or classes compare, and how pupils compare relative to one another.

Positivity dimension background

Overall, research (Wood et al., 2022)⁸ shows that the dimension of **positivity** is critically significant to pupil wellbeing, and is pivotal in pupil adjustment to their academic experience. The more positive children are, the better the overall **school (class) climate** is found to be, and the better a school climate is, the more positive pupils become. In this way, children's positivity helps to create a learning environment that will benefit all pupils at school.

⁸ A select bibliography of the research used to construct the wellbeing survey can be found at <https://www.risingstars-uk.com/nuffield-project>.

Other aspects of the positivity dimension include: **self-esteem**, which has been included as a key positive impact in socio-emotional learning programmes, and is associated with adaptability, and **school belonging**; **optimism**, which mediates the relationship between anxiety and learning strategies, is associated with higher achievement and, more broadly, promotes positive pupil outcomes; and finally, **satisfaction**, which is associated with adaptability, goals and self-efficacy.

Example survey questions:

- *‘I feel welcome at this school.’*
- *‘I think I will be happy at school in the future.’*

Motivation dimension background

Motivation is important in relation to learning activities, academic performance and adjustment and wellbeing. In the survey, children answered questions about task value (**support**), their **intrinsic motivation** (when behaviour is driven by genuine enjoyment of a task) and **extrinsic motivation** (when behaviour is driven by rewards and appreciation) in the context of academic achievement.

Motivation is a complex psychological construct related to aspects from the other dimensions, such as the learner’s perception of likely success or failure, which is linked to the positivity dimension, and their perceived autonomy which falls under self-efficacy.

Example survey questions:

- *‘Schoolwork is important for my future.’*
- *‘When I find things difficult at school I ask my teacher for help.’*

Self-efficacy dimension background

Self-efficacy has been largely linked to achievement and performance, with a focus on domains such as self-regulated learning. However, our research also highlights the importance of positive and negative emotions, as well as the importance of interpersonal relationships in school life. Therefore, pupils are not only required to manage their academic tasks and learning activities (**academic self-efficacy**), but also to manage the positive and negative emotions elicited by academic life – their **emotional self-efficacy** – as well as the relationships with teachers, peers and parents – their **social/interpersonal self-efficacy**.

These three sets of self-efficacy beliefs – academic, emotional and interpersonal – don’t necessarily move together, and its likely children will perceive themselves as differently self-efficacious, thus highlighting the need for tailored actions and tailored questions when the survey was developed.

Example survey questions:

- *‘How well can you stay calm when you don’t get something right at school?’*
- *‘How well can you get along with all of your classmates?’*

Resilience and persistence dimension background

Resilience and Persistence is a complex concept as it is not just an internal personality trait, but for the purposes of the survey it is operationalised as how well children respond to academic success and failure, and the emotions that are associated with both experiences. It is relevant to both pupils' educational experiences and their wellbeing. This is a singular dimension with no associated sub-dimensions.

Example survey question:

- 'If my schoolwork isn't right, I keep trying until I fix it.'

Data sources

The data used in this report comes from survey responses to the *Wellbeing and Attitudes to Learning Survey*. The surveys were taken online during the trial in spring 2018, and at schools during the 2020–2022 school years. Only results from fully completed unique surveys taken by children throughout the school year (only the first time a pupil completes the survey is counted) have been analysed. The surveys are marked at the time of completion, and raw mean scores are converted to red, amber and green zones for each sub-dimension and dimension automatically. The thresholds for these three zones were determined based on the responses from the trial.

Children whose mean dimension scores fell into the green zone were interpreted as exhibiting the dimension in question, i.e.: children who responded with high mean dimension scores for positivity were positive. Children whose mean dimension scores fell into the red zone were interpreted as **not** exhibiting the dimension in question, i.e.: children who responded with low mean dimension scores for positivity were not positive. Children whose mean dimension scores fell between these scores were in the amber zone, and were therefore considered to exhibit some vulnerability in the dimension. Figure A1 shows the threshold limits for the dimension level.

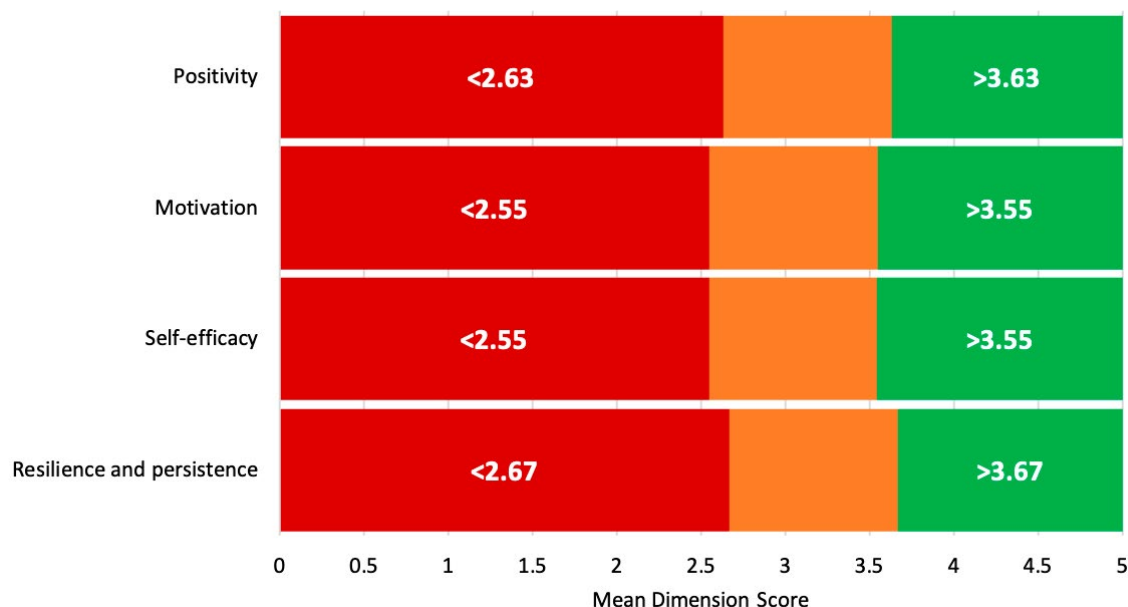


Figure A1: Mean dimension score thresholds for allocation to the green, amber and red zones

All data has been processed in line with the *Wellbeing and Attitudes to Learning* terms and conditions, which can be found at risingstars-uk.com/wellbeing-terms-and-conditions.

Coverage and representativeness of survey responses

The analysis presented here was conducted on a sample of mainstream state primary schools in England. For us to have confidence in our statistical analysis, it is vital that there is a large and representative-enough sample. For this reason, for any analysis of pupil, regional or school groups, the minimum number of survey responses in any group was 1000.

The trial was conducted in 2018, and the wellbeing survey was launched in December 2019. Due to the school closures caused by the pandemic, the data for the 2019–20 period was too small to be used in this analysis.

The trial was carried out with a nationally representative sample of approximately 4,000 pupils in 25 schools in 2018. These results have been used as a benchmark to compare with the 2020–21 cohort of 10,000 pupils at 65 schools, and the 2021–22 cohort of 8,000 pupils at 55 schools. Representativeness and coverage analysis involved looking at school types, regional distribution, KS2 attainment, disadvantage, gender and age distribution. An analysis of the types of schools included in 2020–21 and 2021–22 was similar. For these two periods, similar proportions of children were represented in regions, Key Stage 2 attainment and disadvantage levels, and major school types were included. The 2018 trial data included a slightly different distribution of schools from a regional and disadvantage perspective, however, it contained similar proportions of girls and boys and children in Years 3–6 to the 2020–21 and 2021–22 datasets. The greatest difference between the three datasets was that the 2020–21 and 2021–22 periods contained a higher proportion of children reaching the expected standard in reading, maths and writing in the 2019 National Tests (the most recently available at school level) than the 2018 trial period. To check the impact of this, additional analysis was conducted where the data was re-weighted to reduce the impact of children attending schools with higher-than-expected Key Stage 2 attainment. This analysis did not change any of the conclusions that could be drawn from the data, and since all the other metrics reviewed were in line with national averages, and each time period includes a sufficiently large number of pupils (over 3,000 pupils), the overall differences were considered sufficiently small to allow for a comparison of trends between the 2018 trial data and the unadjusted data collected from schools between 2020 and 2022.

Some caution must nevertheless be applied when comparing the datasets, given the different circumstances the data was collected under, and the composition of the cohorts. For this reason, the trial data is displayed separately through this report, and it is recommended that it is used solely as an indicative pre-pandemic benchmark to look at trends, in particular when considering gender and age. This report analyses data collected over the course of a short period of time, during which there was disruption in learning due to national lockdowns. Therefore, although it gives us some insight into how children across England, who took the *Wellbeing and Attitudes to Learning Survey*, feel about their academic wellbeing, contextualising these results in the wider context of other similar reports and the overall national picture is recommended.

Inclusion criteria

For the 2018 trial, children only completed the survey once. In the 2020–21 and 2021–22 periods, some children took the survey multiple times, but only the first fully completed survey taken by a child in each academic year has been included. A child's response to the wellbeing survey can vary depending on many external factors not measured by the survey, including the time of year the survey is completed, and how a child may be feeling on a particular day. The entire academic year was aggregated in the analysis to generate a sufficiently large sample size for sub-group analysis,

and predominantly to mitigate the impact of fluctuations that could be caused by this. The impact of termly fluctuations was checked by analysing the percentage of children moving between the three zones each term. Since they were small (a fluctuation of 1.67 percentage points on average between the zones), it was considered acceptable to group the three school terms into one academic year. This level of fluctuation is what has informed the threshold for what is considered to be a large change in the data (greater than 5 percentage points).

Dimensions and sub-dimensions

Pearson correlation between dimensions shows moderate (values between 0.5 and 0.7) to strong (values greater than 0.7) correlation between dimensions, as can be seen in Table A6. Analysis of variance (ANOVA) demonstrated highly significant results for each dimension, which means that although they are correlated, they are significantly different from one another.

Dimension	Positivity	Motivation	Self-efficacy	Resilience
Positivity	1.0	0.7	0.6	0.7
Motivation	0.7	1.0	0.5	0.6
Self-efficacy	0.6	0.5	1.0	0.6
Resilience and persistence	0.7	0.6	0.6	1.0

Table A6: Pearson correlation table showing correlations between dimensions in the wellbeing survey

Pearson correlation between sub-dimensions and the dimensions they build up into shows a strong positive correlation, as can be seen in Table A7, which is expected, given the survey design.

Dimension	Sub-dimension	Positivity	Motivation	Self-efficacy	Resilience
Positivity	Self-esteem	0.7	0.5	0.6	0.5
	Optimism	0.8	0.6	0.6	0.6
	Satisfaction	0.8	0.6	0.5	0.5
	Class climate	0.8	0.6	0.5	0.5
	School belonging	0.8	0.6	0.5	0.5
Motivation	Intrinsic motivation	0.7	0.7	0.4	0.5
	Extrinsic motivation	0.4	0.7	0.3	0.3
	Support	0.6	0.8	0.4	0.5
Self-efficacy	Academic self-efficacy	0.6	0.5	0.9	0.5
	Emotional self-efficacy	0.5	0.4	0.9	0.5
	Interpersonal self-efficacy	0.6	0.5	0.8	0.5
Resilience and persistence	Resilience and persistence	0.7	0.6	0.6	1.0

Table A7: Pearson correlation table showing correlations between sub-dimensions and dimensions in the wellbeing survey

Impact of academic wellbeing on attainment

Representativeness and coverage analysis was conducted to ensure that the attainment (autumn 2020 and autumn 2021) and wellbeing (2020–21 and 2021–22) cohorts were similar across both periods being analysed.

Table A8 shows the total number of students who took two sequential attainment tests in autumn 2020 and autumn 2021 for each subject, children who completed the wellbeing survey during the two wellbeing time periods.

Test type	No. pupils (2020–2022)
Wellbeing survey	3,600
GPS attainment tests	44,000
Reading attainment tests	35,000
Maths attainment tests	36,000

Table A8: The number of pupils (to the nearest 1000) who sat multiple attainment tests and wellbeing surveys between autumn 2020 and summer 2022

The breakdown of mean ages by test combination, and the breakdown of gender by subject can be seen in Table A9.

Subject	Girls (%)	Boys (%)	Total (no. pupils)	Mean age (2020–21)	Mean age (2021–22)
Wellbeing Survey + GPS tests	54.8	45.2	186	8.45	9.42
Wellbeing Survey + Reading tests	54.5	45.5	336	8.57	9.62
Wellbeing Survey + Maths tests	51.1	48.9	229	8.47	9.55
Wellbeing survey + Any attainment test (unique pupils)	54.0	46.0	522	8.52	9.54

Table A9: Percentage of children and mean ages by test combination and gender

The correlation between the attainment subjects and over time for the impact of wellbeing on attainment analysis can be seen in Tables A10, A11 and A12.

	GPS	Reading	Maths
GPS		0.69	N/A
Reading	0.69		0.71
Maths	N/A	0.71	

Table A10: Pearson correlation between tests in autumn 2020

	GPS	Reading	Maths
GPS		0.70	0.65
Reading	0.70		0.59
Maths	0.65	0.59	

Table A11: Pearson correlation between tests in autumn 2021

		Autumn 2021		
		GPS	Reading	Maths
Autumn 2020	GPS	0.88		
	Reading		0.72	
	Maths			0.85

Table A12: Pearson correlation between tests in autumn 2020 and 2021

