Department of Education

PISA 2022: National Report for Northern Ireland

Research report

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Northern Ireland Statistics & Research Agency

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Executive Summary

Introduction

The Programme for International Student Assessment (PISA) assesses the knowledge and skills in mathematics, reading and science of 15-year-old pupils in education systems the world over. PISA is run by the Organisation for Economic Co-operation and Development (OECD), and assessment is typically undertaken every 3 years, allowing us to chart how performance changes over time and across different education systems. PISA 2022, which was undertaken 4 years after the previous cycle due to the global COVID-19 pandemic, involved 81 education systems, including Northern Ireland.

In Northern Ireland, 2,384 15-year-old pupils[1] from 80 schools completed a 2-hour computer-based assessment and pupil questionnaire. Principals at participating schools were also asked to complete a questionnaire. The study was carried out in November and December 2022, with most of those pupils who participated completing their GCSE exams in 2023. This report analyses their performance in the three subject domains of mathematics, reading and science. Their responses to the questionnaire are also analysed, as are the responses of their principals.

When reading this report, it is important to keep in mind that Northern Ireland's sample of participating pupils may not be entirely representative of all 15-year-old pupils in Northern Ireland because 2 of PISA's 82 Technical Standards were not met. Analysis of the characteristics of the schools and pupils who participated implied that the estimates of pupils' mean attainment in PISA mathematics and reading maybe somewhat higher than they might otherwise have been. This issue was a challenge for 13 other educational systems.

The OECD estimated the potential increase in the overall mean reading and mathematics scores to be 7 or 10 score points in 5 of the 13 education systems other than Northern Ireland and Wales that did not meet one or more of the PISA Technical Standards[2].

It should be noted that estimates were not made for Northern Ireland and Wales as the OECD report at the level of the UK as the member state. However, as England comprised over 97% of the total sample in Northern Ireland, England and Wales their data was adjudicated by the OECD as representative of the three nations. The OECD then estimated the potential increase in overall mean reading and mathematics scores to be 7 or 8 score points for England. For Scotland, who participate separately to the rest of the UK, the OECD estimated the potential increase in overall mean reading and

[1] Participating pupils were aged between 15 years and 3 months and 16 years and 2 months at the beginning of the testing period.
[2] Source: PISA 2022 Reader's Guide (OECD: 2023)

mathematics scores to be 8 or 9 points. However, it is important to point out that in their report PISA 2022 Results (Volume 1) What Students in Know and Can Do (OECD: 2023), the OECD make no adjustments to the scores in any education system in which PISA's Technical Standards were not met, for any of the PISA subjects.

In Northern Ireland, the school recruitment period overlapped with a time of industrial action by teaching unions, which impacted negatively on participation in PISA. Given that the sample may not be entirely representative of the population, caution is required when interpreting the analysis that is presented in this report.

The term 'significant' is used throughout this report to refer to statistically significant differences between scores or values. In this report, we use a '95% confidence level' to define statistical significance. A statistically significant result is one that is not likely to occur by chance, due to the sampling process, and is more likely to be attributable to a genuine difference between scores or values. Similarly, the term average, as in 'average score', is used to refer to the arithmetic mean for the relevant group, unless stated otherwise.

This report uses the term 'education systems' to refer to all of the participating countries and economies, including both OECD countries and non-member systems, that took part in PISA 2022. We will often refer to the 'OECD average' which is the arithmetic mean of the scores or percentages of the 37 participating OECD countries in PISA 2022. As the number of participating OECD countries has changed over time, when making comparisons to previous PISA studies, we instead refer to the 'OECD trend average', which refers to the group of 35 OECD countries that have consistently participated in all PISA studies since 2012. Finally, this report will often focus on a group of 'higher performing' education systems. These are systems where the average score in that subject was at least 450 in PISA 2022.

Highlights

- Northern Ireland's average scores for mathematics and reading have declined significantly since 2018, while there was no significant change in the average score for science over this period. This pattern was mirrored by that of the OECD trend averages in these subjects.
- As with previous PISA cycles, the highest performing education systems in 2022 tended to be in East Asia, with Singapore significantly outperforming all other education systems, particularly in mathematics and science. Japan, Taiwan, Macao and South Korea were also among the top performing systems for all three subject domains.

- Northern Ireland's average score in PISA was significantly higher than that of Wales, not significantly different to that of Scotland, and significantly lower than the average score for England in each of mathematics, reading and science.

Achievement in mathematics

In PISA 2022, pupils in Northern Ireland achieved an average mathematics score of 475 in 2022. To place this in context, this score was not significantly different to the OECD average score of 472.

Pupils in the majority of the other 79[3] participating education systems (47) who participated in the PISA 2022 mathematics assessment achieved an average score that was significantly below that of Northern Ireland, with a further 11 education systems having scores that were not significantly different to Northern Ireland's. Pupils in around one quarter of the other participating education systems (21) achieved an average mathematics score that was significantly above that of Northern Ireland. The highest performing education systems was Singapore, followed by Macao, Taiwan, Hong Kong, Japan, and South Korea.

Northern Ireland's average mathematics score of 475 in PISA 2022 was significantly lower than the score of 492 achieved in 2018. Performance in mathematics was also, on average, lower across the OECD trend countries (475 compared to 490 in 2018).

In total, 25 of the 37 higher performing education systems including Northern Ireland (those with a score above 450 in PISA 2022) who participated in both 2018 and 2022 saw a significant decrease in their average mathematics score, and only one education system, Taiwan, saw a significant increase.

PISA also describes performance in terms of levels of proficiency, which are determined by the band within which a pupil's score falls. These are associated with descriptors of the kinds of skills and knowledge that pupil has demonstrated in the PISA assessment. Higher proficiency levels represent better knowledge and skills in relation to the subject domain. The percentage of pupils in Northern Ireland who performed at the highest proficiency levels in mathematics, Levels 5 or 6, was 8%, which was not significantly different to the OECD average of 9%. The percentage of pupils in Northern Ireland performing at the lowest proficiency levels (those below Level 2) was 28%, which was significantly lower than the OECD average of 31%. In other words, Northern Ireland had fewer low performers in mathematics than on average across the OECD countries.

[3] This report does not make comparisons of Northern Ireland's mathematics performance to that of Cyprus, because Cyprus' data were not available at the time of writing.

Achievement in reading

In PISA 2022, pupils in Northern Ireland achieved an average score in reading of 485. This was significantly above the OECD average of 476.

Pupils in the majority of the other 78[4] education systems (56) achieved an average score that was significantly below that of Northern Ireland, with a further 10 education systems having reading scores that were not significantly different to Northern Ireland's. Pupils from 12 of the other participating education systems achieved an average score that was significantly above that of Northern Ireland. The highest performing education system was Singapore, followed by the Republic of Ireland, Japan, South Korea, Taiwan and Estonia.

Northern Ireland's average score in reading for PISA 2022 was significantly below the average score achieved in 2018 (501). This pattern was also observed in 37 of the 71 education systems that participated in both cycles of the reading assessment. The OECD trend average was also significantly lower in 2022 (476) than in 2018 (487).

In terms of PISA's reading proficiency levels, the percentage of pupils in Northern Ireland who performed at the highest proficiency levels, Levels 5 or 6, was 8%, which was not significantly different to the OECD average of 7%. The percentage of pupils in Northern Ireland performing at the lowest proficiency levels (those below Level 2) was 22%, which was significantly lower than the average of 26% of pupils across the OECD countries. In other words, Northern Ireland had fewer low performers in reading than on average across the OECD countries.

Achievement in science

In PISA 2022, pupils in Northern Ireland achieved a score of 488 in science. This was not significantly different to the OECD average of 485.

Pupils in the majority of the other 79[5] participating education systems (48) achieved an average science score that was significantly below that of Northern Ireland. There were a further 14 education systems whose average score was not significantly different Northern Ireland's, and 17 which scored significantly higher. The highest performing education systems for science was Singapore, followed by Japan, Macao, and Taiwan. Estonia was the highest performing country outside of East-Asia.

[4] In addition to Cyprus, Vietnam was also excluded from the analysis of reading performance, as a strong linkage to the international PISA reading scale could not be established.
[5] This report does not make comparisons of Northern Ireland's science performance to that of Cyprus, because Cyprus' data were not available at the time of writing.

Northern Ireland's overall average science score for 2022 (488) was not significantly different to the score of 491 that was achieved in PISA 2018. Similarly, there was no significant change in the OECD trend average over this period. Over the 10-year period from 2012 to 2022 however, the performance of pupils in science has been in decline both for Northern Ireland, and on average across the OECD; Northern Ireland's overall average science score has dropped from 507 in 2012 to 488 in 2022, while the OECD trend average has dropped from 499 to 487.

In terms of PISA's science proficiency levels, the percentage of pupils in Northern Ireland who performed at the highest levels, Levels 5 or 6, was 7%, the same as the OECD average. The percentage of pupils in Northern Ireland working at the lowest proficiency levels (those below Level 2) was 23%, which was not significantly different to the OECD average of 24%.

Variations in PISA scores by pupil characteristics

Pupils' PISA scores in mathematics, reading and science were analysed by gender and socioeconomic status, alongside other pupil characteristics.

Across the OECD countries, the average mathematics score for boys (477) was significantly higher than that for girls (468). This was also true in Northern Ireland, where the average score for boys (481) was significantly higher than that for girls (469). For reading, girls in Northern Ireland performed significantly better than boys, with an average score of 494 compared to an average score of 476 for boys. Across the OECD, the average score for girls (488) was also significantly higher than that for boys (464). For science, girls in Northern Ireland had an average science score of 485, compared to an average of 492 for boys, however this does not represent a statistically significant difference in performance. On average across the OECD, there was also no significant difference in the performances of girls and boys in science (both 485).

In terms of socioeconomic status, there was an 81 score point difference in the average mathematics score of the least disadvantaged quarter of pupils and the most disadvantaged quarter of pupils in Northern Ireland. This was not significantly different to the OECD average difference of 93 score points. For reading, the difference in performance was 78 score points, which was significantly smaller than the average gap across the OECD (93 score points). Finally, for science, the performance gap between the least disadvantaged group and the most disadvantaged group was 86 score points, which was not statistically different from the performance gap on average across the OECD countries (96 score points).

Pupil wellbeing, aspirations and experiences of teaching and learning

Pupils who participated in PISA 2022 were asked to complete a questionnaire relating to their attitudes and beliefs, experiences in school, hopes for the future and general wellbeing.

Pupils were asked to rate their overall life satisfaction on a scale from 0 to 10, with 0 indicating very low life satisfaction, and 10 indicating very high satisfaction. Pupils in Northern Ireland reported an average level of life satisfaction (6.50), which was significantly lower than the OECD average of 6.75. The extent to which a pupil feels satisfied with their life is related to performance in the PISA mathematics assessment; pupils in Northern Ireland who reported a rating of 7 or 8 had the highest average score in mathematics, with an average score of 493.

Around two-thirds of pupils in Northern Ireland (66%) reported feeling like they belong at school, compared to an average of 75% of pupils on average across the OECD countries. This may be of note, given that pupils who reported a stronger sense of belonging scored, on average, around 26 points more in PISA mathematics than those who reported that they did not feel like they belonged at their school.

Pupils in Northern Ireland were also asked about the additional mathematics learning activities that they participated in. Around one-tenth reported participating in large group study or practice (12%), compared to an average of 10% across the OECD countries. Around half (53%) of pupils in Northern Ireland reported that they did not take part in any additional mathematics learning activities, compared to the OECD average of 50%.

Pupils in Northern Ireland were, on average, positive about the quality of their mathematics instruction with an average rating of 6.9 out of 10. On average across the OECD countries the average was 6.4 out of 10, with 10 being the highest quality of mathematics instruction. The majority of pupils in Northern Ireland also reported that their mathematics teacher helps them with their learning and gives support when it is needed.

Pupils who have attributes such as believing intelligence is not fixed are said to hold 'growth mindsets' meaning that these pupils can be and may be more willing to embrace educational challenges and acknowledge and learn from criticism, which can lead to positive educational outcomes[6]. In Northern Ireland, over two-fifths (43%) of pupils believed intelligence could not be changed, compared to the OECD average of 42% Around two-thirds of pupils in Northern Ireland agreed that some people, regardless of how much they studied, would not be any good at either mathematics (66%) or English (68%). These compare to the percentages of pupils on average in OECD countries of

[6] For a fuller discussion regarding growth mindsets see Dweck, C. (2006) *Mindset*. New York: Random House.

65% for mathematics and 60% for the language of that pupil's test. In Northern Ireland, 63% of pupils also believed that creativity is 'something about you that you cannot change', compared to an OECD average of 53%.

Schools

When asked about school admission policies, principals in Northern Ireland reported that the residential area of the pupil was a key factor in the school's decision to admit pupils (67% of pupils were in schools where this was the case). Principals indicated that another important factor was whether a pupil had a family member who was currently or formerly at the school (70% of pupils were in schools where this was a factor in admissions decisions). Academic records were considered less often (48% of pupils were in schools where principals reported this as one of their admission criteria).

Principals reported that a larger proportion of pupils in Northern Ireland were grouped by ability for some or all subjects (93%) than on average across the OECD (37%). Principals also reported using a wide range of school monitoring and evaluation policies and practices, which were largely focused on school and teaching improvement. The most commonly reported approach to monitoring pupils by teachers was the use of tests or assessments of pupil achievement (83% of pupils in Northern Ireland attend schools in which the principal reported this). Teacher peer review (59% of pupils) and lesson observations by principal or senior staff (57% of pupils) were also reported. A lack of physical infrastructure was reported to be the most common barrier to teaching (52% of pupils attended schools where the principal reported this being an issue).

Alongside the questionnaire, it was possible to explore the extent to which mathematics performance varies within each of the participating schools relative to how much performance varies between schools. In Northern Ireland, 39% of the variance in mathematics performance was attributable to differences between schools rather than differences within schools. On average across the OECD countries 32% of the variance in mathematics performance was attributable to differences between schools. This suggests there was more heterogeneity between schools in Northern Ireland compared to other OECD education systems. However, caution is advised when interpreting this finding because the potential factors that contribute towards between and within school variance are widespread and difficult to disentangle.

PISA across the UK

All 4 UK nations had lower average scores for mathematics and reading relative to their performance in 2018. In science, Northern Ireland, England and Scotland saw no significant decline in their average science scores, whereas in Wales their score declined significantly between 2018 and 2022.

The UK nations were compared in terms of their performance in mathematics, reading and science. The average mathematics score for Northern Ireland (475) was significantly higher than the average score for Wales (466), not significantly different to that of Scotland (471), and significantly lower than the average score for England (492).

The pattern of performance in mathematics between the UK nations was also found for both reading and science. The average reading score for Northern Ireland (485) was significantly higher than the score for Wales (466), not significantly different to that of Scotland (493) and significantly lower than the average score for England (496). The average science score for Northern Ireland (488) was significantly higher than the score for Wales (473), not significantly different to that of Scotland (483) and significantly lower than the average score for England (503).

Gender differences in PISA 2022 were consistent across the nations of the UK, with boys having a significantly higher average score for mathematics and girls having a significantly higher average score for reading in all 4 nations. In science, there were no significant gender differences in any individual nation of the UK, but across the combined UK cohort, the difference was statistically significant, with boys outscoring girls by an average of 8 score points.

Pupils from relatively less disadvantaged socioeconomic backgrounds performed significantly better than those from relatively more disadvantaged backgrounds across all domains and all UK nations. When comparing the difference in performance between the most and least disadvantaged pupils, the performance gap in Northern Ireland was significantly smaller than the one in Scotland for mathematics, but not significantly different to the gaps for either England or Wales. There were no statistically significant gaps between Northern Ireland and the other UK nations with regard to either reading or science.

1 Introduction to PISA

1.1 What is PISA?

The Programme for International Student Assessment (PISA) is a study of 15-year-old[7] pupils around the world organised by the Organisation for Economic Co-operation and Development (OECD). PISA assesses the knowledge and skills that are considered necessary for participation in social and economic life, specifically in mathematics, reading and science. PISA is typically carried out every 3 years, however, PISA 2022 was undertaken 4 years after the previous assessment in 2018 because of the global COVID-19 pandemic.

Although mathematics, reading and science are always assessed, each round of PISA focuses on one of these three areas in particular – this is called the 'major domain'. The major domain for PISA 2022 was mathematics, as it was in 2012 and 2003, with reading and science as minor subject domains. In Northern Ireland, England, and Wales, PISA 2022 was carried out on behalf of the respective governments by Pearson and Oxford University Centre for Educational Assessment (OUCEA), which acted as the National Centre for PISA 2022.

Across different assessment cycles, the OECD presents PISA scores on the same scale to enable education systems to identify and monitor trends in pupil performance over time. Each participating system receives a detailed breakdown of their results, allowing them to understand how groups of pupils with differing demographic characteristics have performed (e.g., pupils from different socioeconomic backgrounds). The data collected through PISA also enables governments to benchmark education policy and performance, to make evidence-based decisions and to learn from policies and practices in other countries.

In this chapter, we provide an overview of the PISA study. Firstly, we will provide information about other education systems that participate in PISA and a description of Northern Ireland's past participation. We then move on to provide a guide to interpreting the PISA results, including details of the study design, data collection and analysis. Finally, we will provide an overview of the structure of the report.

1.2 Who participates in PISA?

The number of participating PISA education systems has increased from 43 in the initial cycle in 2000 to 81 in 2022 (OECD, 2023a), and around 690,000 pupils participated

[7] Refer to 9.9Appendix A for a more detailed description of the PISA age range.

worldwide. Of the 81 participating countries, 37 were members of the OECD, including the United Kingdom.

1.2.1 Which other countries participate in PISA?

The participating OECD countries are: Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Israel, Italy, Japan, Latvia, Lithuania, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, the Republic of Ireland, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

The participating partner countries and economies education systems are: Albania, Argentina, Azerbaijan (Baku City only), Brazil, Brunei, Bulgaria, Cambodia, Croatia, Cyprus, Dominican Republic, El Salvador, Georgia, Guatemala, Hong Kong, Indonesia, Jamaica, Jordan, Kazakhstan, Kosovo, Macao, Malaysia, Malta, Moldova, Mongolia, Montenegro, Morocco, North Macedonia, Palestinian Authority, Panama, Paraguay, Peru, Philippines, Qatar, Romania, Saudi Arabia, Serbia, Singapore, Taiwan, Thailand, Ukrainian regions[8], United Arab Emirates, Uruguay, Uzbekistan and Vietnam.

In this report Cyprus was not included when comparisons were made between the performance of pupils in England and pupils in other participating education systems as the data were not available at the time of writing. Vietnam was also excluded from the analysis of reading performance as the OECD were unable to make a strong link between their data and the PISA reading scale.

1.2.2 Northern Ireland's participation in PISA

In Northern Ireland, 2,384 15-year-old pupils in 80 schools completed a 2-hour computer-based assessment and pupil questionnaire. In all countries, principals at participating schools were also asked to complete a questionnaire, which included questions regarding school resources and other contextual information. The study was carried out in November and December 2022, with most pupils who participated completing their GCSE exams in 2023. Northern Ireland has participated in all studies since the first PISA study in 2000.

Please see section 1.4.2 on how the findings of this report should be interpreted with caution because of the characteristics of the pupils who participated in PISA 2022.

[8] 18 of the 27 regions in Ukraine participated in PISA 2022 (please see OECD, 2023e, for further information)

1.3 What does PISA measure?

Each cycle of PISA assesses pupils in mathematics, reading and science. The reading and science frameworks have remained unchanged from the PISA 2018 cycle. The major domain for PISA 2022 was mathematics and a new mathematics assessment framework was developed for this cycle.

1.3.1 The PISA 2022 assessment frameworks

In each PISA cycle, a new assessment framework for the major domain is developed (mathematics in PISA 2022). This outlines the specific skills to assess mathematical literacy and the way in which they will be measured. The PISA 2022 mathematics framework is available on the OECD website, along with sample mathematics items.

The OECD's definition of mathematical literacy has a particular focus on pupils who are becoming proficient users of mathematics across school and everyday life. The definition of mathematical literacy used in PISA 2022 is:

> Mathematical literacy is an individual's capacity to reason mathematically and to formulate, employ, and interpret mathematics to solve problems in a variety of real-world contexts. It includes concepts, procedures, facts, and tools to describe, explain, and predict phenomena. It helps individuals know the role that mathematics plays in the world and make the well-founded judgments and decisions needed by constructive, engaged and reflective 21st Century citizens. – *OECD (2023c, p.7)*

The PISA 2022 mathematics assessment framework included a new component of mathematical reasoning in addition to the three components of Formulate, Employ, and Interpret and Evaluate used in the PISA cycles since 2000. PISA 2022 also looked at 4 content knowledge areas: Quantity, Uncertainty and Data, Change and Relationships, and Space and Shape.

Reading literacy is defined as a pupil's capacity to "understand, use, evaluate, reflect on and engage with texts in order to achieve one's goals, develop one's knowledge and potential, and participate in society" (OECD, 2023c, p.14).

Science literacy is defined as "the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen. A scientifically literate person is willing to engage in reasoned discourse about science and technology, which requires the competencies to explain phenomena scientifically, evaluate and design scientific enquiry, and interpret data and evidence scientifically" (OECD, 2023c, p. 14).

1.3.2 The PISA questionnaires

Alongside the PISA assessments in mathematics, reading and science, participating schools and pupils are asked to complete questionnaires. The pupil questionnaire requests information about participating pupils' background, their attitudes and feelings, their educational experiences and their future aspirations. As mathematics was the major domain for PISA 2022, pupils were also asked to report on their experiences and attitudes to mathematics in greater detail. The school questionnaire requested information about the school climate, resources, and perceived barriers to learning, as well as perceptions as to the impact of the COVID-19 pandemic.

1.3.3 The PISA assessment

Following a detailed, iterative review of the test items (questions) by different local and international experts, the PISA 2022 items were translated into different languages and, where appropriate, verified by the PISA consortium (OECD, 2023c). Through a field trial process, items were evaluated using samples of 15-year-old pupils across all participating countries. This ensured that the items met PISA's technical specifications and were comparable across education systems.

PISA takes a sophisticated and therefore technically complex approach to the design and administration of assessment. This differs from more conventional assessments, such as GCSE examinations, where every pupil takes the same test with the same items, and the cohort's average performance is an aggregation of these individual pupil performances. As mentioned above, the assessment itself is computer-based and, unlike other international assessments, employs multi-stage adaptive testing (for mathematics and reading). An adaptive test is one which automatically selects items to suit the ability of the person taking it. This meant that pupils were presented with 'blocks' of items that were selected based on their performance on preceding question blocks.

For more detailed and technical information, please refer to the PISA 2022 Technical report (OECD, forthcoming)[9].

1.3.4 PISA study design and sampling

It is impractical for the PISA assessment to be administered to every single pupil in each participating country. Participating countries therefore assess a sample of their eligible pupils. The OECD employs a two-stage sampling method to ensure that the pupils chosen to take part in the study are nationally representative of the pupil population as a whole. The first stage is to sample schools, the second to sample pupils within the

[9] This report is available on the OECD website: https://www.oecd.org/pisa/publications/

selected schools. Countries that participate in PISA are required to adhere to strict international sampling procedures which facilitates sample comparability.

In line with this procedure, a sample of post-primary schools were selected to take part in PISA 2022. Schools were selected to represent the different geographical regions within Northern Ireland, the different type of schools that pupils attend (grammar or non-grammar), and previous academic attainment at the school level (based on the GCSE performance of pupils in 2019). Within each participating school, a random sample of 40 eligible pupils were selected to take the assessment.

With any sample, some sub-populations may be under or over-represented once the final data is obtained. It is important to note that the PISA design counteracts this, as far as is possible, through statistical methods. Please refer to the PISA 2022 Technical Standards Report (OECD, 2023d) for further detail. Northern Ireland's response rates in relation to these Technical Standards are discussed below, in the section titled Interpreting data from PISA 2022: a reader's guide.

1.4 Interpreting data from PISA: a reader's guide

This section provides important information and context for interpreting Northern Ireland's results in PISA 2022. As discussed, the PISA 2022 data for Northern Ireland are based upon a sample of pupils rather than a census of all pupils. This means that there is a degree of uncertainty in the findings because, however carefully selected the sample, there is always at least some chance that it does not fully represent the overall population of pupils. This uncertainty is described as 'sampling error', though it does not mean a mistake has been made - it is present in all research which relies on the analysis of data taken from a sample.

Another source of uncertainty is 'measurement error', which relates to the extent to which an individual pupil's performance on the PISA test reflects their true ability. Measurement error occurs because a pupil's score may be influenced by factors that are unrelated to their ability, such as their interpretation of the items that they respond to or their level of motivation on the day of the test.

To contextualise and account for this uncertainty, statistical analysis of the differences between countries and groups of pupils has been undertaken in this report to determine whether they are 'statistically significant'. Statistically significant differences are unlikely to be the result of either sampling or measurement error and are likely to reflect a true difference between the education systems or groups being compared. In this report, we use a '95% confidence level' to define statistical significance. A statistically significant result is one that is not likely to occur by chance, due to the sampling process, and is more likely to be attributable to a genuine difference between groups. Similarly, the term

average, as in 'average score', is used to refer to the statistical mean for the relevant group, unless stated otherwise.

Particular caution should be taken when considering the 'rank order', which is not based on statistical significance, of countries who participated in PISA. The two forms of uncertainty discussed above mean that, were the test to be retaken, there would likely be small differences in the average scores of each country that would cause the rank order of performances to change. This report therefore focuses on statistically significant differences between countries and groups, providing greater confidence that findings are robust. As discussed above, findings should also be considered with regard to how representative the pupils who took the test (the sample) are of the population of pupils as a whole. Section 1.4.2 discusses this with regard to Northern Ireland in 2022.

It is also important to note that test items may not be equally difficult for pupils from different socio-cultural or language backgrounds, or across countries and translations. Previous research suggests that some test items may not have necessarily performed in a comparable manner across different countries and languages, thus somewhat undermining the comparability of results (Kreiner & Christensen, 2014; Rutkowski et al., 2016). During the aforementioned PISA development cycle, the OECD make every effort to ensure that comparisons between countries and translations can be validly made but the cross-country comparisons presented in this report should still be cautiously interpreted, especially when comparing distinct educational systems and different languages.

1.4.1 PISA and the COVID-19 pandemic

Data collection for PISA (the administration of the assessment and the questionnaires) had originally been planned for 2021 but was delayed by 12 months because of the COVID-19 pandemic. Although data collection was undertaken in November and December of 2022, the ongoing situation had an impact on recruitment, retention and pupil engagement.

The pandemic caused widespread disruption to schools, teaching and learning, which included significant periods of time when school buildings were closed. Remote instruction or distance learning resources were made available in line with Government guidance at the time. Schools were also offered a range of programmes and types of support to pupils whose learning and wellbeing were affected. However, the impact of this disruption varied between schools and individual pupils within those schools, as well as between different countries and education systems.

Given this complexity, it is not possible to ascertain precisely how the COVID-19 pandemic affected performance in the PISA 2022 assessments for those who were able to participate, or how it may have affected their responses to the questionnaires. A small

number of items were included in the student and school questionnaires that specifically focused on the impact of the COVID-19 pandemic, but as fewer than 70% of participating pupils or principals responded to the majority of these items they have not been included in this report, although they are reported on in the OECD's international report.

In terms of delivering the assessment process, schools were still experiencing issues around the availability of staff in 2022 and were seeking to prioritise support for the learning and wellbeing of their pupils. This, understandably, had an effect on recruitment, with some schools deciding that they were unable to take part in the study and others having to withdraw late in the process, sometimes during the data collection period itself. In such cases, it was not always possible to recruit replacement schools (which had to share sampling characteristics with the schools they were replacing) in the time available. We further discuss response rates, and what they mean for interpreting the findings of PISA 2022, below.

The disruption caused by the COVID-19 pandemic also caused some changes in how parts of the data collection process were undertaken. For example, the field trial that is undertaken ahead of each series of PISA, the purpose of which is to establish the suitability of new test items, was disrupted, although it still produced sufficiently detailed data ahead of the main assessment window. In addition, it was necessary to undertake certain processes, such as the training of coders (markers) and the coding itself, remotely. These processes worked efficiently but were different to those operated in previous cycles of PISA. Despite these challenges, it is important to note that, of the 82 PISA technical standards, 80 were successfully met for Northern Ireland. The two standards which were not met relate to response rates and are discussed below.

1.4.2 Response rates for Northern Ireland

PISA Technical Standard 1.11 states that the final weighted school response rate should be at least 85% of sampled eligible and non-excluded schools. Where a response rate is below 85%, an acceptable response rate can still be achieved through the recruitment of replacement schools. For Northern Ireland, the initial weighted response rate was 55%. Replacement schools were recruited however the final weighted school response rate (61%), was still below the threshold required by PISA's Technical Standards. Similarly, PISA Technical Standard 1.12 states that the final weighted pupil response rate should be at least 80% of all sampled pupils across responding schools. For Northern Ireland, the final weighted pupil response rate was 77%, again below the OECD target.

Given that these response rates did not meet the relevant Technical Standards, a Non-Response Bias Analysis (NRBA) was undertaken to understand, among other things, differences between responding and non-responding schools and between originally sampled schools and replacement schools. The purpose of this analysis is to establish the extent to which the final sample of pupils was likely to represent the population of

pupils in Northern Ireland. The key findings of the NRBA, and what they mean for interpreting Northern Ireland's PISA 2022 results, are described briefly below, and a full report of the analysis can be found in Appendix A.

It is important to be clear that the task of ensuring a high participation rate was particularly challenging in the context of the COVID-19 pandemic and that Northern Ireland was not the only education system unable to meet the PISA sampling technical standards. PISA sampling technical standards were not met in 9 of the 37 OECD countries that are included in the 'OECD average' scores which also serve as a comparison throughout the report, including in 3 of the 4 main comparator countries which this report uses to contextualise Northern Ireland's result (Canada, the Republic of Ireland, and the United States; see section 1.4.3).

For Northern Ireland, it is important to note that the NRBA identified some differences between the characteristics of the final sample and the estimated study population. Most substantively, the final sample had somewhat higher academic attainment on average than the population. In other words, higher performing students may be over-represented and some of the PISA results may subsequently be somewhat higher than they might otherwise be. It is very important to keep in mind these sources of potential bias while interpreting the results and there are regular reminders of this caveat throughout the report. Cautious interpretation is particularly necessary when considering trends in performance over time and when making international comparisons. More confident conclusions can be drawn when making comparisons between groups of pupils within Northern Ireland, where we are not trying to generalise beyond our sample (such analysis takes place in Chapter 6, where a fuller explanation is provided).

Overall, while cautious consideration of the results is encouraged, the analysis remains a valuable insight into the knowledge and skills of 15-year-old pupils in Northern Ireland in mathematics, science and reading, and how they compare to other 15-year-old pupils from around the world.

1.4.3 Selection of comparator countries

Given the large number of education systems that participated in PISA 2022, it is necessary to be selective when making international comparisons. For this report, four countries have been selected for comparison to Northern Ireland. These countries are the Republic of Ireland, the United States, Canada and Norway, and have been selected on the basis that they provide valid, meaningful and valuable comparisons, serving to contextualise the performance of pupils from Northern Ireland. The United States and Norway have performed similarly to Northern Ireland in each subject domain since mathematics was last the major domain. Canada was a higher performing country than Northern Ireland across all domains in 2018 and this trend continued in 2022. Note that, like Northern Ireland, Canada, the Republic of Ireland, and the United States did not

meet the PISA sampling standards in PISA 2022 – see Section 1.4.2 for more information.

1.4.4 Comparisons to OECD averages and OECD trend averages

The report frequently compares information about Northern Ireland's performance to the OECD average performance. The OECD average has been selected for such comparisons, rather than the average for all education systems who participated in PISA 2022, because they are more comparable economically to Northern Ireland and have participated in PISA more consistently over time. For 2022, the OECD average included data from 37 countries – all 38 OECD countries apart from Luxembourg, who did not participate in PISA 2022. However, the countries which are part of the OECD have changed over time as the OECD has expanded. For example, Costa Rica has joined the OECD since PISA 2018. This means that the OECD average for each cycle of PISA includes a different subset of countries. In order to ensure comparisons are consistent and any changes over time in the OECD average are not unduly distorted by the countries which are included or excluded in a given comparison, the OECD has calculated several different averages. These include different sets of countries, allowing for accurate comparisons of change over time to be made in different contexts.

This report will be comparing Northern Ireland's performance to two different OECD averages, depending on the most appropriate comparison. When comparisons are made solely to data from 2022, the report uses the average of all 37 OECD countries which participated in PISA 2022. When comparing trend data, the report uses the average across all 35 OECD member countries who took part in both 2018 and 2022 and have results for both cycles. This allows more robust comparisons to be made. These differing averages will be called the 'OECD Average' and the 'OECD Trend Average' respectively.

1.5 Organisation of this report

The rest of this report is divided into 8 main chapters. Chapters 2 to 6 focus on Northern Ireland's performance in PISA mathematics, reading and science. These chapters include information on the distribution of pupils' test scores by pupil and school characteristics, and an overview of how Northern Ireland's performance has changed over time in relation to other participating countries. As mathematics was the focus of PISA 2022, a detailed comparison of performance across content and cognitive process domains will be presented for mathematics in Chapter 3.

Chapter 7 provides details of pupils' responses to the PISA student questionnaire, with an emphasis on how they view mathematics. It also investigates pupils' wellbeing and their aspirations, taking into consideration how these have changed over time, and how they compare to other parts of the world. The chapter also provides details on how pupil wellbeing and aspirations relate to performance in mathematics, reading and science.

Chapter 8 is about the school environment. The chapter focuses on the views of Principals as reported in the PISA school questionnaire. This includes measures of school management, policies, resources, staff inclusiveness and access to digital devices. The chapter further investigates mathematics instruction within schools by exploring the number of mathematics classes per week, how pupils are grouped, and the length of time allocated to teaching mathematics. This chapter ends by exploring school-level variation in mathematics performance across Northern Ireland.

Chapter 9 focuses on the similarities and differences in outcomes between the 4 nations of the United Kingdom. This includes how test scores vary across the UK, and whether gender and socioeconomic gaps are bigger in certain nations of the UK than others.

2 Performance in mathematics

2.1 Chapter overview

This chapter reports the performance of pupils in Northern Ireland in mathematics. It draws on findings outlined in the international report (OECD, 2023b) and places outcomes for Northern Ireland in the context of those findings. This performance is considered alongside that of previous cycles, PISA 2018, 2015 and 2012. Caution needs to be taken in interpreting these findings as some of the sampling standards for PISA 2022 were not met in Northern Ireland as described in Chapter 1, Section 1.4.2.

2.2 Key findings

- Northern Ireland achieved a mean score in mathematics of 475 in 2022 which was not significantly different to the OECD average of 472.
- Performance in mathematics was significantly lower on average across the OECD trend countries in PISA 2022 (475) compared to PISA 2018 (490). This was in line with the results in Northern Ireland where the average score in 2022 (475) was significantly lower than the score in 2018 (492).
- In total, 41 of the 72 education systems that participated in both 2018 and 2022 saw a significant decrease in their average mathematics score in 2022. Only 7 education systems saw a significant increase and the remaining 24 education systems saw no significant change in their scores.
- Pupils in the majority (48) of the other 79[10] participating education systems achieved an average score that was significantly below Northern Ireland's, with a further 11 education systems having mathematics scores that were not significantly different from Northern Ireland's, and 20 with an average score that was significantly above Northern Ireland's.
- The gap between Northern Ireland's scores at the 90th and 10th percentiles was 242[11] score points, which was not significantly different from the OECD average of 235 score points. The scores at the 90th percentile and at the 10th percentile in Northern Ireland (597 and 354 respectively) were also not significantly different to either of the 90th percentile score and 10th percentile scores on average across the OECD countries (590 and 355 respectively).

[10] International comparisons involving Northern Ireland in this report do not include Cyprus as these data were not available at the time of writing.
[11] After taking into account the rounding of figures.

- In total, 8% of pupils in Northern Ireland were classified as top performers in mathematics (attaining at Level 5 or 6), which was not significantly different to the OECD average of 9%.
- Northern Ireland had 28% of pupils who were classified as low performers in mathematics (attaining below Level 2), which was significantly smaller than the OECD average of 31%.
- The percentage of pupils in Northern Ireland classified as top performers (Level 5 and 6) was not significantly different to the percentage of 8% in 2018, but the percentage of pupils classified as low performers (below Level 2) has significantly increased from 20% in 2018 to 28% in 2022.

2.3 Introduction to PISA mathematics

This chapter will outline how Northern Ireland's performance in mathematics in 2022 compares to that of other participating education systems, as well as how performance has changed over time. In PISA 2022, mathematics was the major domain and was assessed using the OECD 2022 mathematics framework (https://pisa2022-maths.oecd.org/ca/index.html). It was previously the major domain in 2012 and was one of the minor domains in 2018 and 2015.

The data for Northern Ireland were collected as part of a collaborative effort with England and Wales. Although this report focuses on Northern Ireland, the OECD reports on the UK as a whole.

As Northern Ireland's school-level and pupil-level response rates did not meet some of the PISA sampling standards, caution is required when interpreting the analysis reported here. Cautious interpretation is particularly necessary when considering trends in performance over time and when making international comparisons. Canada, the Republic of Ireland, and the United States, which have been included as comparator countries, also did not meet some of the PISA sampling standards as well as some of the other OECD countries included in the OECD averages. For more information see Section 1.4.2.

2.4 Northern Ireland's performance in mathematics

Pupils in Northern Ireland achieved an average score of 475 in mathematics in PISA 2022. This was slightly above the OECD average score of 472. However, it is important to note that this difference was not statistically significant.

In 2022, of a total of 81 participating education systems, 23 had an average score significantly above the OECD average, 10 education systems were not significantly

different to the OECD average and 48 education systems were significantly below the OECD average. As in previous cycles, most of highest performing education systems were from East Asia (Singapore (575), Macao (China) (552), Taiwan (547), Hong Kong (China) (540), Japan (536) and South Korea (527)). The European countries that had an average score significantly above the OECD average were Estonia (510), Switzerland (508), Netherlands (493), Republic of Ireland (492), Belgium (489), Denmark (489), Poland (489), Austria (487), Czech Republic (487) Slovenia (485), Finland (484) and Sweden (482). Canada (497) also had an average score in mathematics significantly above the OECD average while Spain (473), Norway (468), and the United States (465) had average scores in mathematics that were not statistically significantly different from the OECD average.

Pupils in 48 of the other 79 participating education systems[12] achieved an average score that was significantly below Northern Ireland, with a further 11 education systems having mathematics scores that were not significantly different from Northern Ireland's, and 20 with an average score that was significantly above Northern Ireland's. Of the education systems that performed similarly to Northern Ireland, 10 were OECD countries.

The results of the other 38 higher performing education systems (systems with an average score of 450 points or higher) are presented in Table 2.1, which shows each education system's scores relative to Northern Ireland's score of 475. The 41 education systems with an average score less than 450 are not included in this table.

[12] International comparisons involving Northern Ireland in this report do not include Cyprus as these data were not available at the time of writing.

Table 2.1: Mathematics performance of higher-performing education systems in PISA 2022 relative to Northern Ireland

Performance relative to Northern Ireland's score in mathematics (475)	Education system and score
Education systems that scored significantly higher than Northern Ireland	Singapore (575), Macao (552), Taiwan (547), Hong Kong (540), Japan (536), South Korea (527), Estonia (510), Switzerland (508), Canada (497), Netherlands (493), Republic of Ireland (492), Belgium (489), Denmark (489), Poland (489), Austria (487), Australia (487), Czech Republic (487), Slovenia (485), Finland (484), Latvia (483)
Education systems that did not score significantly higher or lower than Northern Ireland	Sweden (482), New Zealand (479), Lithuania (475), Germany (475), France (474), Spain (473), Hungary (473), OECD average (472), Portugal (472), Italy (471), Vietnam (469), Norway (468)
Education systems that scored significantly lower than Northern Ireland	Malta (466), United States (465), Slovakia (464), Croatia (463), Iceland (459), Israel (458), Turkey (453)

Base: All education systems with average scores over 450 in mathematics in PISA 2022. Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

2.5 Mathematics performance over time

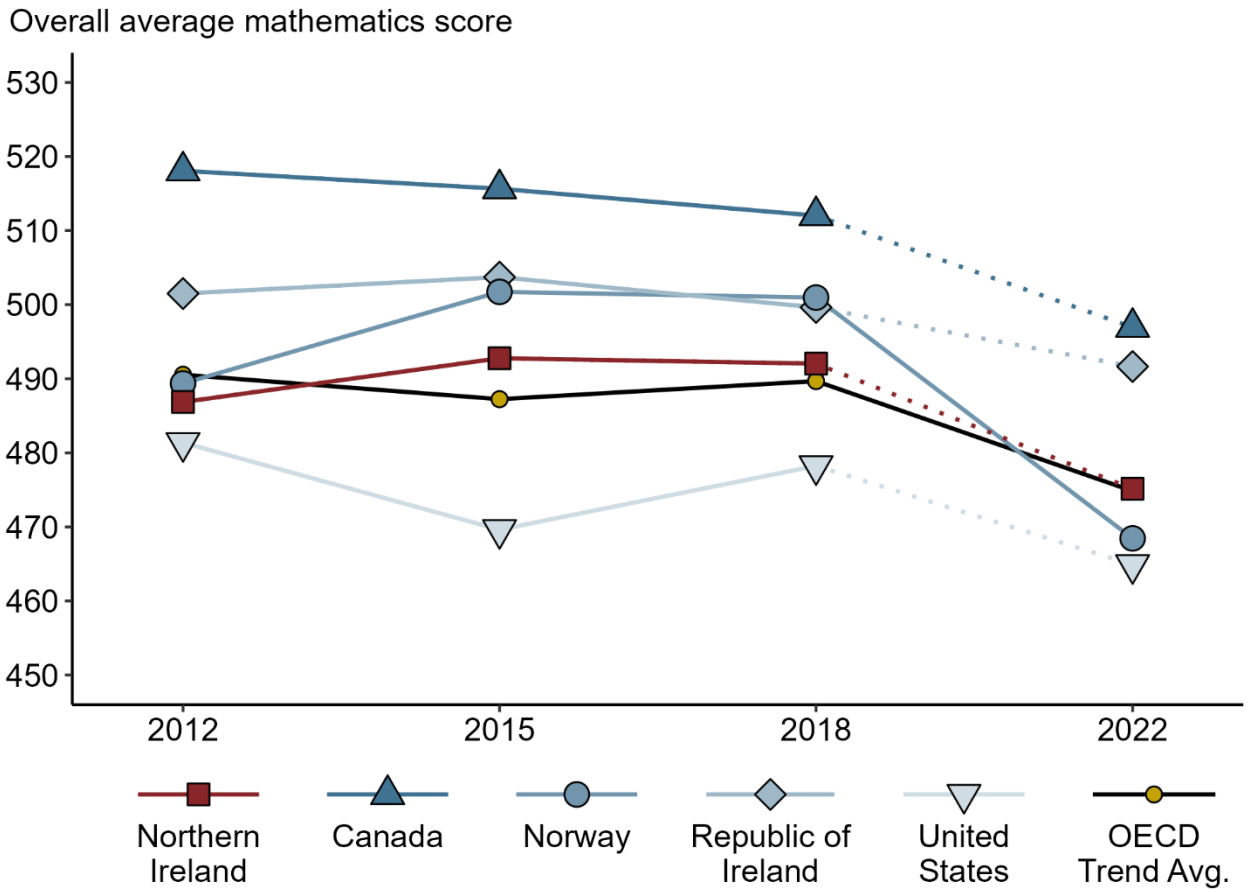
In Northern Ireland's PISA 2018 National Report (Sizmur et al., 2019), the average score in mathematics was reported as 492 which was not statistically significantly different from the OECD average score in that cycle of 489. Both Northern Ireland's average score and the OECD trend average score were significantly lower in 2022 than in 2018.

Pupils in Northern Ireland achieved an average score of 492 in mathematics in PISA 2018, an average score of 493 in PISA 2015 and an average score of 487 in PISA 2012 when mathematics was last the major domain. Each of these average scores was statistically significantly higher than the average mathematics score in PISA 2022 in Northern Ireland. The average mathematics scores in 2018, 2015 and 2012 were not significantly different to each other.

Northern Ireland was not significantly different from the OECD trend average in every PISA cycle since 2012. The trends over time in mathematics scores in Northern Ireland,

Canada, Norway, the Republic of Ireland, the United States, and on average across OECD trend countries in PISA 2022 are shown in Figure 2.1.

Figure 2.1: Trends in mathematics performance in Northern Ireland, comparator countries and on average across the OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	* 487	* 493	* 492	475
Canada	* 518	* 516	* 512	497
Norway	* 489	* 502	* 501	468
Republic of Ireland	* 501	* 504	* 500	492
United States	* 481	470	* 478	465
OECD Trend Average	* 491	* 487	* 490	475

Base: All participating pupils
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022. Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure. OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain. Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022 Database

In total, 41 of the 72 education systems that participated in both 2018 and 2022 saw a significant decrease in their average mathematics score in 2022 compared to 2018, with only 7 education systems seeing a significant increase. The remaining 24 education systems saw no significant change in their scores. Table 2.2 shows the changes in average mathematics scores between PISA 2022 and PISA 2018 for each of the 37 education systems, including Northern Ireland, that participated in both cycles and who scored above 450 in mathematics in PISA 2022. Only 1 education system, Taiwan, scored significantly higher in mathematics in PISA 2022 than in PISA 2018 with an increase of 16 score points. In contrast, 26 education systems including Northern Ireland saw a significant decrease in their average mathematics score in 2022 compared to 2018. There were no statistically significant differences between the scores in PISA 2018 and PISA 2022 for 10 education systems.

Table 2.2: Changes in mathematics average score in PISA 2022 relative to performance in PISA 2018 for higher performing education systems

Trend in mathematics performance	Education system and change in score
Scored significantly higher in mathematics in PISA 2022 than in PISA 2018	Taiwan (+16)
No statistically significant differences in mathematics average scores between PISA 2022 and PISA 2018	Japan (+9), Singapore (+6), South Korea (+1), Turkey (+0), Croatia (-1), Australia (-4), Israel (-5), Malta (-6), Lithuania (-6), Switzerland (-7)
Scored significantly lower in mathematics in PISA 2022 than in PISA 2018	Macao (-6), Republic of Ireland (-8), Hungary (-8), Hong Kong (-11), Austria (-12), Czech Republic (-12), Latvia (-13), United States (-13), Estonia (-13), OECD trend average (-15), Canada (-15), Italy (-15), New Zealand (-15), Northern Ireland (-17), Belgium (-19), Denmark (-20), Portugal (-21), Sweden (-21), France (-21), Slovakia (-22), Finland (-23), Slovenia (-24), Germany (-25), Netherlands (-27), Poland (-27), Norway (-33), Iceland (-36).

Base: All education systems with average scores over 450 in mathematics in PISA 2022 that also participated in PISA 2018.
Change in mathematics score (2022 score – 2018 score) presented in parenthesis.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022 Database

In 2022, mathematics was the major domain for PISA. The last time that mathematics was the major domain was in 2012. Macao was the only higher performing education system[13] that participated in both studies that had an average mathematics score significantly higher in 2022 than in 2012. There were 9 education systems where there was no significant difference (Turkey, Sweden, Singapore, Japan, Lithuania, Hungary, Latvia, Croatia, Israel). The average mathematics score in Northern Ireland was significantly lower in PISA 2022 than in 2012 (-12). This was also the case in all 4 comparator countries (Canada (-21), Norway (-21), the Republic of Ireland (-10) and the United States (-16)).

2.6 Differences between the highest and lowest performers in mathematics

It is important to examine the difference in performance between the highest and lowest performers in mathematics. This is because even where two education systems have similar average scores in mathematics there may be significant differences in how their pupils are performing across the attainment range. For example, an education system with a wide spread of attainment may have a relatively high percentage of pupils who are performing at the lowest levels and a high percentage of pupils performing at the highest levels. They will have greater disparity across their population of pupils. On the other hand, an education system with a lower spread of attainment may have fewer very high performing pupils but may also have fewer lower performing pupils – they will have less disparity across their pupils. Despite these differences, it would be possible for these two education systems to obtain the same average score, masking important differences between the two. There needs to be particular caution in interpreting the scores of the highest and lowest performing pupils in Northern Ireland as the non-response bias analysis suggests that lower performing pupils may be under-represented in the Northern Ireland sample for PISA 2022. Northern Ireland's non-response bias analysis is reported in full in Appendix A.

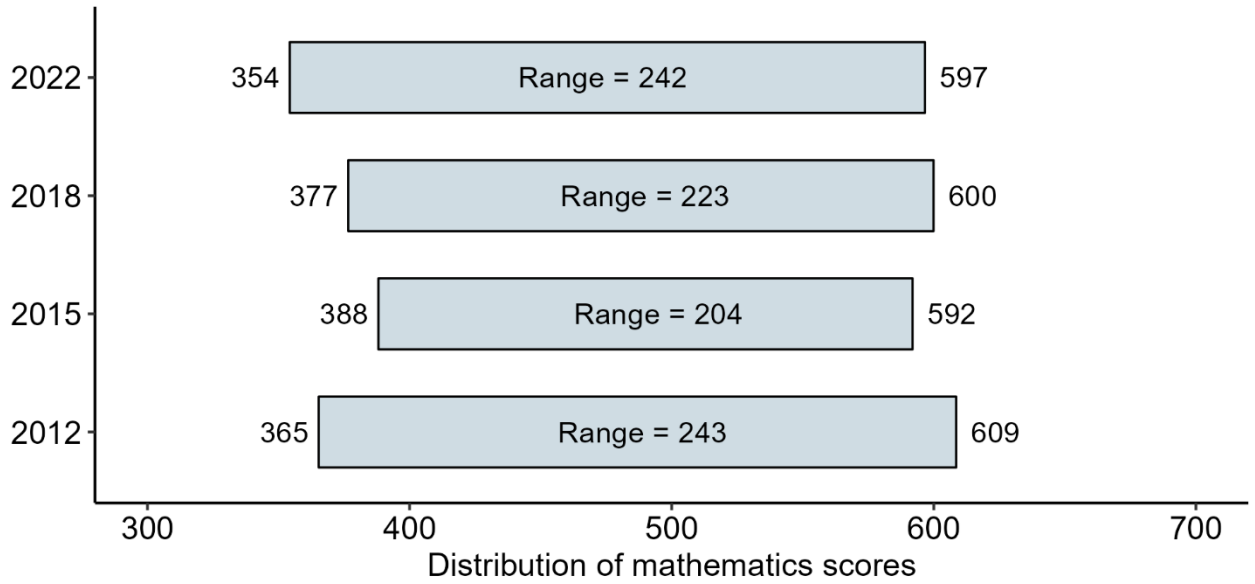
The first way in which the spread of performance in each country can be examined is by looking at the distribution of scores. The 90th percentile is the score above which the highest performing 10% of pupils obtain, while the 10th percentile is the score below which the lowest performing 10% of pupils obtain. The difference between the highest and lowest performers at the 90th and 10th percentiles is a better measure of the spread of scores for comparing countries than using the very highest and lowest performing pupils, as the latter comparison may be affected by a small number of pupils with unusually high or low scores.

[13] Education systems with an average mathematics score above 450

The gap between Northern Ireland's highest and lowest performing pupils was 242 score points. This was not significantly different to the OECD trend average of 237 score points. The gap in performance between Northern Ireland's highest and lowest performing pupils in 2018 was 223 score points which was also not significantly different from the OECD trend average in 2018 of 234 score points.

Figure 2.2 shows the trend in the distribution of PISA mathematics scores in Northern Ireland since PISA 2012. The gap between Northern Ireland's highest and lowest performing pupils in mathematics in PISA 2022 was not statistically significantly different from the gap in PISA 2018 or PISA 2012 but was significantly larger than the gap of 204 score points in 2015.

Figure 2.2: Trends in the gap in mathematics performance between the highest and lowest performing pupils in Northern Ireland



PISA cycle	10th percentile	90th percentile	Range
2022	354	597	242
2018	377	600	223
2015	388	592	204
2012	365	609	243

Base: All participating pupils in Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

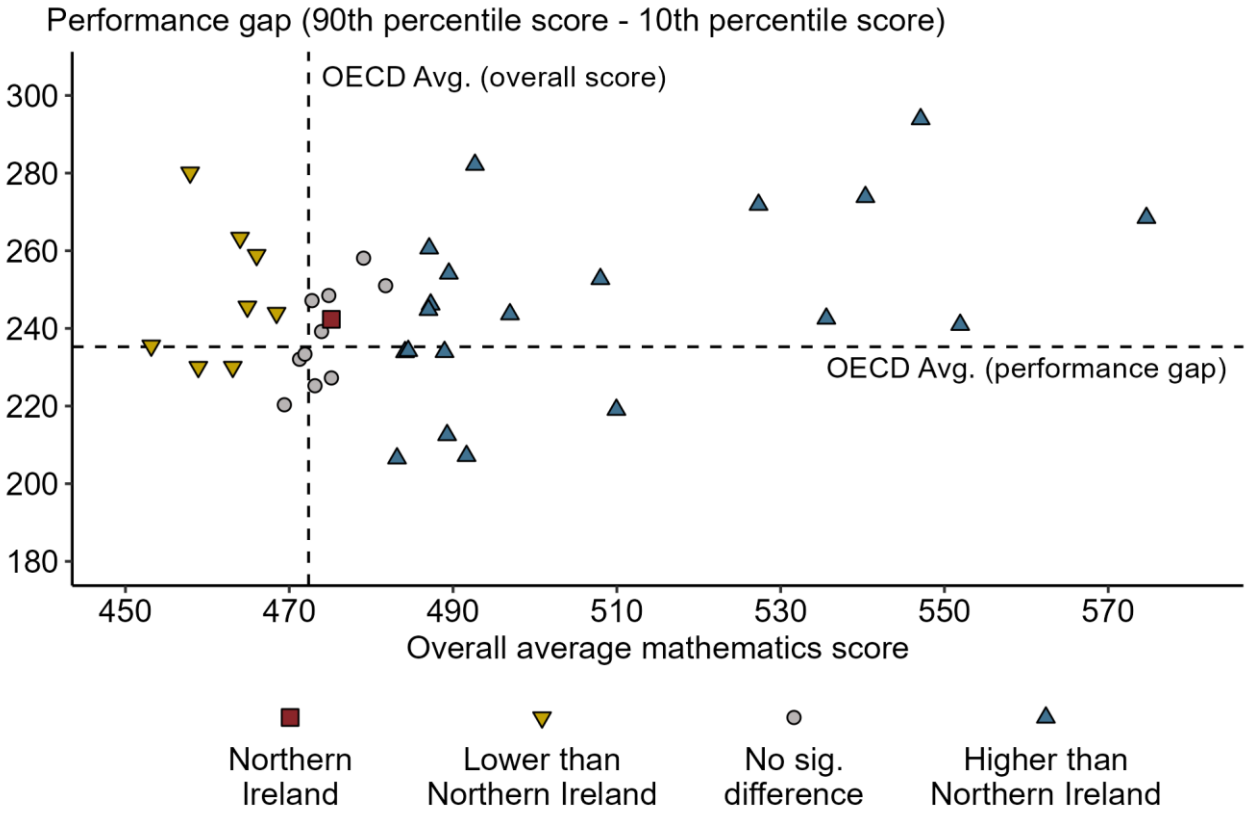
Source: OECD, PISA 2022 Database

The score at the 90th percentile in mathematics in Northern Ireland was 597. The score at the 10th percentile was 354 score points. On average across the OECD countries, the score at the 90th percentile in mathematics was 590 and the score at the 10th percentile

was 355. These scores were not statistically significantly different from the respective scores in Northern Ireland.

To further consider the differences between the highest and the lowest performing pupils in mathematics in Northern Ireland, scores at the 90th and 10th percentiles can be compared with those of other education systems. In PISA 2022, the gaps in performance in mathematics in the United States (246), Norway (244) and Canada (244) were not statistically significantly different from the gap in performance in Northern Ireland (242). However, the gap in performance in the Republic of Ireland (207) was significantly smaller than in Northern Ireland. Figure 2.3 shows the differences between pupils performing at the 90th and the 10th percentiles in all education systems with a mathematics score of 450 score points or above.

Figure 2.3: Gaps in mathematics performance for higher performing education systems and on average across the OECD countries

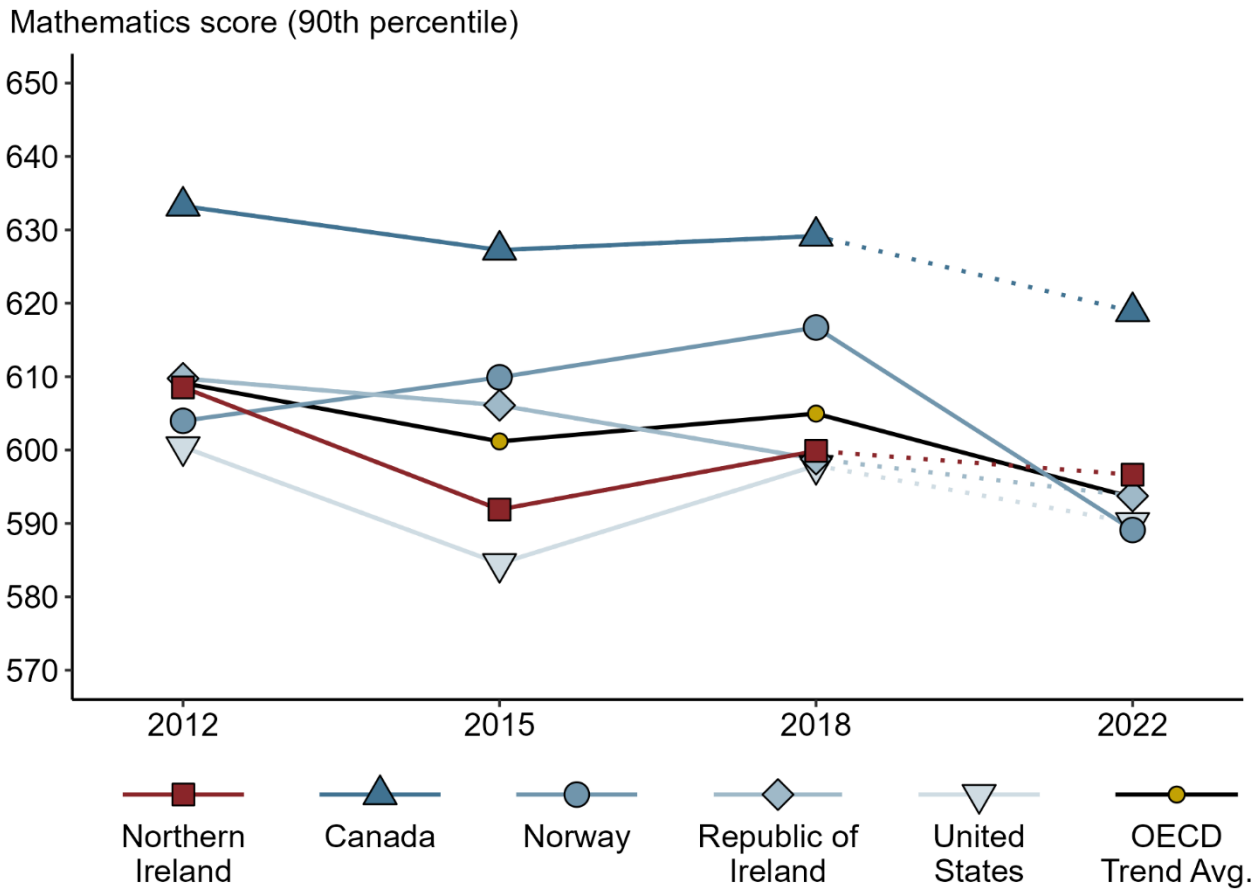


Base: Countries with an overall mathematics score of 450 score points or above.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022 Database

Trends in the performance at the 90th percentile across the 4 most recent cycles of PISA for Northern Ireland, Canada, Norway, the Republic of Ireland, the United States and on average across OECD trend countries are shown in Figure 2.4.

Figure 2.4: Trends in mathematics performance at the 90th percentile for Northern Ireland, comparator countries and on average across OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	609	592	600	597
Canada	* 633	627	* 629	619
Norway	* 604	* 610	* 617	589
Republic of Ireland	* 610	* 606	599	594
United States	600	585	598	590
OECD Trend Average	* 609	* 601	* 605	* 594

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
OECD averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain. Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

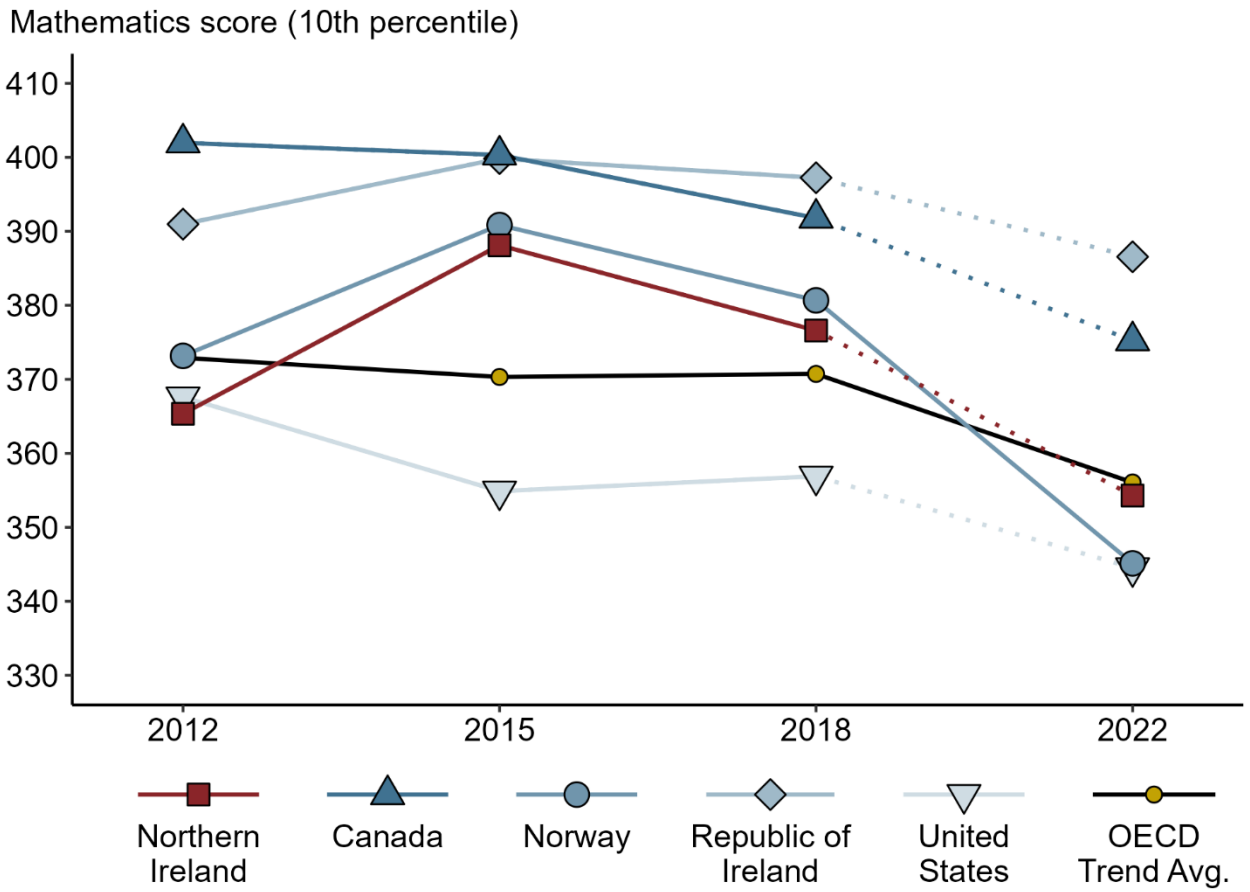
Source: OECD, PISA 2022 Database

While there have been no statistically significant differences in Northern Ireland's score at the 90th percentile since 2012, both Canada and Norway saw a significant decrease in their mathematics scores at the 90th percentile between PISA 2018 and PISA 2022.

There were no statistically significant differences in the scores at the 90th percentile in the United States and in the Republic of Ireland between PISA 2018 and PISA 2022.

Figure 2.5 meanwhile shows the trends in performance at the 10th percentile. In Northern Ireland, the score at the 10th percentile was significantly lower in 2022 than in 2018 or in 2015, decreasing from 388 in 2015, to 277 in 2018 and to 354 in 2022. Similarly, in Norway, Canada, and the Republic of Ireland, there was a statistically significant decrease in the score at the 10th percentile between 2018 and 2022. In the United States, the decrease in the 10th percentile score was not statistically significant.

Figure 2.5: Trends in mathematics performance at the 10th percentile for Northern Ireland, comparator countries and on average across OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	365	* 388	* 377	354
Canada	* 402	* 400	* 392	375
Norway	* 373	* 391	* 381	345
Republic of Ireland	391	* 400	* 397	387
United States	* 368	355	357	345
OECD Trend Average	* 373	* 370	* 371	356

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
OECD averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain. Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022 Database

2.7 Performance across mathematics proficiency levels

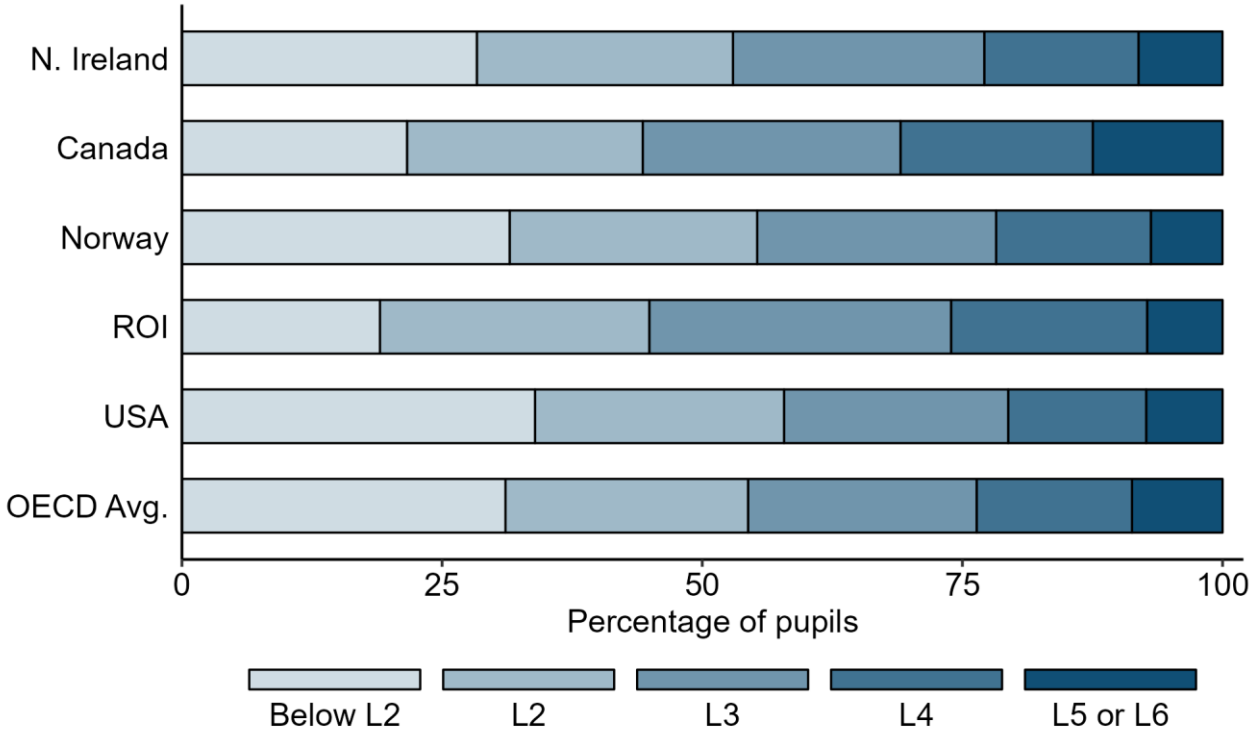
Another way of examining the spread of performance is by looking at Northern Ireland's performance at each of the PISA proficiency levels. The PISA proficiency levels describe the tasks that pupils performing at each level can do. They are devised internationally and are illustrated in the International Report (OECD, 2023b). Mathematics performance in PISA is described in terms of 8 proficiency levels (Levels 1-6, with Level 1 subdivided in 1a, 1b and 1c). These performance levels are outlined in the PISA 2022 Assessment and Analytical Framework (OECD, 2023b, p.49). Pupils who score below Level 2 are considered 'low performers' and those that perform at Level 5 or above are considered 'top performers'. Level 2 is considered the baseline level of proficiency in mathematics where pupils can begin to use mathematics in real-life situations, which is needed to participate fully in society.

In total, 8% of pupils in Northern Ireland were classified as top performers in mathematics. This was not significantly different to the OECD average of 9%. In the United States, Norway, and the Republic of Ireland there were a similar percentage of top performing pupils, with 7% pupils in each of these countries achieving at least at Level 5. The percentage of top performing pupils in Canada was 12%.

Northern Ireland had 28% of pupils who were low performers which was significantly smaller than the OECD average of 31%. In the United States, 34% of pupils performed below the baseline level which was statistically significantly larger than the percentage of pupils in Northern Ireland. In Norway, a similar percentage of pupils (31%) to Northern Ireland were performing below the baseline level. In contrast, in both the Republic of Ireland (19%) and Canada (22%) there was a significantly lower percentage of pupils than in Northern Ireland performing below the baseline level. The distribution of pupils performing at each of the proficiency levels for mathematics in PISA 2022 in Northern Ireland, Canada, Norway, the Republic of Ireland, the United States and on average across the OECD countries is shown in Figure 2.6.

The percentage of pupils in Northern Ireland (8%) at the highest proficiency levels in 2022 was the same as 2018 and was not statistically significantly different from the percentages in 2015 (7%). However, the percentage of pupils performing below the baseline level (Level 2) has increased from 20% in 2018 to 28% in 2022, this increase was statistically significant. On average across OECD trend countries, the percentage of top performing pupils in mathematics in PISA 2022 (8%) was statistically significantly smaller than the percentage in 2015 (9%) and the percentage in 2012 (11%), and not significantly different to the percentage in 2018. The percentage of pupils performing below Level 2 on average across OECD trend countries was statistically significantly larger in 2022 (30%) than in 2018 (24%), 2015 (25%) and 2012 (24%).

Figure 2.6: Percentage of pupils performing at each mathematics proficiency level in Northern Ireland, comparator countries and on average across the OECD countries



Country	Below L2	L2	L3	L4	L5 or L6
Northern Ireland	28%	25%	24%	15%	8%
Canada	22%	23%	25%	18%	12%
Norway	31%	24%	23%	15%	7%
Republic of Ireland (ROI)	19%	26%	29%	19%	7%
United States (USA)	34%	24%	22%	13%	7%
OECD Average	31%	23%	22%	15%	9%

Base: All participating pupils
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022 database

3 Performance in mathematics subscales

3.1 Chapter overview

This chapter reports the performance of pupils in Northern Ireland on the mathematics content and process subdomain scales. It draws on findings outlined in the international report (OECD, 2023e) and places outcomes for Northern Ireland in the context of those findings. Caution needs to be taken in interpreting these findings as some of the sampling standards for PISA 2022 were not met in Northern Ireland, as described in Chapter 1.

3.2 Key findings

- In 2022, Northern Ireland's average score for the change and relationships subdomain was 475, which was statistically significantly higher than the average of 470 across the OECD countries.
- Northern Ireland's average score for the quantity subdomain was 478 which was statistically significantly higher than the OECD average of 472.
- Northern Ireland's mean score for the space and shape subdomain was 461 which was significantly lower than the OECD average score of 471.
- Northern Ireland's average score for the uncertainty and data subdomain was 482. This score was statistically significantly higher than the OECD average of 474.
- Northern Ireland's scores on the quantity (478) and uncertainty and data (482) subscales were significantly higher than the score achieved on the space and shape subscale (461).
- In Northern Ireland, all of the content subscales had similarly sized gaps in performance between the highest and lowest performing pupils.
- Around one-tenth of pupils in Northern Ireland performed at the highest proficiency levels in each of the content subdomains, which was not statistically significantly different from the percentages on average across the OECD countries.
- Less than one-third of pupils in Northern Ireland performed below the baseline proficiency level on all the content subdomains except in the space and shape subdomain, where 35% of pupils were below this threshold. These percentages were not statistically significantly different from those on average across the OECD countries.
- In Northern Ireland, the average score for the mathematical reasoning subdomain was 474 which was not statistically significantly different from the OECD average of 473.

- In Northern Ireland, the average score for the formulating subdomain was 471 which was not statistically significantly different from the OECD average of 469.
- Pupils in Northern Ireland achieved an average score of 476 in the employing subdomain which was not statistically significantly different from the average score across the OECD countries of 472.
- In the interpreting subdomain, pupils in Northern Ireland achieved an average score of 479 which was statistically significantly higher than the OECD average of 474.
- The gap in performance between Northern Ireland's scores at the 90th and 10th percentile in the formulating subdomain was 277 score points, and 263 in the employing subdomain. These gaps were significantly larger than the corresponding gap of 243 score points in the mathematical reasoning subdomain. The gap of 252 scale points in the interpreting subdomain was significantly smaller than the gap in performance in the formulating domain.
- Northern Ireland's scores at the 90th percentile on the process subscales were 609 in the formulating subdomain, 607 in employing, 605 in interpreting, and 597 in mathematical reasoning.
- Northern Ireland's score at the 10th percentile on the mathematical reasoning subscale was 354, and 353 on the interpreting subscale. These were both statistically significantly higher than Northern Ireland's score at the 10th percentile on the formulating subscale (332). Northern Ireland's 10th percentile score in the employing subdomain was 344.
- The percentage of pupils in Northern Ireland performing at the highest proficiency levels (levels 5 and 6) in formulating, employing and interpreting was 10%. The percentage performing at the highest proficiency levels in mathematical reasoning was 8%. These were not statistically significantly different from the average percentages across the OECD countries.
- There were no statistically significant differences in the percentages of pupils in Northern Ireland performing below the baseline proficiency level (Level 2) in each of the process subscales, with 32% in the formulating subdomain, 30% in the employing subdomain, 28% in the interpreting subdomain, and 29% in the mathematical reasoning subdomain. These were not statistically significantly different from the average percentages across the OECD countries.

3.3 Introduction to the subdomains

Mathematical literacy in PISA 2022 was assessed in relation to 4 content subdomains (change and relationships, quantity, space and shape, and uncertainty and data) and 4

process subdomains (mathematical reasoning, formulating, employing, and interpreting). The process subdomain of mathematical reasoning was introduced in PISA 2022. The remaining process subdomains and all the content subdomains were included in the previous mathematics assessment frameworks. The 8 subdomains are described in further detail in this chapter and in the PISA 2022 mathematics framework (OECD, 2023c).

In addition to their overall performance, pupils' performance in mathematics was analysed separately for each of the subdomains. In some education systems, pupils showed notably stronger or weaker performance in some of these areas. Differences between average scores on these subscales could have implications for teaching and learning or might reflect differences in the balance of these content areas across different curricula.

Stronger conclusions can be drawn when comparing across subscales within Northern Ireland because the report is not trying to generalise beyond the Northern Ireland sample. The fact that the sample deviates from the sampling standards has less of an influence because the comparison is taking place within it, rather than between it and samples from previous years or from other education systems. In other words, the subscales within Northern Ireland that are being compared are equally affected by the sampling deviations.

3.4 Mathematics content subdomain scale scores

The 4 mathematics content subdomain scales include change and relationships, quantity, space and shape, and uncertainty and data. These are described below.

3.4.1 Change and relationships

The change and relationships subdomain involves pupils demonstrating their understanding of types of change and recognising when they occur. This can involve the use of suitable mathematical models to both describe the changes and relationships but also to predict change. It also requires the use of appropriate functions and equations to model the change and the relationships, as well as moving between and interpreting different representations of these changes and relationships (https://pisa2022-maths.oecd.org/).

In 2022, Northern Ireland's average score for the change and relationships subdomain was 475 which was statistically significantly higher than the average of 470 across the OECD countries. Pupils in the United States and Norway achieved an average score for the change and relationships subdomain that was not statistically different from Northern Ireland, 465 in both cases. The average scores of 492 in the Republic of Ireland and 502

in Canada were both statistically significantly higher than the average scores of pupils in Northern Ireland for the change and relationships subdomain in PISA 2022.

3.4.2 Quantity

Quantity incorporates the quantification of attributes of objects, relationships, situations and entities in the world, understanding various representations of those quantifications and judging interpretations and arguments based on quantity. The essence of mathematical literacy relative to quantity include number sense, multiple representations of numbers, elegance in computation, mental calculation, estimation and the assessment of the reasonableness of results. This subdomain includes applying knowledge of numbers and number operations in a wide variety of settings (https://pisa2022-maths.oecd.org/).

Northern Ireland's average score for the quantity subdomain was 478 which was significantly higher than on average across the OECD countries (472). The average score of pupils in the Republic of Ireland and in Canada (both 494) were statistically significantly higher than the average score in the quantity subdomain of pupils in Northern Ireland. There was no statistically significant difference between the average score of pupils in Norway (469) and pupils in Northern Ireland, but pupils in the United States had a statistically significantly lower average score (461) in the quantity subdomain.

3.4.3 Space and shape

Space and shape involves a wide range of phenomena that are encountered in our visual and physical world. This includes patterns, properties of objects, positions and orientations, representations of these objects, decoding and encoding of visual information, navigation and dynamic interaction with real shapes as well as with representations, movement, displacement, and the ability to anticipate actions in space. Being literate in the shape and space subdomain involves understanding perspective and interpreting views of three-dimensional shapes from different perspectives, as well as constructing and transforming representations of shapes. It also includes creating and reading maps (https://pisa2022-maths.oecd.org/).

Northern Ireland's average score on the space and shape subscale was 461, which was significantly lower than the OECD average of 471, and significantly lower than Northern Ireland's scores on the quantity and uncertainty and data subscales, although not significantly different to the score on the change and relationships subscale. Pupils on average in the United States and in Norway did not perform statistically significantly differently in the space and shape subdomain to pupils in Northern Ireland, with average scores of 454 and 469 respectively. In contrast, pupils in the Republic of Ireland and in

Canada had statistically significantly higher average scores in the space and shape subdomain than pupils in Northern Ireland with scores of 474 and 491 respectively.

3.4.4 Uncertainty and data

Uncertainty is a phenomenon at the heart of the mathematical analysis of many problem situations. The uncertainty and data content subdomain includes recognising the place of variation in processes, having a sense of the quantification of that variation, acknowledging uncertainty and error in measurement, and knowing about chance (https://pisa2022-maths.oecd.org/).

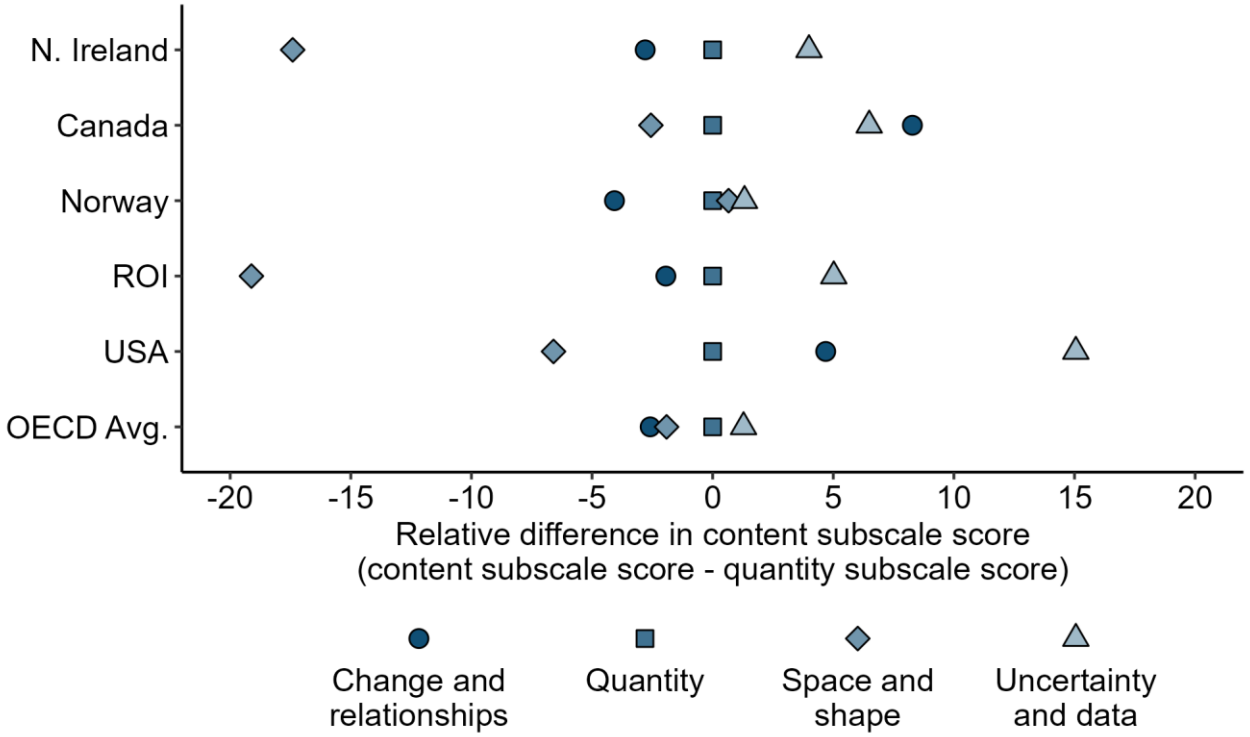
Northern Ireland's average score for the uncertainty and data subdomain was 482. This score was statistically significantly higher than the OECD average of 474. This average score for pupils in Northern Ireland was not statistically significantly different from the average score of pupils in the United States in the uncertainty and data subdomain (476), and it was statistically significantly higher than the average score of pupils in Norway (470). The average scores for pupils in the Republic of Ireland (499) and in Canada (500) were both statistically significantly higher than the average score in the uncertainty and data subdomain in Northern Ireland.

3.4.5 Differences between content subscale scores

In Northern Ireland, the highest average content subdomain score was on the uncertainty and data subscale. This was also the case in the United States and the Republic of Ireland.

The lowest average subdomain score in Northern Ireland was for space and shape, which was also the lowest average subdomain score in the United States, the Republic of Ireland and Canada, though not all of these were significantly lower than the other subdomain scores. On average across the OECD countries, the difference between the highest average content subdomain score (uncertainty and data) and the lowest average content subdomain score (change and relationships) was 4 score points. In Northern Ireland, this difference was 21 score points between uncertainty and data and space and shape. The distribution of the content subdomain scores in Northern Ireland, across the comparator countries and on average across the OECD countries is shown in Figure 3.1. These comparisons are made in each country relative to that country's score on the quantity subscale.

Figure 3.1: Distribution of the average scores for each content subdomain for Northern Ireland, the comparator countries and on average across the OECD countries



Country	Change and relationships	Quantity	Space and shape	Uncertainty and data
Northern Ireland	475	478	461	482
Canada	502	494	491	500
Norway	465	469	469	470
Republic of Ireland (ROI)	492	494	474	499
United States (USA)	465	461	454	476
OECD Average	470	472	471	474

Base: All participating pupils.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included countries.

Source: OECD, PISA 2022 Database

3.4.6 Differences between the highest and lowest performing pupils in the content subscales

In Northern Ireland, all 4 of the content subscales had similarly sized ranges between the scores at the 10th percentile and the 90th percentile. However, Northern Ireland's score at the 90th percentile on the uncertainty and data subscale was significantly higher than the 90th percentile score of 589 on the space and shape subscale. There were no

statistically significant differences between the scores at the 10th percentile on any of the content subscales.

With respect to the PISA proficiency levels, a statistically significantly larger percentage of pupils in Northern Ireland performed at Level 5 or above in the uncertainty and data subdomain (12%) than in the space and shape subdomain (7%). In the change and relationships subdomain 9% of pupils in Northern Ireland achieved the highest proficiency levels, while in the quantity subdomain 10% of pupils were classified as top performers. These were not statistically significantly different from the percentages in the uncertainty and data subdomain or in the space and shape subdomain. On average across the OECD countries, 10% of pupils performed at proficiency Level 5 or above in the change and relationships, quantity and space and shape subdomains and 11% of pupils performed at proficiency Level 5 or above in the uncertainty and data subdomain. The percentage of top performers (Level 5 or 6) in Northern Ireland, in the comparator countries and on average across the OECD countries are shown in Table 3.1.

The percentage of top performers in Canada in each of the content subscales was significantly larger than the corresponding percentage of pupils in Northern Ireland, with 16% of pupils in the change and relationships subdomain, 14% in the quantity subdomain, 14% in the space and shape subdomain and 17% in the uncertainty and data subdomain. Across the 4 content subdomains, there were no significant differences between the percentage of top performers in the Republic of Ireland, the United Sates or in Norway compared to the percentage of top performers in Northern Ireland.

Table 3.1: Percentage of top performing pupils in the content subdomains in Northern Ireland, comparator countries and on average across the OECD countries

Country	Change and relationships	Quantity	Space and shape	Uncertainty and data
Northern Ireland	9%	10%	7%	12%
Canada	16%	14%	14%	17%
Norway	7%	8%	8%	10%
Republic of Ireland	8%	10%	5%	12%
United States	8%	8%	6%	11%
OECD Average	10%	10%	10%	11%

Base: All participating pupils
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included countries.

Source: OECD, PISA 2022 Database

There were no statistically significant differences in the percentage of pupils who performed below the baseline proficiency level (Level 2) in each of the content subscales

in Northern Ireland, with 29% in the change and relationships subdomain and in the quantity subdomain, 35% in the space and shape subdomain, and 28% of pupils in the uncertainty and data subdomain. Around one-third of pupils on average across the OECD countries performed below the baseline proficiency level, with 33% of pupils for the change and relationships subdomain, and 32% of pupils for space and shape, and 28% for quantity and uncertainty and data subdomains. These were not statistically different from the percentage of pupils on average across the OECD countries. The percentage of pupils performing below the baseline level in Northern Ireland, in the comparator countries and on average across the OECD countries are shown in

Table 3.2.

Table 3.2: Percentage of pupils performing below the baseline level in the content subdomains in Northern Ireland, comparator countries and on average across the OECD countries

Country	Change and relationships	Quantity	Space and shape	Uncertainty and data
Northern Ireland	29%	29%	35%	28%
Canada	22%	25%	26%	24%
Norway	33%	32%	32%	33%
Republic of Ireland	20%	21%	25%	19%
United States	34%	36%	38%	31%
OECD Average	33%	32%	32%	32%

Base: All participating pupils
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included countries.

Source: OECD, PISA 2022 Database

3.5 Mathematics process subdomain scale scores

3.5.1 Mathematical reasoning

The mathematical reasoning subdomain was new for PISA 2022. It focuses on pupils' ability to reason logically and present arguments. This subdomain involves 6 key understandings that include:

- understanding quantity, number systems and their algebraic properties;
- appreciating the power of abstraction and symbolic representation;
- seeing mathematical structures and their regularities;

- recognising functional relationships between quantities;
- using mathematical modelling as a lens onto the real world (e.g. those arising in the physical, biological, social, economic and behavioural sciences); and
- understanding variation as the heart of statistics (https://pisa2022-maths.oecd.org/).

In Northern Ireland, the average score for the mathematical reasoning subdomain was 474 which was not statistically significantly different from the OECD average score of 473. This average score for the mathematical reasoning subdomain in Northern Ireland was also not statistically significantly different from the average score in the United States (464) or in Norway (476). Pupils in the Republic of Ireland and pupils in Canada both performed on average significantly higher than pupils on average in Northern Ireland in the uncertainty and data subdomain, with scores of 490 and 499 respectively.

3.5.2 Formulating

The formulating subdomain focuses on the ability of pupils to recognise and identify opportunities to use mathematics and then provide mathematical structure to a problem presented in some contextualised form. In the process of formulating situations mathematically, pupils need to determine where they can extract the essential mathematics to analyse, set up and solve the problem. They also need to be able to translate from a real-world setting to the domain of mathematics and provide the real-world problem with mathematical structure, representations and specificity. Pupils also need to reason about and make sense of constraints and assumptions in the problem.

In Northern Ireland, the average score for the formulating subdomain was 471 which was not statistically significantly different from the OECD average score of 469. Similarly to the mathematical reasoning subdomain, the average score of pupils in Northern Ireland for the formulating subdomain was not statistically significantly different from the average score of pupils in the United States (463) or in Norway (465). The average score of pupils in the Republic of Ireland (487) and in Canada (494) were both significantly higher than the average score of pupils in Northern Ireland in the formulating subdomain.

3.5.3 Employing

The employing subdomain focuses on pupils' ability to apply mathematical concepts, facts, procedures and reasoning to solve mathematically formulating problems to obtain mathematical conclusions. In the process of employing mathematical concepts, facts, procedures and reasoning to solve problems, pupils need to perform mathematical procedures to derive results and find a mathematical solution. Pupils are also required to work on a model of the problem situation, establish regularities, identify connections between mathematical entities and create mathematical arguments.

Pupils in Northern Ireland achieved an average score of 476 in the employing subdomain which was not statistically significantly different from the average score across the OECD countries of 472, or the average score of pupils in Norway (466). This average score was statistically significantly higher than the average score of pupils in the United States (459) but was statistically significantly lower than the average score of pupils in the Republic of Ireland (494) and Canada (495).

3.5.4 Interpreting

The interpreting subdomain focuses on the ability of pupils to reflect upon mathematical solutions, results or conclusions and interpret and evaluate them in the context of the real-life problem that initiated the process. This involves translating mathematical solutions or reasoning back into the context of the problem and determining whether the results are reasonable and make sense in the context of the problem.

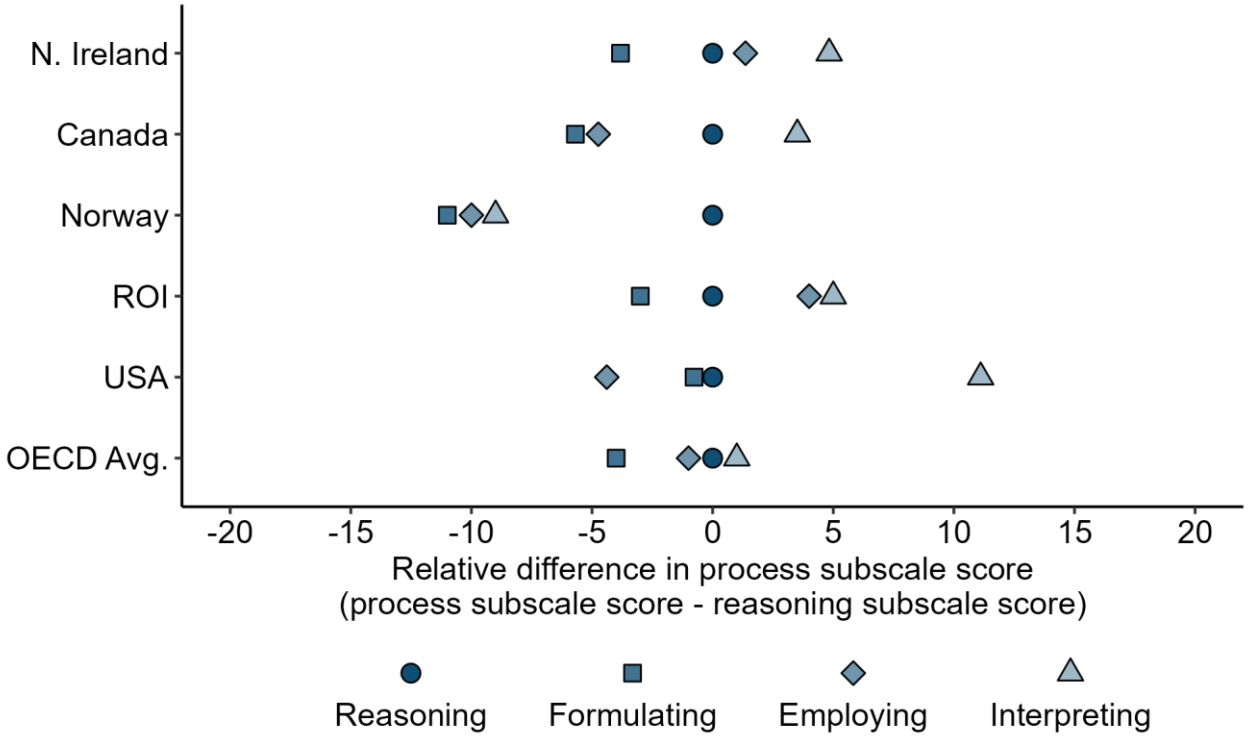
In the interpreting subdomain, pupils in Northern Ireland achieved an average score of 479 which was statistically significantly higher than the OECD average score of 474 and the average score of pupils in Norway (467). There was no statistically significant difference between the average score of pupils in the United States (475) and the average score of pupils in Northern Ireland in the interpreting subdomain. Similarly to the other process subscales, pupils in the Republic of Ireland and pupils in Canada had statistically significantly higher scores on average than pupils in Northern Ireland, with average scores of 495 and 503 respectively.

3.5.5 Differences between process subdomain scores

In Northern Ireland, the highest average process subdomain score was for the interpreting and the mathematical reasoning subdomains. The interpreting subdomain was also the highest subdomain score in Canada, the Republic of Ireland, the United States and on average across the OECD countries, although it was not always significantly higher than the other process subdomain scores. In all of the comparator countries, including Northern Ireland and on average across the OECD countries, bar the United States, the lowest average process subdomain score was in the formulating subdomain. In the United States, the lowest average process subdomain score was in employing.

The difference between the highest process subdomain score and the lowest subdomain scores in Northern Ireland was 8 score points. On average across the OECD countries this difference was 5 score points. The distribution of the content subdomain scores in Northern Ireland, across the comparator countries and on average across the OECD countries is shown in Figure 3.2. These comparisons are made in each country relative to that country's score on the mathematical reasoning subscale.

Figure 3.2: Distribution of the average scores for each process subdomain for Northern Ireland, the comparator countries and on average across the OECD countries



Country	Mathematical reasoning	Formulating	Employing	Interpreting
Northern Ireland	474	471	476	479
Canada	499	494	495	503
Norway	476	465	466	467
Republic of Ireland (ROI)	490	487	494	495
United States (USA)	464	463	459	475
OECD Average	473	469	472	474

Base: All participating pupils
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included countries.

Source: OECD, PISA 2022 Database

3.5.6 Differences between the highest and lowest performing pupils in the process subscales

The difference in Northern Ireland's scores at the 10th and 90th percentiles on the formulating subscale was 277 score points, and 263 score points on the employing subscale. These were both significantly larger than the range in score on the mathematical reasoning subscale of 243 score points. The difference in scores on the

formulating subscale (277 score points) was also significantly larger than the difference in scores on the interpreting subscale (252 score points).

The score at the 90th percentile in Northern Ireland was 609 on the formulating subscale, 607 on the employing subscale, 605 on the interpreting subscale and 597 on the mathematical reasoning subscale. There were no statistically significant differences between these scores. Instead, the significant differences in the gap in performances arise from significant differences in the scores at the 10th percentile. The score at the 10th percentile on the mathematical reasoning subscale was 354, and 353 on the interpreting subscale, both of which were significantly higher than the 10th percentile score on the formulating subscale (332). The score at the 10th percentile in Northern Ireland on the employing subscale was 344. On all four subscales, Northern Ireland's scores at the 10th and 90th percentile did not significantly differ from the scores at these percentiles on average across the OECD countries.

The percentage of pupils in Northern Ireland performing at the highest proficiency levels (Levels 5 and 6) in formulating, employing and interpreting was 10%. The percentage performing at the highest proficiency levels in mathematical reasoning was 8% which was not statistically significantly different from the percentages in the other process subscales. The percentage of pupils achieving the highest proficiency levels in Northern Ireland, comparator countries and on average across the OECD countries are shown in Table 3.3.

A statistically significantly larger percentage of pupils in Canada achieved the highest proficiency levels than in Northern Ireland, with 15% of pupils performing at Level 5 or 6 in formulating and employing, 17% in interpreting and 14% in mathematical reasoning. There were no statistically significant differences between the percentages of pupils in the United States or the Republic of Ireland performing at the highest proficiency levels compared to Northern Ireland in all of the process subscales. This was also the case for pupils in Norway except in the formulating subdomain where 7% of pupils achieved the highest proficiency levels compared to 10% in Northern Ireland.

Table 3.3: Percentage of top performing pupils in the process subdomains in Northern Ireland, comparator countries and on average across the OECD countries

Country	Mathematical reasoning	Formulating	Employing	Interpreting
Northern Ireland	8%	10%	10%	10%
Canada	14%	15%	15%	17%
Norway	8%	7%	8%	9%
Republic of Ireland	7%	9%	10%	9%
United States	7%	9%	8%	10%
OECD Average	9%	10%	10%	10%

Base: All participating pupils
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included countries.

Source: OECD, PISA 2022 Database

Similarly, there were no statistically significant differences in the percentages of pupils in Northern Ireland performing below the baseline proficiency level (Level 2) in each of the process subscales, with 32% in the formulating subdomain, 30% in the employing subdomain, 28% in the interpreting subdomain, and 29% in the mathematical reasoning subdomain. The percentage of pupils in each of the process subdomains in Northern Ireland were not significantly different from the percentages on average across the OECD countries.

The percentage of pupils performing below the baseline proficiency level in Canada and the Republic of Ireland was statistically significantly smaller than in Northern Ireland. In Canada 26% of pupils for the formulating subdomain, 25% for the employing subdomain, 23% for the interpreting subdomain and 22% for the mathematical reasoning subdomain performed below Level 2. In the Republic of Ireland these percentages were 23% for formulating, 21% for employing, 19% for interpreting and 20% for mathematical reasoning. In Norway a statistically significantly larger percentage of pupils (33%) did not achieve the baseline proficiency level for interpreting than in Northern Ireland (28%). There were no statistically significant differences in the percentage of pupils in Norway who performed below the baseline in the formulating (33%), employing (33%) or mathematical reasoning (29%) subdomains and the percentage of pupils in Northern Ireland. In the United States a statistically significantly larger percentage of pupils did not achieve the baseline in the employing (37%) and mathematical reasoning (34%) subdomains compared to the percentage of pupils in Northern Ireland, however there were no statistically significant differences in the percentage of pupils achieving below the baseline in the formulating (36%) and interpreting (31%) subdomains.

Table 3.4: Percentage of pupils performing below the baseline level in the process subdomains in Northern Ireland, comparator countries and on average across the OECD countries

Country	Mathematical reasoning	Formulating	Employing	Interpreting
Northern Ireland	29%	32%	30%	28%
Canada	22%	26%	25%	23%
Norway	29%	33%	33%	33%
Republic of Ireland	20%	23%	21%	19%
United States	34%	36%	37%	31%
OECD Average	31%	34%	32%	31%

Base: All participating pupils
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included countries.

Source: OECD, PISA 2022 Database

4 Reading

4.1 Chapter overview

This chapter focuses on Northern Ireland's performance in the reading domain of PISA 2022, and how this compares to the performance of other education systems and to Northern Ireland's participation in previous cycles. This chapter also looks at the distribution of reading performance in Northern Ireland and the percentage of pupils in Northern Ireland who performed at the different PISA proficiency levels in reading. Caution needs to be taken in interpreting these findings as some of the sampling standards for PISA 2022 were not met in Northern Ireland as described in section 1.4.2.

4.2 Key findings

- In 2022, Northern Ireland's average score in reading (485) was significantly above the OECD average in reading (476). The average score in Northern Ireland was also significantly above the OECD average in the previous cycle of PISA in 2018, and not significantly different to the OECD average in 2015 and 2012.
- Of all other 78 participating education systems[14], Northern Ireland outperformed 56, was not significantly different to 10 systems and was significantly outperformed by 12 systems.
- Northern Ireland's average score in reading in 2022 was significantly below the average score in 2018 (501), and the OECD average was also significantly lower in 2022 than in 2018 (487).
- Over the period of 2012-2022, the performance of pupils in reading has been relatively stable in Northern Ireland, however it has been in decline on average across the OECD countries. In 2022, Northern Ireland's average score was not significantly different to the score in 2012 (498), whereas the OECD average was significantly lower in 2022 than in 2012 (496).

4.3 Introduction to reading in PISA

The framework for assessing pupils' reading literacy was revised in PISA 2018, when reading was the major domain of assessment. The reading component of the PISA 2022 assessment aims to consider both the pupils' capacity to understand, use and reflect on written texts as well as the potential purpose of reading such as developing knowledge

[14] International comparisons involving Northern Ireland in this report do not include Cyprus as these data were not available at the time of writing. Vietnam was also excluded from the analysis of reading performance as a strong linkage to the international PISA reading scale could not be established.

and participating in society (OECD, 2023a). More information on the current PISA reading framework and example reading test items from previous PISA cycles can be found in the OECD's PISA 2018 Reading Framework.

As Northern Ireland's school-level and pupil-level response rates did not meet some of the PISA sampling standards, caution is required when interpreting the analysis reported here. Cautious interpretation is particularly necessary when considering trends in performance over time and when making international comparisons. Canada, the Republic of Ireland, and the United States, which have been included as comparator countries, also did not meet some of the PISA sampling standards as well as some of the other OECD countries included in the OECD averages. For more information see section 1.4.2.

4.4 Northern Ireland's performance in reading

Northern Ireland's average score in reading in PISA 2022 was 485. This was statistically significantly above the OECD average of 476. A total of 12 education systems had average scores significantly above Northern Ireland, while 10 systems had average scores that were not statistically significantly different to Northern Ireland. The other 56 education systems had an average score in reading that was significantly below Northern Ireland's. The 6 highest performing systems in PISA 2022 were Singapore (543), who scored significantly above every other education system, followed by the Republic of Ireland (516), Japan (516), South Korea (515), Taiwan (515) and Estonia (511).

Table 4.1 shows Northern Ireland's performance relative to all of the higher performing education systems (those with average scores of 450 or higher in reading).

Table 4.1: Reading performance of education systems in PISA 2022 relative to Northern Ireland

Performance relative to Northern Ireland's score in reading (485)	Education system and score
Education systems that scored significantly higher than Northern Ireland	Singapore (543), Republic of Ireland (516), Japan (516), South Korea (515), Taiwan (515), Estonia (511), Macao (510), Canada (507), United States (504), New Zealand (501), Hong Kong (500), Australia (498)
Education systems that did not score significantly higher or lower than Northern Ireland	Finland (490), Denmark (489), Poland (489), Czech Republic (489), Sweden (487), Northern Ireland (485), Switzerland (483), Italy (482), Austria (480), Germany (480), Belgium (479)
Education systems that scored significantly lower than Northern Ireland	Portugal (477), Norway (477), OECD average (476), Croatia (475), Latvia (475), Spain (474), France (474), Israel (474), Hungary (473), Lithuania (472), Slovenia (469), Netherlands (459), Turkey (456)

Base: All education systems with average scores over 450 in reading in PISA 2022.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

4.5 Reading performance over time

Northern Ireland's reading average score of 485 in PISA 2022 represented a drop of 16 score points from PISA 2018 (501). This decline was statistically significant. This trend was not unique to Northern Ireland, with the OECD trend average being significantly lower in PISA 2022 (477) than in PISA 2018 (488).

Out of 71 education systems that participated in both cycles, including Northern Ireland, 6 education systems scored significantly higher in reading in PISA 2022 than in PISA 2018, with Brunei experiencing the greatest gain (+21). The OECD country that experienced the greatest gain was Japan (+12), following decreases in their average score in 2015 and 2018. By contrast, 37 education systems saw their average reading score significantly lower in 2022 than in 2018, with Jordan experiencing the largest decline (-77). The OECD country that experienced the largest decline was Iceland (-38).

Table 4.2 shows the changes in average reading scores between PISA 2018 and PISA 2022 for every higher performing education system in PISA 2022.

Table 4.2: Changes in reading average score in PISA 2022 relative to performance in PISA 2018 for higher performing education systems

Trend in reading performance	Education system and change in score
Scored statistically significantly higher in reading in PISA 2022 than in PISA 2018	Taiwan (+13), Japan (+12)
No statistically significant differences in reading average score between PISA 2022 and PISA 2018	Italy (+5), Israel (+3), South Korea (+1), Switzerland (-1), United States (-1), Czech Republic (-2), Republic of Ireland (-2), Hungary (-3), Croatia (-3), Austria (-4), Lithuania (-4), Latvia (-4), Australia (-5), New Zealand (-5)
Scored statistically significantly lower in reading in PISA 2022 than in PISA 2018	Singapore (-7), Turkey (-10), OECD trend average (-10), Estonia (-12), Denmark (-12), Canada (-13), Belgium (-14), Macao (-15), Portugal (-15), Northern Ireland (-16), Germany (-18), France (-19), Sweden (-19), Norway (-23), Poland (-23), Hong Kong (-25), Netherlands (-26), Slovenia (-27), Finland (-30)

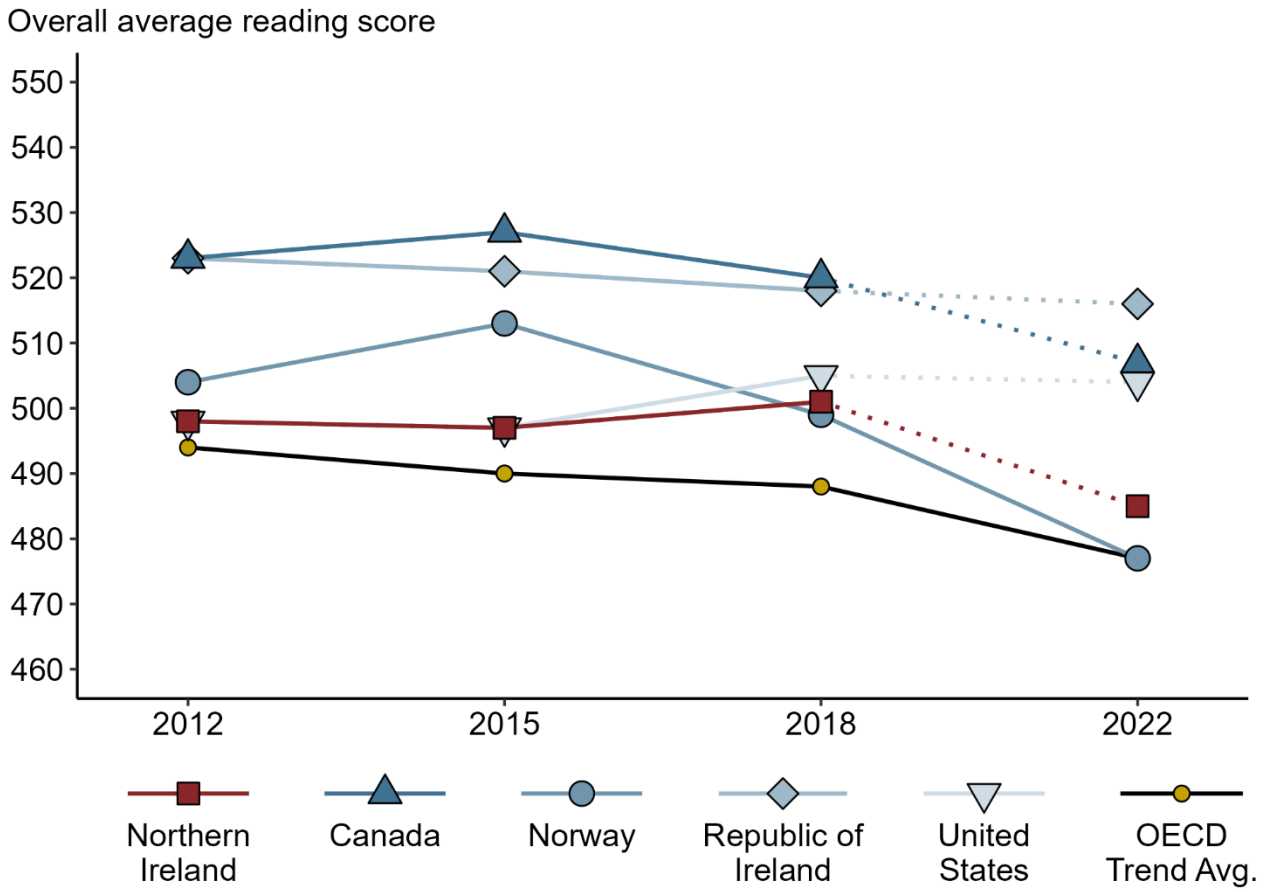
Base: All education systems with average scores over 450 in reading in PISA 2022 that also participated in PISA 2018.
Change in reading score (2022 score – 2018 score) presented in parenthesis.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Figure 4.1 presents Northern Ireland's overall reading performance over the last 4 cycles of PISA relative to the comparator countries and to the OECD trend average. Northern Ireland's reading average score in PISA 2022 (485) was significantly lower than the score in 2018 (501), and not significantly different to the scores in 2015 (497) and 2012 (498). Looking at the comparator countries, the trajectories of overall reading performance of Canada and Norway showed a downward trend from 2015. Canada scored significantly lower in PISA 2022 (507) than in 2018 (520), 2015 (527) and 2012 (523), and Norway scored significantly lower in PISA 2022 (477) than in 2018 (499), 2015 (513) and 2012 (504). The Republic of Ireland's reading average score in PISA 2022 (516) was not significantly different to the scores in 2018 (518), 2015 (521) and 2012 (523). The United States' reading performance showed a consistency in average score across the 4 PISA cycles, as their reading average score in PISA 2022 (504) was not significantly different to the scores in 2018 (505), 2015 (497) and 2012 (498).

On average across the OECD trend countries, the overall reading performance shows a downward trend since 2012. The OECD trend average in PISA 2022 (477) was significantly lower than the scores in 2018 (488), 2015 (493) and 2012 (494).

Figure 4.1: Trends in reading performance in Northern Ireland, comparator countries and on average across the OECD countries



Country	2012	2015	2018	2022
Northern Ireland	498	497	* 501	485
Canada	* 523	* 527	* 520	507
Norway	* 504	* 513	* 499	477
Republic of Ireland	523	521	518	516
United States	498	497	505	504
OECD Trend Average	* 494	* 490	* 488	477

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that system's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

4.6 Differences between the highest and lowest performing pupils in reading

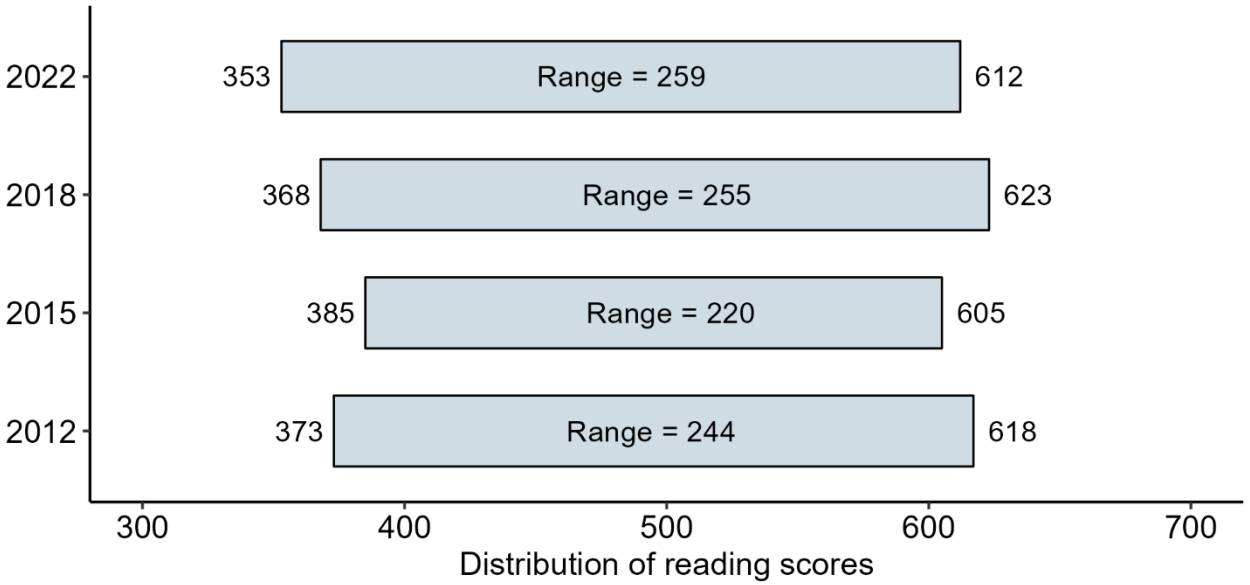
In this section, we look at the range of pupils' performance in reading by discussing Northern Ireland's performance at the 90th and 10th percentiles. The 90th percentile is the score above which the highest performing 10% of pupils obtain, while the 10th percentile is the score below which the lowest performing 10% of pupils obtain. The difference between the highest and lowest performers at the 90th and 10th percentiles is a better measure of the spread of scores for comparing countries than using the very highest and lowest performing pupils, as the latter comparison may be affected by a small number of pupils with unusually high or low scores.

There needs to be particular caution in interpreting the scores of the highest and lowest performing pupils as the non-response bias analysis suggests that lower performing pupils may have been under-represented among pupils who participated in PISA 2022.

Figure 4.2 shows the distribution of reading scores for Northern Ireland in each PISA cycle since 2012. The range in reading scores in PISA 2022 (259) was statistically significantly wider than the range in 2015 (219), and not statistically significantly different to the ranges in 2018 (255) and 2012 (244).

This increasing range can be explained by a 32 score point drop in the reading score at the 10th percentile, which was statistically significant, while the difference in the score at the 90th percentile between PISA 2022 (612) and 2015 (605) was not statistically significant.

Figure 4.2: Trends in the gap in reading performance between the highest and lowest performing pupils in Northern Ireland



PISA cycle	10th percentile	90th percentile	Range
2022	353	612	259
2018	368	623	255
2015	385	605	220
2012	373	618	244

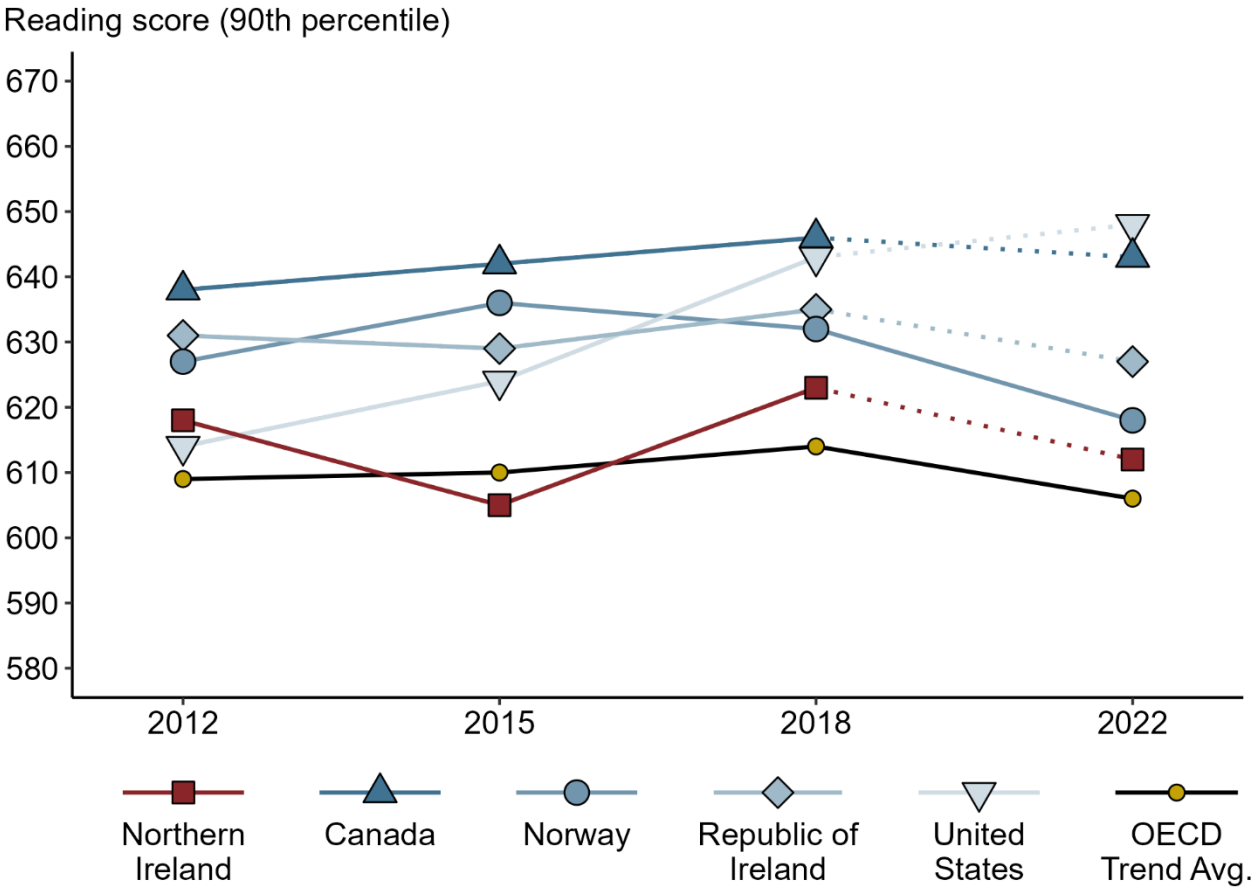
Base: All participating pupils.
Ranges calculated as 90th percentile – 10th percentile. Ranges may appear inconsistent with percentile scores due to rounding. Caution is required when interpreting estimates because some of the PISA sampling standards were not met.

Source: OECD, PISA 2022

Figure 4.3 and Figure 4.4 highlight this widening gap in performance by focusing on reading performance at the 90th and 10th percentiles respectively, and with reference to international trends at these percentiles.

Figure 4.3 shows Northern Ireland's reading performance at the 90th percentile across the last 4 PISA cycles. Northern Ireland's reading score of 612 at the 90th percentile in PISA 2022 was not statistically significantly different to the scores in 2018 (623), 2015 (605) and 2012 (618). The reading score on average across the OECD countries of 603 at the 90th percentile in PISA 2022 was statistically significantly lower than the scores in 2018 (614) and 2015 (613), and not significantly different to the score in 2012 (613). Comparing pupils' reading performance at the 90th percentile in Northern Ireland and on average across the OECD countries, Northern Ireland's score at the 90th percentile was not statistically significantly different to the OECD's score in each of the 4 last PISA cycles.

Figure 4.3: Trends in reading performance at the 90th percentile for Northern Ireland, comparator countries and on average across the OECD countries



Country	2012	2015	2018	2022
Northern Ireland	618	605	623	612
Canada	638	642	646	643
Norway	627	* 636	* 632	618
Republic of Ireland	631	629	635	627
United States	* 614	* 624	643	648
OECD Trend Average	613	* 613	* 614	603

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that system's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Looking at the comparator countries, Canada and the Republic of Ireland showed relative consistency in reading performance at the 90th percentile from 2012, similar to Northern Ireland. In Canada and the Republic of Ireland, the reading score at the 90th percentile in PISA 2022 was not statistically significantly different to the scores in the three previous

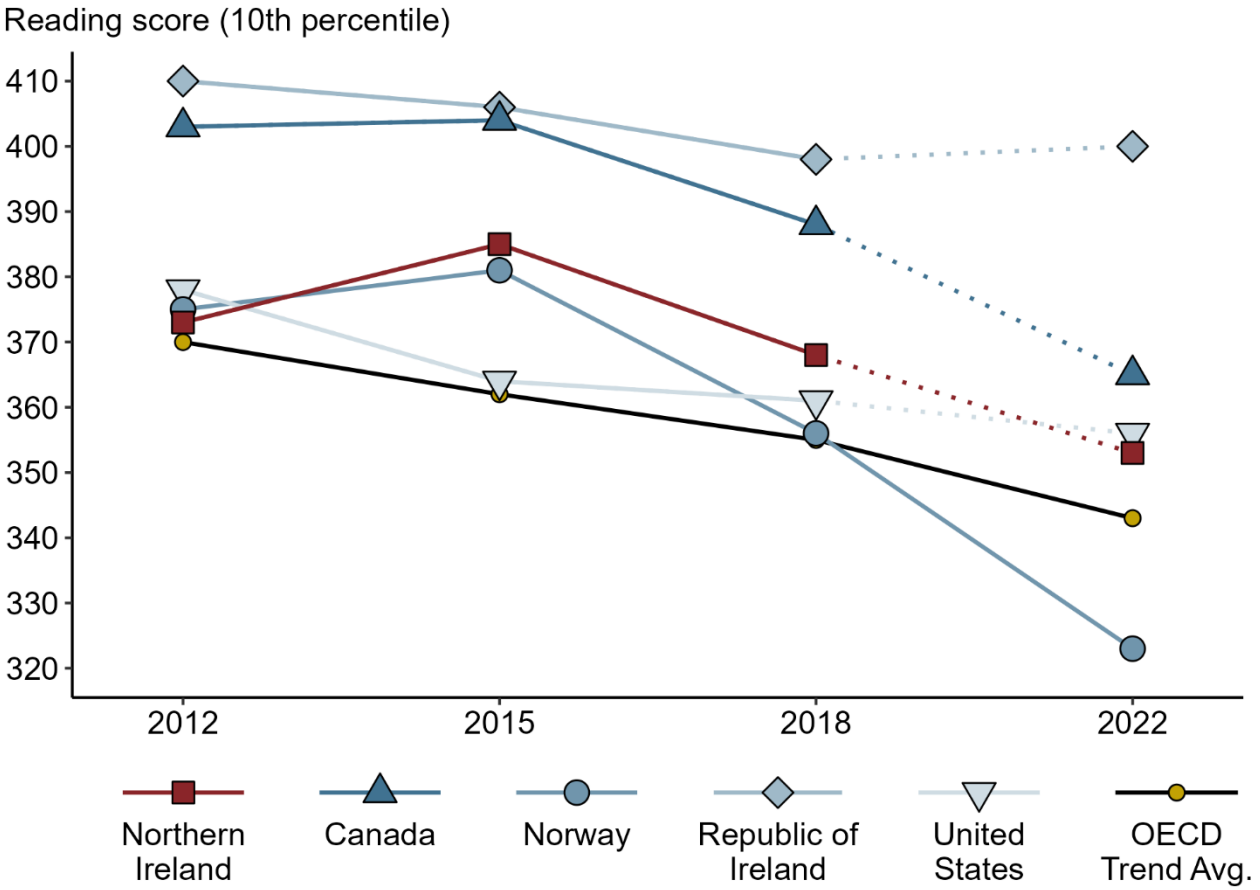
PISA cycles. On the other hand, the United States showed an upward trend from 2012. The United States' reading score at the 90th percentile in PISA 2022 (648) was significantly higher than the scores in 2015 (624) and 2012 (614), but not statistically significantly different to the score in 2018 (643). Norway showed a downward trend from 2015. Norway's reading score at the 90th percentile in PISA 2022 (618) was significantly lower than the scores in 2018 (632) and 2015 (636), and not significantly different to the score in 2012 (627).

Figure 4.4 shows Northern Ireland's reading performance at the 10th percentile across the last 4 PISA cycles. Northern Ireland's score of 353 at the 10th percentile in PISA 2022 was significantly lower than the score in 2015 (385), but not significantly different to the scores in 2018 (368) and 2012 (373).

On average across the OECD countries, there has been a downward trend in reading performance at the 10th percentile since 2012. The reading score at the 10th percentile was statistically significantly lower in PISA 2022 (342) than in 2018 (354), 2015 (364) and 2012 (372). Comparing pupils' reading performance at the 10th percentile in Northern Ireland and on average across the OECD countries, Northern Ireland's reading score at the 10th percentile was significantly above the OECD's score in 2018 and 2015. In 2022 and 2012, Northern Ireland's reading score at the 10th percentile was not significantly different to the score on average across the OECD countries.

Looking at the comparator countries, the Republic of Ireland showed little change in reading performance at the 10th percentile from 2012. The reading score for the Republic of Ireland at the 10th percentile in PISA 2022 (400) was not statistically significantly different to the scores in the 3 previous PISA cycles. On the other hand, Canada and Norway showed a downward trend from 2015. Canada's reading score at the 10th percentile was significantly lower in 2022 (365) than in 2018 (388), 2015 (404) and 2012 (403), and Norway's reading score was significantly lower in 2022 (323) than in 2018 (356), 2015 (381) and 2012 (375). The United States also showed a downward trend from 2012. The United States' reading score at the 10th percentile in 2022 (356) was significantly lower than 2012 (378) and not significantly different to the scores in 2018 (361) and 2015 (364).

Figure 4.4: Trends in reading performance at the 10th percentile for Northern Ireland, comparator countries and on average across the OECD countries



Country	2012	2015	2018	2022
Northern Ireland	373	* 385	368	353
Canada	* 403	* 404	* 388	365
Norway	* 375	* 381	* 356	323
Republic of Ireland	410	406	398	400
United States	* 378	364	361	356
OECD Trend Average	* 372	* 364	* 354	342

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that system's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

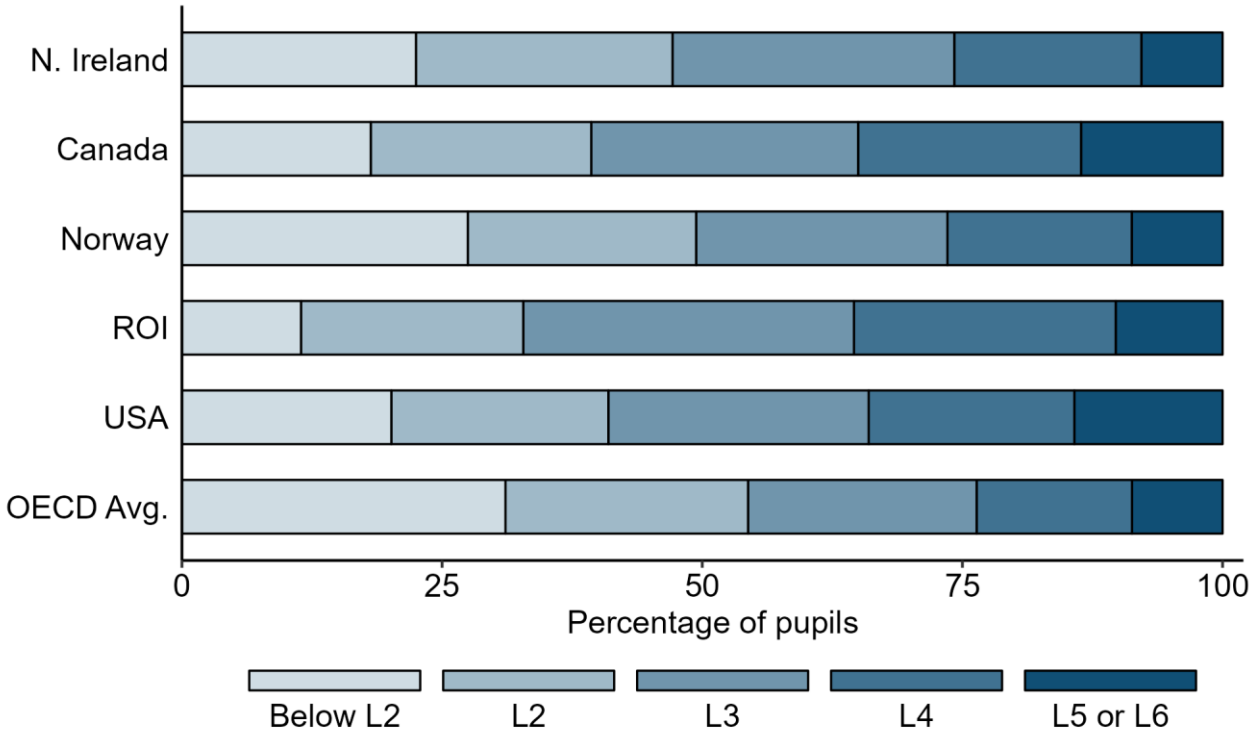
Source: OECD, PISA 2022

4.7 Performance across reading proficiency levels

Another way of assessing the spread of reading performance across the country is to look at the percentage of pupils performing at each of the PISA proficiency levels. These provide descriptors of how PISA scores in reading correspond with pupils' ability to understand, interpret, and critically evaluate texts (OECD, 2023a). Pupils who score below Level 2 are considered low performers and those who perform at Level 5 or above are considered top performers. Level 2 is considered the baseline level of proficiency in reading needed for pupils to participate fully in society.

Figure 4.5 provides an overview of the percentage of pupils in Northern Ireland who performed at each of the proficiency levels in reading in PISA 2022, compared to the percentage of pupils reaching each proficiency level on average across the OECD countries and the comparator countries.

Figure 4.5: Percentage of pupils performing at each reading proficiency level in Northern Ireland, comparator countries and on average across the OECD countries



Country	Below L2	L2	L3	L4	L5 or L6
Northern Ireland	22%	25%	27%	18%	8%
Canada	18%	21%	26%	21%	14%
Norway	27%	22%	24%	18%	9%
Republic of Ireland (ROI)	11%	21%	32%	25%	10%
United States (USA)	20%	21%	25%	20%	14%
OECD Average	26%	24%	25%	17%	7%

Base: All participating pupils.
Percentages may appear inconsistent due to rounding.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

In PISA 2022, the percentage of pupils in Northern Ireland reaching some reading proficiency levels deviated from the percentage of pupils on average across the OECD countries. The percentage of Northern Ireland's pupils who scored above the threshold for the Level 5 proficiency level (8%) was not statistically significantly different to that on average across the OECD countries (7%). At the other end of the distribution, Northern Ireland had a significantly smaller percentage of pupils who scored at the lowest proficiency levels (below Level 2), with 22% of the pupils in Northern Ireland scoring at these levels compared to 26% on average across the OECD countries.

Looking at the comparator countries, Northern Ireland had a lower percentage of pupils scoring at or above the threshold for the Level 5 proficiency level than Canada (14%), the Republic of Ireland (10%) and the United States (14%). At the other end of the distribution, the percentage of pupils scoring at the lowest proficiency levels in Northern Ireland was higher than in Canada (18%) and the Republic of Ireland (11%) but lower than in Norway (27%).

5 Science

5.1 Chapter overview

This chapter focuses on Northern Ireland's performance in the science domain of PISA 2022, and how this compares to the performance of other education systems and to Northern Ireland's performance in previous PISA studies. This chapter also looks at the range of pupils' science achievement in Northern Ireland, and the percentage of pupils in Northern Ireland who perform at the different PISA proficiency levels in science. Caution needs to be taken in interpreting these findings as some of the sampling standards for PISA 2022 were not met in Northern Ireland as described in Chapter 1.

5.2 Key findings

- Northern Ireland's average science score in 2022 was 488. This was not significantly different to the OECD average of 485. Northern Ireland's previous scores in science were significantly above the OECD average in both 2012 and 2015, and not significantly different to the OECD average in 2018.
- Northern Ireland's average score in science in 2022 was significantly higher than the scores of 49 other education systems, not significantly different to 14 systems, and significantly lower than the scores of 17 systems.
- Northern Ireland's average science score in 2022 was not significantly different to the score of 491 achieved in 2018. On average across the OECD countries, there was no significant change in average science score since 2018. Nine of the education systems who scored above 450 saw significant improvements in their science scores over this period, whereas 6 systems saw significant decreases and 22 saw no significant change.
- Over the 10-year period from 2012 to 2022, the performance of pupils in science has been in decline both in Northern Ireland and on average across the OECD countries. Northern Ireland's average science score has decreased significantly from 507 in 2012 to 488 in 2022, and the score on average across the OECD trend countries decreased significantly from 499 to 487 over the same period.
- The range in achievement between Northern Ireland's scores at the 10th and 90th percentiles increased significantly between 2018 (238 score points) and 2022 (262 score points). This was partly due to the cumulative effect of a non-significant increase in Northern Ireland's score at the 90th percentile, and a non-significant decrease in the score at the 10th percentile. The range of achievement in 2022 had returned to a similar magnitude as seen in 2012 (261 score points).

- The percentage of pupils in Northern Ireland classified as top performers (performing at Level 5 proficiency or above) was the same as the OECD average of 7%. Similarly, the percentage of low performers (performing below Level 2 proficiency) was similar in Northern Ireland to that across the OECD countries (23% in Northern Ireland compared to 24% across the OECD countries).

5.3 Introduction to science in PISA

The framework for assessing pupils' scientific literacy was revised in PISA 2015, when science was last the major domain in PISA. In the PISA science framework, three main competencies of scientific literacy are assessed:

- Explaining phenomena scientifically
- Evaluating and designing scientific enquiry
- Interpreting data and evidence scientifically

These competencies are assessed over three main content areas:

- Living systems (e.g., cells, organisms and human biology)
- Physical systems (e.g., matter, motion, and forces)
- Earth and space science systems (e.g., the history of the Earth, space, and the universe)

More information on the current PISA science framework and example science test items from previous PISA cycles can be found in the OECD PISA 2015 Science Framework. Unlike in the major domain of PISA 2022, mathematics, there are no subdomain scores for these different competency and content areas of the scientific literacy framework in PISA 2022. Instead, this chapter focuses on Northern Ireland's estimate of overall science performance, including trends over time and in relation to other education systems.

As Northern Ireland's school-level and pupil-level response rates did not meet some of the PISA sampling standards, caution is required when interpreting the analysis reported here. Particular caution should be taken when considering trends in performance over time and when making international comparisons. Canada, the Republic of Ireland, and the United States, which have been included as comparator countries, also did not meet some of the PISA sampling standards as well as some of the other OECD countries included in the OECD averages. For more information see Section 1.4.2.

5.4 Northern Ireland's performance in science

Northern Ireland's score in science in PISA 2022 was 488. This was significantly higher than the average science scores of 49 education systems, not significantly different to 13 education systems, and significantly lower than the average science scores of 17 education systems. Northern Ireland's average science score was also not significantly different to the OECD average science score of 485.

The education systems whose average scores were greater than 450 are shown with their average scores relative to Northern Ireland in Table 5.1. Not included in the table are the 41 education systems with scores less than or equal to 450.

Table 5.1: Science performance of education systems in PISA 2022 relative to Northern Ireland

Performance relative to Northern Ireland's score in science (488)	Education system and score
Education systems that scored significantly higher than Northern Ireland	Singapore (561), Japan (547), Macao (543), Taiwan (537), South Korea (528), Estonia (526), Hong Kong (520), Canada (515), Finland (511), Australia (507), New Zealand (504), Republic of Ireland (504), Switzerland (503), Slovenia (500), United States (499), Poland (499), Czech Republic (498)
Education systems that did not score significantly higher or lower than Northern Ireland	Latvia (494), Denmark (494), Sweden (494), Germany (492), Austria (491), Belgium (491), Netherlands (488), France (487), Hungary (486), OECD average (485), Spain (485), Lithuania (484), Portugal (484), Croatia (483)
Education systems that scored significantly lower than Northern Ireland	Norway (478), Italy (477), Turkey (476), Vietnam (472), Malta (466), Israel (465), Slovakia (462), Ukrainian regions (450)

Base: All education systems with average scores over 450 in science in PISA 2022.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Singapore was the highest performing education system in science in PISA 2022. The average score for Singapore of 561 was significantly higher than the score of every other participating education system. Japan, Macao, and Taiwan were the next highest performing systems, and all significantly outperformed the highest performing education system outside of East Asia, Estonia.

5.5 Science performance over time

Northern Ireland's science score of 488 in PISA 2022 was not significantly different to the score of 491 in 2018. On average across the OECD trend countries there was also no significant change in performance between 2018 (489) and 2022 (487).

Of the 71 education systems that participated in both PISA 2018 and PISA 2022, 18 systems saw significant improvement in their science scores over this period, with Kazakhstan and the Dominican Republic experiencing the greatest gains (+26 and +25 respectively). A total of 33 systems, including Northern Ireland, experienced no statistically significant change. The remaining 20 systems saw their average science score drop significantly from 2018, with Albania and North Macedonia experiencing the largest drops (-41 and -33 respectively).

Table 5.2 shows the science scores between PISA 2018 and PISA 2022 for the 36 higher performing education systems (including Northern Ireland) that participated in both cycles.

Table 5.2: Changes in science average scores between 2018 and 2022 for higher performing education systems

Trend in science performance	Education system and change in score
Scored significantly higher in science in PISA 2022 than in PISA 2018	Taiwan (+22), Japan (+17), Singapore (+10), Croatia (+10), Italy (+9), Malta (+9), Republic of Ireland (+8), Turkey (+8), Latvia (+7)
No statistically significant differences in science scores between PISA 2022 and PISA 2018	South Korea (+9), Switzerland (+7), Hungary (+5), Australia (+4), Hong Kong (+4), Israel (+3), Lithuania (+2), Austria (+1), Denmark (+1), Czech Republic (+1), Macao (+0), Slovakia (-2), OECD trend average (-2), Northern Ireland (-3), United States (-3), Canada (-3), Estonia (-4), New Zealand (-4), France (-6), Sweden (-6), Belgium (-6), Portugal (-7)
Scored significantly lower in science in PISA 2022 than in PISA 2018	Slovenia (-7), Germany (-11), Finland (-11), Norway (-12), Poland (-12), Netherlands (-15)

Base: All education systems with average scores over 450 in science in PISA 2022 that also participated in PISA 2018.
Change in science score (2022 score – 2018 score) presented in parenthesis.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Nine of these education systems scored significantly higher in science in 2022 than in 2018. By contrast, 6 education systems saw their overall science score significantly drop from 2018. The remaining 21 of these education systems experienced no statistically significant changes in their science score over this period.

The last time science was the major domain of study for PISA was back in 2015, and since then, 9 education systems have seen their average science score significantly improve. By contrast, 25 systems, including Northern Ireland, have seen their average science score significantly drop, with another 25 experiencing no significant change. The greatest gain has been experienced by Turkey (+50 score points), while the greatest drop has been seen in Albania (-51 score points).

Table 5.3 reports the changes in average science scores since PISA 2015 for the 37 higher performing education systems that participated both in 2015 and 2022. Of these, 7 education systems have experienced significant improvements over this period, while 14 education systems, including Northern Ireland, have experienced significant drops.

Table 5.3: Changes in overall average science score between 2015 and 2022 in higher performing education systems

Trend in science performance	Education system and change in score
Scored significantly higher in science in PISA 2022 than in PISA 2015	Turkey (+50), Macao (+15), South Korea (+12), Hungary (+9), Lithuania (+9), Croatia (+7), Singapore (+6)
No statistically significant differences in science scores between PISA 2022 and PISA 2015	Japan (+8), Taiwan (+5), Czech Republic (+5), Latvia (+4), United States (+3), Slovakia (+1), Republic of Ireland (+1), Malta (+1), Sweden (+0), Israel (-2), Poland (-2), Hong Kong (-3), Switzerland (-3), Australia (-3), Italy (-3), Austria (-4)
Scored significantly lower in science in PISA 2022 than in PISA 2015	France (-8), Denmark (-8), Spain (-8), Estonia (-8), New Zealand (-9), Belgium (-11), Northern Ireland (-12), Canada (-13), Slovenia (-13), Germany (-17), Portugal (-17), Finland (-20) Norway (-20), Netherlands (-20)

Base: All education systems with average scores over 450 in science in PISA 2022 that also participated in PISA 2015.
Change in science score (2022 score – 2015 score) presented in parenthesis.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Most of the high performing education systems that have experienced significant drops in performance over this period were OECD countries in Western Europe. In the remaining 16 education systems, there were no significant differences in their average science scores in 2015 and 2022.

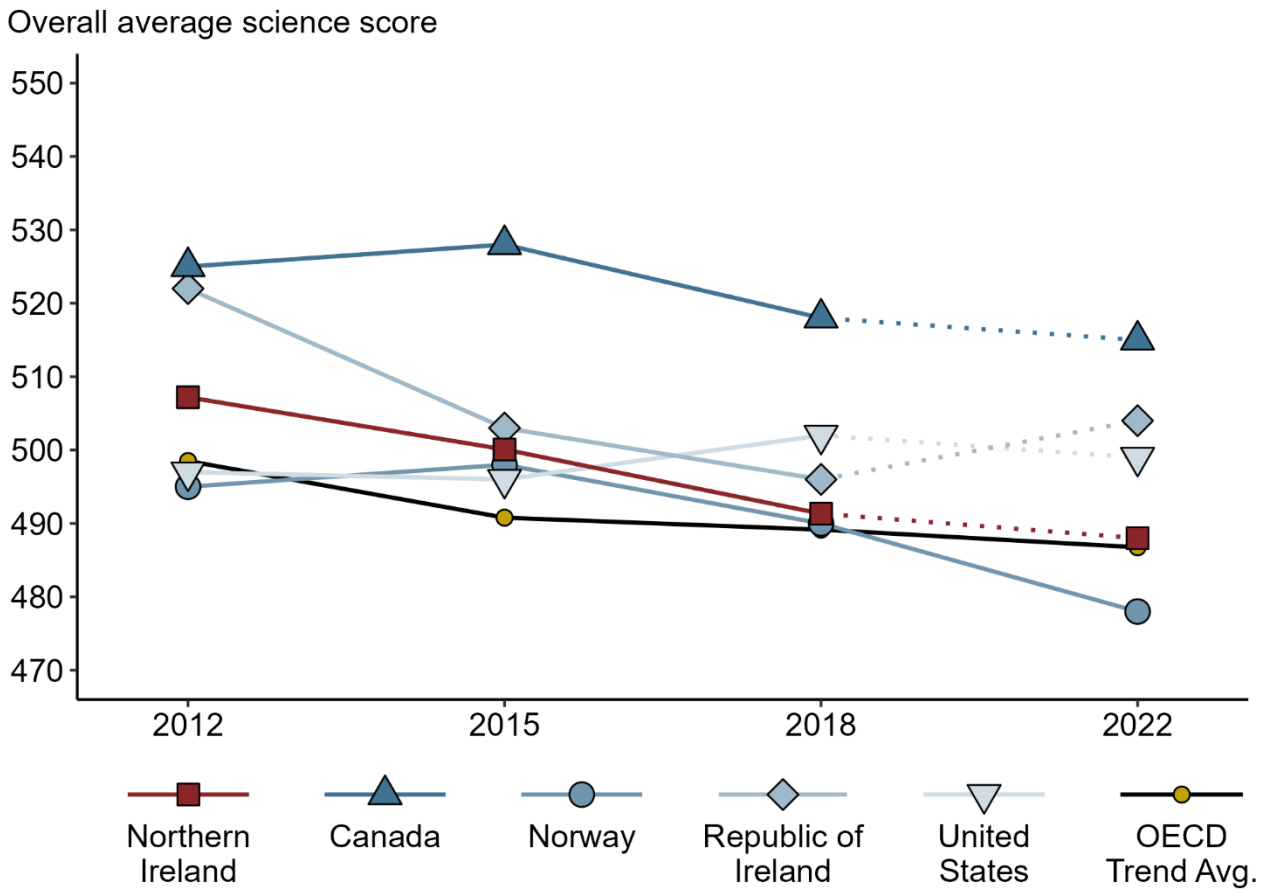
Figure 5.1 presents Northern Ireland's average performance in science over the last 4 cycles of PISA relative to the comparator countries and to the OECD trend average. Northern Ireland's average science score of 488 in PISA 2022 was significantly lower than the scores in 2012 (507) and 2015 (500), and not significantly different to the score in 2018 (491). This pattern in science performance was also seen on average across OECD trend countries. The OECD trend average score of 487 in 2022 was significantly lower than the averages in 2012 (499) and 2015 (491), but not significantly different to the average in 2018 (489).

Of the comparator countries, Canada and the United States, like Northern Ireland, experienced no significant change in their average science score between PISA 2018 and 2022. In Norway, the average score in 2022 (478) was significantly below their score in 2018 (490), while the Republic of Ireland's average score in 2022 (504) was significantly above their average score in 2018 (496).

Over the ten years since PISA 2012, as in Northern Ireland, average science scores have declined significantly in the comparator countries of Norway and the Republic of Ireland. In Norway, the average score in 2012 (495) was significantly above the score in 2022 (478) and the Republic of Ireland's average score in 2012 (522) was significantly above their score in 2022 (504). Average science scores in Canada and the United States did not change significantly between 2012 and 2022.

Canada, the Republic of Ireland, and the United States have continued to score significantly above the OECD trend average in PISA 2022, as they had done in all previous cycles since 2012. Northern Ireland performed significantly above the OECD trend average in science in 2012 and 2015. However, in 2022 Northern Ireland's score was similar to the OECD trend average (488 and 487 respectively).

Figure 5.1: Trends in science performance in Northern Ireland, comparator countries, and on average across OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	* 507	* 500	491	488
Canada	525	* 528	518	515
Norway	* 495	* 498	* 490	478
Republic of Ireland	* 522	503	* 496	504
United States	497	496	502	499
OECD Trend Average	* 499	* 491	489	487

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.

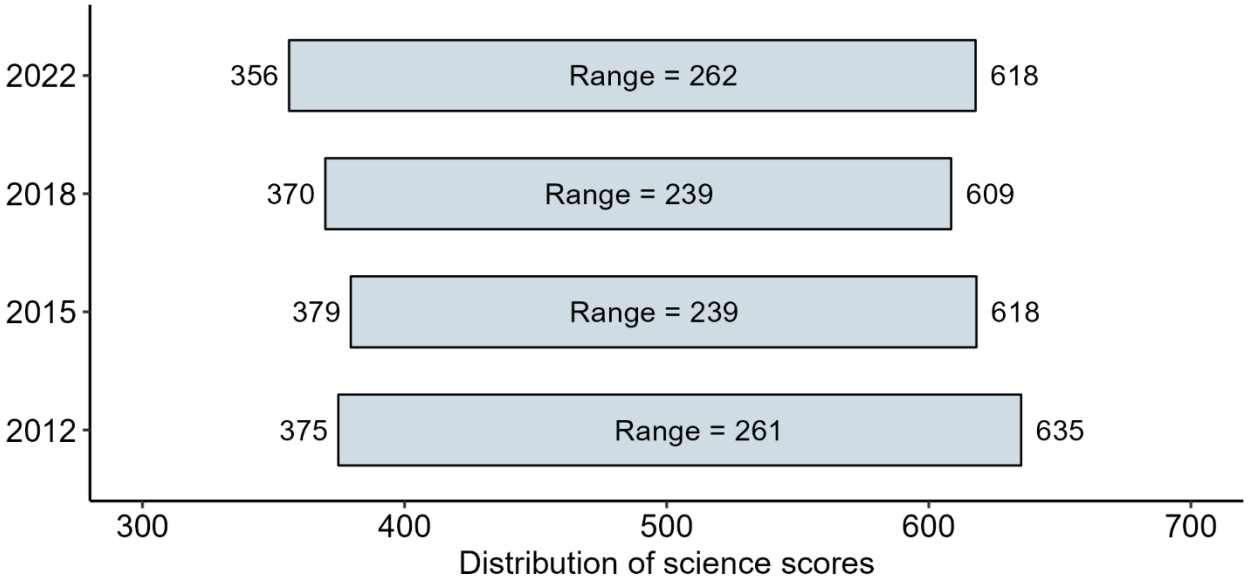
Source: OECD, PISA 2022

5.6 Differences between the highest and lowest performing pupils in science

In this section, we look at the range of pupils' performance in science by discussing Northern Ireland's scores at the 90th and 10th percentiles. The 90th percentile is the score above which the highest performing 10% of pupils obtain, while the 10th percentile is the score below which the lowest performing 10% of pupils obtain. The difference between the score at the 90th and 10th percentiles is a better measure of the spread of scores for comparing education systems than using the very highest and lowest performing pupils, as the latter comparison may be affected by a small number of pupils with unusually high or low scores. There needs to be particular caution in interpreting the scores of the highest and lowest performing pupils as the non-response bias analysis suggests that lower performing pupils may be under-represented in the Northern Ireland sample for PISA 2022.

Figure 5.2 summarises Northern Ireland's scores in science at the 90th and 10th percentiles across the past 4 cycles of PISA and reports the range between these percentiles (calculated as the 90th percentile score minus the 10th percentile score). Since 2018, there has been a statistically significant widening in the distribution of science scores in Northern Ireland, with the range in achievement between the 10th and 90th percentile returning to a similar range as observed in 2012. This increase in the range from 238 points in 2018 to 262 points in 2022 was driven by both a decrease of 14 points at the 10th percentile, and an increase of 9 points at the 90th percentile. It is important to note that neither of the individual changes at the 10th or 90th percentiles were statistically significant, but cumulatively produce a statistically significant widening of the range in achievement in Northern Ireland. Additionally, while the size of the range in achievement in Northern Ireland in PISA 2022 (262) and PISA 2012 (261) were not significantly different to one another.

Figure 5.2: Distribution of Northern Ireland's PISA science scores across cycles



PISA cycle	10th percentile	90th percentile	Range
2022	356	618	262
2018	370	609	239
2015	379	618	239
2012	375	635	261

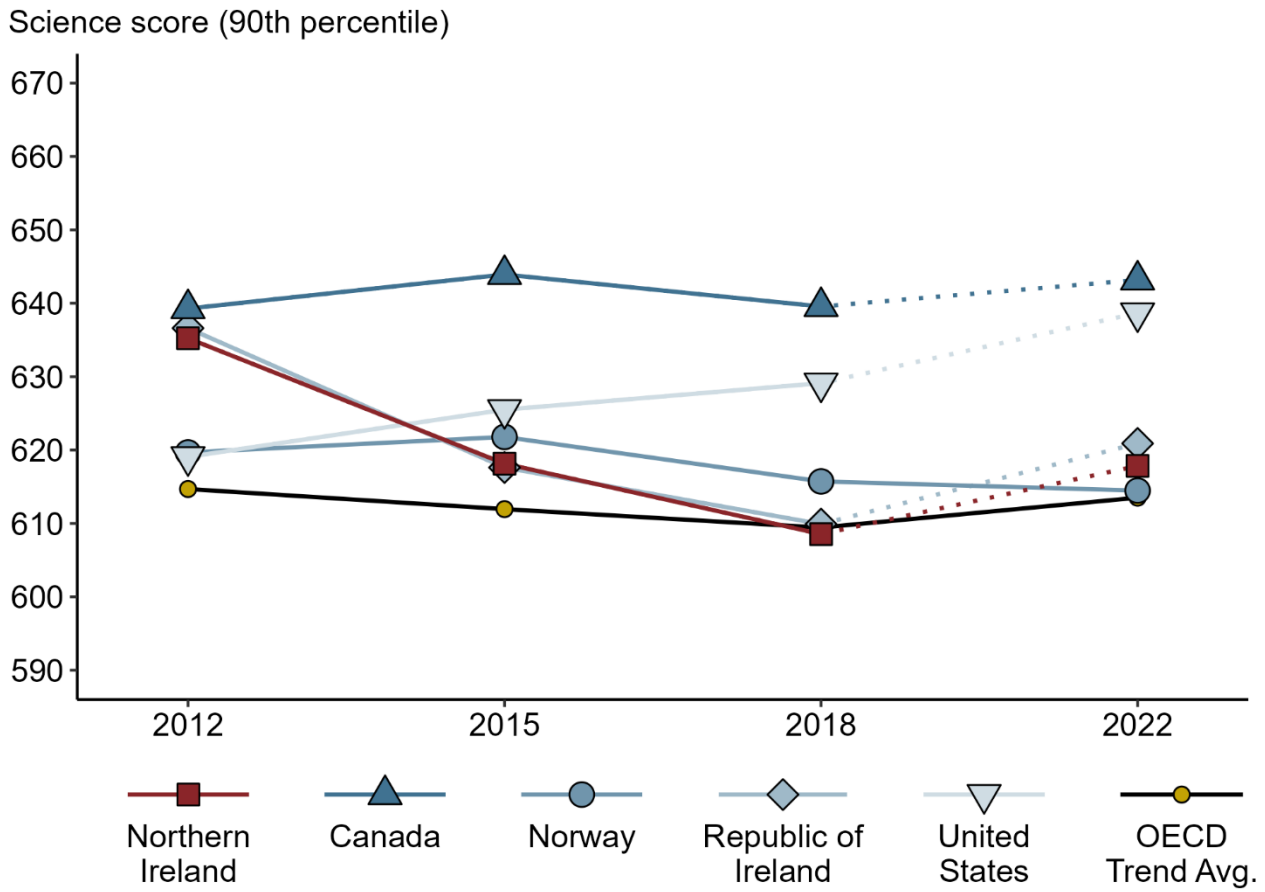
Base: All participating pupils.

Ranges calculated as 90th percentile – 10th percentile. Ranges may appear inconsistent with percentile scores due to rounding.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

Figure 5.3 and Figure 5.4 focus on science scores at the 90th and 10th percentiles respectively, in the comparator countries and on average across OECD trend countries over the last 4 PISA cycles. Northern Ireland's score at the 90th percentile in 2022 (618), was significantly lower than the score at the 90th percentile in 2012 (635) and was not significantly different from either the score in 2015 (618) or 2018 (609).

Figure 5.3: Trends in science performance at the 90th percentile for Northern Ireland, comparator countries and on average across OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	* 635	618	608	618
Canada	639	644	640	643
Norway	620	622	616	614
Republic of Ireland	* 637	618	* 610	621
United States	* 619	* 626	629	639
OECD Trend Average	615	612	609	614

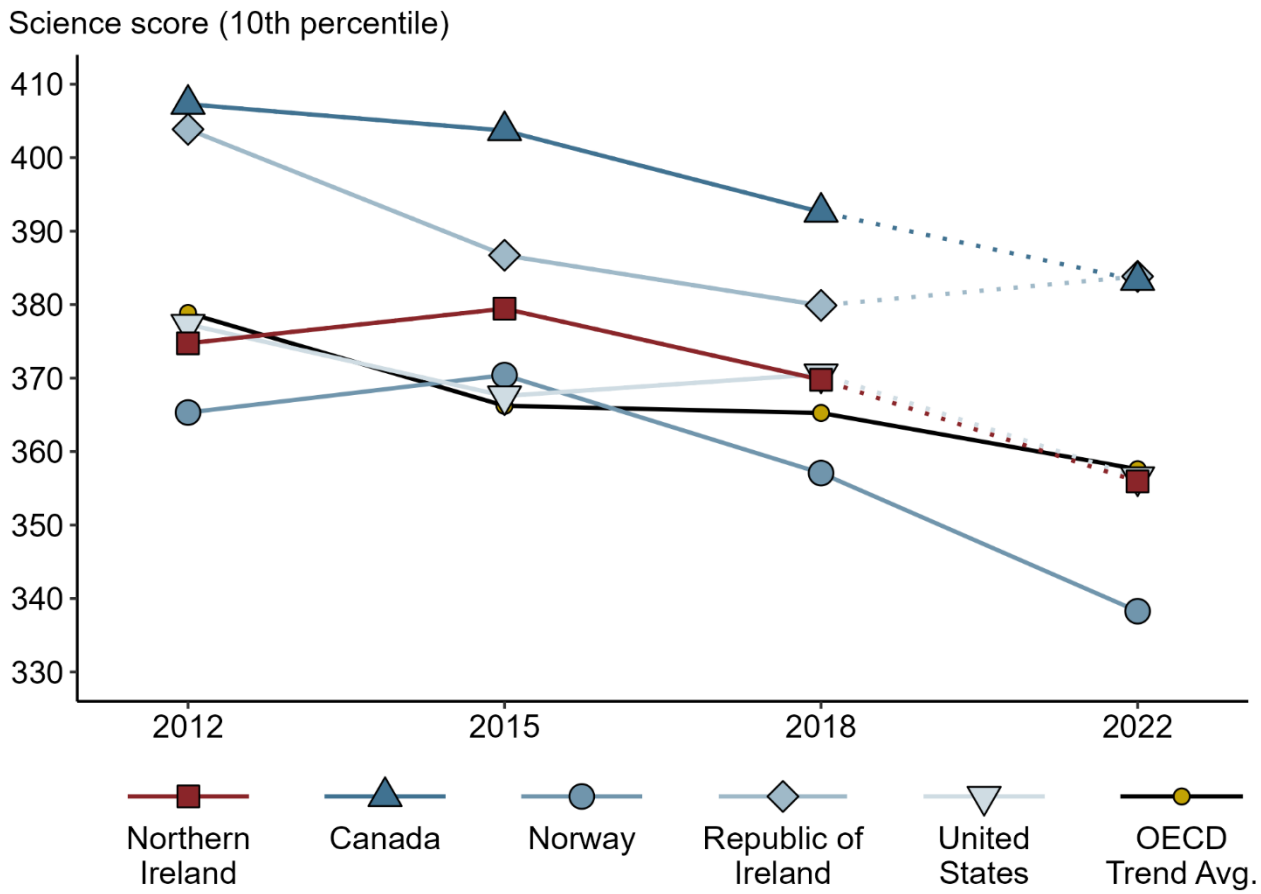
Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.

Source: OECD, PISA 2022

Figure 5.4 shows that Northern Ireland's score at the 10th percentile in 2022 (356) was not significantly different to the score at this percentile in 2018 (370) and was significantly lower than in 2012 (375) and 2015 (379). At both the 10th and 90th percentile, Northern

Ireland's score did not differ significantly from the OECD trend average in all PISA cycles since 2012.

Figure 5.4: Trends in science performance at the 10th percentile for Northern Ireland, comparator countries and on average across OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	* 375	* 379	370	356
Canada	* 407	* 404	* 393	383
Norway	* 365	* 370	* 357	338
Republic of Ireland	* 404	387	380	384
United States	* 377	368	371	357
OECD Trend Average	* 379	* 366	* 365	356

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.

Source: OECD, PISA 2022

Canada and Norway have not experienced any significant changes in their scores at the 90th percentile since 2012, and both scored significantly lower at the 10th percentile in 2022 than in their 3 previous participations. Norway's score at the 90th percentile was not significantly different to the OECD trend average, and significantly lower than the OECD trend average at the 10th percentile in each PISA cycle since 2012. Canada meanwhile has scored significantly higher than the OECD trend average at both percentiles in each PISA cycle since 2012.

The Republic of Ireland's scores in 2022 at both the 10th and 90th percentiles were significantly lower than their scores at these percentiles in 2012, while significantly higher than in 2018 at the 90th percentile and not significantly different at the 10th percentile. Although the scores at the percentiles have shown significant changes the Republic of Ireland has maintained a stable range of science achievement between the 10th and 90th percentiles between 2012 and 2022.

While there has not been a significant change in the average score of the United States since 2012, there has been a large, significant widening of the range in achievement, due to both a significant 21 point reduction in scores at the 10th percentile and a significant 20 point increase in scores at the 90th percentile. More recently between 2018 and 2022 neither of the scores at these percentiles changed significantly. However, the cumulative effect of a non-significant 14 point decrease at the 10th percentile, and a non significant 10 point increase at the 90th percentile, was a statistically significant increase in the range of science achievement.

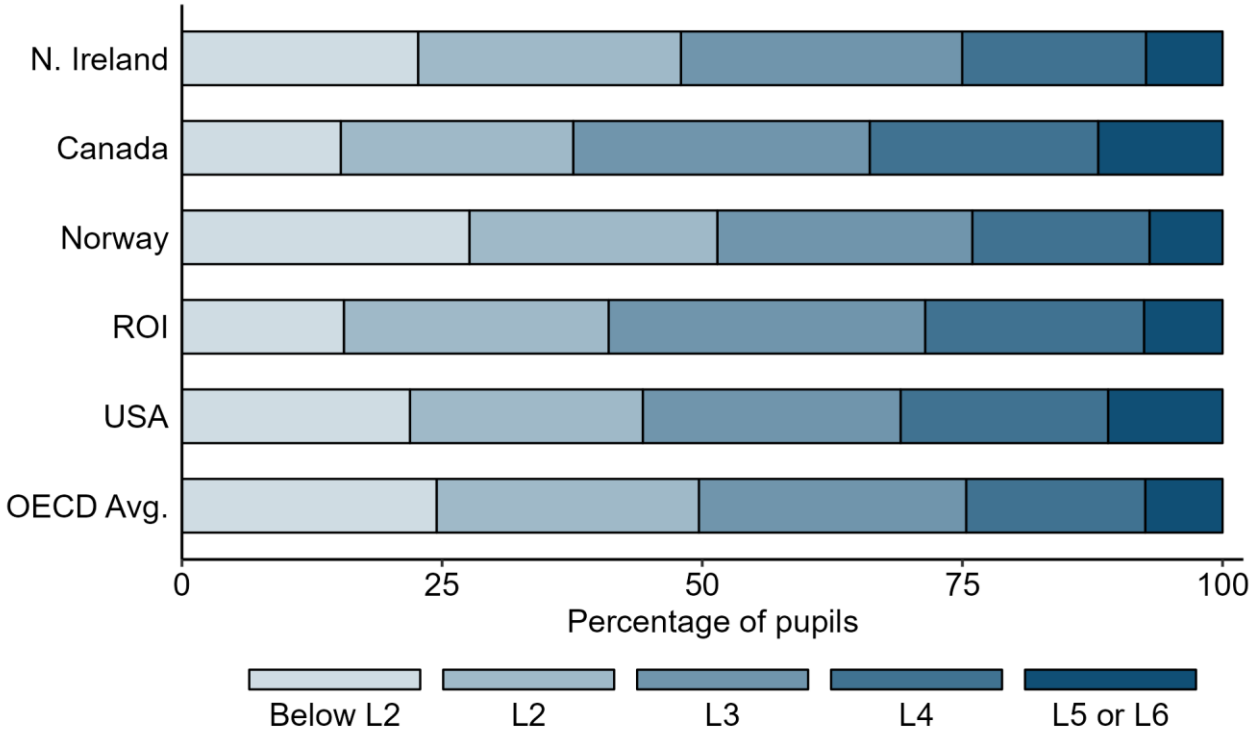
5.7 Science performance at PISA proficiency levels

Another way of assessing the spread of performance across an education system is to look at the percentage of pupils performing at each of the PISA proficiency levels. These provide descriptors of how PISA scores in science correspond with pupils' skills, knowledge and proficiencies. The OECD defines low performers in science as those who score below Level 2 and top performers as those scoring at or above Level 5. As in the case of mathematics and reading, Level 2 in science is defined as the benchmark at which pupils begin to demonstrate the science skills necessary for full participation in society and are able to engage in reasoned discourse about science and technology (OECD, 2023a). Pupils performing at Level 5 or above meanwhile are able to apply their wide skill and knowledge about science to answering a broad range of questions across many different contexts and evaluate the limitations of different sources of scientific information (OECD, 2023a).

Figure 5.5 provides an overview of the percentage of pupils in Northern Ireland who performed at each of the proficiency levels in science in PISA 2022, compared to the

percentage of pupils reaching each proficiency level on average across the OECD countries.

Figure 5.5: Percentage of pupils in Northern Ireland, comparator countries and on average across the OECD countries performing at each PISA science proficiency level in PISA 2022



Country	Below L2	L2	L3	L4	L5 or L6
Northern Ireland	23%	25%	27%	18%	7%
Canada	15%	22%	28%	22%	12%
Norway	28%	24%	25%	17%	7%
Republic of Ireland (ROI)	16%	25%	30%	21%	8%
United States (USA)	22%	22%	25%	20%	11%
OECD Average	24%	25%	26%	17%	7%

Base: All participating pupils.
Percentages may appear inconsistent due to rounding.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Approximately 7% of pupils in Northern Ireland scored at or above Level 5. This was the same as the OECD average. Similarly, the percentage of pupils in Northern Ireland scoring below Level 2 (23%) was not significantly different to the percentage of pupils scoring below this level on average across the OECD countries (24%). Canada and the

Republic of Ireland had significantly smaller percentages of pupils who scored below Level 2, 15% and 16% respectively, than Northern Ireland (23%) and the other comparator countries. The United States and Canada had significantly larger percentages of top performing pupils, 11% and 12% respectively, than the other comparator countries and Northern Ireland.

6 Performance by pupil characteristics

6.1 Chapter overview

In this chapter we explore differences in pupils' PISA scores in mathematics according to specific characteristics: gender, socioeconomic status, immigrant background, and the language spoken at home. Caution needs to be taken in interpreting these findings as some of the sampling standards for PISA 2022 were not met in Northern Ireland as described in section 1.4.2.

6.2 Key findings

- In Northern Ireland boys performed significantly higher than girls in mathematics by 12 score points. In 2018, 2015 and 2012 there was no significant difference in boys' and girls' performance in mathematics.
- On average across the OECD countries, boys performed significantly higher than girls in mathematics by 9 score points. In the vast majority of higher performing education systems[15], boys scored significantly higher than girls in mathematics.
- There was no significant difference between the score at the 10th percentile for girls (355) and the score at the 10th percentile for boys (353) in mathematics in Northern Ireland. However, the difference of 22 score points between boys' and girls' scores at the 90th percentile (607 and 585 respectively) was significant.
- In Northern Ireland, a significantly larger percentage of boys achieved the highest proficiency levels in mathematics (10%) compared with the percentage of girls (6%). There was no significant difference in the percentage of boys (27%) and the percentage of girls (30%) performing below the baseline proficiency level in mathematics.
- In Northern Ireland, boys had a significantly higher average score than girls in the quantity and space and shape mathematics content subdomains and in the mathematical reasoning, formulating and employing process subdomains. There were no significant differences between the performance of boys and girls in the change and relationships and uncertainty and data content subdomains or in the interpreting process subdomain.
- In Northern Ireland, girls performed significantly higher than boys in reading by 18 score points. The average score for girls was 494 and 476 for boys. The gender difference in average scores was not significantly different to that of the OECD average.

[15] Those education systems with an average mathematics score of over 450 score points.

- In Northern Ireland, the gender difference in reading in PISA 2022 was not significantly different from the gender difference in 2018, 2015 and 2012.
- In Northern Ireland in science, there was no significant difference in the average performance of girls and boys. Girls had an average score of 485 compared to an average of 492 for boys. Since 2012 the only significant gender difference in science performance was in 2018 when girls outperformed boys by 17 score points.
- Northern Ireland's average score on the ESCS Index was +0.15 indicating that on average, pupils in Northern Ireland had a higher socioeconomic status than the average across the OECD countries (0).
- The difference in mathematics performance associated with a one-unit increase in ESCS was significantly smaller in Northern Ireland (36 score points) than on average across the OECD countries (39 score points). The difference in reading performance was 35 score points in Northern Ireland and the difference in science performance was 38 score points. On average across the OECD countries these scores were 39 score points for reading and 41 score points for science.
- In each PISA subject domain, the most disadvantaged quarter of pupils scored significantly below the least disadvantaged quarter of pupils in Northern Ireland. In mathematics this difference was 81 score points, in reading this difference was 78 score points and in science it was 86 score points.
- The percentage of the variance in mathematics and science performance in Northern Ireland that could be explained by socioeconomic status was 12%, while in reading it was 9%. On average across the OECD countries 15% of the variance in mathematics performance, 13% of the variance in reading performance and 14% of the variance in science performance could be explained by socioeconomic status.
- In Northern Ireland, 12% of pupils were academically resilient in mathematics and 13% were academically resilient in reading and in science. On average across the OECD countries, 10% of pupils were academically resilient in mathematics while 11% were academically resilient in reading and science.
- There were no significant differences in the average mathematics performance of pupils who spoke a language other than English at home (461) and pupils who spoke English at home (479). Pupils who spoke a language other than English at home on average scored significantly lower in the reading (467) and science (472) than pupils who spoke English at home (490 and 492 respectively).

6.3 Gender

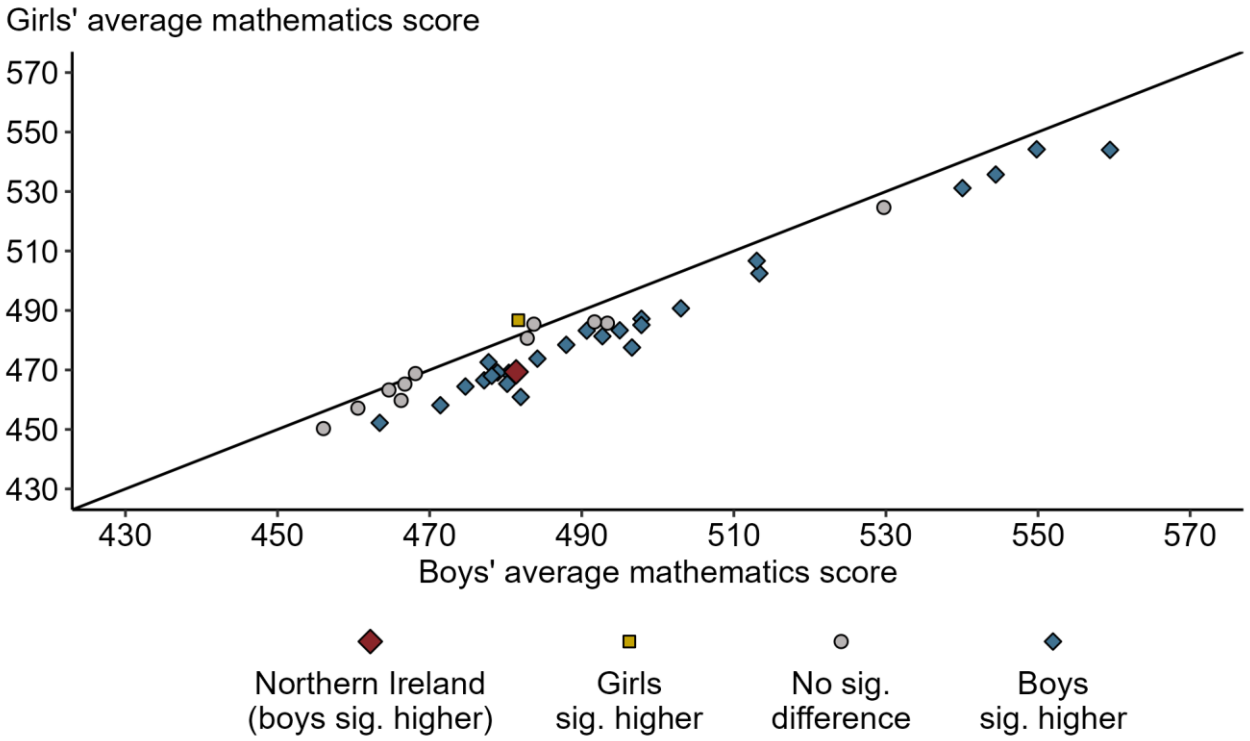
6.3.1 Mathematics

In Northern Ireland, boys scored significantly higher in mathematics than girls. Boys achieved an average score of 481, while girls achieved an average score of 469. In 2018, 2015 and 2012 there was no significant difference between boys' and girls' performance in mathematics.

On average across the OECD countries boys performed significantly higher than girls by 9 score points, with an average score of 477 for boys and 468 for girls. The gender gap in performance in Northern Ireland favouring boys (12 score points) was not statistically significantly different from the average gap in performance across the OECD countries (9 score points).

Boys performed significantly higher than girls in the majority of higher performing education systems (those with average mathematics scores over 450 score points) as shown in Figure 6.1. The diagonal line on the figure shows where girls and boys scores were the same. Education systems in which girls scored significantly higher than boys in mathematics are shown in yellow above the line, while systems where boys scored significantly higher than girls are shown in blue below the line. Girls scored significantly higher than boys in just 1 education system, Finland. In 12 education systems, there were no significant differences between the average score in mathematics for girls and boys, and in 25 education systems, including Northern Ireland, boys outperformed girls.

Figure 6.1: Average mathematics scores of boys and girls across education systems



Type of gender gap	Education system and gender gap size
Education systems in which girls scored significantly higher than boys in mathematics (represented by yellow squares)	Finland (+5)
Education systems without statistically significant gender gaps in mathematics (represented by grey circles)	Slovenia (+2), Norway (+1), Slovakia (-1), Malta (-1), Sweden (-2), Iceland (-3), South Korea (-5), Poland (-6), Turkey (-6), Croatia (-6), Belgium (-8)
Education systems in which boys scored significantly higher than girls in mathematics (represented by blue diamonds)	Lithuania (-5), Estonia (-6), Czech Republic (-7), Hong Kong (-9), Japan (-9), OECD average (-9), Latvia (-10), France (-10), Spain (-10), New Zealand (-10), Vietnam (-10), Netherlands (-11), Switzerland (-11), Israel (-11), Australia (-11), Germany (-11), Denmark (-11), Northern Ireland (-12), Singapore (-12), Canada (-12), Republic of Ireland (-13), United States (-13), Hungary (-15), Macao (-15), Austria (-19), Italy (-21)

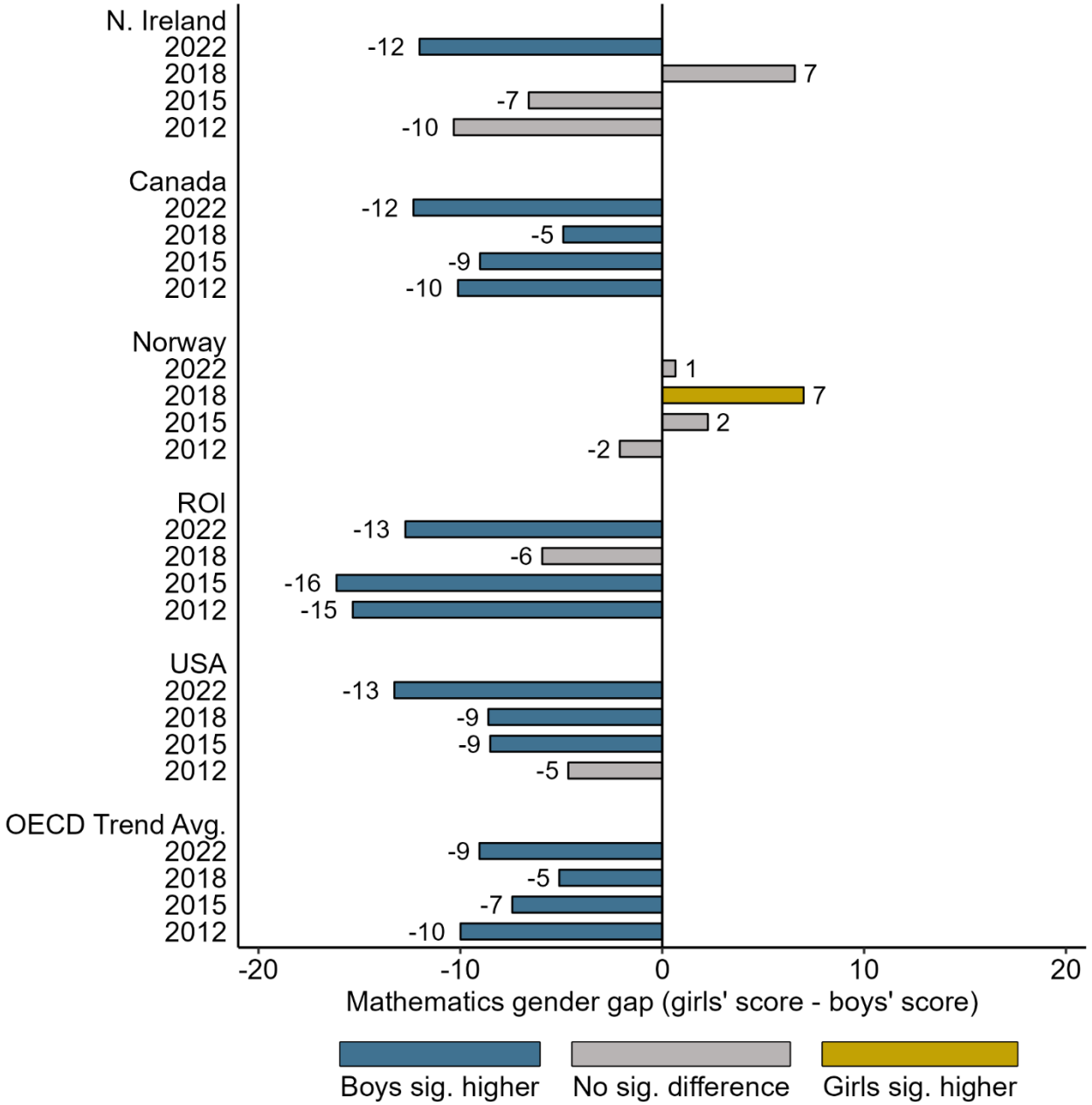
Base: All education systems with average scores over 450 in mathematics in PISA 2022.
Gender gaps calculated as girls' science score – boys' mathematics score and reported in parenthesis.

Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Figure 6.2 meanwhile shows the gender gap in Northern Ireland, comparator countries and on average across OECD trend countries since 2012. On average across the OECD trend countries in previous cycles, boys have consistently outperformed girls in mathematics. This has also been the case in Canada, and in all but one cycle for the Republic of Ireland (not significant in 2018) and the United States (not significant in 2012). By contrast, Northern Ireland has bucked the previous trend over the past 3 PISA cycles, with boys significantly outscoring girls for the first time over this period and representing a 19 point swing in the gender gap. Of the comparator countries, Norway was the only one to have a previous case of girls outperforming boys in mathematics, as observed in 2018. However, in 2022, no significant difference in the mathematics scores of girls and boys in Norway was found.

Figure 6.2: Gender differences in mathematics scores in Northern Ireland, comparator countries and on average across the OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	-10	* -7	7	* -12
Canada	* -10	* -9	* -5	* -12
Norway	-2	2	* 7	1
Republic of Ireland	* -15	* -16	-6	* -13
United States	-5	* -9	* -9	* -13
OECD Trend Average	* -10	* -7	* -5	* -9

Base: all participating education systems.
Gender gaps calculated as girls' mathematics score – boys' mathematics score. OECD trend averages

calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain. Asterisks (*) in the table indicate that the gender gap shown represents a statistically significant difference in that year. Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

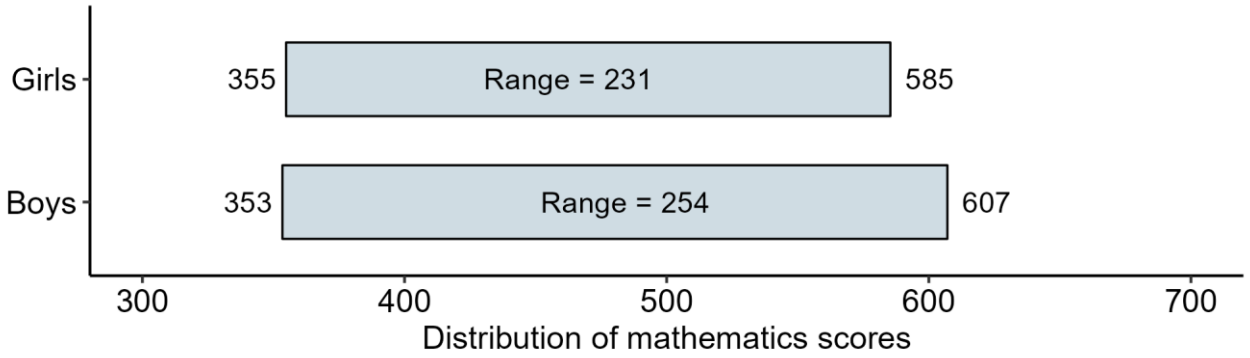
Source: OECD, PISA 2022

6.3.2 Gender differences in the ranges of performance between the highest and lowest performing pupils in mathematics

There are two ways to look at the differences between the highest and lowest performing pupils. One way is to look at the score at the 90th percentile, which is the score above which the highest 10% of pupils within Northern Ireland perform, and the score at the 10th percentile, which is the score below which the lowest 10% of pupils within Northern Ireland perform. Another way is to look at the PISA proficiency levels for mathematics, specifically the percentage of pupils in Northern Ireland performing at the highest levels, Levels 5 and 6, and the percentage of pupils performing below the OECD's baseline threshold of Level 2. In this section, we consider both of these in relation to the differences between girls' and boys' performance.

In Northern Ireland, the mathematics score at the 10th percentile for girls (355) was not significantly different from the score at the 10th percentile for boys (353). However, the mathematics score at the 90th percentile for girls of 585 was significantly below the score of 607 for boys. The size of this gender gap at the 90th percentile in Northern Ireland (22 score points) was the same as the average gap across the OECD countries with a girls' score at the 90th percentile score of 579 and boys' score of 600, after allowing for the rounding of the figures. The distribution of girls' and boys' performance in mathematics in Northern Ireland is shown in Figure 6.3.

Figure 6.3: Performance of girls and boys at the 90th and 10th percentiles in mathematics



Gender	10th percentile	90th percentile	Range
Girls	355	585	231
Boys	353	607	254

Base: All participating pupils in Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met. Some results may appear inconsistent due to rounding.

Source: OECD, PISA 2022

At the 90th percentile, the gender gap in performance in the United States was 32 score points, in the Republic of Ireland it was 25 score points, and in Norway it was 17 score points, with boys significantly outperforming girls in each country. At the 10th percentile, the gender gap was 5 score points in Canada, 3 score points in the United States and in the Republic of Ireland it was 2 score points but these gaps in performance were not statistically significant. In contrast, in Norway, the gender gap at the 10th percentile was 19 score points with girls significantly outperforming boys.

In Northern Ireland, significantly more boys (10%) than girls (6%) were performing at the highest proficiency levels (Levels 5 and 6) in mathematics. In contrast, there was no significant difference between the percentage of boys (27%) and the percentage of girls (30%) performing below the baseline proficiency level (Level 2). These gender differences were not significantly different from the averages across the OECD countries. Significantly more boys (11%) than girls (7%) on average across the OECD countries performed at the highest proficiency levels. The gender gap at the lowest proficiency levels was not significant on average across the OECD countries with 32% of girls and 31% of boys achieving below the baseline level.

In the United States and in the Republic of Ireland, 5% of girls and 10% of boys performed at the highest proficiency levels. In Norway it was 5% of girls and 8% of boys, and in Canada it was 10% of girls and 15% of boys performing these highest proficiency levels. In each of these comparator countries the gender gap at these highest proficiency levels was statistically significant, with a larger percentage of boys achieving the highest

proficiency levels than girls. In the United States, the Republic of Ireland and Canada there was no significant difference in the percentage of girls (35%, 20% and 22% respectively) and the percentage of boys (33%, 19% and 21% respectively) performing below the baseline level. In contrast, in Norway a significantly larger percentage of boys (33%) performed below the baseline level than girls (30%).

6.3.3 Mathematics subdomains

Table 6.1 shows the average score for girls and boys, in Northern Ireland, and the difference between these scores, across all of the mathematics process and content subscales. The difference between the average score for boys and for girls was statistically significant, favouring boys, in all subscales except for the change and relationships, uncertainty and data, and interpreting subscales where there were no significant differences in the performance of girls and boys in Northern Ireland.

Table 6.1: Average mathematics scores of boys and girls in Northern Ireland

Scale	Girls' average score	Boys' average score	Score difference
Mathematics (overall)	469	481	* -12
Change and relationships	470	480	-10
Quantity	472	484	* -12
Space and shape	452	470	* -18
Uncertainty and data	477	487	-11
Employing	468	485	* -17
Formulating	463	479	* -16
Interpreting	477	481	-4
Mathematical reasoning	467	483	* -16

Base: All participating pupils in Northern Ireland.
Score difference calculated as average girls' score – average boys' score. Some results may appear inconsistent due to rounding. Asterisks (*) in the table indicate that the gender gap shown represents a statistically significant difference. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

On average across the OECD countries boys significantly outperformed girls in each of the subdomains as shown in Table 6.2. For the content subdomains, the gender gaps were 12 score points in space and shape, 11 score points in quantity, 8 score points in change and relationships and 7 score points in uncertainty and data. For the process subdomains, the gender gaps were 15 score points in formulating, 10 score points in employing, 9 score points in mathematical reasoning and 5 score points in interpreting.

Table 6.2: Average mathematics scores of boys and girls on average across the OECD countries

Scale	Girls' average score	Boys' average score	Score difference
Mathematics overall	468	477	* -9
Change and relationships	466	474	* -8
Quantity	467	478	* -11
Space and shape	464	477	* -12
Uncertainty and data	470	477	* -7
Formulating	461	476	* -15
Employing	467	477	* -10
Interpreting	472	477	* -5
Mathematical reasoning	468	477	* -9

Base: All participating pupils.
Score difference calculated as girls' average score – boys' average score. Some results may appear inconsistent due to rounding. Asterisks (*) in the table indicate that the gender gap shown represents a statistically significant difference. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

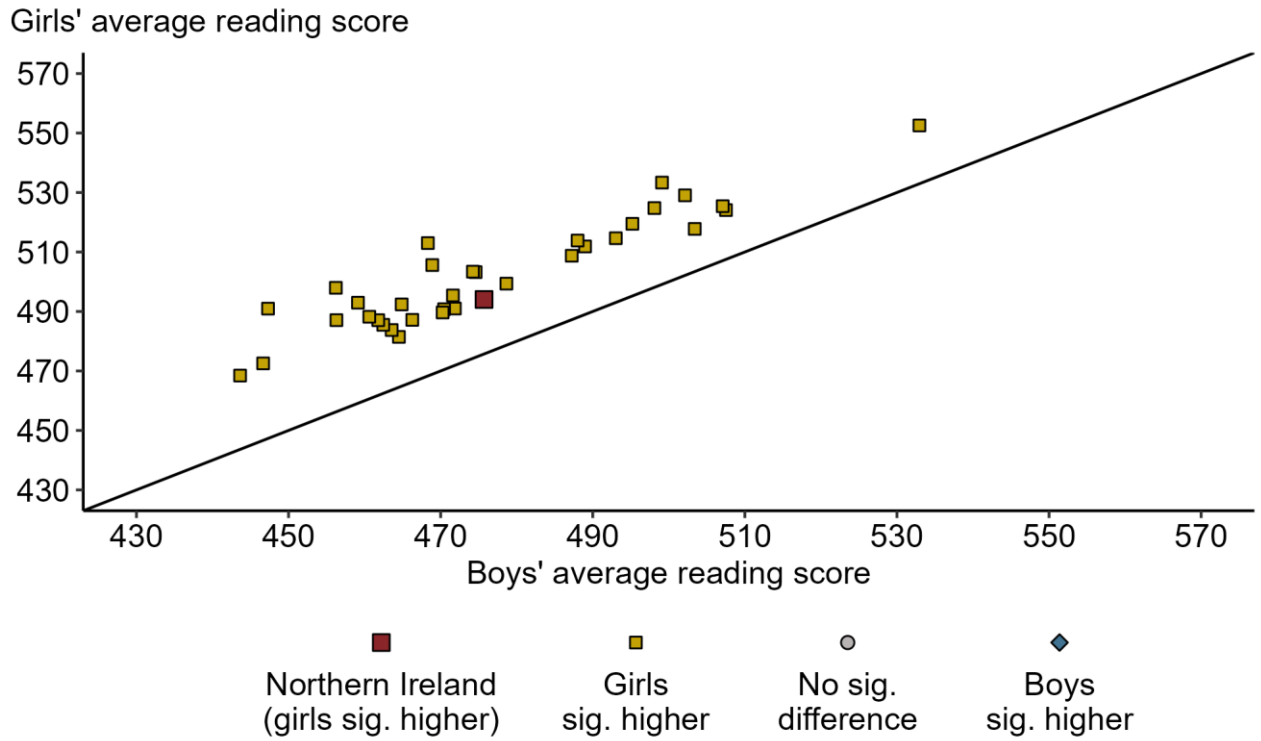
Source: OECD, PISA 2022

6.3.4 Reading

In PISA 2022, girls in Northern Ireland had an average score for reading of 494, compared to an average score of 476 for boys. This 18 score point difference represents a statistically significant difference in performance. On average across the OECD countries girls (488) also scored significantly higher than boys (464). The gender difference in reading in Northern Ireland (18 score points) was not significantly different to the OECD average (24 score points).

Figure 6.4 shows the reading performance of girls and boys in every participating education system with a mean score above 450 in PISA 2022. The diagonal line on the figure shows the point where girls and boys scored equally well. Education systems in which girls scored significantly higher than boys in reading are shown in yellow above the line. Out of 80 education systems that participated in PISA 2022, including Northern Ireland, there were 78 education systems where girls scored significantly higher than boys. There were no systems in which boys scored significantly higher than girls, and only two education systems (Chile and Costa Rica, both lower performing) in which there was no significant difference in the average reading scores of girls and boys.

Figure 6.4: Reading performance of girls and boys in PISA 2022



Type of gender gap	Education system and gender gap size
Education systems in which girls scored significantly higher than boys in reading – represented by yellow squares	Finland (+45), Slovenia (+44), Norway (+42), Sweden (+37), South Korea (+34), Croatia (+34), Lithuania (+31), Czech Republic (+29), Poland (+29), Latvia (+28), Belgium (+28), Taiwan (+27), Estonia (+27), Netherlands (+26), New Zealand (+26), Spain (+25), Turkey (+25), Canada (+24), OECD average (+24), Switzerland (+24), Israel (+23), Hong Kong (+23), United States (+22), Australia (+22), Portugal (+21), Denmark (+21), Austria (+20), France (+20), Singapore (+20), Germany (+19), Italy (+19), Northern Ireland (+18), Republic of Ireland (+18), Hungary (+17), Japan (+17), Macao (+14)

Base: All education systems with mean scores over 450 in reading in PISA 2022.
Gender gaps calculated as girls' reading score – boys' reading score and reported in parenthesis.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

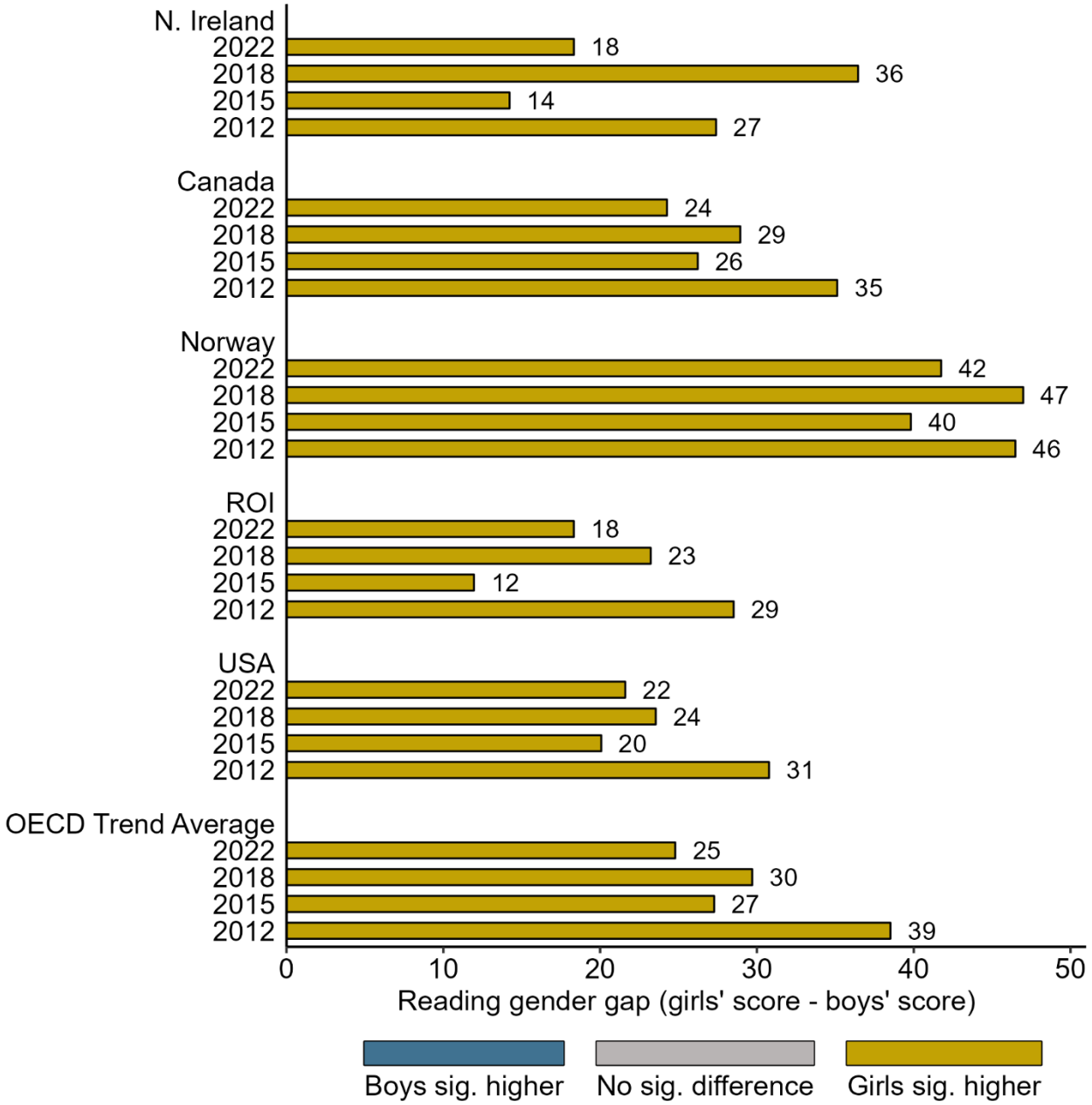
Source: OECD, PISA 2022

Figure 6.5 shows the trends in the gender gaps of Northern Ireland, the comparator countries and on average across OECD trend countries since the 2012 cycle of PISA. Northern Ireland has had a significant gender gap in reading favouring girls in each cycle,

and the size of this gap in 2022 (+18) was not significantly different to the size of the gaps in 2018 (+36), 2015 (+14) and 2012 (+27).

A gender gap favouring girls was also seen on average across the OECD countries in each cycle and the size of the gap in 2022 (+24) was also not significantly different to the size of the gap in 2018 (+30), 2015 (+27) and 2012 (+38). Northern Ireland's gender gap in reading in 2022 was significantly lower than that of Norway (+42), however it was not significantly different to that of Canada (+24), the Republic of Ireland (+18) and United States (+22).

Figure 6.5: Gender gaps in reading performance across PISA cycles (2012-2022)



Country	2012	2015	2018	2022
Northern Ireland	* 27	* 14	* 36	* 18
Canada	* 35	* 26	* 29	* 24
Norway	* 46	* 40	* 47	* 42
Republic of Ireland (ROI)	* 29	* 12	* 23	* 18
United States (USA)	* 31	* 20	* 24	* 22
OECD Trend Average	* 39	* 27	* 30	* 25

Base: All participating pupils.
Gender gaps calculated as girls' reading score – boys' reading score. Asterisks (*) in the table indicate that the gender gap shown represents a statistically significant difference. OECD trend averages calculated

using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

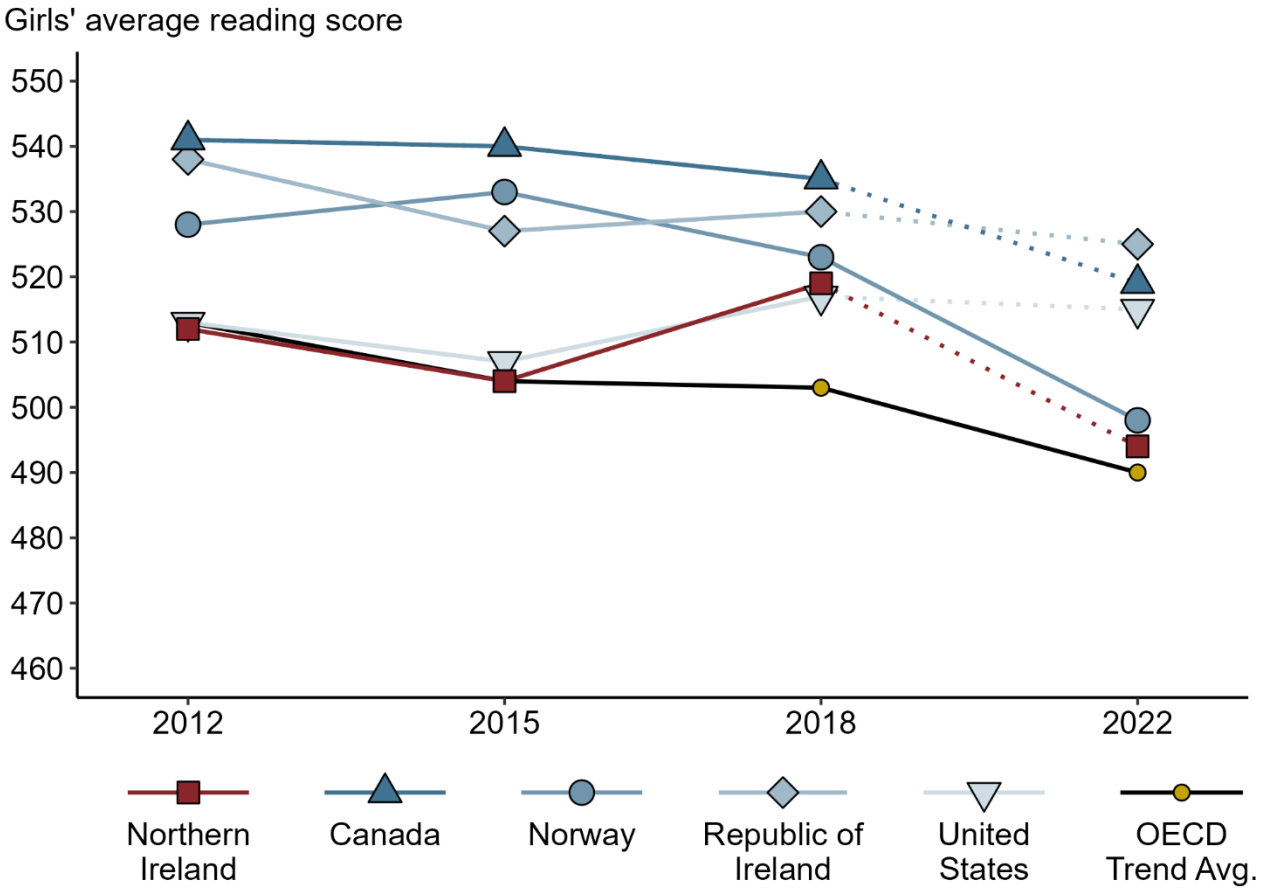
Source: OECD, PISA 2022

The trends in the gender gaps of Northern Ireland and the comparator countries since the 2012 cycle of PISA are further contextualised by Figure 6.6 and Figure 6.8. The two figures focus on the trends in the average reading scores of girls and boys respectively. In Northern Ireland, the average score for girls in 2022 (494) was significantly lower than in 2018 (519), 2015 (504) and 2012 (512). However, the average score for boys in 2022 (476) was not significantly different to that in 2018 (482), 2015 (490) and 2012 (484).

Across the OECD trend countries, there was a downward trend in reading performance since 2012 for girls and 2015 for boys. The OECD trend average for girls was significantly lower in 2022 (490) than in 2018 (503), 2015 (504) and 2012 (513) and boys' reading score in PISA 2022 (465) was also significantly lower than that in 2018 (473), 2015 (477) and 2012 (474).

The comparator countries showed different trends in reading performance between girls and boys since 2012. Canada and Norway showed a downward trend in girls' and boys' reading performance from 2015. In Canada, girls scored significantly lower in 2022 (519) than in the three previous PISA cycles and boys scored significantly lower in 2022 (495) than in 2018 (506) and 2015 (514) but not significantly different to 2012 (506). In Norway, girls scored significantly lower in 2022 (498) than in 2018 (523), 2015 (533) and 2012 (528), and boys also scored significantly lower in 2022 (456) than in 2018 (476), 2015 (494) and 2012 (481). In the Republic of Ireland and the United States, the reading scores of girls and boys in PISA 2022 were not significantly different to their average scores in the 3 previous PISA cycles.

Figure 6.6: Trends in girls' reading performance in Northern Ireland, comparator countries and on average across OECD trend countries

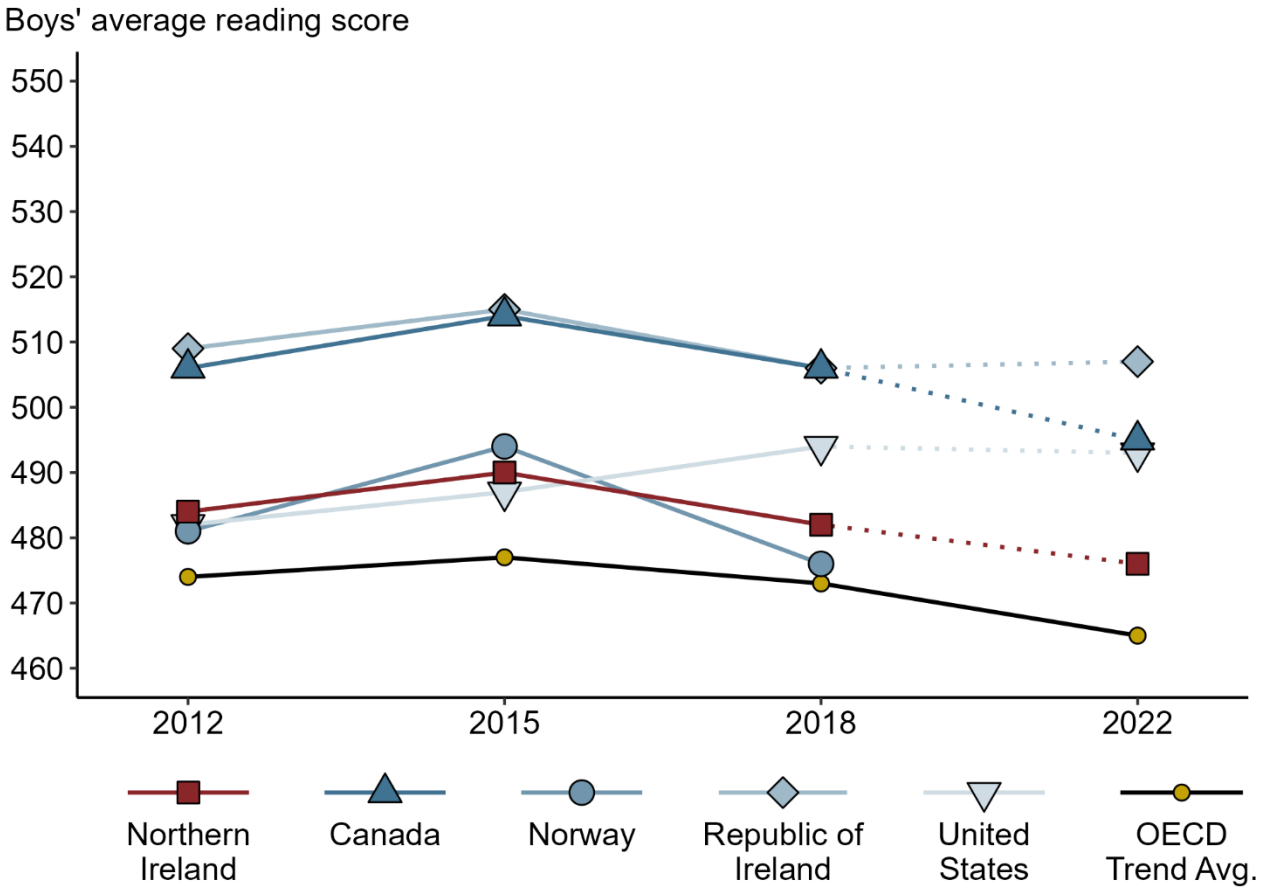


Country	2012	2015	2018	2022
Northern Ireland	* 512	504	* 519	494
Canada	* 541	* 540	* 535	519
Norway	* 528	* 533	* 523	498
Republic of Ireland	538	527	530	525
United States	513	507	517	515
OECD Trend Average	* 513	* 504	* 503	490

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that system's score for PISA 2022.
Trend results where PISA sampling standards were not all met indicated with dotted lines in the figure.
OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Figure 6.7: Trends in boys' reading performance in Northern Ireland, comparator countries and on average across OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	484	490	482	476
Canada	506	* 514	* 506	495
Norway	* 481	* 494	* 476	456
Republic of Ireland	509	515	506	507
United States	482	487	494	493
OECD Trend Average	* 474	* 477	* 473	465

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that system's score for PISA 2022.
Trend results where PISA sampling standards were not all met indicated with dotted lines in the figure.
OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

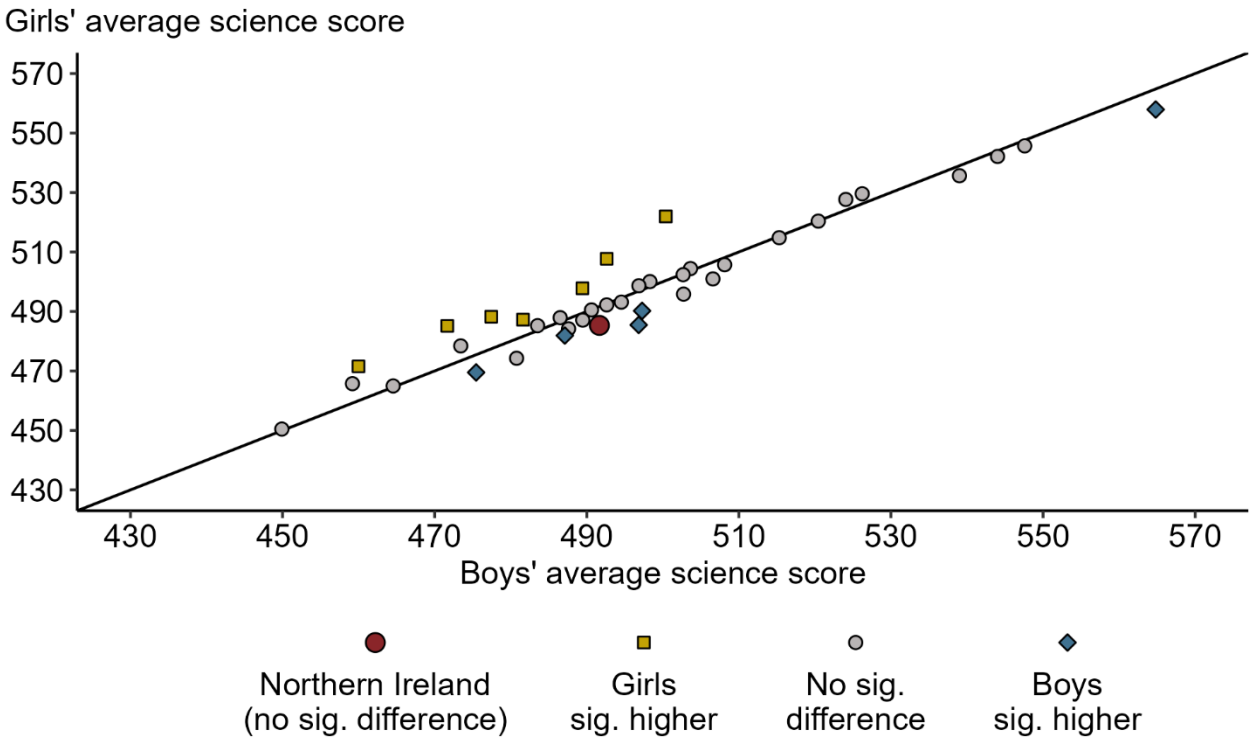
6.3.5 Science

Across previous cycles of PISA, the overarching findings across the OECD countries were that girls typically outperform boys in PISA reading, while boys outperform girls in PISA mathematics. However, the findings relating to science have not been as consistent; in PISA 2018, there was a small, but statistically significant advantage of around 2 points favouring girls in science. This contrasted with the results of the 2015 cycle, when boys in OECD countries scored significantly higher on average than girls by 4 score points. In Northern Ireland, girls significantly outperformed boys in science in 2018 by 17 score points on average, and prior to this, the gender difference in science performance was not statistically significant.

In PISA 2022, girls in Northern Ireland had an average science score of 485 which was not significantly different to the average score of 492 for boys. On average across the OECD countries in 2022, there was no difference in the performance of girls and boys in science, with both scoring an average of 485.

Figure 6.8 shows the science performance of girls and boys in participating education systems with average science scores greater than 450. The diagonal line on the figure shows the point where girls' and boys' scores are equal. Education systems in which girls scored significantly higher than boys in science are shown in yellow above the line, while systems where boys scored significantly higher than girls are shown in blue below the line. In total, there were 7 systems where girls scored significantly higher than boys, and 4 systems where boys scored significantly higher than girls. Finland, Slovenia and Norway were the education systems in which girls outperformed boys the most in science. Austria and the highest performing country in science in PISA 2022, Singapore, were the systems with the strongest relative performance of boys. Larger gender gaps, in either direction, tended to be more common in lower performing systems.

Figure 6.8: Science performance of girls and boys in PISA 2022



Type of gender gap	Education system and gender gap size
Education systems in which girls scored significantly higher than boys in science – represented by yellow squares	Finland (+22), Slovenia (+15), Norway (+13), Malta (+12), Croatia (+11), Sweden (+8), Lithuania (+6)
Education systems without statistically significant gender gaps in science – represented by grey circles	Slovakia (+7), Turkey (+5), Estonia (+4), South Korea (+3), Czech Republic (+2), Poland (+2), Portugal (+2), France (+1), New Zealand (+1), Ukrainian regions (+1), Israel (0), OECD average (0), Hong Kong (0), Belgium (0), Switzerland (0), Germany (0), Canada (-1), Latvia (-1), Macao (-2), Japan (-2), Netherlands (-2), Australia (-2), Taiwan (-3), Hungary (-3), Northern Ireland (-6), Republic of Ireland (-6), Italy (-7), United States (-7)
Education systems in which boys scored significantly higher than girls in science – represented by blue diamonds	Spain (-5), Vietnam (-6), Singapore (-7), Denmark (-7), Austria (-11)

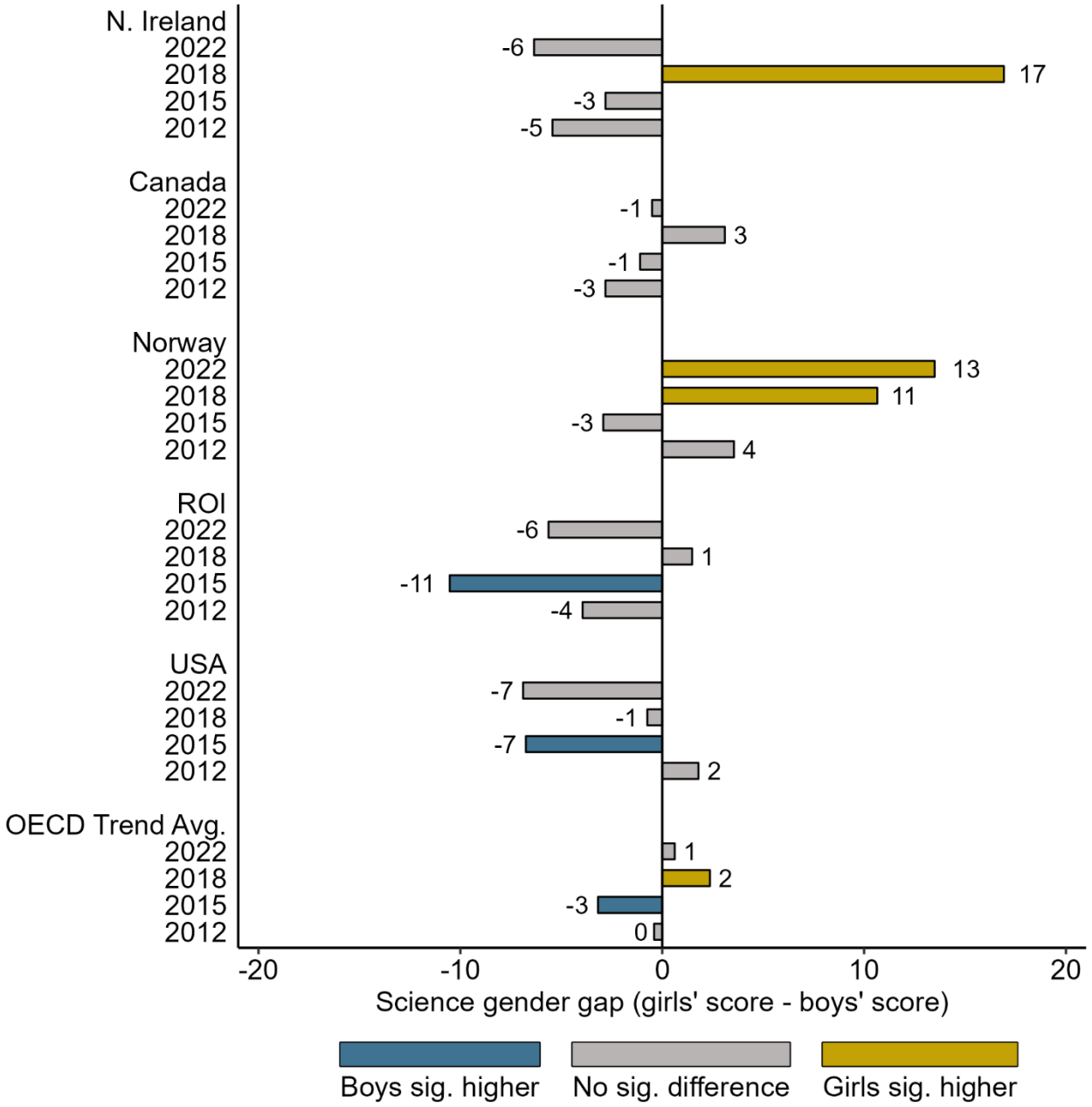
Base: All education systems with average scores over 450 in science in PISA 2022.
Gender gaps calculated as girls' science score – boys' science score and reported in parenthesis.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Figure 6.9 shows the trends in the gender gaps of Northern Ireland, the comparator countries and OECD trend countries since the 2012 cycle of PISA. These are further contextualised by Figure 6.10 and Figure 6.11, which focus on the trends in the average science scores of girls and boys respectively.

In PISA 2018, girls in Northern Ireland scored, on average, 17 points higher in science than boys did. This result contrasted with previous performance in Northern Ireland and in 2022 where there were non-statistically significant differences in science scores in favour of boys as shown in Figure 6.9. This changing pattern can also be seen in Figure 6.10 and Figure 6.11.

Figure 6.9: Trends in gender gaps in science performance in Northern Ireland, comparator countries and on average across OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	-5	-3	* 17	-6
Canada	-3	-1	3	-1
Norway	4	-3	* 11	* 13
Republic of Ireland (ROI)	-4	* -11	1	-6
United States (USA)	2	-7	-1	-7
OECD Trend Average	0	* -3	* 2	1

Base: All participating pupils.
Gender gaps calculated as girls' science score – boys' science score. Asterisks (*) in the table indicate that

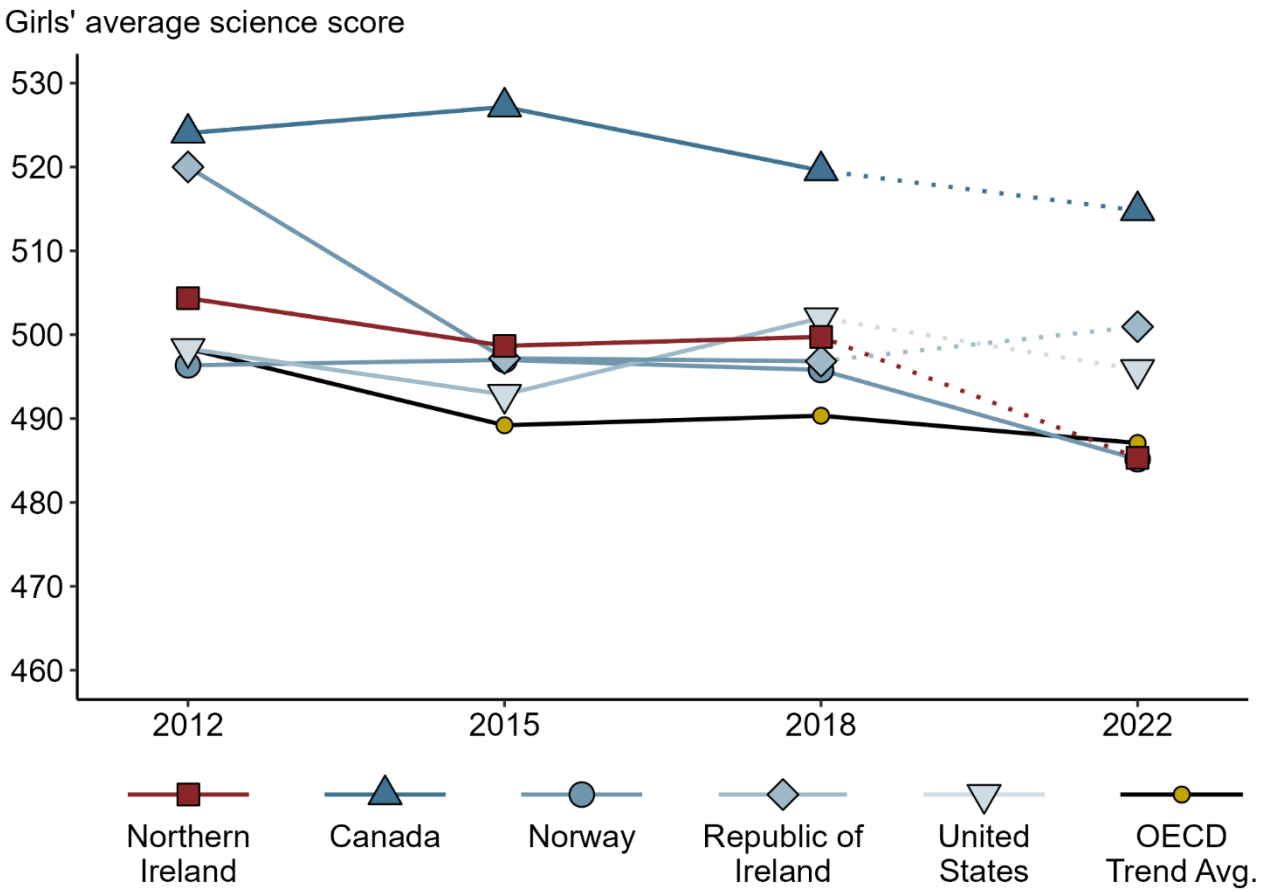
the gender gap shown represents a statistically significant difference. OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

In Northern Ireland, the average performance of girls in science was significantly lower in 2022 (485) than in 2018 (500), 2015 (499) and 2012 (504). All the comparator countries, with the exception of Norway, saw no significant difference in the average score for girls between 2018 and 2022. In Norway the average score for girls in 2022 (485) was significantly lower than in 2018 (496). On average across OECD trend countries the average score for girls has been relatively stable since 2015. However, the average score for girls in 2012 was significantly higher than the score in 2022.

The performance of boys in Northern Ireland has been stable since 2012 with no significant differences between the average score in 2022 (492) in science and each of the PISA cycles since 2012. This was also the case in the United States. In Norway, the average score for boys in science was significantly lower in 2022 than in 2018, dropping from 485 to 472. On average across OECD trend countries there was no significant difference between the scores for boys in 2022 (486) and 2018 (488), however the average score for boys in 2022 was significantly lower than in 2015 (492) and 2012 (499).

Figure 6.10: Trends in girls' science performance in Northern Ireland, comparator countries and on average across OECD trend countries

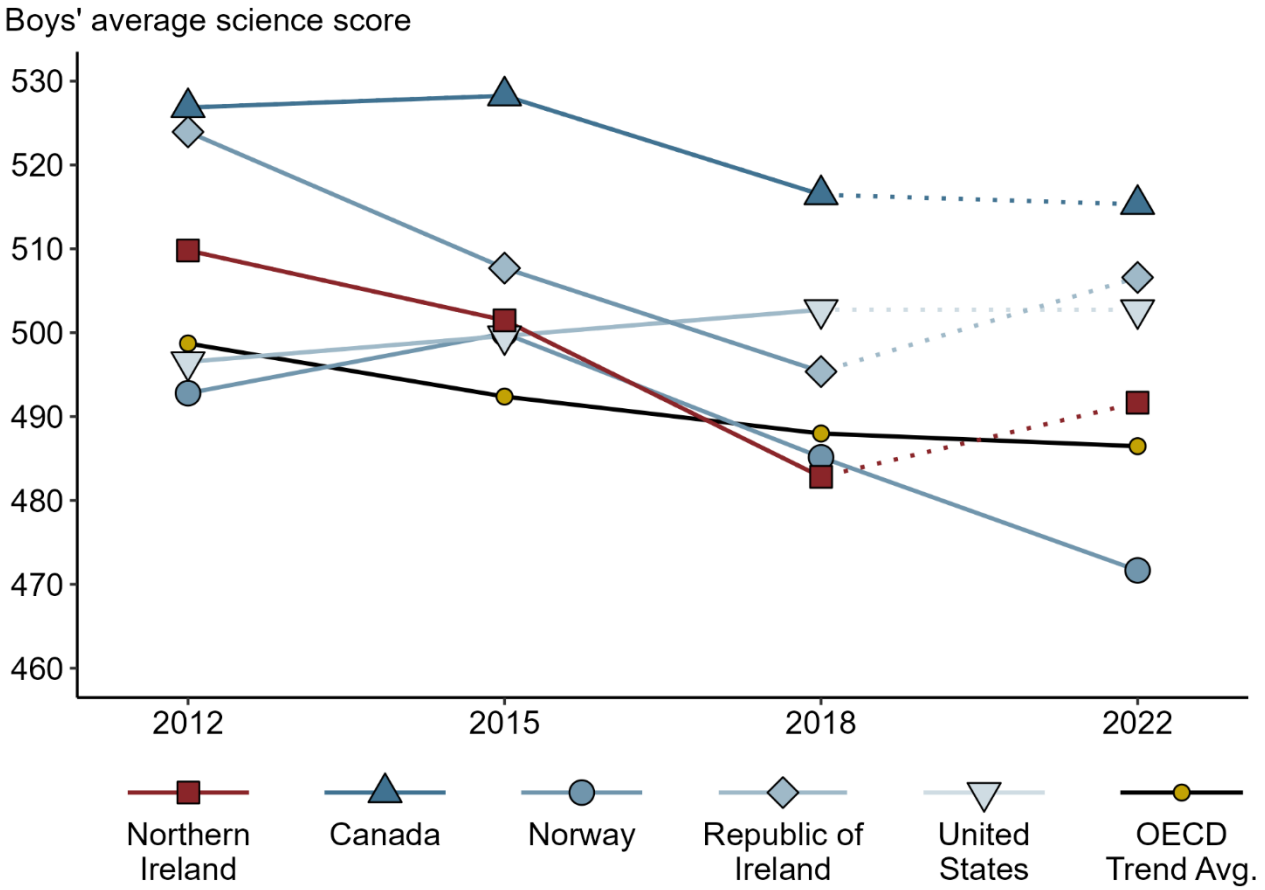


Country	2012	2015	2018	2022
Northern Ireland	* 504	* 499	* 500	485
Canada	524	* 527	520	515
Republic of Ireland	* 520	497	497	501
United States	498	493	502	496
Norway	496	* 497	* 496	485
OECD Trend Average	* 498	489	490	487

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that system's score for PISA 2022.
Trend results where PISA sampling standards were not all met indicated with dotted lines in the figure.
OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Figure 6.11: Trends in boys' science performance in Northern Ireland, comparator countries and on average across OECD trend countries



Country	2012	2015	2018	2022
Northern Ireland	510	501	483	492
Canada	527	* 528	516	515
Norway	* 493	* 500	* 485	472
Republic of Ireland	* 524	508	* 495	507
United States	497	500	503	503
OECD Trend Average	* 499	* 492	488	486

Base: All participating pupils.
Asterisks (*) indicate that the score shown was significantly different to that system's score for PISA 2022.
Trend results where PISA sampling standards were not all met indicated with dotted lines in the figure.
OECD trend averages calculated using OECD countries in PISA 2022 excluding Costa Rica, Luxembourg and Spain.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

6.4 Socioeconomic background

This section reports on how mathematics, reading and science scores vary by pupils' socioeconomic background. This is done through the use of PISA's economic, social and cultural status (ESCS) index. The ESCS Index is based on pupils' responses to questions about their parents' background, education, and possessions in their homes. The index is set to a mean of approximately 0 across the OECD countries, with a standard deviation of 1. This index was calculated differently in PISA 2022 to previous cycles of PISA. Comparisons with previous cycles in this report are made using this new index.

Northern Ireland's mean score on the ESCS Index was +0.08 indicating that, on average, pupils in Northern Ireland had a slightly higher socioeconomic status than the average across the OECD countries. However, in Northern Ireland, the data needed for the ESCS Index was missing for 9% of pupils. In 2018, in Northern Ireland, using the new ESCS Index the mean score was +0.06 and the data missing figure related to 4% of pupils.

There are 2 different ways to think about the relationships between socioeconomic status and attainment. The first is to consider the difference in attainment between average pupils with high socioeconomic status and those with low socioeconomic status. This is referred to as the size of the effect and can be seen as the 'steepness of the slope' (the gradient of the line) when plotting the relationship between socioeconomic status and attainment. Comparisons can be made by dividing pupils into 4 equal groups (quartiles) according to their ESCS score[16] and examining the gap in performance between pupils in the most disadvantaged group compared to the least disadvantaged group. Relative to the OECD average, there was a similar percentage of pupils in Northern Ireland with 'missing' or otherwise unavailable ESCS estimates (9% compared to 6%). This percentage of missing data should be considered when assessing the national representativeness of Northern Ireland's ESCS data.

The second way to think about the relationship between socioeconomic status and attainment is to consider how much variation in attainment there is between pupils with similar socioeconomic backgrounds. Put another way, we can assess how strongly correlated socioeconomic status is with attainment. If there is a strong correlation, then there will be less variability in the attainment of pupils with the same socioeconomic status, which implies that socioeconomic status is the dominant factor in determining outcomes, which is referred to as the strength of the effect.

[16] These groups were based on the percentage of pupils after the application of weights, rather than before. In terms of the raw numbers of pupils, 617 pupils in Northern Ireland were classified as being in Quartile 4 (least disadvantaged), compared to just 478 in Quartile 1 (most disadvantaged). This is a consequence of schools with high percentages of Quartile 1 pupils being under-represented in the sample, and thus having larger weights. After the application of weights, there is an equal distribution of pupils in all four quartiles.

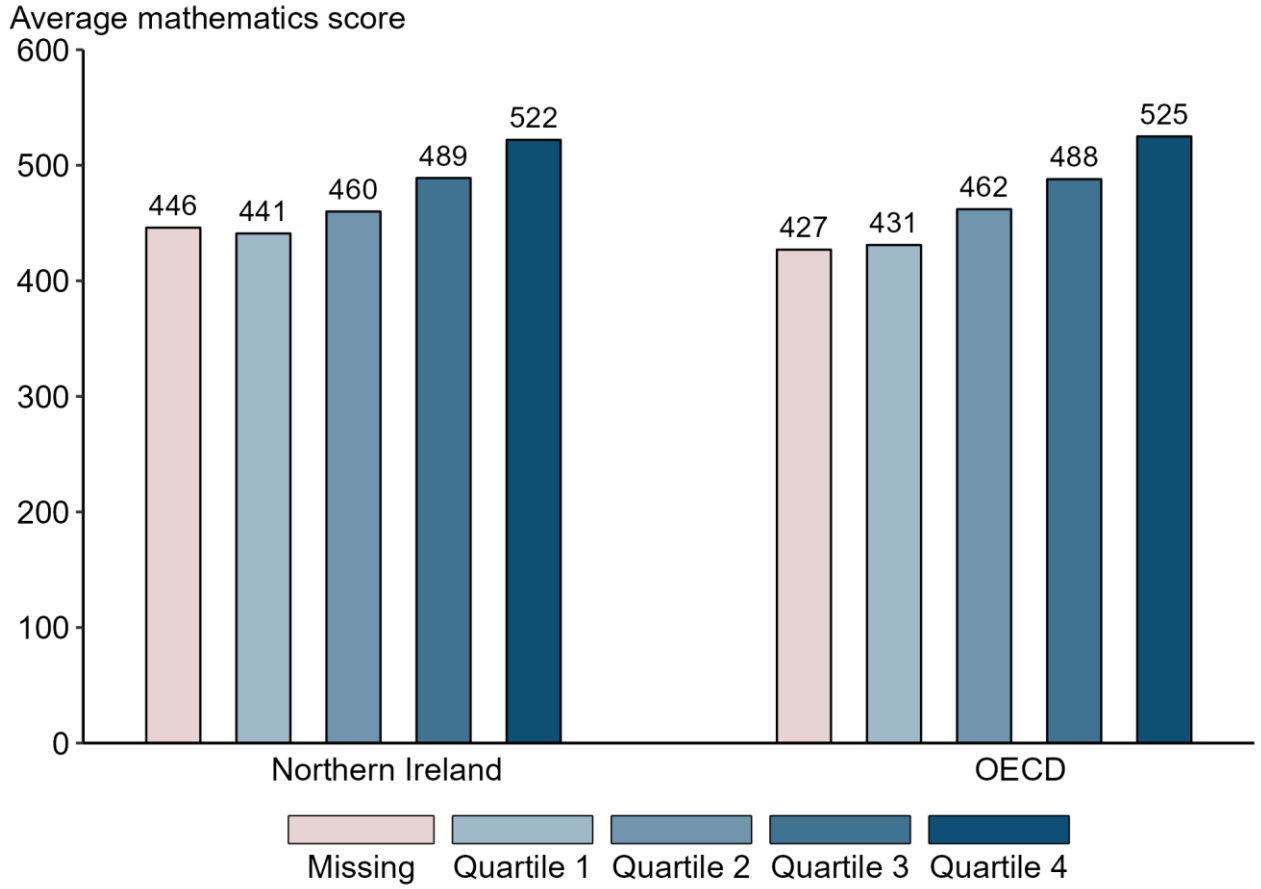
6.4.1 Mathematics

In Northern Ireland, there was a 36 score point difference in mathematics performance associated with a one-unit increase on the ESCS Index. On average across the OECD countries, there was a 39 score point difference in mathematics performance associated with a one-unit increase in ESCS. The score point difference in Northern Ireland was significantly smaller than the average score point difference across the OECD countries. In Canada, there was a 40 score point difference in mathematics performance associated with a one-unit increase in ESCS. In the United States this difference was 38 score points, in the Republic of Ireland and in Norway there was a 35 score point difference in mathematics performance associated with a one-unit increase in ESCS. None of these scores point differences in mathematics in the comparator countries were significantly different from the score point difference in mathematics in Northern Ireland.

In Northern Ireland, there was an 81 gap in performance in mathematics between the most disadvantaged quartile and the least disadvantaged quartile of pupils. This was not significantly different from the OECD average gap of 93 score points.

The average mathematics scores of pupils in each ESCS quartile are shown in Figure 6.12. In Northern Ireland and on average across the OECD countries, less disadvantaged pupils achieved higher mathematics scores than their more disadvantaged peers, and this was true for each successive quartile. The gap in performance in mathematics between the most disadvantaged quartile and the least disadvantaged quartile of pupils was not significantly different from the performance gaps in Canada (77), the Republic of Ireland (74) or Norway (81). In contrast, this performance gap in mathematics in Northern Ireland was significantly smaller than the performance gap in the United States (102).

Figure 6.12: Mathematics performance by ESCS Index quartile in Northern Ireland and the OECD



Country	Missing	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Northern Ireland	446	441	460	489	522
OECD Average	* 427	* 431	462	488	525

Base: All participating pupils in the included education systems.
'Missing' or unavailable ESCS data for around 9% of pupils in Northern Ireland and around 6% of pupils on average across the OECD countries.
Asterisks (*) indicate that the score shown was significantly different the respective score in Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

The percentage of the variance in mathematics performance explained by socioeconomic status in Northern Ireland was 12%. On average across the OECD countries 15% of the variance in mathematics performance was explained by the ESCS Index. Out of the education systems that performed similarly to Northern Ireland overall in mathematics all of them, except Norway and Malta, had a larger percentage of the variance in their mathematics performance explained by socioeconomic status. In the United States 15% of the variance in mathematics performance was explained by the ESCS Index, with 13% in the Republic of Ireland, and 10% in Canada and Norway.

The ESCS Index allows us to compare the percentage of pupils in different education systems who are 'academically resilient'. These are pupils who succeed academically despite their socioeconomic background. A pupil is classified as resilient in PISA if they are in the bottom quarter of the ESCS Index in their education system and perform in the top quarter of pupils in that system. In Northern Ireland, 12% of pupils were academically resilient, compared to an average of10% on average across the OECD countries.

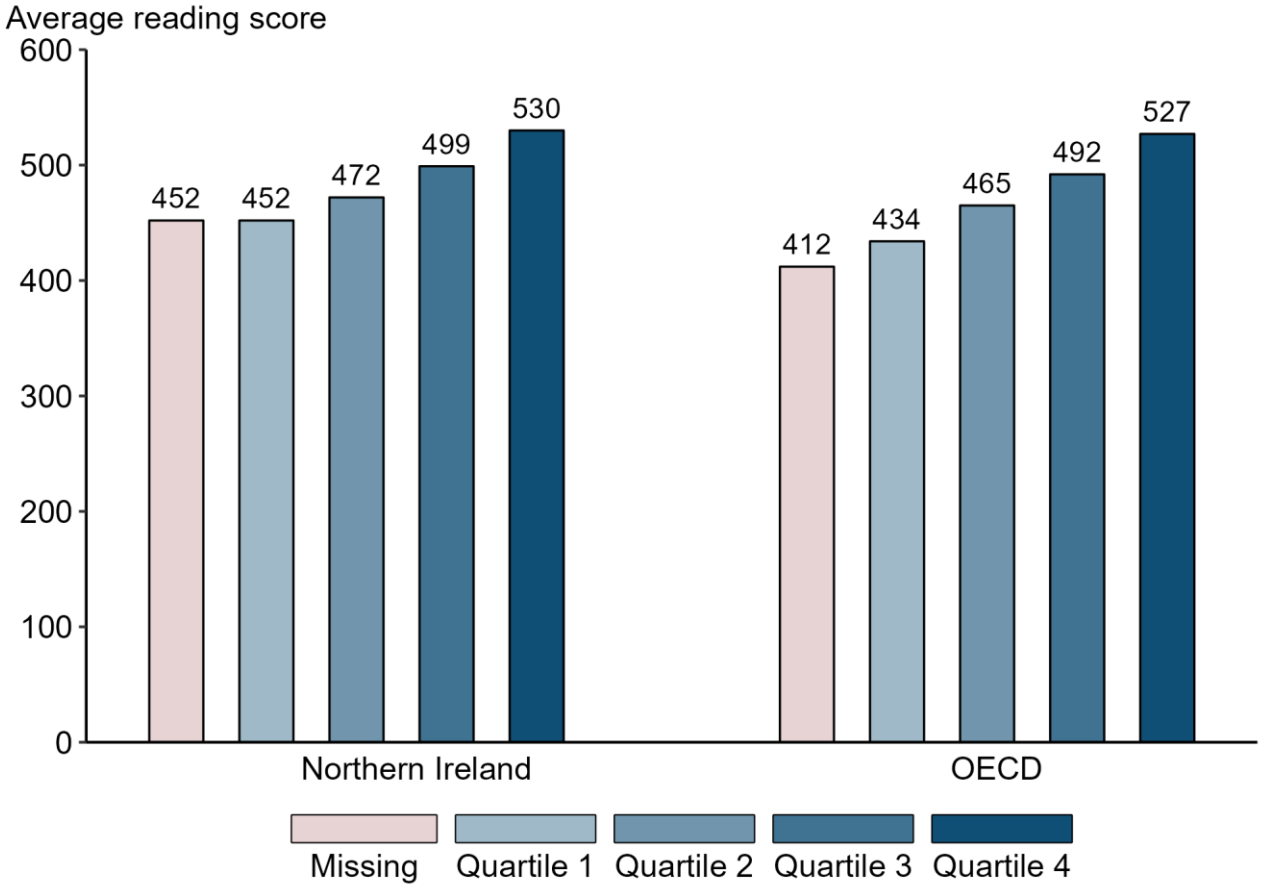
6.4.2 Reading

In Northern Ireland, there was a 35 score point difference in reading performance associated with a one-unit increase in ESCS. On average across the OECD countries, there was a 39 score point difference in reading performance associated with a one-unit increase in ESCS. The score point difference in Northern Ireland was significantly smaller than the average score point difference across the OECD countries. There were no significant differences between the score point difference in reading performance in Northern Ireland and the score point difference in the United States (38), Norway (39), the Republic of Ireland (36) or Canada (39).

Figure 6.13 shows the overall reading performance of pupils in Northern Ireland and on average across the OECD countries broken down into the 4 ESCS quartiles described in the introduction to this chapter. Figure 6.13 shows that, in Northern Ireland and on average across the OECD countries, relative socioeconomic advantage was associated with stronger performance in PISA reading. The average score of pupils in Quartile 1 in Northern Ireland was significantly higher than the OECD average score at this quartile, however the average scores of pupils in Quartiles 2, 3 and 4 in Northern Ireland were not significantly different to the corresponding OECD average scores. The gap in performance between the reading scores of pupils in Quartile 1 and Quartile 4 in Northern Ireland was 78 points, which was significantly smaller than the OECD average performance gap (93 points).

The gap in performance in reading between pupils in the most disadvantaged group (Quartile 1) and pupils in the least disadvantaged group (Quartile 4) in Northern Ireland of 78 score points was not significantly different from the gap in Canada (74), the Republic of Ireland (76) and Norway (89) but was significantly smaller than the gap in performance in the United States (101).

Figure 6.13: Reading performance of pupils in Northern Ireland and on average across the OECD countries by their ESCS Quartile



Country	Missing	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Northern Ireland	452	452	472	499	530
OECD Average	* 412	* 434	465	492	527

Base: All participating pupils in the included education systems.
'Missing' or unavailable ESCS data for around 9% of pupils in Northern Ireland and around 6% of pupils on average across the OECD countries.
Asterisks (*) indicate that the score shown was significantly different the respective score in Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

The percentage of the variation in reading performance explained by socioeconomic status in Northern Ireland was 9%. On average across the OECD countries 13% of the variation in reading performance was explained by socioeconomic status. In the Republic of Ireland 11% of the variance in reading performance was explained by the ESCS index, with 8% in Norway, 11% in the United States and 7% in Canada being explained by the ESCS index.

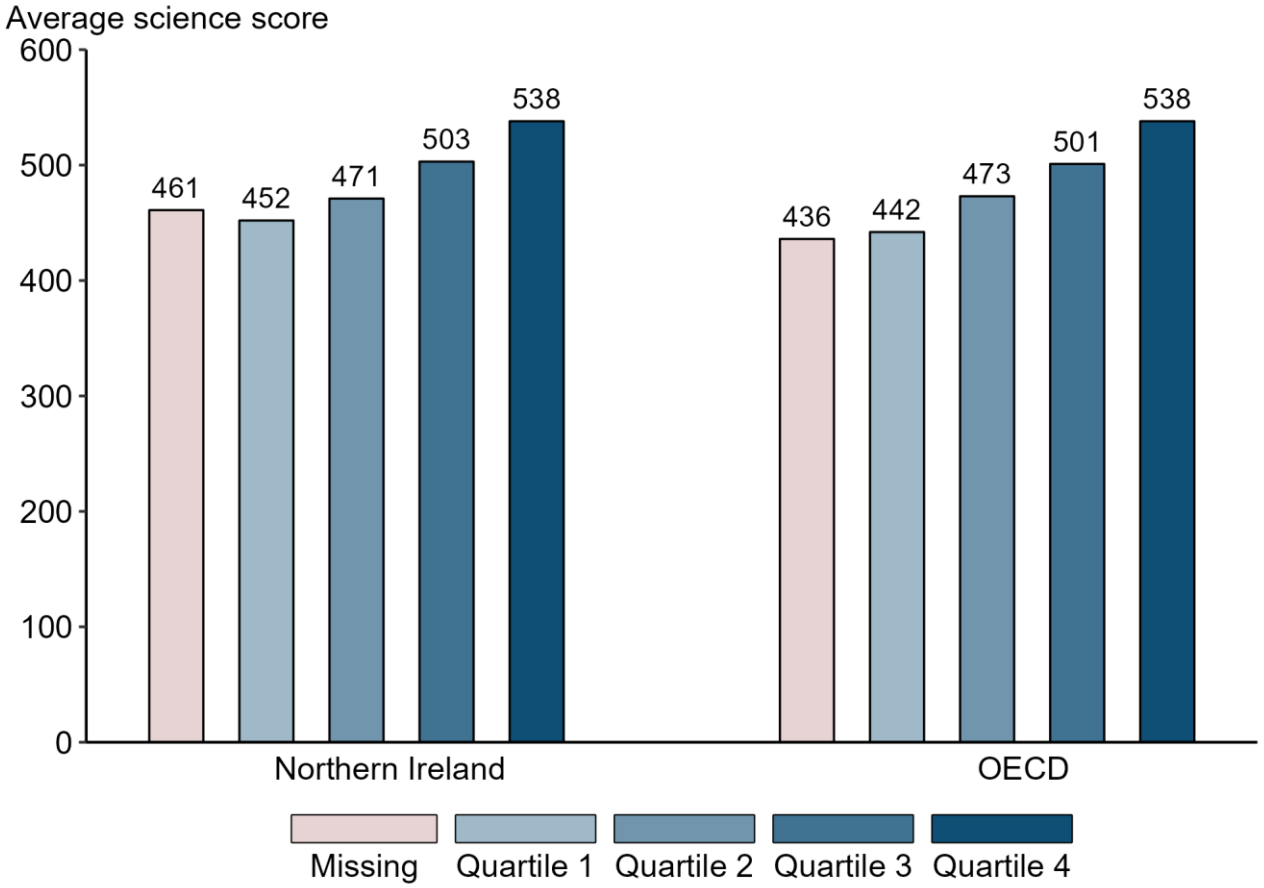
The percentage of academically resilient pupils in reading in Northern Ireland was 13% while on average across the OECD countries the percentage was 11%. In Canada the percentage was 15%, in Norway and the United States the percentage was 12%, while in the Republic of Ireland it was 13%.

6.4.3 Science

In Northern Ireland there was a 38 score point difference in science performance associated with a one-unit increase in ESCS. On average across the OECD countries there was a 41 score point difference in science performance associated with a one-unit increase in ESCS. The score point difference in science performance in Northern Ireland was not significantly different from the average across the OECD countries, or from the differences in the United States (40), Norway (39), Canada (38) and the Republic of Ireland (37).

Figure 6.14 shows that, both in Northern Ireland and on average across the OECD countries, relative socioeconomic advantage was associated with stronger performance in PISA science. At each quartile, there were no statistically significant differences between the performances of pupils in Northern Ireland and the OECD average scores of pupils in these quartiles. There was also not a significant difference in the size of the gap in performance between average science scores of pupils in Quartile 1 and Quartile 4 in Northern Ireland (86 points) compared to the average gap in performance across the OECD countries (96 points). This gap in performance in science in Northern Ireland was also not significantly different from the gap in performance in science in Canada (72), the Republic of Ireland (78) and Norway (90) and was significantly smaller than the gap in performance in science in the United States (108).

Figure 6.14: Science performance of pupils in Northern Ireland and on average across the OECD countries by their ESCS Quartile



Country	Missing	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Northern Ireland	461	452	471	503	538
OECD Average	436	442	473	501	538

Base: All participating pupils in the included education systems.
'Missing' or unavailable ESCS data for around 9% of pupils in Northern Ireland and around 6% of pupils on average across the OECD countries.
Asterisks (*) indicate that the score shown was significantly different the respective score in Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

The percentage of the variation in science performance explained by the ESCS index in Northern Ireland was 12% while on average across the OECD countries it was 14%. The percentage in the United States was 13%, in New Zealand was 15%, in Norway was 9% and in the Republic of Ireland was 11%.

The percentage of academically resilient pupils in science in Northern Ireland was 13% while on average across the OECD countries it was 11%. In the United States the

percentage was 11%, in New Zealand it was 9% and in the Republic of Ireland and Norway it was 13%.

6.4.4 Immigrant background and language

The pupil questionnaire in PISA 2022 collects information which enables us to assess the performance of pupils with respect to their immigration background. Immigrant background is defined in the OECD international report as:

- Non-immigrant pupils are pupils whose mother or father (or both) was/were born in the country where the pupil sat the PISA test, regardless of whether the pupil was born in that country.
- First-generation immigrant pupils are pupils born in another country whose parents were also born in another country.
- Second-generation immigrant pupils are pupils born in the country of assessment but whose parents were both born in another country.

The international report notes that the percentage of pupils on average across the OECD countries with an immigrant background has increased from 12% in 2018 to 13% in 2022. In Northern Ireland, the percentage of pupils with an immigrant background in 2022 was 11%, which was similar to the OECD average and similar to the Northern Ireland percentage in 2018 (10%).

The performance of pupils with an immigrant background tends to be lower than their peers with a non-immigrant background. Across the OECD countries, the average mathematics score for immigrant pupils was 447 which was significantly lower than the performance of non-immigrant pupils (479). In Northern Ireland, the average mathematics score for immigrant pupils was 463 which was significantly lower than the mathematics score of 481 for non-immigrant pupils.

Table 6.3 shows the average mathematics score for pupils with different immigrant backgrounds. In Northern Ireland, pupils with a non-immigrant background and pupils with a second-generation immigrant background had average mathematics scores that were not significantly different from each other (481 and 480 respectively). Both of these scores were significantly higher than the average mathematics score for pupils with a first-generation immigrant background (455). Similarly, on average across the OECD countries, pupils with a non-immigrant background had the highest mathematics performance with an average score of 479, while pupils with a second-generation immigrant background had an average mathematics score of 459. Pupils with a first-generation immigrant background had the lowest average mathematics score of 435. The average scores for mathematics for pupils with non-immigrant backgrounds and pupils with second-generation immigrant backgrounds were not significantly different from the corresponding average scores for mathematics on average across the OECD countries.

The average score for mathematics for pupils with a first-generation immigrant background was significantly higher than the average score on average across the OECD countries.

Table 6.3: Immigration background and PISA mathematics scores of pupils in Northern Ireland

Immigration background	Percentage of pupils	Average mathematics score
Non-immigrant pupils	79%	481
First-generation immigrant pupils	3%	455
Second-generation immigrant pupils	7%	480
Immigrant status unknown	10%	446

Base: All participating in Northern Ireland.
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

In reading, the average score for pupils in Northern Ireland with a non-immigrant background was 492 which was the same as the average score for pupils with a second-generation immigrant background. Both these scores were significantly higher than the average score in reading for pupils with a first-generation immigrant background (449). On average across the OECD countries the average score for reading in PISA 2022 for pupils with a non-immigrant background was 483, with an average score of 461 for pupils with a second-generation immigrant background and an average score of 425 for pupils with a first-generation immigrant background. The average scores in reading for each of the groups with different immigrant backgrounds in Northern Ireland were all significantly higher than the scores for each corresponding group of pupils on average across the OECD countries.

The average score in science for pupils in Northern Ireland with a non-immigrant background was 494 which was not significantly different from the average for pupils with a second-generation immigrant background of 496. Both of these scores were significantly higher than the average science score for pupils in Northern Ireland with a first-generation immigrant background where the average score was 465. On average across the OECD countries the average score for science in PISA 2022 for pupils with a non-immigrant background was 492, with an average science score of 466 for pupils with a second-generation immigrant background and an average score of 438 for pupils with a first-generation immigrant background. The average score for pupils in Northern Ireland with a non-immigrant background was not significantly different from the score for these pupils on average across the OECD countries. However, the average scores in science

for pupils with either a first-generation or a second-generation background were both significantly higher in Northern Ireland than the corresponding scores on average across the OECD countries.

Pupils were also asked about the language they spoke at home. Table 6.4 shows the mathematics, reading and science scores of pupils who speak English at home compared with pupils who speak another language at home. Pupils who spoke a language other than English at home scored significantly less in the reading and science than pupils who spoke English at home, however there was no significant difference between the average mathematics scores for pupils in these groups.

Table 6.4: Language spoken at home and scores in PISA domains of pupils in Northern Ireland

PISA 2022 domain	Average score of pupils who speak English at home	Average score of pupils who speak another language at home
Mathematics	479	461
Reading	490	467
Science	492	472

Base: 2,208 pupils in Northern Ireland (93% weighted percentage of pupils).
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

7 Pupil wellbeing, aspirations and experiences of teaching and learning

7.1 Chapter overview

This chapter focuses on how pupils in Northern Ireland responded to questions relating to their wellbeing, future aspirations and their experiences of teaching and learning in the pupil questionnaire, and how these relate to performance in PISA mathematics. The chapter begins by looking at how pupils in Northern Ireland rated their overall life satisfaction, as well as their experiences of bullying and perceptions of safety at school, and whether they feel like they belong at their schools. The chapter then moves on to discuss aspects of pupils' academic wellbeing, including whether the pupils have growth mindsets towards learning, and how pupils experience anxiety specifically in relation to mathematics, and their academic aspirations. The chapter concludes by looking at pupils' experiences of teaching and learning. Caution needs to be taken in interpreting these findings as some of the sampling standards for PISA 2022 were not met in Northern Ireland as described in 1.4.2.

7.2 Key findings

- Pupils in Northern Ireland reported an average overall life satisfaction of 6.5 out of 10. This was significantly lower than the average rating of 6.75 out of 10 on average across the OECD countries.
- Around 16% of pupils in Northern Ireland report that they are made fun of at school at least a few times a month, compared to the OECD average of 12%. On average across the OECD countries, pupils who report more regular bullying at school score significantly lower in mathematics than those that report no or very infrequent experiences of being bullied. A similar trend was noted for pupils that do not feel safe at school.
- Around two-thirds of pupils in Northern Ireland (66%) reported feeling like they belong at school, compared to the OECD average of 75%. Pupils in Northern Ireland and on average across the OECD who reported feeling like they belong at school had significantly higher average mathematics scores than pupils who did not feel this way.
- Forty-three per cent of pupils in Northern Ireland agreed or strongly agreed that intelligence could not be changed, compared to the OECD average (42%) These pupils had significantly lower average performance in mathematics than pupils who disagreed or strongly disagreed (454 and 500 respectively).

- Pupils in Northern Ireland were more positive about the quality of their mathematics instruction than pupils on average across the OECD countries. A larger percentage also reported that their mathematics teacher helps them with their learning than on average across the OECD countries.
- The majority (57%) of pupils in Northern Ireland reported spending more than 1 hour a day on homework compared to the OECD average of 54% of pupils.
- Pupils in Northern Ireland reported significantly higher levels of mathematics instructional quality in their schools (6.9 out of 10) to the average level reported by pupils on average across the OECD countries (6.4 out of 10).

7.3 Introduction

The pupil questionnaire contains a large number of questions relating to pupils' attitudes and beliefs, experiences in school, hopes for the future, and general wellbeing. The questions used in the pupil questionnaire vary in how the question was asked, and the options that were available for pupils' responses. Most questions asked pupils to state how strongly they agreed with a given statement, e.g., "I feel nervous about approaching exams". In some questions, 4 options (strongly agree, agree, disagree, strongly disagree) could be chosen, and in others, pupils could also select a 'neither agree nor disagree' option. Other questions asked pupils to report the frequency of a given event, e.g., "Other pupils made fun of me". In a few questions, such as when asked to rate their overall life satisfaction, pupils were asked to rate themselves on a scale, usually between 0 and 10. Throughout this chapter, we will report the types of questions pupils were asked, and how they were asked to respond.

It is important to note that the pupil response rate in Northern Ireland (77%) was below the rate required by the OECD (80%) as described in section 1.4.2. This means that it is possible that the findings reported here do not reflect an accurate picture of the national situation. The non-response bias analysis found that there was some evidence of potential non-response bias with more higher achieving pupils participating than lower achieving pupils. A lower proportion of sampled SEN pupils participated in PISA than sampled non-SEN pupils and sampled FSME pupils were also less likely to participate than sampled non FSME pupils (see Appendix A for more details). It is also important to note that not all pupils who responded to the questionnaire answered all possible questions. In order to mitigate this risk, this chapter only includes questions that had responses from at least 60% of the pupils in Northern Ireland who participated in PISA 2022. Each table includes information about the percentage of pupils that answered the questions. However, the national results reported in this chapter should still be interpreted with caution. There will be additional questionnaire items reported on in the international report on a UK basis that are not reported on in this report.

In this chapter, we do not report whether differences between the percentage of pupils in Northern Ireland and the percentage of pupils on average across the OECD countries were statistically significant because, due to the large sample sizes, small differences can be statistically significant but not meaningful in terms of policy or practice.

7.4 Pupils' wellbeing and aspirations

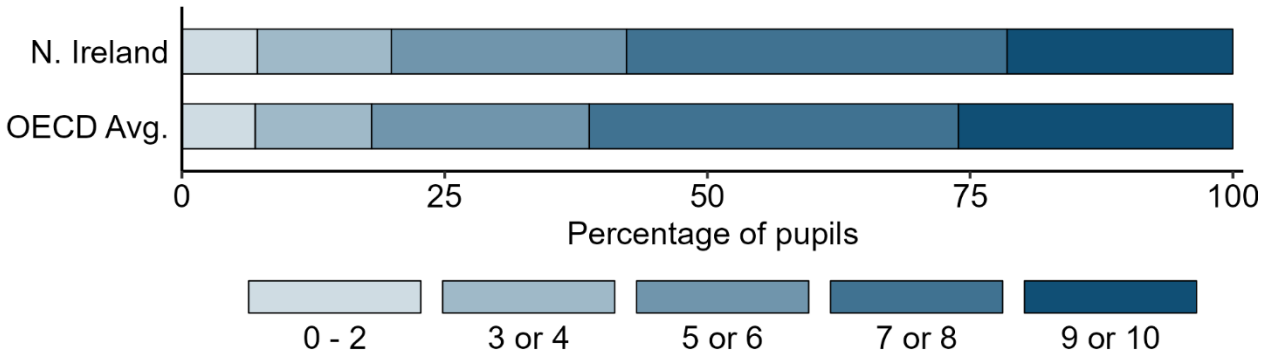
In this section, we focus on a number of questions relating to pupils' wellbeing and future aspirations. These include questions about pupils' satisfaction with different aspects of their lives, beliefs about their abilities, and feelings related to school.

7.4.1 Pupils' life satisfaction

Pupils were asked to rate their overall life satisfaction on a scale from 0 to 10, with 0 indicating very low life satisfaction, and 10 indicating very high satisfaction.

Figure 7.1 shows the percentage of pupils in Northern Ireland reporting each level of overall life satisfaction, compared to the average across all participating OECD countries. The individual ratings have been collapsed into five subdomains for the purpose of presentation; ratings of 0, 1 or 2 (not satisfied); 3 or 4 (slightly satisfied); 5 or 6 (somewhat satisfied); 7 or 8 (satisfied) and; 9 or 10 (very satisfied).

Figure 7.1: Self-reported overall life satisfaction scores of pupils in Northern Ireland and on average across the OECD countries



Country	0 – 2	3 or 4	5 or 6	7 or 8	9 or 10
Northern Ireland	7%	13%	22%	36%	21%
OECD Average	7%	11%	21%	35%	26%

Base: 2,187 pupils in Northern Ireland (91% weighted pupil response rate). OECD average based on data from 31 OECD countries.
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included countries.

Source: OECD, PISA 2022, ST016

The average rating from pupils in Northern Ireland was 6.5 out of 10. This was significantly lower than the OECD average of 6.75 out of 10. Pupils in Northern Ireland who reported being satisfied with life (a rating of 7 or 8) had the highest average score in mathematics with an average score of 493. This was significantly higher than all other groups of pupils. There were no significant differences in the mathematics performance of pupils who reported being very satisfied (461), slightly satisfied (465) or not satisfied (465). The average mathematics scores for pupils in Northern Ireland providing each rating of life satisfaction are given in Table 7.1.

Table 7.1: Mathematics performance of pupils in Northern Ireland with different levels of life satisfaction

Life satisfaction	Rating	Percentage of pupils	Average mathematics score
Not satisfied	0 – 2	7%	465
Slightly satisfied	3 or 4	13%	465
Somewhat satisfied	5 or 6	22%	478
Satisfied	7 or 8	36%	493
Very satisfied	9 or 10	21%	461

Base: 2,187 pupils in Northern Ireland (91% weighted pupil response rate).
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included countries.

Source: OECD, PISA 2022, ST016

7.4.2 Pupils' perceptions of school safety

Pupils were also asked about whether they felt safe at school, including on their travel to and from school. Pupils were asked if they agreed with 4 statements shown in Table 7.2, ("strongly disagree", "disagree", "agree", "strongly agree"). In all 4 statements, the vast majority of pupils in Northern Ireland agreed or strongly agreed that they felt safe at school and travelling to and from school. For each of the statements, the percentage of pupils in Northern Ireland who agreed or strongly agreed was similar to the percentage of pupils on average across the OECD countries.

Table 7.2: Percentage of pupils in Northern Ireland and on average across the OECD countries agreeing with statements about their perceptions of safety at their school

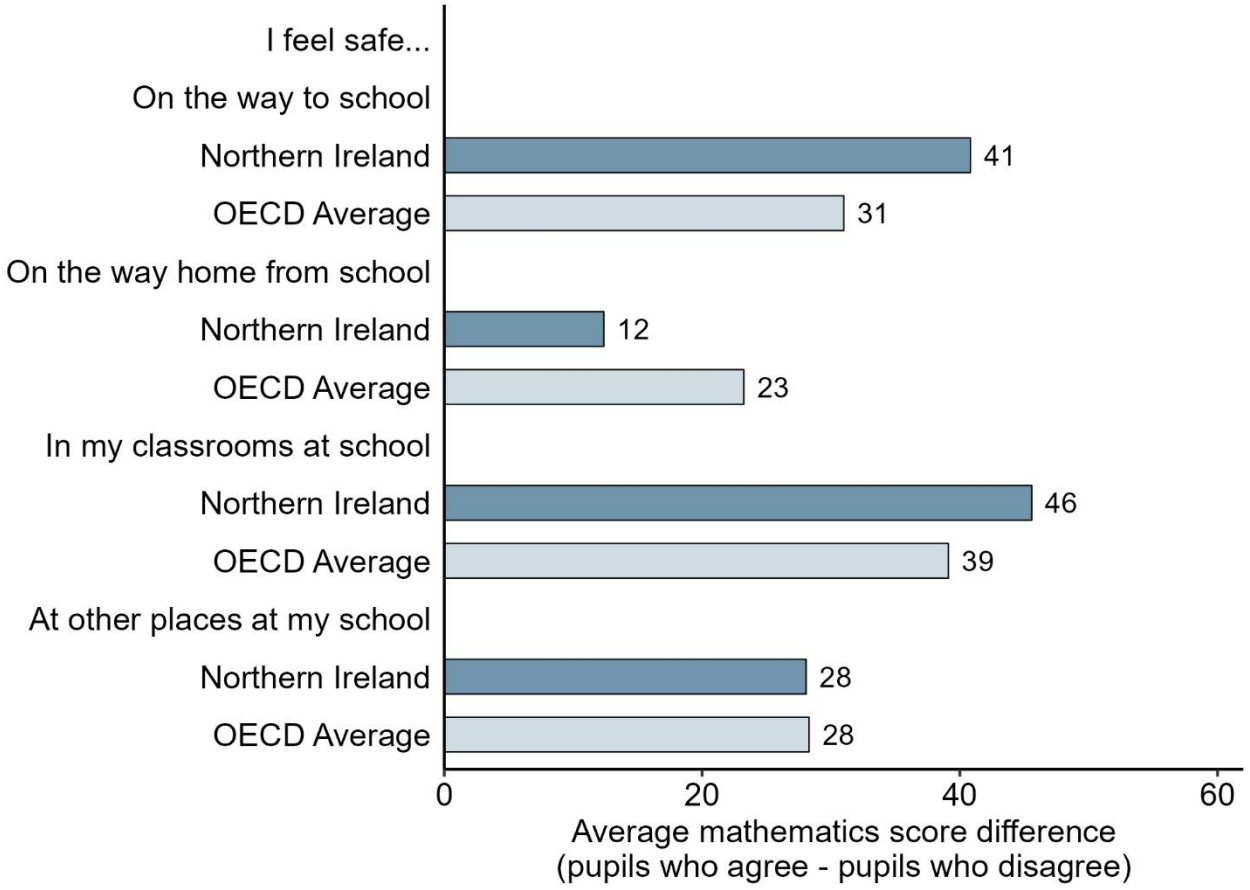
Statement	Northern Ireland	OECD average
I feel safe on my way to school	96%	92%
I feel safe on my way home from school	94%	91%
I feel safe in my classrooms at school	95%	93%
I feel safe at other places at school (e.g., hallway, cafeteria, toilets)	90%	90%

Base: 2,194 and 2,195 pupils in Northern Ireland (91% weighted pupil response rate). OECD average based on data from 32 OECD countries.
Percentages based on the percentage of pupils who agreed, or strongly agreed with the given statement. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST265

For all the different places listed, pupils in Northern Ireland who reported feeling safe scored more highly in mathematics than pupils who did not. Pupils in Northern Ireland who agreed or strongly agreed that they felt safe in their classrooms in school had an average score in mathematics 46 score points higher than pupils who disagreed or strongly disagreed. This was not significantly different to the difference of 39 score points on average across the OECD countries. Figure 8.2 shows the mathematics score point differences between pupils who agreed or strongly agreed and pupils who disagreed or strongly agreed with whether they feel safe in different locations in Northern Ireland and on average across the OECD countries.

Figure 7.2: Mathematics performance score difference between pupils who felt safe in different places and those who did not in Northern Ireland and on average across the OECD countries



Statement	Northern Ireland	OECD average
I feel safe on my way to school	41	31
I feel safe on my way home from school	12	23
I feel safe in my classrooms at school	46	39
I feel safe at other places at school (e.g., hallway, cafeteria, toilets)	28	28

Base: 2,194 and 2,195 pupils in Northern Ireland (91% weighted pupil response rate). OECD average based on data from 32 OECD countries.
Percentages based on the percentage of pupils who agreed, or strongly agreed with the given statement.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST265

7.4.3 Pupils' sense of belonging at school

Table 7.3 shows the extent to which pupils agreed with 6 statements relating to their sense of belonging in school, including statements about how easily they get along with their peers, and whether they experience feelings of isolation or loneliness.

Most pupils in Northern Ireland agreed or strongly agreed that they were liked by other pupils (88%), compared to 82% of pupils on average across the OECD countries. A minority of pupils in Northern Ireland and on average across the OECD countries agreed or strongly agreed with the statement 'I feel lonely at school',13% and 16% respectively. Around two-thirds of pupils (66%) in Northern Ireland agreed or strongly agreed that they felt they belong at their school, compared to an average of 75% of pupils across the OECD countries.

Table 7.3: Percentage of pupils in Northern Ireland and on average across the OECD countries agreeing with statements about their sense of belonging at their school

Statement	Northern Ireland	OECD average
I feel like an outsider (or left out of things) at school	16%	17%
I make friends easily at school	79%	76%
I feel like I belong at school	66%	75%
I feel awkward and out of place in my school	24%	21%
Other students seem to like me	88%	82%
I feel lonely at school	13%	16%

Base: 1,797 and 1,835 pupils in Northern Ireland (between 75% and 77% weighted pupil response rate). OECD average based on data from 36 OECD countries.
Percentages based on the percentage of pupils who agreed, or strongly agreed with the given statement. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST034

Pupils in Northern Ireland who agreed or strongly agreed that they felt like they belonged at school had an average mathematics score of 486, significantly higher than the average scores for pupils who disagreed or strongly agreed (460) with the statement. On average across the OECD countries, pupils who agreed or strongly agreed that they felt like they belonged at school had an average mathematics score 21 points higher than pupils who disagreed or strongly disagreed. This was not significantly different from the gap in performance in Northern Ireland.

7.4.4 Pupils' experiences of bullying at school

Pupils were asked how often they had experienced different forms of bullying in the past 12 months at school. The percentage of pupils in Northern Ireland reporting how often they experienced each of these is presented in Table 7.4. The table also shows the average percentage of pupils across the OECD countries who reported experiencing each of these different forms of bullying at least a few times a month.

For each of these statements, the percentage of pupils in Northern Ireland who reported never or almost never experiencing them was similar to the average percentage of pupils reporting these across the OECD countries.

Table 7.4: Percentage of pupils in Northern Ireland reporting different experiences of bullying at school

Statement	Never or almost never	A few times a year	A few times a month or more	A few times a month or more (OECD average)
Other pupils left me out of things on purpose	72%	21%	7%	7%
Other pupils made fun of me	56%	29%	16%	12%
I was threatened by other pupils	84%	11%	5%	3%
Other pupils took away or destroyed things that belonged to me	86%	12%	3%	3%
I got hit or pushed around by other pupils	83%	11%	5%	4%
Other pupils spread nasty rumours about me	76%	17%	7%	7%
I was in a physical fight on school property	92%	6%	1%	2%
I stayed at home from school because I felt unsafe	92%	5%	2%	4%
I gave money to someone at school because they threatened me	97%	1%	2%	1%

Base: 2,182 to 2,196 pupils in Northern Ireland (91% to 92% weighted pupil response rate). OECD data based on responses from 36 OECD countries.
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST038

Over 90% of pupils in Northern Ireland reported never or almost never giving money to someone at school because they threatened them (97%), being involved in a physical fight on school property (92%) or staying home from school because they felt unsafe (92%). More than three-quarters of pupils in Northern Ireland reported that they never or almost never had things that belonged to them taken away from them or destroyed by other pupils (86%), were threatened by other pupils (84%), got hit or pushed around by other pupils (83%) or had nasty rumours about them spread by other pupils (76%).

In Northern Ireland, around 16% of pupils reported being made fun of at school at least a few times a month, compared to the OECD average of 12% of pupils. Pupils in Northern Ireland reported less frequent instances of other forms of bullying, and these were generally similar to the OECD average. This set of statements were combined into a single index with an approximate average value of 0 and a standard deviation of 1 across the OECD countries, where a positive value indicates that pupils were more exposed to bullying at school than on average across the OECD countries. In PISA 2022, the average scale score for Northern Ireland was not significantly different from the average across the OECD countries (-0.16 and -0.30 respectively).

On average across the OECD countries and in Northern Ireland, pupils who reported more regular instances of bullying, particularly those reporting that these happened once a week or more, had lower average levels of mathematics performance than those who reported less frequent instances of bullying. Across the OECD countries, for a one-unit increase in the index of exposure to bullying there was a decrease on average of 8 score points in mathematics. In Northern Ireland the decrease was 1 score point.

7.4.5 Pupils' sense of relative family wealth

Pupils in Northern Ireland were asked about their perceptions of their relative family wealth compared to other families in the country. On a scale from 1 to 10, pupils were told that people who earn the most money, receive the best education, and have the most respected jobs would be rated as a 10, whereas the least well-off families, who earn the least money, receive no education, and have no jobs or the least respected jobs would be rated a 1. Pupils were asked to first rate where they would place their family on this scale, and then where they think they would end up on the scale at the age of 30.

Figure 7.3 shows that more than two-thirds (67%) of pupils in Northern Ireland placed their relative family wealth as a 7 or higher on the scale, and only around 7% placed their family wealth lower than a 5 on the scale now. On average across the OECD countries[17] 67% of pupils placed their relative family wealth as a 7 or higher on the scale, and around 8% placed their family wealth lower than a 5 on the scale now.

Pupils had positive expectations for their future relative wealth, with more than a quarter (26%) expecting to rate as a 9 or 10 on the scale by the age of 30. This was below the percentage on average across the OECD countries (34%).

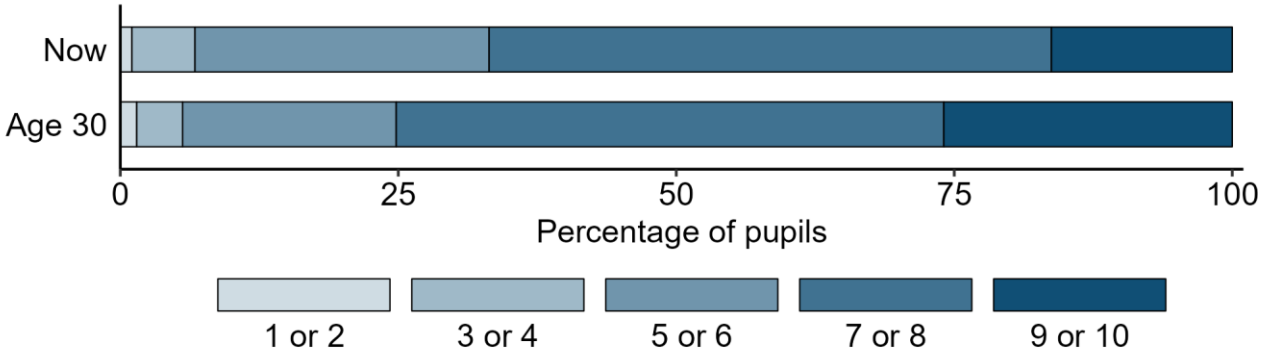
Pupils who placed their relative family wealth as a 7 or higher on the scale also had a positive ESCS Index, and pupils who placed their relative family wealth as below 7 on the scale had a negative ESCS Index. This means that on average pupils in Northern Ireland who placed their relative family wealth as high also had a higher socioeconomic status than the average across the OECD countries. Pupils in Northern Ireland who placed their

[17] Data not available for 9 of the 37 OECD countries

relative family wealth as a 5 or 6, representing the middle of the scale, had an ESCS Index of -0.19 which was lower than the average ESCS Index across the OECD countries and the average ESCS Index for pupils in Northern Ireland.

Pupils' perceptions of their current relative family wealth generally related to how they performed in mathematics, with pupils placing their relative family wealth lower on the scale achieving a lower average score in mathematics. This was true for all groups except the group that placed their relative family wealth at 9 or 10 on the scale which had an average mathematics score of 436 which was below the average score for all pupils in Northern Ireland.

Figure 7.3: Pupils' perceptions of their current relative family wealth, and expectations of their relative wealth by the time they are 30



Time	1 or 2	3 or 4	5 or 6	7 or 8	9 or 10
Relative wealth now	1%	6%	26%	51%	16%
Expectation at age 30	1%	4%	19%	49%	26%

Base: 2,158 and 2,132 pupils in Northern Ireland respectively (90% and 89% weighted response rate). Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST259

Pupils were also asked about how often they did not eat in the past 30 days because there was not enough money to buy food. Table 7.5 shows the percentage of pupils in Northern Ireland who reported that this had never or almost never happened in the past 30 days, compared to the percentage who reported that this happened every day or almost every day. Relative to the OECD average of 3% of pupils, a similar percentage of pupils in Northern Ireland (6%) reported that they had to skip eating every day or almost every day because there was not enough money to buy food.

Table 7.5: Percentage of pupils in Northern Ireland reporting different regularity of not being able to afford to buy food

Statement	Never or almost never	Between once a week and 5 times a week	Every day or almost every day
In the past 30 days, how often did you not eat because there was not enough money to buy food?	89%	4%	6%

Base: 2,182 pupils in Northern Ireland (91% weighted pupil response rate).
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST258

Pupils in Northern Ireland who reported never or almost never not eating because there was not enough money to buy food had average PISA mathematics scores 59 points higher than pupils in Northern Ireland who reported that they had to skip meals (484 compared to 426).

7.5 Pupils' attitudes towards learning

In addition to more general questions about pupils' wellbeing, the student questionnaire also asks pupils a variety of questions about their attitudes to learning, including whether they have views conducive to a 'growth mindset'.

A growth mindset refers to the view that intelligence is something that can be developed, rather than something static or predetermined. Dweck (2006; 2016) argues that pupils who see intelligence as something that can be developed are more willing to embrace educational challenges, persevere when challenged, acknowledge and learn from criticism, and be inspired by others who succeed. In turn, Dweck argues that pupils with a growth mindset are able to reach higher levels of achievement. By contrast, pupils who see their intelligence as fixed are likely to avoid challenge and give up easily, ignore negative feedback and feel threatened by the success of others, and may therefore not reach their academic potential.

This section focuses on pupils' growth mindsets, before looking at their persistence more generally, as well as their anxiety specifically in mathematics.

7.5.1 Pupils' growth mindsets

Four questions, shown in Table 7.6, asked pupils about their views on statements relating to growth mindsets. Forty-three percent of pupils in Northern Ireland agreed or strongly agreed that intelligence could not be changed, similar to the OECD average

(42%). In Northern Ireland, just under two-thirds (63%), felt this way about creativity, compared to 53% of pupils on average across the OECD countries.

Around two-thirds of pupils in Northern Ireland agreed or strongly agreed that some people, regardless of how much they studied, would not be any good in either mathematics (66%) or English (68%). These were similar to the percentage of pupils on average in OECD countries where 65% of pupils agreed or strongly agreed that some people, regardless of how much they studied, would not be any good in mathematics, and 60% in English.

Table 7.6: Percentage of pupils in Northern Ireland and on average across the OECD countries agreeing with statements about the flexibility of intelligence and subject-specific skills

Statement	Northern Ireland	OECD average
Your intelligence is something about you that you cannot change very much	43%	42%
Some people are just not good at mathematics, no matter how hard they study	66%	65%
Some people are just not good in English*, no matter how hard they study	68%	60%
Your creativity is something about you that you cannot change very much	63%	53%

** Internationally, this question asked about the language of the test taken by the pupil, not always English.*
Base: 2,120 and 2125 pupils in Northern Ireland (88% or 89% weighted pupil response rate). OECD average percentage based on data from 36 OECD countries.
Percentages based on the percentage of pupils who agreed, or strongly agreed with the given statement. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST263

Pupils in Northern Ireland who disagreed or strongly disagreed that your intelligence is something about you that you cannot change very much, scored significantly higher, on average, in mathematics than those who agreed or strongly agreed (500 and 454 respectively). This was also the case on average across the OECD countries with an average difference of 24 score points, which was not significantly different from the average difference in Northern Ireland of 46 score points.

Similarly, pupils who disagreed or strongly disagreed that some people are just not good at mathematics or English, no matter how hard they study scored significantly higher in mathematics than pupils who agreed or strongly agreed, with a 34 score point difference for mathematics, and an 18 score point difference for English. There was no significant

difference in mathematics performance for pupils in Northern Ireland who disagreed or strongly disagreed that your creativity is something about you that you cannot change very much compared to pupils who agreed or strongly agreed (2 score points difference).

7.5.2 Pupils' mathematics anxiety

Pupils were asked about their anxiety towards mathematics classes and completing mathematical problems. Pupils were also asked how much they agree with 6 statements shown in Table 7.7. Around one-third of pupils (33%) in Northern Ireland reported that they agree or strongly agree that they get nervous doing mathematical problems, while just over half (52%) agreed or strongly agreed that they often worry they will face difficulties in mathematics classes. Sixty-two per cent, reported that they were worried about getting poor marks in mathematics.

Table 7.7: Percentage of pupils in Northern Ireland and on average across the OECD countries agreeing with statements about their anxiety towards mathematics

Statement	Northern Ireland	OECD average
I often worry that it will be difficult for me in mathematics classes	52%	60%
I get very tense when I have to do mathematics homework	34%	39%
I get very nervous doing mathematical problems	33%	39%
I feel helpless when doing a mathematics problem	32%	41%
I worry that I will get poor marks in mathematics	62%	65%
I feel anxious about failing in mathematics	60%	55%

Base: 1,666 and 1,707 pupils in Northern Ireland (69% to 71% weighted pupil response rate). OECD average percentage based on data from 36 OECD countries.
Percentages based on the percentage of pupils who agreed, or strongly agreed with the given statement. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST292

Responses to these questions were highly predictive of mathematics scores; for example, pupils in Northern Ireland who agreed or strongly agreed that they were worried about getting poor marks in mathematics had an average mathematics score of 474, more than 26 points behind those that disagreed or strongly disagreed with the statement (average score 501). For each statement the difference in mathematics scores between pupils in Northern Ireland who agreed and strongly agreed and pupils who disagreed and

strongly disagreed was not significantly different to the average differences in scores across the OECD countries.

7.5.3 Pupil aspirations

Pupils were asked which qualifications they expected to complete. Almost all pupils expected to complete GCSEs or equivalent qualifications. Around three-quarters of pupils in Northern Ireland (74%) expected to complete AS, A levels or an equivalent qualification and 60% of pupils expected to complete a university degree, with around a quarter of pupils (26%) reporting that they did not know if they expected to complete a university degree as shown in Table 7.8. These were similar to the percentage of pupils on average across the OECD countries where 78% of pupils said they were expecting to complete the equivalent to A levels and 53% of pupils said they were expecting to complete a university degree.

Table 7.8: Percentage of pupils in Northern Ireland who expect to complete specific qualifications

Qualification	Yes	No	I don't know
Qualifications at level 1 e.g., BETC level 1, Entry level certificates	53%	15%	32%
GCSEs or equivalent (e.g. BTEC First)	91%	3%	6%
AS or A levels, or equivalent qualifications (e.g., BTEC National)	74%	10%	16%
A Higher Education access course (this qualifies a person to enter higher education without level 3 qualifications)	40%	19%	41%
A university degree (e.g., BA, BSc, BEd)	60%	14%	26%
A master's degree (e.g., MA, MSc, MBA)	28%	22%	50%
A doctorate or higher degree (e.g., MPhil, PhD)	14%	31%	54%

Base: 1,653 and 1,953 pupils in Northern Ireland (68% to 81% weighted pupil response rate).
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST327

7.6 Pupil experiences of teaching and learning

This section reports on pupils' responses to questions about their experiences of teaching and learning in mathematics, English and science, and compares these to those of pupils on average in the OECD countries.

7.6.1 Pupil attitudes towards mathematics, English and science

Almost all pupils in Northern Ireland reported that they wanted to do well in mathematics, English and science, although the majority of pupils did not consider these subjects to be one of their favourites. The percentage of pupils in Northern Ireland who agreed with the statement mathematics is one of my favourite subjects (41%) and the percentage who agreed with the statement English is one of my favourite subjects (38%) and the percentage who agreed with the statement science is one of my favourite subjects (45%) were similar to the percentage of pupils on average in OECD countries; 39%, 39% and 47% respectively.

Table 7.9 shows the percentages of pupils agreeing or strongly agreeing with each of the statements in Northern Ireland and on average across the OECD countries. A similar percentage of pupils in Northern Ireland wanted to do well in mathematics, science and English as on average across the OECD countries.

Table 7.9: Percentage of pupils in Northern Ireland and on average across the OECD countries agreeing with statements about their attitudes towards core subjects

Statement	Northern Ireland	OECD average
Mathematics is one of my favourite subjects.	41%	39%
English is one of my favourite subjects*.	38%	39%
Science is one of my favourite subjects.	45%	47%
Mathematics is easy for me.	49%	44%
English is easy for me*.	52%	57%
Science is easy for me.	45%	50%
I want to do well in my mathematics class.	95%	89%
I want to do well in my English class*.	94%	89%
I want to do well in my science class.	91%	88%

** Internationally, this question asked about the language of the test taken by the pupil, not always English.*
Base: 2,087 to 2,133 pupils in Northern Ireland (87% to 89% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Percentages based on the percentage of pupils who agreed, or strongly agreed with the given statement.

Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

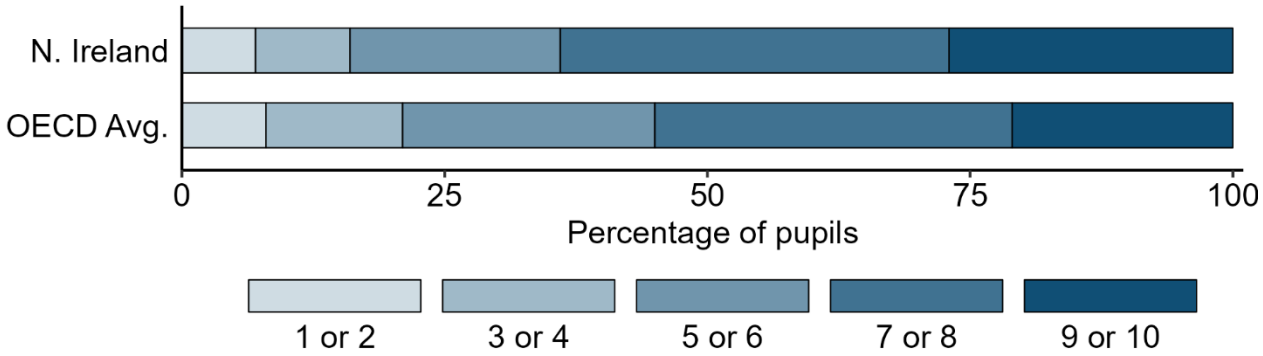
Source: OECD, PISA 2022, ST268

Around half of the pupils reported that they found mathematics easy (49%), 52% reported they found English easy, with 45% of pupils in Northern Ireland reporting that they found science easy. This was similar to the percentage of pupils on average across the OECD countries who reported finding mathematics (44%), English (or the language of the PISA assessment) (52%), or science (45%) easy. A similar percentage of pupils in Northern Ireland wanted to do well in mathematics, science and English as on average across the OECD countries.

Pupils in Northern Ireland were also asked to rate the quality of mathematics instruction this year on a scale of 1 to 10 where 1 was the worst mathematics instruction possible and 10 was the best mathematics instruction possible. In Northern Ireland, the average rating was 6.9, which was significantly higher than the OECD average of 6.4.

Figure 7.4 shows the distribution of pupil responses for Northern Ireland and on average across the OECD countries.

Figure 7.4: Quality of mathematics instruction as rated by pupils in Northern Ireland and on average across the OECD countries.



Country	1 or 2	3 or 4	5 or 6	7 or 8	9 or 10
Northern Ireland	7%	9%	20%	37%	27%
OECD Average	8%	13%	24%	34%	21%

Base: 2,131 pupils in Northern Ireland (89% weighted pupil response rate). OECD average percentages based on data from 34 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST272

Pupils were also asked how often their teacher supports them in their mathematics lessons by stating how often each of the activities in Table 7.10 occurred. In Northern Ireland, the percentage of pupils who reported that each of the support activities occurred

in every or most mathematics lessons was higher than the OECD average. Pupils in Northern Ireland were more likely to report that their mathematics teacher helps pupils with their learning in every or most mathematics lessons (82%) than reported by pupils on average across the OECD countries, (72%). A similar percentage of pupils in Northern Ireland reported that their mathematics teacher gives extra help when needed in every or most mathematics lessons (80%) and that their mathematics teacher shows an interest in their learning (72%), continues teaching until they understand (70%) in every or most mathematics lessons, to the percentage of pupils on average across the OECD countries, 70%, 63% and 64% respectively.

Table 7.10: Percentage of pupils in Northern Ireland and on average across the OECD countries who reported that each of these statements occurred in every or most mathematics lessons

Statement	Northern Ireland	OECD average
The teacher shows an interest in every student's learning.	72%	63%
The teacher gives extra help when students need it.	80%	70%
The teacher helps students with their learning.	82%	72%
The teacher continues teaching until the students understand.	70%	64%

Base: 2,104 to 2,108 pupils in Northern Ireland (88% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Percentages based on the percentage of pupils who agreed, or strongly agreed with the given statement. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST268

7.6.2 Pupil time spent on learning-related activities

The majority of pupils in Northern Ireland reported spending less than 30 minutes a day on mathematics, English or science homework, as shown in Table 7.11. A similar percentage of pupils spent more than an hour on mathematics (12%), English (20%) and science (16%) homework each day to the average across the OECD countries (21%, 18% and 22% respectively). The majority of pupils (57%) reported spending more than 1 hour each day on homework which was a similar percentage of pupils on average across the OECD countries (54%).

Table 7.11: Time spent on homework as reported by pupils in Northern Ireland

Type of homework	Up to 30 minutes a day	More than 30 minutes and up to 1 hour a day	More than 1 hour a day
Mathematics homework	60%	28%	12%
English homework	53%	27%	20%
Science homework	55%	30%	16%
Total time for all homework in all subjects, including subjects not listed above	24%	19%	57%

Base: 2,060 to 2.097 pupils in Northern Ireland (86% or 87% weighted pupil response rate).
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST296

Pupils in Northern Ireland who reported spending more than 1 hour a day on mathematics homework had an average score for mathematics of 495. This compares to an average mathematics score for pupils who reported spending up to 30 minutes a day (476). Similarly, pupils in Northern Ireland who reported spending between 30 minutes and up to 1 hour a day on reading homework had a significantly higher average score for reading (503) than pupils who reported spending up to 30 minutes a day (484). Pupils who reported spending between 30 minutes and up to 1 hour a day on science homework had a significantly higher average score (514) for science than pupils who reported spending up to 30 minutes a day on science homework (484). For the total time for all homework in all subjects, pupils in Northern Ireland who reported spending more than 1 hour a day in total had an average performance in mathematics of 499, which was significantly higher than pupils who reported spending up to 30 minutes a day (442).

Pupils in Northern Ireland were also asked about additional mathematics learning activities that they participated in. Around one-tenth of pupils in Northern Ireland reported participating in large group study or practice (12%) which was similar to the percentage of pupils on average in OECD countries (10%). A similar percentage of pupils in Northern Ireland (53%) and on average across the OECD countries (50%) did not take part in any additional mathematics learning activities. Pupils' reported participation in these different additional mathematics learning activities are shown in Table 7.12.

Table 7.12: Percentage of pupils in Northern Ireland and on average across the OECD countries who reported attending additional mathematics learning activities this school year

Mathematics learning activity	Northern Ireland	OECD average
One-on-one tutoring with a person	18%	20%
Internet or computer tutoring with a programme or application	14%	18%
Video-recorded instruction by a person	13%	16%
Small group study or practice (2 to 7 students)	14%	18%
Large group study or practice (8 or more students)	12%	10%
I do not participate in additional mathematics learning activities	53%	50%

Base: 2,184 pupils in Northern Ireland (91% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST297

7.6.3 Pupil use of digital devices

Pupils were asked a series of questions about how they felt or acted towards digital devices both in school and outside of school. Over half of pupils in Northern Ireland (53%) reported turning off notifications during class and almost a half turned off notifications when they went to sleep (48%). These percentages were similar to the average across the OECD countries, 53% and 51% respectively, as shown in Table 7.13. While around a quarter of pupils across the OECD countries (26%) reported that they used digital devices in class to take notes or search for information, only 12% of pupils in Northern Ireland did this. Only 5% of pupils in Northern Ireland reported feeling pressured to be online and answer messages when they were in class compared to 10% of pupils across the OECD countries.

Table 7.13: Percentage of pupils in Northern Ireland and on average across the OECD countries who reported feeling or acting towards digital devices in specific ways

Statement	Northern Ireland	OECD average
I turn off notifications from social networks and apps on my digital devices during class.	53%	53%
I turn off notifications from social networks and apps on my digital devices when I go to sleep.	48%	51%
I keep my digital device near me to answer messages when I am home.	79%	69%
I have my digital device open in class so I can take notes or search for information.	12%	26%
I feel pressured to be online and answer messages when I am in class.	5%	10%
I feel nervous/anxious when I don't have my digital device near me.	16%	16%

Base: 1,778 to 1,818 pupils in Northern Ireland (75% or 76% weighted pupil response rate). OECD average percentage based on data from 36 OECD countries.
Percentages based on the percentage of pupils who reported each statement happened more than half the time or all or almost all of the time.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST322

Pupils in Northern Ireland were asked how many hours a day they usually used digital resources in a range of different situations in the last school year.

Table 7.14 shows that around one-third of pupils in Northern Ireland reported using digital resources for learning activities before and after school and at weekends, with 39% using digital resources for learning activities in school.

Table 7.14: Time pupils in Northern Ireland reported using digital resources for learning activities.

Use of digital resources	None	Up to 1 hour	More than 1 hour
For learning activities at school	19%	42%	39%
For learning activities before and after school	30%	37%	33%
For learning activities on weekends	40%	27%	34%

Base: 2,074 to 2,124 pupils in Northern Ireland (87% or 89% weighted pupil response rate).
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST326

A large percentage of pupils in Northern Ireland reported not using digital resources for leisure activities in school or using them for less than an hour a day (75%). The majority of pupils in Northern Ireland reported using digital resources for more than 4 hours for leisure on weekends (59%), as shown in Table 7.15.

Table 7.15: Time pupils in Northern Ireland reported using digital resources for leisure activities.

Use of digital resources	None or up to 1 hour	More than 1 hour and up to 4 hours	More than 4 hours
For leisure at school	75%	21%	4%
For leisure before and after school	30%	41%	30%
For leisure on weekends	13%	28%	59%

Base: 2,083 to 2,091 pupils in Northern Ireland (87% weighted pupil response rate).
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, ST326

Pupils were asked how often they used different digital devices or software at school and at home. Most pupils in Northern Ireland accessed the internet in school at least once a week (74%) and also used a desktop or laptop computer at least once a week (74%), as shown in Table 7.16. The use of educational software and school learning platforms were used less often with 46% of pupils reporting that they used educational software, games or apps, or other learning tools and 44% of pupils using a learning management system or school learning platform only once or twice a month or less often.

Table 7.16: How often pupils in Northern Ireland who reported using digital devices or software in school

Type of digital device or software	Once or twice a month or less often	About once or twice a week	Every day or several times a day
Desktop or laptop computer	24%	37%	37%
Smartphone (i.e., mobile phone with internet access)	26%	19%	51%
Tablet device (e.g., iPad, Galaxy Tab, Amazon Fire) or e-book reader (e.g. Amazon Kindle, Kobo)	63%	11%	17%
Internet access (except on smartphones)	22%	25%	49%
School portal (to consult timetable, absences, etc.)	56%	14%	22%
Educational software, games or apps, other learning tools (e.g., CK-12™ or Mathalicious online support)	46%	23%	26%
A learning management system or school learning platform ((e.g., Blackboard, Edmodo, Moodle, Google® Classroom)	33%	24%	37%

Base: 2,003 to 2,072 pupils in Northern Ireland (83% to 86% weighted pupil response rate).
Table does not include pupils who reported that the resource was not available to them in school. Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, IC170

Out of school, the majority of pupils in Northern Ireland reported using a smartphone (85%) every day or several times a day. The majority of pupils (73%) also reported accessing the internet on a device other than a smartphone every day or several times a day. Around half of pupils in Northern Ireland (45%) also reported using educational software, games or Apps, or other learning tools at least once a week out of school. Table 7.17 shows how often pupils in Northern Ireland reported using different digital devices or software out of school.

Table 7.17: How often pupils in Northern Ireland reported using digital devices or software out of school

Type of digital device or software	Once or twice a month or less often	About once or twice a week	Every day or several times a day
Desktop or laptop computer	24%	26%	48%
Smartphone (i.e., mobile phone with internet access)	7%	8%	83%
Tablet device (e.g., iPad, Galaxy Tab, Amazon Fire) or e-book reader (e.g., Amazon Kindle, Kobo®)	47%	16%	31%
Internet access (except on smartphones)	12%	13%	73%
Educational software, games or Apps, other learning tools (e.g., CK-12™ or Mathalicious online support)	50%	19%	26%
Video or online games (e.g., used with game consoles such as a Play Station 4 or Nintendo Switch, online gaming platforms such as Steam or gaming Apps such as Angry Birds)	32%	17%	48%

Base: 1,963 to 1,984 pupils in Northern Ireland (81% or 82% weighted pupil response rate).
Table does not include pupils who reported that the resource was not available to them out of school.
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, IC171

The percentage of pupils in Northern Ireland who reported that a range of digital resources were available and used in school was similar to the percentage of pupils on average across the OECD countries, as shown in Table 7.18.

Table 7.18: Percentage of pupils in Northern Ireland and on average across the OECD countries agreeing with statements about the availability and use of digital resources in school

Statement	Northern Ireland	OECD average
There are enough digital resources for every student at my school.	68%	71%
There are enough digital devices with access to the Internet at my school.	75%	74%
The school's internet speed is sufficient.	56%	54%
Digital resources function properly at my school.	73%	71%
Digital resources are easily accessible within the classroom.	69%	67%
Digital learning resources available at my school make learning interesting.	75%	68%
The school provides sufficient technical support to help students in their use of digital resources.	76%	69%
Teachers at my school have the necessary skills to use digital devices during instruction.	78%	70%
Teachers at my school are willing to use digital resources for teaching.	82%	77%

Base: 1,975 to 2,013 pupils in Northern Ireland (82% to 84% weighted pupil response rate). OECD average percentage based on data from 29 OECD countries.
Percentages based on the percentage of pupils who agreed, or strongly agreed with the given statement.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, IC172

In Northern Ireland, the majority of pupils reported that they used digital resources in less than half of their mathematics (67%), English (72%) and science (64%) lessons. Around one-fifth of pupils in Northern Ireland reported that they used digital resources in more than half their lessons or every lesson (16% in English lessons, 22% in mathematics lessons and 19% in science lessons).

Table 7.19: How often pupils in Northern Ireland reported using digital resources in different classes at school

School subject	Less than half of the lessons or never	In about half of the lessons	In more than half of the lessons or every lesson
English	72%	11%	16%
Mathematics	67%	10%	22%
Science	64%	14%	19%

Base: 2,000 to 2,028 pupils in Northern Ireland (83% or 84% weighted pupil response rate
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, IC173

8 Schools

8.1 Chapter overview

This chapter focuses on the responses from the principals of pupils that participated in PISA 2022 to the school questionnaire. It discusses school management and policies, as well as aspects related to school climate. A description of variation in mathematics performance both within and across schools in Northern Ireland is also provided.

8.2 Key findings

- Principals in Northern Ireland reported that the most frequently used admission policies in their schools were residence in a particular area and preference given to family members of current or former pupils with 67% and 70% of pupils respectively being in schools whose principal reported that these criteria were used sometimes or always. Academic records were considered less often (48% of pupils).
- In Northern Ireland a smaller percentage of pupils were in schools whose principal reported that they have a home language other than English (6%), have immigrated (not including refugees) (3%) and have parents who have immigrated (5%) than on average across the OECD countries (14%, 8% and 12% respectively). The percentage of 15-year-old pupils in Northern Ireland and on average across the OECD countries that were in schools whose principal reported that they are refugees was the same (1%).
- Almost all pupils in Northern Ireland (93%) were in schools whose principal reported that, for some or all subjects, pupils were grouped by ability into different classes, larger than the percentage of pupils on average across the OECD countries (37%).
- The most commonly reported approach to monitoring teachers was using tests or assessments of pupil achievement with 83% of pupils being in schools whose the principal reported this happening. Other approaches used included teacher peer review (59%), principal or senior staff observations of lessons (53%) and observation of classes by inspectors or other persons external to the school (24%).
- A lack of physical infrastructure was reported to be the most common barrier to teaching, with 52% of pupils attending schools where the principal reported this being an issue. Additionally, 45% of pupils were in schools whose principal reported that inadequate or poor quality physical infrastructure and a lack of teaching staff as a barrier to teaching at least to some extent.

- Pupils not paying attention was reported to be the most common behaviour that hindered pupils' learning, with 64% of pupils being in schools whose principal reported that this affected pupils' learning at least to some extent.
- In Northern Ireland, 39% of the variance in mathematics performance was attributable to differences between schools rather than differences within schools. On average across the OECD countries 32% of the variance in mathematics performance was attributable to differences between schools. This suggests there was more heterogeneity between schools in Northern Ireland compared to other OECD education systems.

8.3 School questionnaire

As part of PISA 2022, principals of participating schools were asked to complete a questionnaire. This questionnaire asked about aspects related to school context, school management, teaching staff, assessment and evaluation, grouping policies in school, the school climate and learning environment.

Typically, the questions related to policy and practices at the school and asked principals to state whether the policies are mandatory as well as how frequently they are practised in their school (e.g., weekly, monthly, never). Some questions also asked principals to elaborate on details regarding each policy or practice, as well as their perceptions of the impact of certain policies at their school. As in the previous chapter, this chapter describes the questions that principals were asked, the possible response options for each question, and their responses to relevant sub-questions.). As PISA is a study of pupils in schools and not schools directly, the results are reported in terms of the percentage of pupils in a participating education system that were in schools where the principal responded in a certain way. In other words, the principals' responses to the questions in this chapter represent a certain percentage of all 15-year-old pupils. To ensure that the answers from these principals remain confidential and anonymous, all figures that identify fewer than 10 pupils are suppressed. The results for Northern Ireland are presented and compared with averages across the OECD countries to provide a perspective on how these factors in schools in Northern Ireland align with those on average in other education systems.

It is important to note that not all principals completed the school questionnaire and among those that did, individual questions had differing response rates. Additionally, the sample of schools in Northern Ireland participating in PISA in 2022 did not meet some of the PISA sampling standards (see Chapter 1 for further details). Consequently, the national results reported in this chapter should be interpreted with caution and a note is included below each table that shows the number of pupils whose principal responded to those questions, as well as the number of and the weighted pupil response rate. In order

to provide information that presents the most reliable information available, this chapter only includes questions that had weighted response rates from principals in Northern Ireland of at least 70% for the majority of items within a question (i.e., a minimum of 53 schools).

In this chapter, we also do not report whether differences between the percentage of pupils whose principals responded a certain way in Northern Ireland and the percentage of pupils whose principals responded that way on average across the OECD countries were statistically significant because, due to the large sample sizes, small differences in percentages can be statistically significant but not meaningful in terms of policy or practice.

8.4 School management and policies

This section presents the responses of principals to questions regarding school type, characteristics of pupils who attend their schools, and policies regarding admissions, monitoring and evaluation and professional development at their school. The findings are presented in terms of the percentage of pupils that are represented by the responses of their principal.

8.4.1 School characteristics

Principals of participating pupils were asked whether their school was public (i.e., managed directly or indirectly by a local authority, government agency, or central government) or independent (i.e., managed directly or indirectly by a non-government organisation). Almost all pupils (97%) in Northern Ireland were in schools identified as a public school by their principal, compared to an average of 83% of pupils across the OECD countries.

Principals of participating pupils were also asked about the overall characteristics of 15-year-old pupils in their schools. This reflected pupils' characteristics from the principals' perspective, compared to the pupils' responses as reported in Chapter 7.

In Northern Ireland a lower percentage of pupils were in schools whose principal reported that they have a home language other than English (6%), have immigrated (not including refugees) (3%) and have parents who have immigrated (5%) than on average across the OECD countries (14%, 8% and 12% respectively). The percentage of 15-year-old pupils in Northern Ireland and on average across the OECD countries that were in schools whose principal reported they are refugees was the same (1%).

In contrast, in Northern Ireland there was a larger percentage of 15-year-old pupils in schools whose principal reported they had special educational needs (19%) and a larger

percentage from socioeconomically disadvantaged homes (28%), compared to the OECD averages of 11% and 22% respectively. These results are shown in Table 8.1.

Table 8.1: The percentage of pupils in Northern Ireland and on average across the OECD countries with particular characteristics as reported by principals weighted by the number of pupils they represent

Criteria	Northern Ireland	OECD average
Students whose home language is not English	6%	14%
Students with special educational needs	19%	11%
Students from socioeconomically disadvantaged homes	28%	22%
Students who are immigrants (not including refugees)	3%	8%
Students who have parents who have immigrated	5%	12%
Students who are refugees	1%	1%

Base: Northern Ireland data from between 1,756 and 2,008 pupils from 59 to 67 schools (between 72% and 82% weighted pupil response rate). OECD average percentage based on data from 36 OECD countries. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC211

8.4.2 School admissions policies

PISA 2022 asked principals about their school's admissions criteria and their frequency of use. Different criteria used by schools and differences in their frequency of use can lead to greater between school variation in mathematics performance (see section 8.6 for a discussion on between school variation). The responses from principals in Northern Ireland describing the frequency at which each of the factors considered for admission to their school are shown Table 8.2.

Principals in Northern Ireland reported that the most frequently used admission policies in their schools were residence in a particular area and preference given to family members of current or former pupils with 67% and 70% of pupils respectively being in schools whose principal reported that these criteria were used sometimes or always. Academic records were considered less often (48% of pupils). On average across the OECD countries, residential area was sometimes or always considered for admission for 60% of pupils and preference given to family members of current or former pupils for 40%. The percentage of 15-year-old pupils in Northern Ireland and on average across the OECD countries that were in schools whose principal reported that they are refugees was the same (1%).

Table 8.2: Factors considered for admission to school as reported by principals in Northern Ireland and on average across the OECD countries

Criteria	Northern Ireland	OECD average
Preference given to family members of current or former pupils	70%	40%
Residence in a particular area	67%	60%
Pupil's record of academic performance	48%	52%
Pupil's disciplinary record in this or another school	41%	45%
Recommendation of feeder schools	40%	41%
Whether the pupil requires or is interested in a special programme	32%	57%
Parents' or guardians' endorsement of the teaching or religious philosophy of the school	24%	26%
Pupil's cultural or ethnic background	10%	9%
Pupil's working status	8%	14%
Pupil's parental status or pregnancy	2%	10%

Base: Northern Ireland data from 2,035 or 2,097 pupils from 68 or 70 schools (84% or 86% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Percentage of pupils with principals who reported sometimes or always using each admission criteria.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC012

Almost half of all pupils (48%) in Northern Ireland were in schools whose principal reported that a pupil's academic record was considered for admission either sometimes or always similar to the percentage of pupils on average across the OECD countries (52%). Criteria related to pupils' personal characteristics such as their cultural or ethnic background, their working status or their parental status were almost never considered as admission criteria in Northern Ireland or in other OECD countries.

8.4.3 Pupil grouping policies

Principals were also asked to report on grouping policies at their schools by noting the prevalence of policies where pupils are grouped by ability either into different classes or within their class. Principals could respond to each type of grouping policy by stating if it was used: 'for all subjects', 'for some subjects' or 'not for any subjects'. Table 8.3 shows the grouping policies as reported by the principals of participating pupils in Northern Ireland.

Table 8.3: The percentage of pupils in Northern Ireland an on average across the OECD countries whose principal reported that ability grouping policies are used in their school for all or some subjects

Pupil grouping policy	Northern Ireland	OECD average
By ability into different classes	93%	37%
By ability within the same class	62%	49%

Base: Northern Ireland data from 1,776 pupils in 59 schools (73% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Percentage of pupils in schools that group pupils for all or some subjects as reported by the school principal.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC042

In Northern Ireland, grouping policies are more regularly used to group pupils by ability into different classes than within the same class, with 93% of pupils being in schools whose principal reported that, for some or all subjects, pupils were grouped by ability into different classes. In contrast, 62% of pupils were in schools whose principal reported that pupils were grouped by ability within the same class for some or all subjects. Both across and within classes, ability grouping was more commonly confined to some subjects, rather than in every subject.

Ability grouping into different classes was less common on average across the OECD countries than it was in Northern Ireland. On average across the OECD countries, 37% of pupils were in schools where principals reported that pupils were grouped by ability into different classes for some or all subjects, and 49% were in schools where principals reported that pupils were grouped by ability within the same class for some or all subjects.

Principals were also asked about the use of ability grouping practices in mathematics classes specifically. Table 8.4 is based on principals' responses to these questions and shows the most common response, either 'all classes' or 'some classes', or 'no classes', and the percentage of pupils in schools where principals reported that each grouping policy was used for all, some, or no mathematics classes. In mathematics classes in Northern Ireland, grouping by ability was more typically practised than across the OECD countries. Just over half of pupils (53%) were in schools where principals reported that all mathematics classes at their school study similar content but at different levels of difficulty, compared to 33% of pupils on average across the OECD countries. Similarly, it was also common for pupils (48%) to be in schools where principals reported that in all mathematics classes, pupils are grouped by ability within that class, whereas it was more common on average across the OECD countries (54%) for pupils to be in schools where principals reported that this never happens.

Table 8.4: The percentage of pupils in Northern Ireland whose principal reported using different grouping policies for mathematics classes

Grouping policy	For all classes	For some classes	Not for any classes
Mathematics classes study similar content, but at different levels of difficulty	53%	42%	4%
Different classes study different content or sets of mathematics topics that have different levels of difficulty	41%	48%	11%
Pupils are grouped by ability within their mathematics classes	48%	35%	17%
In mathematics classes, teachers use pedagogy suitable for pupils with heterogeneous abilities	23%	39%	38%

Base: Northern Ireland data based on data from 1,776 pupils in 59 schools (73% weighted pupil response rate).
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC187

8.4.4 School assessment policies and practices

Principals were also asked to report how often pupils in the PISA year groups (Year 11 and 12 in Northern Ireland) were assessed using each of the following methods: externally set and marked examinations (e.g., GCSEs), non-mandatory standardised tests (e.g., publicly or commercially available standardised test material), teacher developed tests, and teachers' judgmental ratings in general and for mathematics specifically. In Northern Ireland, these questions were responded to by 58 principals. Principal reports in Northern Ireland revealed that there were marked differences in the frequency at which standardised tests (whether mandatory or not) were used when compared to teacher-based assessment methods. Externally set examinations were common in Northern Ireland, with 82% of pupils being in schools where principals reported that they were used once or twice a year and all other pupils being in schools where principals reported that they were used more frequently. This is likely to be because most pupils in Northern Ireland take their GCSE examinations in Year 12. Non-mandatory standardised tests were reported by principals of 76% of pupils in Northern Ireland to be used only once or twice a year. On average across the OECD countries, 45% of pupils were in schools where the principals reported that they only used them once or twice a year and 34% of pupils were in schools where the principals reported that they never used non-mandatory standardised tests.

Teacher-based assessments were typically used more frequently than standardised assessment methods in Northern Ireland, with 57% of pupils being in schools where principals reported that teacher developed tests were used between 3 and 5 times a year, and 33% of pupils being in schools where principals reported that they were used monthly or more. On average across the OECD countries 28% of pupils were in schools where principals reported using teacher developed tests between 3 and 5 times a year and 62% were in schools where principals reported that they were used monthly or more frequently.

In mathematics classrooms, principals reported that the most frequently used assessment method in Northern Ireland was teacher-developed tests with 52% of pupils being in schools where principals reported that they were used at least monthly. On average across the OECD countries, 63% of pupils were in schools where principals reported using teacher-developed tests in mathematics at least monthly. In Northern Ireland, 47% of pupils were in schools where principals reported that pupils were assessed in mathematics using teachers' judgmental ratings at least monthly. In contrast, on average across the OECD countries 61% of pupils were in schools where principals reported using teachers' judgement ratings at least monthly.

Principals of participating schools were also asked to report on how the information gained from both standardised testing and teacher-developed tests was used by teachers and the school. In Northern Ireland, the majority of pupils were in schools where principals reported that standardised tests were used to monitor school progress year to year (73%), and to identify aspects of instruction or the curriculum that could be improved (84%). Teacher-developed tests were most commonly reported to be used for the purposes of guiding pupils' learning (95% of pupils), to inform parents or guardians about their child's progress (79% of pupils) and to adapt teaching to pupils' needs (> 98% of pupils).

8.4.5 Monitoring and evaluation

Principals in participating schools reported on the procedures, policies and practices associated with quality assurance and school improvements at their schools. They were asked to describe the quality assurance practices listed in Table 9.5 according to whether they exist at their school as well as whether the existing arrangements were based on mandatory national or local policies or school initiatives.

The most frequent quality assurance and school improvement activities reported by principals in Northern Ireland are shown in Table 8.5. The majority of pupils in Northern Ireland and on average across the OECD countries were in schools whose principal reported using each of these quality assurance and school improvement activities. Pupils were more likely to be in schools in Northern Ireland whose principal reported using a written specification of the school's curricular profile and educational goals (over 99%)

than on average across the OECD countries (92%). Pupils in Northern Ireland were also more likely to be in schools whose principal reported having regular consultations aimed at school improvement with one or more experts over a period of at least six months (87%) and implement a standardised policy for mathematics subjects (85%) than on average across the OECD countries (53% and 67% respectively).

Table 8.5: The percentage of pupils in schools where the principal reported that their school conducted different quality assurance and school improvement activities in Northern Ireland and on average across the OECD countries

Quality assurance and school improvement activities	Northern Ireland	OECD average
Internal evaluation / Self-evaluation	>98%	95%
External evaluation	95%	78%
Written specification of the school's curricular profile and educational goals	>98%	92%
Written specification of pupil performance standards	96%	86%
Systematic recording of data such as teacher or pupil attendance and professional development	>98%	95%
Systematic recording of pupil test results and graduation rates	>98%	95%
Seeking written feedback from pupils	89%	71%
Teacher mentoring	> 98%	81%
Regular consultation aimed at school improvement with one or more experts over a period of at least six months	87%	53%
Implementation of a standardised policy for mathematics subjects	85%	67%

Base: Northern Ireland data based on between 1,797 and 1,879 pupils from between 60 and 63 schools (74% to 77% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Percentages are the percentages of pupils in schools with principals who reported that these activities were used because they were mandatory or on the school's initiative.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC037

Principals in participating schools were also asked to report on the impact of external evaluations at their school by describing how the results of the evaluations are used. The percentage of pupils in Northern Ireland with principals that reported the different consequences of external evaluation are presented in Table 8.6. In Northern Ireland,

more than 93% of pupils were in schools where principals reported that they use the data from external evaluations to plan specific actions for school development, to plan specific actions for the improvement of teaching and to put measures into practice derived from the results of external evaluations. Eighty-five per cent of pupils were in schools where principals reported that the results of this external evaluation led to changes in school policies. These were all larger than the percentage of pupils on average across the OECD countries where between 54% and 71% of pupils were in schools where principals reported these impacts.

Table 8.6: The percentage of pupils in schools where the principal reported the impacts of external evaluation in Northern Ireland and on average across the OECD countries

Impact of external evaluations	Northern Ireland	OECD average
The results of external evaluation led to changes in school policies	85%	54%
We used the data to plan specific action for school development	95%	71%
We used the data to plan specific action for the improvement of teaching	93%	69%
We put measures derived from the results of external evaluations into practice	93%	67%

Base: Northern Ireland data based on 1,864 pupils in 62 schools (76% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022 SC200

Principals in participating schools were also asked to state which approaches to monitoring teachers were used at their school in the last school year. The percentage of pupils in schools where principals reported each approach in Northern Ireland and on average across the OECD countries are presented in Table 8.7.

Table 8.7: The percentage of pupils in schools where the principal reported approaches to monitoring teachers at their school in Northern Ireland and on average across the OECD countries

Approach to monitoring teachers	Northern Ireland	OECD average
Tests or assessments of pupil achievement	83%	73%
Teacher peer review (of lesson plans, assessment instruments, lessons)	59%	58%
Principal or senior staff observations of lessons	57%	77%
Observation of classes by inspectors or other persons external to the school	24%	33%

Base: Northern Ireland data based on 1,842 pupils from 61 schools (76% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC032

In Northern Ireland 83% of pupils were in schools where principals reported monitoring teachers through tests or assessments of pupils' achievement. On average across the OECD countries, 73% of pupils were in schools where principals reported using these assessments. More than half of the pupils in Northern Ireland were in schools where the principal reported using teacher peer review (59%) and/or observations by senior staff (57%) to monitor teachers. Around one-quarter of pupils in Northern Ireland were in schools where the principals reported using observations by external staff including inspectors (24%). Around three-quarters of pupils on average across the OECD countries were in schools where principals reported using tests or senior staff observations (77%), with 58% reporting that they used teacher peer review and 33% involving observations from people external to the school.

According to principal reports, teacher appraisals were not likely to have an impact on teachers' salaries or financial rewards in Northern Ireland, with more than 94% of pupils in schools where principals said these appraisals had little or no effect. In Northern Ireland, 41% of pupils were in schools where principals reported teacher appraisals to have a moderate to large impact on opportunities for professional development. On average across the OECD countries this figure was 47%.

8.4.6 Professional development

Principals were asked to report the percentage of teachers at their school who had attended a formal programme of professional development in the three months before the study took place in November 2022. To qualify as a programme of professional development for this item, the session needed to be designed to enhance teaching skills

or pedagogical practice, focused on teaching and education, and have lasted for at least one full day. It was not necessary for the professional development activities to lead to a recognised qualification.

In Northern Ireland, principals reported that, on average, 68% of the teachers at their schools had recently attended a formal professional development session. The average across the OECD countries, was 51% of the teachers at their schools had recently attended professional development. For mathematics teachers specifically, these figures were of 59% of mathematics teachers in schools in Northern Ireland and 48% of mathematics teachers on average across the OECD countries.

Principals also described the in-house professional development activities that took place at their schools. Table 8.8 shows the percentage of pupils in schools where principals reported that their school organised in-house professional development activities in the form of specialist training sessions, workshops for specific school issues, and/or workshops for specific groups of teachers. More than 95% of pupils were in schools where principals reported that their school invites specialists to conduct in-service training and organises in-service workshops to deal with school-specific issues or for specific groups of teachers. On average across the OECD countries 80%, 84% and 72% of pupils were in schools where principals reported that these workshops were organised respectively.

Table 8.8: Type of in-house professional development activities as reported by principals in Northern Ireland and on average across the OECD countries

Type of professional development activity	Northern Ireland	OECD average
Our school invites specialists to conduct in-service training for teachers	95%	80%
Our school organises in-service workshops which deal with specific issues that our school faces	> 98%	84%
Our school organises in-service workshops for specific groups of teachers	91%	72%

Base: Northern Ireland data based between 1,812 and 1,842 pupils from 60 or 61 schools (74% or 76% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC027

8.5 School climate and the learning environment

This section describes the results from the school questionnaire items that examined school climate and the learning environment at participating schools. Principals provided their perspectives on different factors that might affect teaching and learning at their schools. Their responses describe issues related to key factors that might impact the overall school climate such as barriers to teaching, barriers to learning as well as pupil behaviours and the prevalence of issues such as vandalism or bullying.

8.5.1 Barriers to teaching and learning at school

There are numerous factors that might impact teaching and learning at schools. Principals were asked to describe the extent to which their school's capacity to provide teaching is hindered by the factors listed in Table 8.9.

The most commonly reported barriers to teaching was a lack of physical infrastructure, with over half (52%) of pupils being in schools where principals reported that this issue affected teaching to least to some extent. Over 40% of pupils were in schools where principals reported that teaching was affected by infrastructure that was inadequate or of poor quality (46%), a lack of digital resources (42%) and a lack of teaching staff (42%).

On average across the OECD countries issues relating to staffing, as in Northern Ireland, were commonly reported by principals as affecting teaching to least to some extent. On average across the OECD countries, 47% of pupils were in schools where principals reported that a lack of teaching staff affected teaching at least to some extent, 26% were in schools where principals reported inadequate or poorly qualified teaching staff and 36% where principals reported a lack of assisting staff had an impact on teaching.

However, a lack of physical infrastructure and inadequate or poor quality physical infrastructure were both less of an issue on average across the OECD countries than in Northern Ireland, with 29% and 28% of pupils respectively being in schools where principals reported these issues as affecting teaching to least to some extent (52% and 46% in Northern Ireland respectively).

Table 8.9: Issues faced by schools affecting teaching to some extent or a lot as reported by principals in Northern Ireland and on average across the OECD countries

Instruction is hindered by:	Northern Ireland	OECD Average
A lack of teaching staff	42%	47%
Inadequate or poorly qualified teaching staff	17%	26%
A lack of assisting staff	40%	36%
Inadequate or poorly qualified assisting staff	26%	19%
A lack of educational material	33%	24%
Inadequate or poor quality educational material	26%	22%
A lack of physical infrastructure	52%	29%
Inadequate or poor quality physical infrastructure	46%	28%
A lack of digital resources	42%	24%
Inadequate or poor quality digital resources	35%	25%

Base: Northern Ireland data based on data from between 1,842 and 1,877 pupils from 61 or 62 schools (76% or 77% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Percentage of pupils in schools with principals who reported each statement happened very little or not at to some extent or a lot.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC017

Principals were also asked to describe the extent to which pupils' learning was hindered by factors relating to pupil and teacher behaviours. Table 8.10 presents the perspectives of principals of participating schools in Northern Ireland on issues hindering pupils' learning at their schools. Around two-thirds (64%) of pupils in Northern Ireland were in schools where the principal reported that learning was hindered, to at least some extent, by pupils not paying attention. On average across the OECD countries this figure was 61% of pupils. All of the other issues listed were infrequently reported by principals in Northern Ireland at most 17% of pupils were in schools where the principal reported that they happened at least to some extent.

Table 8.10: Issues faced by schools affecting learning to some extent or a lot as reported by principals in Northern Ireland and on average across the OECD countries

Learning is hindered by:	Northern Ireland	OECD Average
Pupil truancy	15%	42%
Pupils skipping classes	15%	38%
Pupils lacking respect for teachers	17%	24%
Pupil use of alcohol or illegal drugs	6%	10%
Pupils intimidating or bullying other pupils	11%	13%
Pupils not paying attention	64%	61%
Teachers not meeting individual pupils' needs	10%	28%
Teacher absenteeism	17%	28%
Staff resisting change	16%	29%
Teachers being too strict with pupils	2%	13%
Teachers not being well prepared for classes	8%	11%

Base: Northern Ireland data based on responses from 1,810 pupils in 60 schools (74% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Percentage of pupils in schools with principals who reported each statement happened to some extent or a lot. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC061

Principals were also asked to report on school climate in terms of the extent to which certain negative behaviours were a problem at their school. The percentage of pupils in schools where principals in Northern Ireland reported the occurrence of these behaviours are shown in Table 8.11. Over 86% of pupils in Northern Ireland were in schools where principals reported that problems with profanity, vandalism, theft, physical injuries or intimidation or verbal abuse of staff happened not at all or to a small extent. The percentage of pupils in schools with principals that reported intimidation or verbal abuse among pupils occurring not at all or to a small extent was 80%, while the average percentage of pupils in schools with principals who reported intimidation or verbal abuse among pupils across the OECD countries was 74%.

Table 8.11: Problem behaviours occurring not at all or to a small extent at school as reported by principals in Northern Ireland and on average across the OECD countries

Problem behaviour at school	Northern Ireland	OECD Average
Profanity	86%	71%
Vandalism	> 98%	86%
Theft	> 98%	95%
Intimidation or verbal abuse among pupils	80%	74%
Physical injury caused by pupils to other pupils	> 98%	96%
Intimidation or verbal abuse of teachers or non-teaching staff	95%	95%

Base: Northern Ireland data based on 1,810 pupils from 60 schools (74% weighted pupil response rate). OECD average percentage based on data from 34 OECD countries.
Percentage of pupils in schools with principals who reported each statement happened to a small extent or not at all. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC172

8.5.2 Parental engagement

This section describes the principals' perspectives on the engagement between parents or guardians of pupils who participated in PISA 2022 and their school. Parental engagement was described in terms of activities such as participation in school activities, communication with teachers and support for learning at home. Principals were asked to report on the percentage of parents at their schools who participated in the school-related activities listed in Table 8.12.

Parents' discussions with teachers related to their child's behaviour and/or progress occurred more frequently than parents' participation in school events or groups. In Northern Ireland, between 29% and 43% of pupils were in schools where principals reported that parents had discussions with teachers related to their child's behaviour and/or progress, compared to between 9% and 20% of pupils in schools where principals reported that parents volunteered in physical or extra-curricular activities, participated in local school government, and/or assisted in fundraising for the school.

According to principals in Northern Ireland, teachers were more typically proactive in arranging discussions with parents about their child's progress than parents themselves. Forty-three per cent of pupils were in schools where principals reported that parents had discussions about their child's progress that were initiated by teachers compared to 20% of pupils where these discussions were initiated by parents themselves.

According to principals a larger percentage of pupils were in schools in Northern Ireland where parents were involved in fundraising for the school (20%) compared to the OECD average (11%) and the percentage of parents volunteering for participation in extra-curricular activities was similar in Northern Ireland (12%) and on average across the OECD countries (11%). However, a larger percentage of pupils were in schools where principals reported on average across the OECD countries that parents participated in local school government (15%) compared to Northern Ireland (9%).

Table 8.12: Percentage of parents engaging in school-related activities as reported by principals in Northern Ireland and on average across the OECD countries

Type of parental engagement	Northern Ireland	OECD average
Discussed their child's behaviour with a teacher on the parents' or guardians' own initiative	30%	29%
Discussed their child's behaviour on the initiative of one of their child's teachers	33%	43%
Discussed their child's progress with a teacher on the parents' or guardians' own initiative	29%	33%
Discussed their child's progress on the initiative of one of their child's teachers	43%	52%
Volunteered in physical or extra-curricular activities	12%	11%
Participated in local school government	9%	15%
Assisted in fundraising for the school	20%	11%

Base: Northern Ireland data based on between 1,662 and 1,778 pupils in between 55 and 59 schools (between 68% and 72% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC064

Principals were asked to describe in further detail the frequency of communication between school staff and parents. Reports of communication with parents from principals of schools in Northern Ireland with participating pupils are described in Table 8.13.

Around half of the pupils in Northern Ireland (56%) were in schools where the principal reported that communications with parents or guardians about school programmes took place a few times a month or more often. All the other types of communication with parents were reported to occur less frequently, with principals most commonly reporting that these took place a few times a year. Overall, the percentage of pupils in schools in which principals reported each type of communication varied but generally parental engagement regarding involvement in volunteering, school decision-making and

academic support in Northern Ireland were reported as occurring less frequently than on average across the OECD countries.

Table 8.13: Frequency of engagement between school staff and parents in the last year as reported by principals in Northern Ireland and on average across the OECD countries

Type of communication	Northern Ireland	OECD Average
Invited parents or guardians to volunteer for school activities	5%	91%
Initiated communications with parents or guardians about school programmes	56%	72%
Initiated communications with parents or guardians about their child's progress	48%	52%
Included parents or guardians in making school decisions	6%	87%
Provided information to parents or guardians about how to help pupils with homework and other curriculum-related activities	20%	58%
Provided information to parents or guardians about how to help pupils improve their skills in mathematics	7%	69%

Base: Northern Ireland data based on 1,778 pupils from 59 schools (72% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC192

8.5.3 Extra-curricular activities

This section describes information reported by principals of participating schools on the different extra-curricular activities offered at their schools. Table 8.14 displays the percentage of schools that offered various extra-curricular activities in the school year leading up to the PISA study in November 2022, as reported by principals.

For all 10 types of activity reported in the table, a greater percentage of pupils in Northern Ireland were in schools where principals reported that they had these extra-curricular activities than the average across the OECD countries. The greatest difference was in the percentage of pupils in schools where principals reported offering school bands, orchestras and choirs or a mathematics club (43 percentage points) and was smallest for chess clubs (15 percentage points).

Table 8.14: Extra-curricular activities offered at school in 2022 as reported by principals in Northern Ireland and on average across the OECD countries

Type of extra-curricular activity offered	Northern Ireland	OECD average
Band, orchestra or choir	> 98%	57%
School play or school musical	73%	50%
School yearbook, newspaper or magazine	67%	42%
Volunteering or service activities	90%	70%
Mathematics club	71%	28%
Mathematics competitions	85%	66%
Chess club	47%	32%
Club with a focus on computers	84%	42%
Art club or art activities	84%	59%
Sporting team or sporting activities	> 98%	83%

Base: Northern Ireland data based on 1,810 pupils from 60 schools (74% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC053

In addition to extra-curricular activities, some schools also provided extra study support for pupils within the school. Table 8.15 shows the percentage of pupils in schools where principals reported different types of study support offered to 15-year-old pupils in Northern Ireland and on average across the OECD countries.

The majority of pupils in Northern Ireland were in schools where principals reported that they provided rooms for pupils to do homework (84%) and offered staff to support with homework (77%). These compare to 74% and 63% of pupils in schools on average across the OECD countries. Peer tutoring programmes were less common than the other forms of study support, reported for 69% of pupils in Northern Ireland, and for 51% of pupils on average across the OECD countries.

Table 8.15: Study support for pupils within the school as reported by principals in Northern Ireland and on average across the OECD countries

Type of study support	Northern Ireland	OECD average
Room(s) where the pupils can do their homework	84%	74%
Staff help with homework	77%	63%
Peer-to-peer tutoring	69%	51%

Northern Ireland data based on 1,810 pupils from 60 schools (74% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC212

8.5.4 Career development activities

As well as extra-curricular and study support, principals were also asked about career guidance offerings that they provide at school. This section describes the information provided by principals in Northern Ireland on the prevalence, delivery, responsibilities, and types of career guidance available to 15-year-old pupils.

Table 8.16 shows the structure of career guidance offered. Almost all pupils in Northern Ireland (98%) were in schools where principals reported that career guidance was formally scheduled into school hours, with a minority reporting that pupils sought this voluntarily (2%). This compares to 69% and 31% respectively, of pupils on average across the OECD countries.

Table 8.16: Structure of career guidance support offered at school as reported by principals in Northern Ireland and on average across the OECD countries

Structure of career guidance	Northern Ireland	OECD average*
Career guidance is sought voluntarily by pupils	2%	31%
Career guidance is formally scheduled into pupils' time at school	> 98%	69%

** OECD figures based solely on those countries where principals reported that the school offers career guidance.*
Base: Northern Ireland data based on 1,759 pupils from 58 schools (72% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC210

Table 8.17 shows the type of career information offered to 15-year-old pupils in Northern Ireland. Almost all pupils in Northern Ireland were in schools where principals, reported that they provided information about internships (95%), commonly referred to as apprenticeships in Northern Ireland, future careers (99%) and future educational opportunities (99%) and 82% of pupils were in schools where the principals reported that they offered information about pupil financing (e.g., student loans/grants).

On average across the OECD countries, almost all pupils were in schools where principals reported their school offered information to their pupils about future careers (89%) and future educational opportunities (94%). Fewer pupils, on average across the OECD countries, were in schools where principals reported that their school provided information about internships (68%) or pupil financing (63%).

Table 8.17: Information on careers offered to Year 11 and 12 pupils at school as reported by principals in Northern Ireland and on average across the OECD countries

Type of career information offered	Northern Ireland	OECD average
Information about internships	95%	68%
Information about future careers	> 98%	89%
Information about future educational opportunities	> 98%	94%
Information about pupil financing (e.g. student loans/grants)	82%	63%

Northern Ireland data based on 1,759 from 58 schools (72% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC171

Principals were also asked to report on who has responsibility for the career guidance offered at their school. Their responses are described in Table 8.18. The majority of pupils in Northern Ireland (67%) were in schools where the principal reported that specific teachers within the school had the main responsibility for career guidance. Just 15% of pupils were in schools where the principal reported using guidance counsellors employed at the school and 10% reported their schools had guidance counsellors who regularly who visit the school.

Table 8.18: The percentage of pupils in Northern Ireland and on average across the OECD countries whose principals reported which staff at their schools are responsible for career guidance

Responsibility for career guidance	Northern Ireland	OECD average
All teachers share the responsibility for career guidance	9%	14%
Specific teachers have the main responsibility for career guidance	67%	30%
One or more specific career guidance counsellors employed at school have the main responsibility for career guidance	15%	48%
One or more specific career guidance counsellors who regularly visit the school have the main responsibility for career	10%	11%

Northern Ireland data based on 1,759 pupils from 58 schools (72% weighted pupil response rate). OECD average percentage based on data from 37 OECD countries.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022, SC170

On average across the OECD countries, it was more common for pupils to be in schools where the principals reported that their schools employed dedicated career guidance counsellor(s) at their school (48%) and less common for pupils to be in schools where principals reported that specific teachers within the school had the main responsibility for career guidance (30%).

8.6 School-level variation in mathematics performance

PISA provides information about the extent to which mathematics performance varies across different schools, as well as how much it varies within each of the participating schools. School level variation in mathematics performance can provide insight into the level of heterogeneity within and between schools.

On average across the OECD countries, 32% of the total variance in mathematics performance in PISA 2022 was attributed to differences between schools, while 68% of the variance was attributed to differences within schools. In Northern Ireland, 39% of the variance was attributed to differences between schools, compared to the OECD average of 32%. This suggests there was more heterogeneity between schools in Northern Ireland compared to other OECD education systems.

The potential factors that contribute towards between/within school variance are widespread and often difficult to disentangle. Further research controlling for factors such as pupil background, school type (grammar and non-grammar), and classroom practices may provide insight into the different factors affecting attainment gaps in mathematics performance in Northern Ireland both within and across schools.

9 PISA across the United Kingdom

9.1 Chapter overview

This chapter compares the PISA mathematics, reading and science scores for Northern Ireland, England, Scotland and Wales. The analysis includes a comparison of how each nation scores across the mathematics subdomains described in Chapter 3. This chapter also compares the relative performance of the highest and lowest achieving pupils in each UK nation, the relative gender differences in average scores, and the relative differences between the most and least disadvantaged socioeconomic groups. Caution needs to be taken in interpreting these findings as some of the sampling standards for PISA 2022 were not met in Northern Ireland, as described in section 1.4.2.

9.2 Key findings

- All 4 UK nations had lower average scores for mathematics and reading relative to their performance in 2018. In science, Northern Ireland, England and Scotland saw no significant decline in their average science scores whereas in Wales their score declined significantly between 2018 and 2022. There were no significant differences in the size of the drops in scores since 2018 between Northern Ireland and the other UK nations.
- The average mathematics score for Northern Ireland (475) was significantly higher than the average score for Wales (466), not significantly different to that of Scotland (471), and significantly less than the average score for England (492).
- The average reading score for Northern Ireland (485) was significantly higher than the score for Wales (466), not significantly different to that of Scotland (493) and significantly less than the average score for England (496).
- The average science score for Northern Ireland (488) was significantly higher than the score for Wales (473), not significantly different to that of Scotland (483) and significantly less than the average score for England (503).
- Gender differences in PISA 2022 were consistent across the nations of the UK, with boys having a significantly higher average score for mathematics and girls having a significantly higher average score for reading. In science there were no significant gender differences in any individual nation of the UK, though across the pooled UK cohort, boys scored significantly higher in science than girls.
- Pupils from relatively the least disadvantaged socioeconomic backgrounds performed significantly better than those from the most disadvantaged backgrounds across all domains and all UK nations.

9.3 Introduction

The focus of this chapter is the comparison of PISA scores for Northern Ireland, England, Scotland and Wales. Although the OECD reports on the United Kingdom (UK) as a single participating country, schools and pupils from each of the constituent nations are sampled separately. This means that each UK nation has a representative sample, allowing robust comparisons between their scores to be made. There are many similarities between Northern Ireland, England, Scotland and Wales. However, there are also substantive differences in terms of their education systems, culture, and demographic composition. This report does not attempt to explore possible explanations for the differing scores between nations.

This chapter summarises and compares the scores for UK nations across the three domains of mathematics, reading and science. The chapter also compares performance across the mathematics subdomains, thus providing insight into the relative strengths and weaknesses of each nation in terms of their performance in mathematics. The relative performance of high and low achieving pupils is also compared across nations, as are relative differences in performance across socioeconomic groups and by gender.

As has been noted throughout the previous chapters, Northern Ireland's school-level and pupil-level response rates did not meet some of the PISA sampling standards (as was the case with the other UK nations), and so caution is required when interpreting the analysis reported here. Please see section 1.4.2 for more information about how to interpret the findings of this report.

9.4 Comparing average scores across the UK

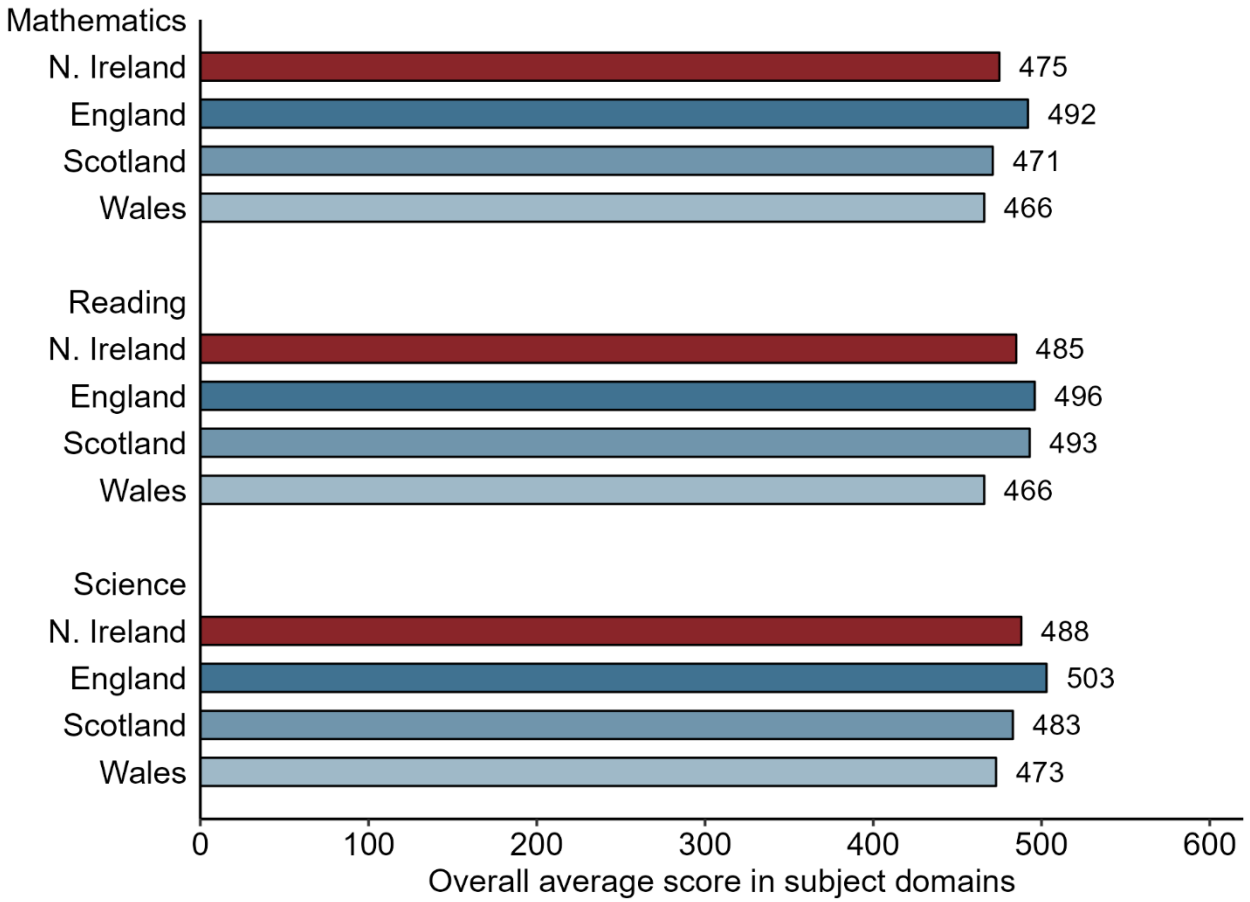
Figure 9.1 shows the average PISA scores for each nation in each of the three subject domains. It is important to note that not all differences between nations are statistically significant. The rank order of UK nations should therefore be interpreted with caution. This section focuses on statistically significant differences between the average scores of Northern Ireland and the other UK nations.

For mathematics, the average score for pupils in Northern Ireland was 475. The difference between this and the average score for England (492) was statistically significant, as was the difference between the average scores of Northern Ireland and Wales (466). The difference between Northern Ireland and Scotland (471) was not statistically significant.

For reading, a similar pattern was observed. The difference between the average scores for Northern Ireland (485) and England (496) was statistically significant, as was the difference between Northern Ireland and Wales (466), while the difference between Northern Ireland and Scotland (493) was not statistically significant.

The average score for science in Northern Ireland was 488. The difference between Northern Ireland and England (503) was statistically significant, which was also the case for the comparison between Northern Ireland and Wales (473). The difference in the average scores of Northern Ireland and Scotland (483) does not reach the threshold for statistical significance.

Figure 9.1: Average PISA score by nation



Nation	Mathematics	Reading	Science
Northern Ireland	475	485	488
England	* 492	* 496	* 503
Scotland	471	493	483
Wales	* 466	* 466	* 473

Base: All pupils in each national sample.
An asterisk (*) indicates where a nation's score was significantly different to the equivalent score for Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

The scores for mathematics can be broken down into the 8 subdomains that are described in Chapter 3. Table 9.1 provides a summary of how each nation performed in

each of these subdomains. As with the overall average scores, it is important to note that not all differences between nations in subdomains are statistically significant. The rank order of UK nations should be interpreted cautiously.

The differences between the subdomain specific average scores for Northern Ireland and England were statistically significant in all cases. The differences between the average scores for Northern Ireland and Wales were statistically significant for two subdomains: 'quantity' and 'interpreting, applying and evaluating mathematical outcomes'. None of the subdomain comparisons between Northern Ireland and Scotland reach the threshold for statistical significance.

Table 9.1: Average PISA mathematics subdomain score by nation

Mathematics subdomain	Northern Ireland	England	Scotland	Wales
Change and relationships	475	* 491	464	465
Quantity	478	* 491	474	* 462
Space and shape	461	* 480	461	451
Uncertainty and data	482	* 502	476	475
Employing mathematical concepts, facts and procedures	476	* 492	465	464
Formulating situations mathematically	471	* 488	462	461
Interpreting, applying and evaluating mathematical outcomes	479	* 495	477	* 467
Mathematical reasoning	474	* 493	477	467

Base: All pupils in each national sample.
An asterisk (*) indicates where a subdomain score for a nation was significantly different to the equivalent score for Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

The disparity between the highest and lowest scoring nations was similar across the subdomains. This suggests that the differences between the nations in overall performance do not reflect disparities in specific subdomains but rather a consistent difference across all of them. In other words, though there were differences in how the nations performed in mathematics overall, these do not appear to stem from differences in particular subdomains.

9.5 Performance across the PISA levels

The UK nations may also be compared in terms of the percentages of pupils attaining at each of the PISA proficiency levels for mathematics, reading and science. These proficiency levels range between Level 1 and Level 6, with Level 1 further divided into Levels 1a, 1b and 1c for mathematics and Levels 1a and 1b for reading and science. Each level is defined by a band of scores into which a pupil's score may fall (a score may also fall below the threshold for Level 1). In the following sections, the UK nations are compared with regards to their percentages of top performing pupils (those pupils attaining Level 5 or Level 6) and low performing pupils (those pupils attaining below Level 2). The term significant is used to refer to a statistically significant difference between Northern Ireland and another UK nation.

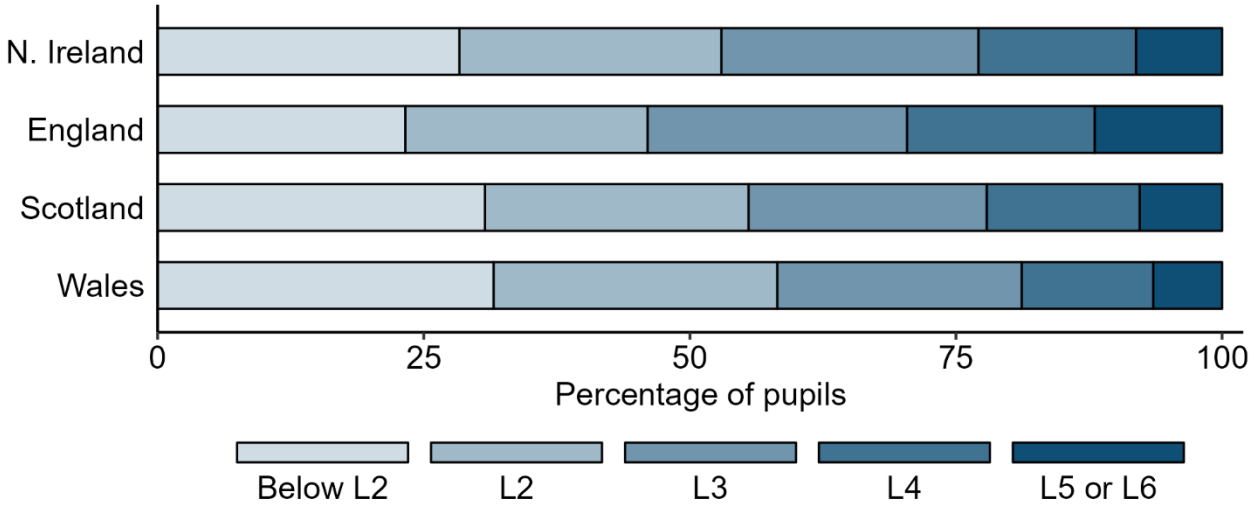
9.5.1 Mathematics

Figure 9.2 shows the percentage of pupils performing at each PISA mathematics proficiency level in each nation of the UK. Statistical comparisons are made between the percentage of pupils achieving below Level 2 in Northern Ireland to the percentage achieving below Level 2 in the other UK nations, and also for pupils performing at Level 5 or Level 6.

For Northern Ireland, 28% of pupils were classified as low performers, attaining below Level 2. This was not significantly different to either Wales (32%) or Scotland (31%), although there was a significantly lower percentage of low performing pupils in England (23%).

Eight per cent of pupils in Northern Ireland were classified as top performers in mathematics, attaining at Level 5 or 6. This was significantly less than the percentage of top performers in England (12%), and not significantly different to either Scotland (8%) or Wales (6%). In general, the percentages of pupils at each level reflect the differences in the overall average PISA mathematics score.

Figure 9.2: Percentage of pupils achieving each mathematics level by UK nation



Nation	Below L2	L2	L3	L4	L5 or L6
Northern Ireland	28%	25%	24%	15%	8%
England	* 23%	23%	24%	18%	* 12%
Scotland	31%	25%	22%	14%	8%
Wales	32%	27%	23%	12%	6%

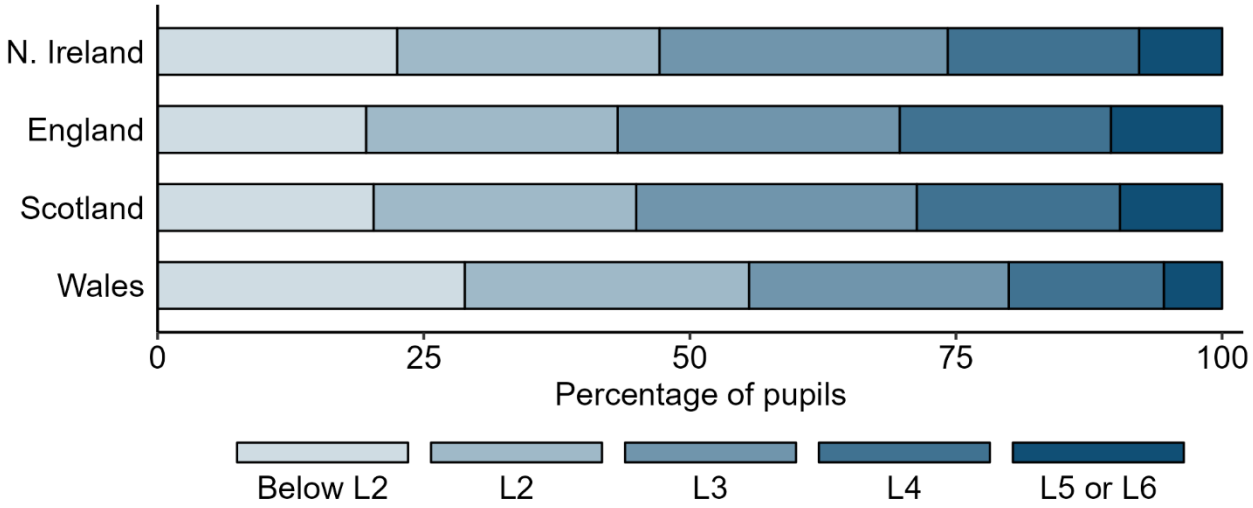
Base: All pupils in each national sample.
An asterisk (*) indicates where a percentage was significantly different to the equivalent percentage for Northern Ireland. Percentages may appear inconsistent due to rounding.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

9.5.2 Reading

Figure 9.3 shows the percentage of pupils attaining at each PISA reading proficiency level in each nation of the UK.

Figure 9.3: Percentage of pupils achieving each reading level by UK nation



Nation	Below L2	L2	L3	L4	L5 or L6
Northern Ireland	22%	25%	27%	18%	8%
England	20%	24%	26%	20%	* 10%
Scotland	20%	25%	26%	19%	10%
Wales	* 29%	27%	24%	15%	* 5%

Base: All pupils in each national sample.
An asterisk (*) indicates where a percentage was significantly different to the equivalent percentage for Northern Ireland. Percentages may appear inconsistent due to rounding.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

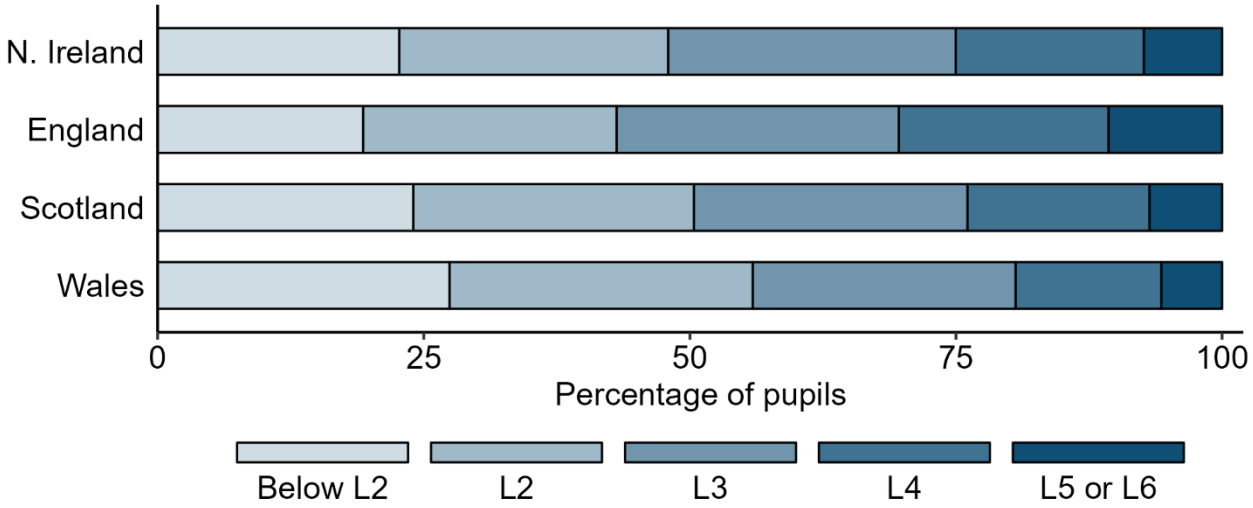
Over one-fifth (22%) of pupils in Northern Ireland were classified as low performers in reading, which was not significantly different to the percentages in either England (20%) or Scotland (20%) and was significantly lower than the percentage in Wales (29%).

Eight per cent of pupils in Northern Ireland were classified as top performers in reading, attaining at Level 5 or 6, significantly below England (10%) and significantly above Wales (5%). Northern Ireland and Scotland had percentages of pupils who were classified as low performers reading that were not significantly different (8% and 10% respectively). As with mathematics, this broadly reflects the differences between each nation's average overall reading score.

9.5.3 Science

Figure 9.4 shows the percentage of pupils attaining at each PISA science proficiency level in each nation of the UK.

Figure 9.4: Percentage of pupils achieving each science level by UK nation



Nation	Below L2	L2	L3	L4	L5 or L6
Northern Ireland	23%	25%	27%	18%	7%
England	* 19%	24%	27%	20%	* 11%
Scotland	24%	26%	26%	17%	7%
Wales	* 27%	28%	25%	14%	6%

Base: All pupils in each national sample.
An asterisk (*) indicates where a percentage was significantly different to the equivalent percentage for Northern Ireland. Percentages may appear inconsistent due to rounding. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

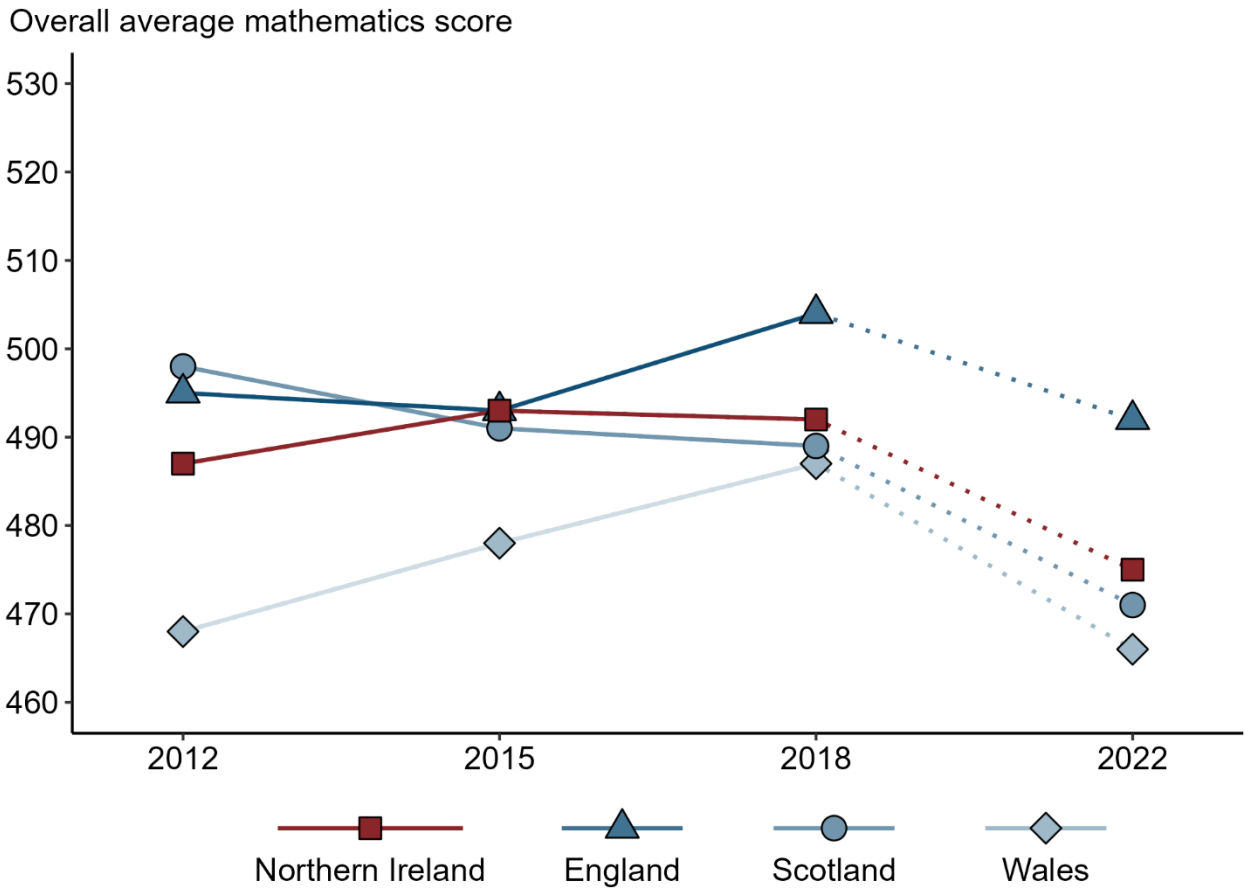
Source: OECD, PISA 2022

Around one quarter of pupils in Northern Ireland (23%) were classified as low performers in science, attaining below Level 2. The percentage of pupils who attained below Level 2 in Northern Ireland was not significantly different to the percentage in Scotland (24%), was significantly above the percentage in England (19%) and significantly below the percentage in Wales (27%). In Northern Ireland and Scotland, 7% of pupils were classified as top performers in science, attaining at Level 5 or at Level 6. The percentage of top performing pupils in Wales was not significantly different, at 6%. However, a significantly higher percentage of pupils in England, 11%, were classified as higher performing than across the rest of the UK nations.

9.6 Performance over time

Figure 9.5 shows how the average mathematics scores for each nation have changed over the ten-year period 2012 to 2022.

Figure 9.5: PISA mathematics score by UK nation over time



Nation	2012	2015	2018	2022
Northern Ireland	* 487	* 493	* 492	475
England	495	493	* 504	492
Scotland	* 498	* 491	* 489	471
Wales	468	* 478	* 487	466

Base: All pupils in each national sample.
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

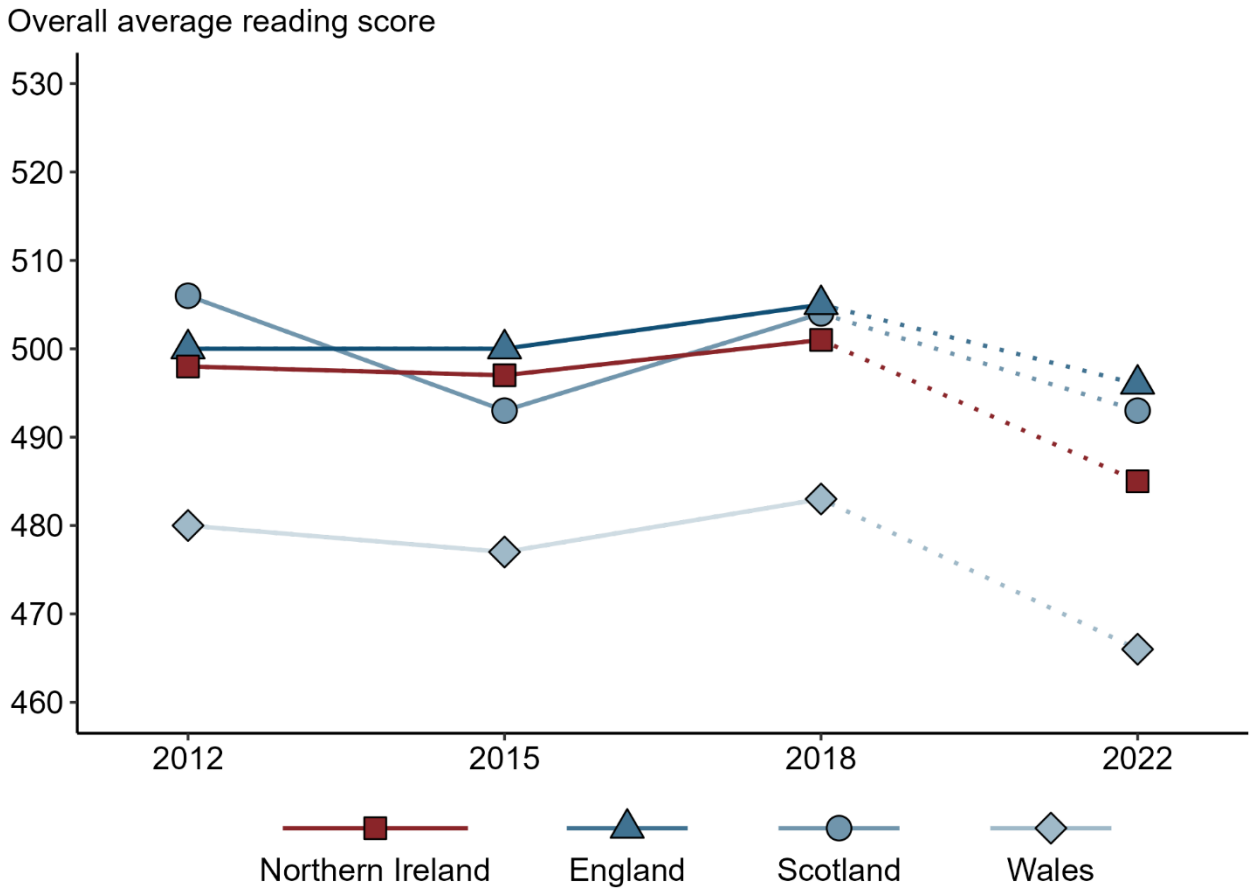
As shown in previous chapters, the differences between the 2018 and 2022 scores were statistically significant in all cases. In Northern Ireland, the average score for mathematics had decreased significantly by 17 points from 492 in 2018 to 475 in 2022. Statistically significant decreases between 2018 and 2022 were also found for England (12 points), Scotland (18 points) and Wales (21 points). There were no significant differences between the size of the drop in score in Northern Ireland to the size of the drop in any of the other UK nations.

Over the longer term, the average mathematics score for Northern Ireland in 2022 (475) was significantly below the score in 2012 (487), a difference of 12 points. The difference between the average scores in 2012 and 2022 was also statistically significant for Scotland (a decline of 28 points) but not for either England or Wales.

Figure 9.6 shows how the average reading scores for each UK nation have changed over the ten year period 2012 to 2022. A similar, if less pronounced, pattern was apparent for reading and mathematics. The average score for reading significantly decreased by 16 points in Northern Ireland, falling from 501 in 2018 to 485 in 2022. Significant decreases were also found for England (9 points), Scotland (11 points) and Wales (18 points). There were no significant differences between the size of the drop in score in Northern Ireland to the size of the drop in any of the other UK nations.

When considering the longer term comparison between the average reading scores in 2012 and those in 2022, it is important to note that none of the differences in any nation reached the threshold for statistical significance. There were no significant differences between the size of the drop in score in Northern Ireland to the size of the drop in any of the other UK nations.

Figure 9.6: PISA reading score by UK nation over time



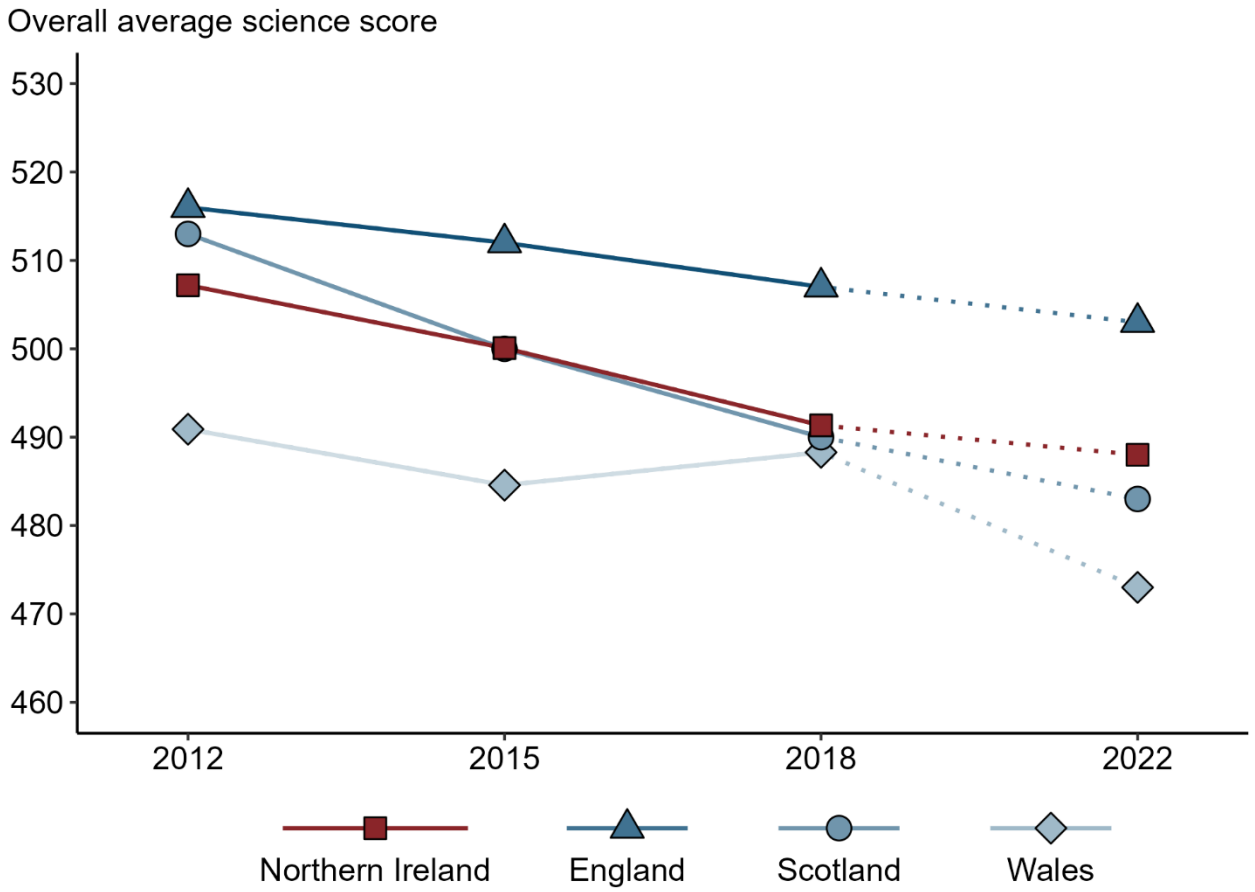
Nation	2012	2015	2018	2022
Northern Ireland	498	497	* 501	485
England	500	500	* 505	496
Scotland	506	493	* 504	493
Wales	480	477	* 483	466

Base: All pupils in each national sample.
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

Figure 9.7 shows how average science scores have changed over time for each UK nation. The average score for science in Northern Ireland in 2022 (488) was not significantly different to the score in 2018 (491). There was also no significant change in the average science score in England between 2018 (507) and 2022 (503), nor was there one in Scotland (490 in 2018 and 483 in 2022). However, in Wales there was a significant decrease of 15 points from 488 in 2018 to 473 in 2022. There were no significant differences between the size of the drop in score in Northern Ireland to the size of the drop in any of the other UK nations.

Figure 9.7: PISA science score by UK nation over time



Nation	2012	2015	2018	2022
Northern Ireland	* 507	* 503	491	488
England	516	* 512	507	503
Scotland	* 513	* 497	490	483
Wales	* 491	* 485	* 488	473

Base: All pupils in each national sample.
Asterisks (*) indicate that the score shown was significantly different to that country's score for PISA 2022.
Trend results where PISA sampling standards were not all met are indicated with dotted lines in the figure.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met in some of the included education systems.

Source: OECD, PISA 2022

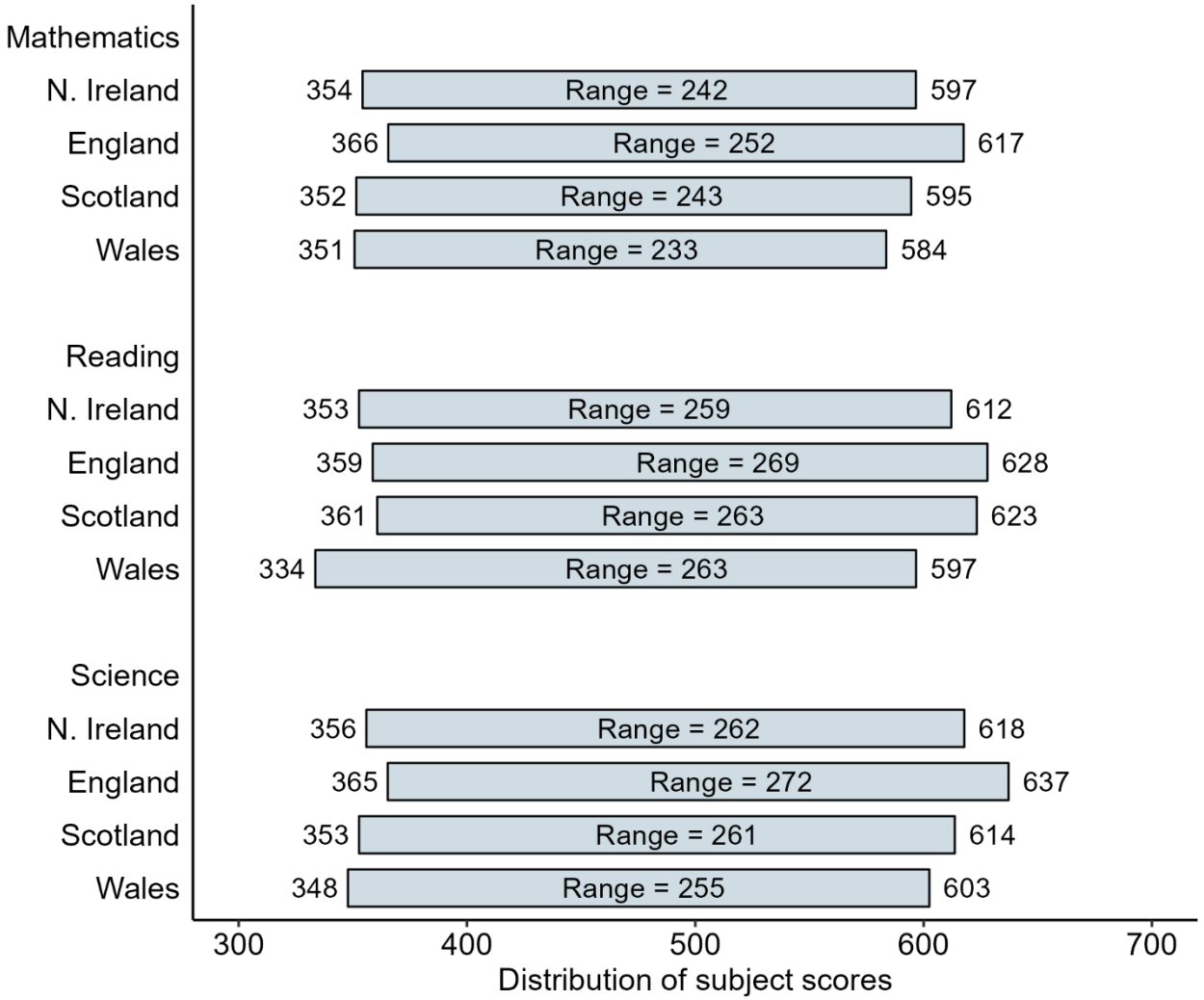
Over the longer term, the average science score for Northern Ireland in 2022 (488) was significantly below the score in 2012 (507), a difference of 19 points. The difference between the average scores in 2012 and 2022 was also statistically significant for Scotland (a decline of 30 points) and Wales (a decline of 18 points) but not for England.

9.7 Scores of highest and lowest performing pupils

This section compares the performance of the highest and lowest performing pupils in each UK nation. To undertake this analysis, pupil scores for each nation are arranged in rank order and the percentage of pupils achieving specific scores are calculated. Two scores can then be compared – the 10th percentile, which represents lower achieving pupils, and the 90th percentile, which represents higher achieving pupils. The 90th percentile is the score above which the highest performing 10% of pupils obtain, while the 10th percentile is the score below which the lowest performing 10% of pupils obtain.

Figure 9.8 shows the 10th and 90th percentile scores for mathematics, reading and science for each UK nation, and reports the range (the size of the gap) between these two scores. When comparing the size of the gaps between the 90th and 10th percentile for each UK nation and each subject domain it is important to note that the differences between them were not statistically significant. The difference between the scores of the highest and lowest performing pupils was therefore similar in each of the UK nations, with each nation exhibiting a similar range of scores across their pupils. The differences between the average scores of the UK nations therefore represent differences across the full attainment range.

Figure 9.8: Range between 10th and 90th percentile scores by domain and nation



Nation	Mathematics	Reading	Science
Northern Ireland	242	259	262
England	252	269	272
Scotland	243	263	261
Wales	233	263	255

Base: All pupils in each national sample.
Ranges calculated as 90th percentile – 10th percentile. Ranges may appear inconsistent with percentile scores due to rounding.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

9.8 Gender differences

This section provides the average PISA scores for girls and boys in each subject domain in each UK nation. In the following tables, the difference between these scores is

determined by subtracting the girls' average score from the boys' average score. A positive difference represents a gender difference favouring girls and a negative difference represents a gender difference favouring boys.

Table 9.2 displays the average scores for mathematics, showing that, for all four nations, boys had a significantly higher average score than girls. The difference in Northern Ireland was 12 points compared to 9 points in Wales, 15 points in England and 16 points in Scotland. The size of the gender gap in Northern Ireland did not significantly differ to the size of the gender gap in any of the other UK nations.

Table 9.2: PISA mathematics score gender difference by nation

Nation	Girls average score	Boys average score	Difference (Girls' score - boys' score)
Northern Ireland	469	481	-12
England	485	499	-15
Scotland	463	478	-16
Wales	461	470	-9

Base: All pupils in each national sample.
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

Table 9.3 shows the average PISA reading scores by gender for each nation. For reading, girls had a significantly higher average score than boys in all four UK nations with the difference between the two being 18 points for Northern Ireland. The difference between the average scores for boys and girls was similar for Wales (19 points), Scotland (18 points) and England (16 points).

Table 9.3: PISA reading score gender difference by nation

Nation	Girls average score	Boys average score	Difference (Girls' score - boys' score)
Northern Ireland	494	476	18
England	505	488	16
Scotland	502	484	18
Wales	475	456	19

Base: All pupils in each national sample.
Because of rounding, some results may appear inconsistent.

Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

Table 9.4 shows the average PISA science scores by gender. It is important to note that the gender differences for science were not statistically significant for any of the UK nations. However, the average difference of 8 points favouring boys for the combined UK sample did represent a statistically significant difference. The size of the gender gap in Northern Ireland did not significantly differ to the size of the gender gap in any of the other UK nations.

Table 9.4: PISA science score gender difference by nation

Nation	Girls average score	Boys average score	Difference (Girls' score - boys' score)
Northern Ireland	485	492	-6
England	499	507	-8
Scotland	481	485	-4
Wales	469	477	-7

Base: All pupils in each national sample.
Because of rounding, some results may appear inconsistent.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

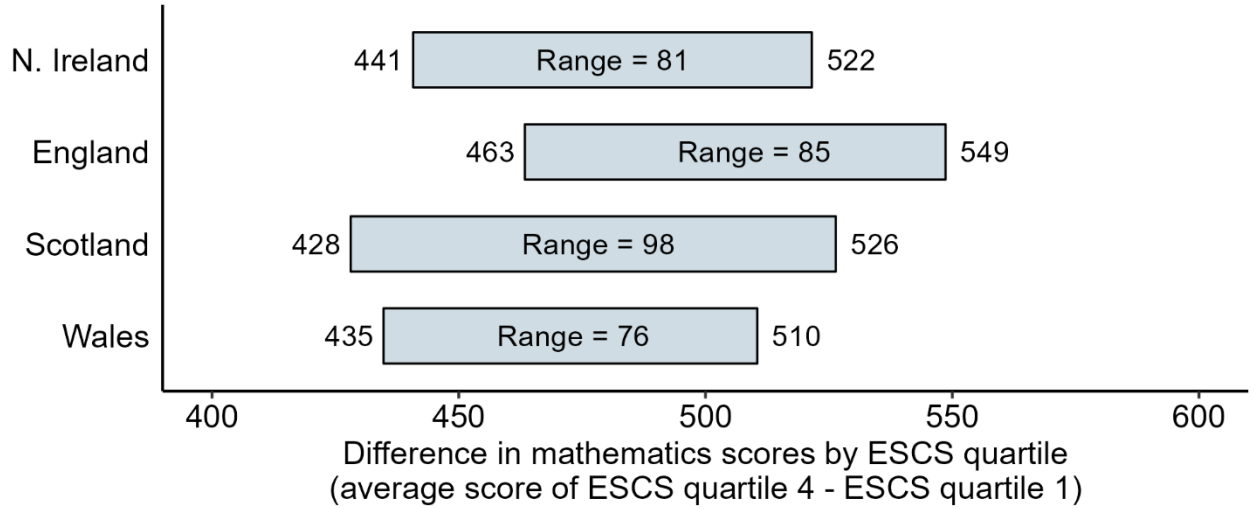
Source: OECD, PISA 2022

9.9 The relationship between socioeconomic status and performance

This section will explore how different socioeconomic groups perform relative to each other across the UK nations. As in previous chapters, pupils were divided into quartiles on the basis of their score on the PISA index of economic, social and cultural status (ESCS). The first quartile represents the most disadvantaged pupils and the fourth quartile the least disadvantaged pupils. The ESCS was derived from their responses to questions about their family background and education and possessions in their homes (see section 6.4 for further detail about the ESCS variable). Findings in this section should be considered with caution because, along with the caveat about some of PISA's sampling standards not being met by the UK nations, some participating pupils did not provide sufficient information for their ESCS quartile to be determined (the percentage of pupils in each nation for which ESCS data was missing is presented under the following tables).

Figure 9.9 shows the average mathematics scores for pupils in the first and fourth ESCS quartiles for each of the UK nations (in 2022). Across all nations, there was a significant difference in the average performance of pupils from the highest and lowest ESCS groups, such that pupils from relatively less disadvantaged backgrounds obtained higher scores than those from relatively more disadvantaged backgrounds. When comparing the first quartile to the fourth, the gap in performance for Northern Ireland was 81 points. This gap was significantly smaller than the one for Scotland (98), but not significantly different to the gaps for either England (85) or Wales (76).

Figure 9.9: Average PISA mathematics score for first and fourth ESCS quartiles by nation of the UK



Nation	First ESCS quartile average mathematics score	Fourth ESCS quartile average mathematics score	Difference (fourth quartile score - first quartile score)
Northern Ireland	441	522	81
England	463	549	85
Scotland	428	526	* 98
Wales	435	510	76

Base: ESCS data was missing or unavailable for around 23% of pupils in England, 9% of pupils in Northern Ireland, 7% of pupils in Scotland and 16% of pupils in Wales.
An asterisk (*) indicates where the range (gap) between a UK nation's fourth and first quartile score was significantly different to the range between the fourth and first quartile score for Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

Table 9.5 shows the average reading scores for pupils in the first and fourth ESCS quartiles for each of the UK nations. All within nation differences between the first and fourth ESCS quartiles were statistically significant. Pupils from less disadvantaged

socioeconomic backgrounds achieve higher scores than those from more disadvantaged backgrounds. When comparing the first quartile to the fourth, the gap between average reading scores for Northern Ireland was 78 points. This gap in performance was not significantly different to those of any of the other UK nations.

Table 9.5: Average PISA reading score for first and fourth ESCS quartiles

Nation	First ESCS quartile average reading score	Fourth ESCS quartile average reading score	Difference (fourth quartile score - first quartile score)
Northern Ireland	452	530	78
England	471	553	82
Scotland	457	545	89
Wales	441	506	65

Base: ESCS data was missing or unavailable for around 23% of pupils in England, 9% of pupils in Northem Ireland, 7% of pupils in Scotland and 16% of pupils in Wales.
An asterisk (*) indicates where the range (gap) between a UK nation's fourth and first quartile score was significantly different to the range between the fourth and first quartile score for Northern Ireland.
Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

A similar pattern can also be observed for PISA science scores (Table 9.6). The difference between average science scores obtained by first and fourth ESCS quartiles for Northern Ireland was 86 points. As with mathematics and reading, the differences in average score between the first and fourth ESCS quartiles were statistically significant within all UK nations, but the gap in performances for England (92) Ireland, Scotland (92) and Wales (81) were not significantly different to the gap for Northern Ireland.

Table 9.6: Average PISA science score for first and fourth ESCS quartiles

Nation	First ESCS quartile average science score	Fourth ESCS quartile average science score	Difference (fourth quartile score - first quartile score)
Northern Ireland	452	538	86
England	471	563	92
Scotland	444	536	92
Wales	441	522	81

Base: ESCS data was missing or unavailable for around 23% of pupils in England, 9% of pupils in Northem Ireland, 7% of pupils in Scotland and 16% of pupils in Wales.
An asterisk (*) indicates where the range (gap) between a UK nation's fourth and first quartile score was

significantly different to the range between the fourth and first quartile score for Northern Ireland. Caution is required when interpreting estimates because one or more PISA sampling standards were not met.

Source: OECD, PISA 2022

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Appendix A PISA 2022 Northern Ireland non-response bias analysis

PISA 2022 Northern Ireland non-response bias analysis summary

The Programme for International Student Assessment (PISA) is an international study that assesses each education system's national picture of the knowledge, skills and competencies of their 15-year-old pupils. However, it is impractical for the PISA assessment to be administered to every single pupil in each participating country. Participating countries therefore assess a sample of their eligible pupils.

How were pupils and schools selected?

Schools and pupils were randomly selected to participate in PISA through a two-stage sampling design. For PISA 2022, a representative sample of 127 eligible schools in Northern Ireland was selected by the international PISA sampling organisation Westat. The sampling design used considers both the type of school and the region of Northern Ireland that the school is in to ensure that the sample was representative of the different schools across Northern Ireland. Larger schools also had a greater chance of being included in the sample because they had more 15-year-old pupils. Once schools agreed to participate, 40 eligible pupils were then randomly selected from each school.

Data was collected from schools during November and December 2022. This was a difficult time for some schools and not all were able to take part. As a result, the final participating sample of schools and pupils in Northern Ireland was smaller than the targets of 85% of schools and 80% of pupils taking part set by the OECD, with 58% of the original sample of schools participating and 77% of all sampled pupils across responding schools. The overall level of schools participating was bolstered by replacement schools to 63% but this was still below the level set by the OECD of 94.3%.

What is a non-response bias analysis?

To determine how well the achieved sample in Northern Ireland in PISA 2022 reflects the population of 15-year-old pupils and to assess the quality of the achieved sample we compared the background characteristics of the schools and pupils taking part with the known characteristics of eligible schools and pupils in Northern Ireland.

This analysis can tell us if particular groups of schools or pupils were more or less likely to participate in PISA 2022 than other groups. For example, whether boys were more likely to participate than girls, or the variation by Education Authority region within

Northern Ireland of those schools who chose to participate. If some groups were less likely to participate than others, we would say that our data are biased and the analysis may not accurately represent all 15-year-old pupils in Northern Ireland.

What did we find out?

The school sample of 80 schools was largely representative of all schools in Northern Ireland with regard to many characteristics: school type (grammar or non-grammar), school gender (mixed or single), the percentage of pupils with special educational needs (SEN), Newcomer pupils, and pupils eligible for free school meals (FSME) within the last 6 years.

There was evidence of potential bias in relation to the region in which schools were and the average GCSE performance of pupils in schools. Schools in the Southern region of Northern Ireland were over-represented and the data from all schools including lower-attaining pupils on average were under-represented. Schools including higher-attaining pupils on average were over-represented. This means that the overall performance in mathematics, reading and science in PISA 2022 is likely to be higher than if we had an unbiased sample.

The pupil sample of 2,384 pupils was also found to be biased because fewer of the selected pupils with SEN participated in the study than expected compared to selected pupils without SEN. FSME pupils were also less likely to participate in PISA 2022 than non FSME pupils. This means that the PISA 2022 measure of socio-economic background, the ESCS Index, is likely to be higher than if we had an unbiased sample.

The issues with bias identified by this analysis may also have affected previous cycles of PISA and other education systems where a non-response bias analysis has not been required or has not been possible because the necessary data are not available. Caution is required when considering trend or country comparisons which may have been affected by this bias.

Interpreting the PISA 2022 results

There is always some uncertainty in the precision of what is being measured in survey research such as PISA. This uncertainty is taken into account in the analysis, for example when considering differences in performance between countries.

Although the non-response bias analysis has identified some potential issues with regard to how much the pupils who participated in PISA can be said to represent all 15-year-old pupils in Northern Ireland, the results for Northern Ireland can still provide a broad picture of their performance. Where the analysis shows stronger performance than in previous

years or in comparison with other education systems, we cannot be certain of the extent to which this performance was due to general changes in the population of 15-year-olds in Northern Ireland or due to higher attaining schools being overrepresented in the data. This may also be the case for the previous PISA cycles or the other education systems that we are making comparisons with.

PISA 2022 Northern Ireland non-response bias analysis

Introduction

The Programme for International Student Assessment (PISA) is a large international comparative study of the knowledge, skills, and competencies of 15-year-old pupils in the domains of mathematics literacy, reading literacy, and science literacy. To provide valid estimates of pupils' achievement in these domains in each of the participating education systems, national samples of pupils were selected to participate in the study and represent their education system's full population of 15-year-old pupils.

PISA uses a two-stage stratified sampling design. The first stage selects schools using a systematic probability-proportionate-to-size technique. School size is the estimated age-eligible enrolment of the school. In Northern Ireland, schools were also grouped into two explicit strata, school type and region, before being systematically sampled using probabilities proportional to the school size. For most education systems each school that was chosen in the initial sample, two replacement schools were also identified with similar characteristics to the originally sampled school. In Northern Ireland this was not possible as there were not enough schools within each of the explicit strata.

The second stage randomly selects up to 40 eligible pupils within each sampled school. The OECD require that participating pupils were aged between 15 years and 3 months and 16 years and 2 months at the beginning of the testing period. Pupils may be excluded from participating in PISA 2022 if they have SEN that results in them being unable to take the test, or they have insufficient English language experience that results in them being unable to take the test. The Northern Ireland PISA sample consisted of 127 eligible schools having at least one pupil in this age range.

Data collection in Northern Ireland took place in November and December 2022. Of the 127 schools in the original sample, 94 agreed to participate, along with a further 12 replacement schools, but 26 schools withdrew before data collection. Data was therefore collected from 73 schools in the original sample and 7 replacement schools. In Northern Ireland, 2,166 pupils from original sample schools and 218 pupils from replacement schools participated. Pupils in participating schools who did not participate are not replaced.

The final weighted school response rates for Northern Ireland were 57.5% before replacement, and 62.6% after replacement. These rates for Northern Ireland are lower than the response-rate targets set by the OECD (either 85% of original sample schools, or 94.3% after replacement given the achieved original response-rate across Northern Ireland). The final weighted pupil response rate for Northern Ireland was 76.6% including pupils in replacement schools. This rate was lower than the automatically acceptable

response-rate target set by the OECD of at least 80% of all sampled pupils across responding schools.

This non-response bias analysis report explores potential sources of bias due to non-response and determines the extent to which the weight adjustments alleviate any bias that is found. This report uses the full achieved sample of 80 schools (73 from the original sample) from which some pupil data was collected as the basis for the school-level analysis, and the full achieved sample of 2,384 pupils (2,166 from the original sample) as the basis for the pupil-level analysis.

Methodology

School level analysis

The non-response bias analysis at the school level compared the characteristics of the original sample of schools to those of the participating schools. This analysis was conducted in two parts:

1. Analysis of the original sample of schools (before replacement). The characteristics of the participating schools from the original sample (N=73) was compared with those of the original school sample (N=127). In each group, schools were weighted by their school base weights, excluding any non-response adjustment factor.
2. Analysis of the participating final sample (with replacements). The characteristics of all the participating schools (N=80), which includes 7 schools that were used as replacements for non-responding schools from the original sample, was compared to the original school sample (N=127). The participating schools were weighted by their non-response adjusted weights.

The first part of the analysis indicates the potential for non-response bias that was introduced through school non-response. The second indicates the potential for bias after accounting for the mitigating effects of both replacement and non-response weight adjustments.

In addition to weighting the schools by their school base weights or non-response adjusted final weights, the analysis also includes these weights multiplied by the school enrolment of 15-year-olds. This gives an estimate in terms of the survey population of 15-year-olds for each characteristic.

Participating schools and the total original school sample were compared using matched achievement data and school characteristic data from the Department of Education (Northern Ireland).

For the school-level non-response bias analysis the matched variables used include:

- Percentage of pupils who have special educational need(s) (SEN);
- Percentage of Newcomer[18] pupils;
- Percentage of pupils who have been eligible for free school meals (FSM) for any period in the last 6 years.

In addition, the analysis included the stratification variables (school gender[19] and school attainment band[20]) and the estimated number of 15-year-old eligible pupils enrolled from the school sampling frame.

Pupil-level analysis

The non-response bias analysis at the pupil level compared the characteristics of the original sample of pupils to those of the participating pupils. This analysis was conducted in two parts:

1. Analysis of the participating pupils: The distribution of the participating pupils (N = 2,384) was compared to the distribution of the sampled pupils that did not participate in PISA. Note that these analyses only focus on pupils within the participating schools, and not pupils from sampled schools that did not participate in the study. pupils were weighted by their pupil base weights, excluding any non-response adjustment factor. In addition, the distribution of the participating pupils was compared to the original sample schools weighted by the school base weights multiplied by the school enrolment of 15-year-olds. This gives an estimate in terms of the survey population of 15-year-olds for each characteristic.
2. Analysis of the participating final sample with non-response weight adjustments: The distribution of the participating pupils (N = 2,384) was compared to the same estimate of the survey population of 15-year-olds for each characteristic used in the previous part. The participating pupils were weighted by their non-response adjusted weights.

The first part of the analysis indicates the potential for non-response bias that was introduced through pupil non-response. The second indicates the potential for bias after accounting for the mitigating effects of both replacement and non-response weight adjustments at the school and pupil levels. Pupils in participating schools were compared using matched pupil characteristic data from the Northern Ireland School Census.

[18] The term 'Newcomer' is used to refer to a pupil who does not have satisfactory language skills to participate fully in the school curriculum and does not have a language in common with the teacher.
[19] Single and mixed. The Female and Male categories of the original stratification variables were collapsed into a single category to ensure that there were enough elements in each of the comparison categories.
[20] The original categories correspond to quintiles based on the percentage of pupils achieving 5 or more GCSEs at grades A*-C (or equivalent) and one category for schools where these data were missing.

For the pupil-level non-response bias analysis, the matched variables used include:

- Whether the pupil has been eligible for free school meals (FSM) for any period in the last 6 years.
- Whether the pupil has SEN.

In addition, the analysis included the school-level stratification variables (school type, region, school gender and school attainment band), pupil gender taken from the datasets provided by Westat, and the estimated number of 15-year-old eligible pupils enrolled from the school sampling frame.

For each of the matched variables an additional category of unknown was added to account for the number of pupils with these data missing.

Statistical analysis

For categorical variables, the distribution of frame characteristics for participants was compared with the distribution for non-participants. The hypothesis of independence between the characteristic and participation status was tested using a Rao-Scott modified Chi-square statistic at the 95% confidence level. For continuous variables, summary means were calculated and the difference between means was tested using a t-test. The p-values for the tests are presented in the tables. The statistical significance of differences between participants and non-participants is identical to that which would result from comparing participants and the total sample of which they are a subset. The bias and relative bias are also shown in tables where appropriate. The bias is the difference between the respective estimates for the participants and the total sample. The relative bias is calculated as the bias divided by the estimate from the total sample. The relative bias is a measure of the size of the bias compared to the total sample estimate.

In addition, logistic regression models were used to provide a multivariate analysis that examined the relationship of participation status to pupil and school characteristics. All statistical analyses were performed in R version 4.2.2 using the survey package[21] to account for the complex sample design. The analysis used the base weights, replicate weights and non-response adjusted weights provided by Westat. The international weighting procedures form non-response adjustment classes by cross-classifying the explicit and implicit stratification variables.

[21] Lumley T (2020). “survey: analysis of complex survey samples.” R package version 4.0.

Original school sample (before replacement)

This section presents the non-response bias analysis based on the original sample of 127 schools. The distribution of the participating schools from the original sample was compared to the total original sample. School base weights were used for both the total original sample and the participating schools.

The distribution of schools from the original sample by the implicit stratification variables (school gender and school attainment band) is shown in Table A.1. There were no statistically significant relationships between participation status and any of the characteristics shown in Table A.1. However, there was a relative bias greater than an absolute value of 10% observed for schools in all bands apart from the middle band, with the lower attaining bands (1 and 2) being under-represented.

Table A.1: Percentage distribution of schools in Northern Ireland's original sample for PISA 2022 by implicit stratification variables

School characteristic	Original sample %	Participating schools %	Bias	Relative bias	Non-participating schools %
School gender: Mixed	78.8	80.2	-1.4	-0.02	76.8
School gender: Single	21.2	19.8	1.4	0.07	23.2
Attainment band: Low 1	21.1	16.7	4.4	0.21	27.0
Attainment band: 2	20.5	14.2	6.3	0.31	29.0
Attainment band: 3	17.3	17.2	0.1	0.01	17.6
Attainment band: 4	22.1	26.4	-4.3	-0.19	16.3
Attainment band: High 5	19.0	25.5	-6.5	-0.34	10.1

Base: Original sample: n = 127; Participating schools: n = 73; Non-participating schools: n = 54
School gender: χ^2(ndf = 1, ddf = 43) = 0.28, p=0.6
School attainment band: χ^2(ndf = 4.38, ddf = 188) = 2.29, p=0.06
Note: Bias is calculated as the difference between the estimates of the participating schools and the total sample (= participating schools – total sample). Relative bias is calculated as the bias divided by the estimate from the total sample. The p-value for the chi-square test was calculated by testing the difference in distributions between the participating and non-participating schools. Schools were weighted by their school base weights.

Source: OECD, PISA 2022, Department of Education, 2022.

When the schools were weighted by their enrolled eligible 15-year-old pupils, there was also no statistically significant relationship between participation status and the school gender as shown in Table A.2. However, there was a statistically significant relationship between participation status and school attainment band with a larger proportion of schools in the higher attainment bands participating than in the lower attainment bands.

This was further supported by the relative bias in these attainment bands which were greater than an absolute value of 10%.

Table A.2: Percentage distribution of schools weighted by enrolled eligible 15-year-old pupils in Northern Ireland's original sample for PISA 2022 by implicit stratification variables

School characteristic	Original sample %	Participating schools %	Bias	Relative bias	Non-participating schools %
School gender: Mixed	77.6	77.4	0.2	0.00	78.0
School gender: Single	22.4	22.6	-0.2	-0.01	22.0
Attainment band: Low 1	20.6	14.3	6.3	0.31	29.1
Attainment band: 2	19.2	17.1	2.1	0.11	21.9
Attainment band: 3	18.7	17.2	1.5	0.08	20.7
Attainment band: 4	22.1	26.6	-4.5	-0.20	15.9
Attainment band: High 5	19.6	24.9	-5.3	-0.27	12.4

Base: Original sample: sum of weights = 23,353; Participating schools: sum of weights = 13,430; Non-participating schools: sum of weights = 9,923
School gender: χ^2(ndf = 1, ddf = 43) = 0, p=0.98
School attainment band: χ^2(ndf = 4.22, ddf = 181) = 2.76, p=0.03
Note: Bias is calculated as the difference between the estimates of the participating schools and the total sample (= participating schools – total sample). Relative bias is calculated as the bias divided by the estimate from the total sample. The p-value for the chi-square test was calculated by testing the difference in distributions between the participating and non-participating schools. Schools were weighted by their school base weights multiplied by the school enrolment of 15-year-old eligible pupils.

Source: OECD, PISA 2022. Department of Education, 2022.

School-level continuous variables

The mean values of the percentage of pupils who have SEN, the percentage of Newcomer pupils, and the percentage of pupils who have been eligible for free school meals (FSM) for any period in the last 6 years are given in Table A.3 and Table A.4. The differences in the mean percentage of pupils who have SEN, are Newcomer pupils and pupils who have been eligible for free school meals (FSM) for any period in the last 6 years were not significantly different between participating and non-participating schools. The low relative bias between the original sample schools and the participating schools from the original sample also indicates minimal potential for bias due to non-response.

Table A.3: School average pupil characteristics of schools in Northern Ireland's original sample for PISA 2022

School-level pupil characteristics	Original sample %	Participating schools %	Bias	Relative bias	Non-participating schools %	*t*-test p-value
Pupils who have been eligible for free school meals (FSM) for any period in the last 6 years	28.0	26.6	1.4	0.05	29.9	0.24
Pupils with SEN	19.5	17.4	2.1	0.11	22.3	0.20
Newcomer pupils	4.5	3.5	1.1	0.24	5.9	0.38

Base: Original sample: n = 126, missing = 1 (n = 86, missing = 41 for Newcomer measure);
Participating schools: n = 72, missing = 1 (n = 49, missing = 24 for Newcomer measure);
Non-participating schools: n = 54, missing = 0 (n = 37, missing = 17 for Newcomer measure);
Note: Bias is calculated as the difference between the estimates of the participating schools and the total sample (= participating schools – total sample). Relative bias is calculated as the bias divided by the estimate from the total sample. The p-value for the t-test was calculated by testing the difference in means between the participating and non-participating schools. Schools were weighted by their school base weights.

Source: OECD, PISA 2022, Department of Education, 2022.

Table A.4: Pupils characteristics of schools weighted by enrolled eligible 15-year-old pupils in Northern Ireland's original sample for PISA 2022

School-level pupil characteristics	Original sample %	Participating schools %	Bias	Relative bias	Non-participating schools %	*t*-test p-value
Pupils who have been eligible for free school meals (FSM) for any period in the last 6 years	26.6	25.1	1.5	0.06	28.7	0.16
Pupils with SEN	16.9	15.4	1.5	0.09	18.9	0.14
Newcomer pupils	3.7	3.0	0.7	0.19	4.6	0.41

Base: Original sample: sum of weights = 23,165, missing proportion = 0% (sum of weights = 15,861, missing proportion = 0.5% for Newcomer measure);
Participating schools: sum of weights = 13,242, missing proportion = 0% (sum of weights = 9,108, missing proportion = 0.5% for Newcomer measure);
Non-participating schools: sum of weights = 9,923, missing proportion = 0% (sum of weights = 6,753, missing proportion = 0.5% for Newcomer measure);

Note: Bias is calculated as the difference between the estimates of the participating schools and the total sample (= participating schools – total sample). Relative bias is calculated as the bias divided by the estimate from the total sample. The p-value for the t-test was calculated by testing the difference in means between the participating and non-participating schools. Schools were weighted by their school base weights multiplied by the student enrolment of 15-year-old eligible pupils.

Source: OECD, PISA 2022, Department of Education, 2022.

Regression Models

The logistic regression models the probability of participation in PISA in relation to the implicit stratification variables and the percentage of pupils who have SEN, the percentage of Newcomer pupils and the percentage of pupils who have been eligible for free school meals (FSM) for any period in the last 6 years as the independent variables.

Table A.5 and Table A.6 show that there were no significant relationships between response status and school gender, or the percentage of pupils who have SEN, or the percentage of Newcomer pupils or the percentage of pupils who have been eligible for free school meals (FSM) for any period in the last 6 years was detected when considered either by school base weight or by 15-year-old eligible pupil weight. However, schools in the highest school achievement band were statistically significantly more likely to participate when compared to schools in the middle and lower school achievement bands both when considered by school base weight or by 15-year-old eligible pupil weight.

Table A.5: Logistic regression modelling relationship of response status to school characteristics in Northern Ireland's original sample for PISA 2022

Variable	Estimate	Standard Error	*t*-value	*p*-value
Intercept	0.34	0.86	0.39	0.70
School gender: Mixed	0	0	-	-
School gender: Single	0.03	0.57	0.05	0.96
Attainment band: Low 1	-0.17	0.64	-0.27	0.79
Attainment band: 2	-0.80	0.76	-1.05	0.30
Attainment band: 3	0	0	-	-
Attainment band: 4	0.90	0.89	1.01	0.32
Attainment band: High 5	1.63	0.79	2.05	* 0.05
Mean percentage of Pupils who have been eligible for free school meals (FSM) for any period in the last 6 years	0.02	0.03	0.79	0.44
Pupils with SEN	-0.03	0.03	-0.99	0.33
Newcomer pupils	-0.04	0.05	-0.76	0.45

**p<0.05, **p<0.01, ***p<0.001*
Note: Schools were weighted by their school base weights.

Source: OECD, PISA 2022, Department of Education, 2022.

Table A.6: Logistic regression modelling relationship of response status to school characteristics in Northern Ireland's original sample for PISA 2022, weighted by school enrolment of 15-year-old eligible pupils

Variable	Estimate	Standard Error	*t*-value	*p*-value
Intercept	-0.03	0.68	-0.04	0.97
School gender: Mixed	0	0	-	-
School gender: Single	0.17	0.54	0.32	0.75
Attainment band: Low 1	-0.11	0.45	-0.24	0.81
Attainment band: 2	0.10	0.43	0.24	0.81
Attainment band: 3	0	0	-	-
Attainment band: 4	1.21	0.75	1.62	0.12
Attainment band: High 5	1.63	0.57	2.88	* 0.01
Mean percentage of pupils who have been eligible for free school meals (FSM) for any period in the last 6 years	0.01	0.02	0.64	0.52
Mean percentage of pupils with SEN	-0.02	0.02	-0.70	0.49
Mean percentage of Newcomer pupils	-0.03	0.05	-0.61	0.54

**p<0.05, **p<0.01, ***p<0.001*
Note: Schools were weighted by their school base weights multiplied by the school enrolment of 15-year-old eligible pupils.

Source: OECD, PISA 2022, Department of Education, 2022.

Non-response adjusted participating final sample (with replacements)

This section presents the non-response bias analysis based on the original sample of 127 schools. The distribution of the final participating sample (80), including participating replacement schools, was compared to the schools in the original sample. School base weights were used for the original sample of schools, whereas non-response adjusted weights were used for the participating schools.

School-level categorical variables

The distribution of schools from the original sample by the implicit stratification variables is shown in comparison with the participating final sample in Table A.7 and Table A.8. The absolute value of the relative bias for schools in all the attainment bands except the middle attainment band was greater than 10% indicating potential bias related to school attainment remains after adjustments for non-response.

Table A.7: Percentage distribution of schools in Northern Ireland's final participating sample for PISA 2022 compared with the original sample by implicit stratification variables

School characteristic	Original sample %	Participating schools %	Bias	Relative bias
School gender: Mixed	78.8	82.1	-3	-0.04
School gender: Single sex	21.2	17.9	3	0.16
Attainment band: Low 1	21.1	17.8	3	0.16
Attainment band: 2	20.5	15.3	5	0.25
Attainment band: 3	17.3	17.6	0	-0.02
Attainment band: 4	22.1	26.0	-4	-0.18
Attainment band: High 5	19.0	23.3	-4	-0.23

Base: Original sample: n = 127; Participating Schools: n = 80
Note: Bias is calculated as the difference between the estimates of the participating schools and the total sample (= participating schools – total sample). Relative bias is calculated as the bias divided by the estimate from the total sample. Schools were weighted by their school base weights (original sample) and non-response adjusted school weights (final participating sample).

Source: OECD, PISA 2022, Department of Education, 2022.

Table A.8: Percentage distribution of schools in Northern Ireland's final participating sample for PISA 2022 compared with the original sample by implicit stratification variables, weighted by school enrolment of 15-year-old eligible pupils

School characteristic	Original sample %	Participating schools %	Bias	Relative bias
School gender: Mixed	77.6	79.1	-1	-0.02
School gender: Single	22.4	20.9	2	0.07
Attainment band: Low 1	20.6	15.3	5	0.26
Attainment band: 2	19.2	19.0	0	0.01
Attainment band: 3	18.7	17.4	1	0.07
Attainment band: 4	22.1	26.2	-4	-0.18
Attainment band: High 5	19.6	22.0	-2	-0.12

Base: Original sample: sum of weights = 23,353; Participating Schools: n = 22,025
Note: Bias is calculated as the difference between the estimates of the participating schools and the total sample (= participating schools – total sample). Relative bias is calculated as the bias divided by the estimate from the total sample. Schools were weighted by their school base weights (original sample) and non-response adjusted school weights (final participating sample) multiplied by the school enrolment of 15-year-old eligible pupils.

Source: OECD, PISA 2022, Department of Education, 2022.

School-level continuous variables

The mean values of the variables related to the characteristics of each school in the final participating sample are shown in comparison with the original sample in Table A.9 and Table A.10 for the percentage of pupils with special educational needs, the percentage of newcomer pupils, and the percentage of pupils who have been eligible for free school meals for any period in the last 6 years between schools in the final participating sample and the original sample. The absolute values of the relative bias were all less than 10%, which indicates minimal potential bias due to non-response.

Table A.9: Pupil characteristics of schools in Northern Ireland's final participating sample for PISA 2022 compared with the original sample

School-level pupil characteristics	Original sample %	Participating schools %	Bias	Relative bias
Mean percentage of pupils who have been eligible for free school meals (FSM) for any period in the last 6 years	28.0	27.8	0.2	0.01
Mean percentage of pupils who have SEN	19.5	18.3	1.2	0.06
Mean percentage of Newcomer pupils	4.5	3.6	0.9	0.20

Base: Original sample: n = 126, missing = 1 (n = 86, missing = 41 for Newcomer measure);
Participating schools: n = 72, missing = 1 (n = 49, missing = 24 for Newcomer measure);
Note: Bias is calculated as the difference between the estimates of the participating schools and the total sample (= participating schools – total sample). Relative bias is calculated as the bias divided by the estimate from the total sample. Schools were weighted by their school base weights.

Source: OECD, PISA 2022, Department of Education, 2022.

Table A.10: Pupil characteristics of schools in Northern Ireland's final participating sample for PISA 2022 compared with the original sample, weighted by enrolled eligible 15-year-old pupils

School-level pupil characteristics	Original sample %	Participating schools %	Bias	Relative bias
Mean percentage of pupils who have been eligible for free school meals (FSM) for any period in the last 6 years	26.6	26.4	0.2	0.01
Mean percentage of pupils who have SEN	16.9	16.3	0.6	0.04
Mean percentage of Newcomer pupils	3.7	3.1	0.6	0.16

Base: Original sample: sum of weights = 23,165, missing proportion = 0% (sum of weights = 15,861, missing proportion = 0.5% for Newcomer measure);
Participating schools: sum of weights = 21,667, missing proportion = 0% (sum of weights = 15,122, missing proportion = 0.3% for Newcomer measure);
Note: Bias is calculated as the difference between the estimates of the participating schools and the total sample (= participating schools – total sample). Relative bias is calculated as the bias divided by the estimate from the total sample. Schools were weighted by their school base weights multiplied by the student enrolment of 15-year-old eligible pupils.

Source: OECD, PISA 2022, Department of Education, 2022.

Comparisons of participating and non-participating pupils

This section presents the non-response bias analysis of the participating pupils: the distribution of the participating pupils (N = 2,384) was compared to the distribution of sampled pupils within participating schools that did not participate (N = 790). Pupils were weighted by their pupil base weights, excluding any non-response adjustment factor. In addition, the distribution of the participating pupils was compared to the original sample schools weighted by the school base weights multiplied by the estimated school enrolment of 15-year-olds from the school sampling frame. This gives an estimate in terms of the survey population of 15-year-olds for each characteristic.

School-level categorical variables

Table A.11 shows the proportion of participating pupils relative to the proportions of pupils in the original sample that attended schools based on the explicit stratification variables used in the school sampling – the type of school they attend, and the region within Northern Ireland.

Pupils attending grammar schools made up 40% of the original sample but made up 42% of the pupils that participated in PISA. There was also an over-representation of pupils

from the Southern region of Northern Ireland and a slight under-representation of pupils from the Western region of Northern Ireland in the final participating sample of pupils relative to the proportion of these pupils in the original sample.

Table A.11: Percentage distribution of pupils in Northern Ireland's final participating sample for PISA 2022 compared with the original sample by explicit stratification variables

School characteristic	Original sample %	Participating pupils %	Bias	Relative bias	Non-participating pupils %
Grammar	39.9	42.4	-2.5	-0.06	30.2
Non grammar	60.1	57.6	2.5	0.04	69.8
Belfast	20.1	19.0	1.1	0.05	19.6
North Eastern	22.3	22.3	0.0	0.00	20.6
South Eastern	18.7	17.2	1.5	0.08	19.0
Southern	21.5	26.1	-4.6	-0.21	25.5
Western	17.4	15.4	2.0	0.11	15.3

Base: Original sample: n = 5075; Participating pupils: n = 2,384; Non-participating pupils: n = 790.
School type: $\chi 2(ndf = 1, ddf = 79) = 15.58, p=0.00$
School region: $\chi 2(ndf = 3.82, ddf = 302) = 0.23, p=0.91$
Note: Bias is calculated as the difference between the estimates of the participating pupils and the final sample. Relative bias is calculated as the bias divided by the estimate from the final sample. The p-values for chi-square tests were calculated by comparing the participating and non-participating pupils. pupils were weighted by their pupil base weights. The final sample is weighted by the school base weight multiplied by the number of eligible pupils enrolled in the school.

Source: OECD, PISA 2022, Department of Education, 2022.

Table A.12 shows the proportion of participating pupils relative to the proportions of pupils in the original sample that attended schools based on the implicit stratification variables used in the school sampling – gender selectivity and school-attainment band.

There were no significant differences in the proportion of the participating pupils that came from single-sex or mixed schools than in the original sample. However, the differences based on school-attainment band were statistically significant at the 95% confidence level, the proportion of participating pupils from the highest attainment band 5 (22%) and the attainment band 4 (28%) schools were both higher than in the original sample, 22% and 20% respectively. The proportion of participating pupils from the lowest attainment band 1 (14%) was also lower than in the original sample (21%).

Table A.12: Percentage distribution of pupils in Northern Ireland's final participating sample for PISA 2022 compared with the original sample by implicit stratification variables

School characteristic	Original sample %	Participating pupils %	Bias	Relative bias	Non-participating pupils %
Mixed	77.6	78.6	-1.0	-0.01	83.3
Single sex	22.4	21.4	1.0	0.04	16.7
Low 1	20.6	13.7	6.9	0.33	21.1
2	19.2	19.2	0.0	0.00	18.5
3	18.7	17.0	1.7	0.09	16.1
4	22.1	27.5	-5.4	-0.24	24.4
High 5	19.6	21.7	-2.1	-0.11	17.1
Missing	NA	0.9	NA	NA	2.9

Base: Original sample: n = 5075; Participating pupils: n = 2,384; Non-participating pupils: n = 790.
School type: $\chi 2(ndf = 1, ddf = 79) = 4.66, p=0.03$
School region: $\chi 2(ndf = 3.6999413, ddf = 292.2953615) = 4.47, p=0.00$
Note: Bias is calculated as the difference between the estimates of the participating pupils and the final sample. Relative bias is calculated as the bias divided by the estimate from the final sample. The p-values for chi-square tests were calculated by comparing the participating and non-participating pupils. pupils were weighted by their pupil base weights. The final sample is weighted by the school base weight multiplied by the number of eligible pupils enrolled in the school.

Source: OECD, PISA 2022, Department of Education, 2022.

Pupil characteristics

Table A.13 compares the proportions of pupils who participated and those that did not with respect to 3 different characteristics – their gender, whether they have SEN, and whether they have been eligible for free-school-meals (FSM) at any point in the past 6 years. For the last three of these characteristics, these comparisons were made possible by matching pupils' data from PISA with data from the Northern Ireland School Census. However, this matching was not possible for all pupils. Table 13 includes information on differences between the participating and non-participating pupils who did not have the relevant data within the Northern Ireland School Census.

Pupils who had been FSM eligible at any point in the past six years were over-represented among the participating pupils, making up 39% of the participating pupils but 37% of those that did not participate. Pupils with SEN support in school (17) were also overrepresented among the participating pupils (17%) compared with non-participating pupils (14%). Pupils without SEN or FSM data in the School Census were under-represented in the group of participating pupils compared to those that did not participate. The differences in the proportions of pupils who have SEN and FSM eligibility between

the participating and non-participating pupils represented statistically significant differences at the 95% confidence level. In contrast, there was no statistically significant difference in the proportions of female pupils or male pupils who participated than those that did not participate.

Pupils may be excluded from participating in PISA 2022 if they have SEN that results in them being unable to take the test, or they have insufficient English language experience. Participating pupils who were ineligible due to these exclusion criteria were identified and excluded from the analysis. However, it is not possible to identify further pupils who were ineligible if they did not participate which may contribute to the proportions of pupils with SEN in the final participating sample.

Table A.13: Percentage distribution of pupils in Northern Ireland's final participating sample for PISA 2022 compared with the original sample by pupil characteristics

Pupil characteristic	Participating pupils %	Non-participating pupils %
Female	49.9	49.0
Male	50.1	51.0
Not eligible for FSM in the past 6 years	59.0	58.0
Eligible for FSM in the past 6 years	38.6	36.5
FSM eligibility in the past 6 years unknown	2.5	5.4
No SEN	80.4	81.1
SEN	17.2	13.5
SEN unknown	2.5	5.4

Base: Participating pupils: n = 2,384; Non-participating pupils: n = 790, (Participating pupils: n = 2,334; Non-participating pupils: n = 752 for gender).
Gender: $\chi 2(ndf = 1, ddf = 79) = 0.23, p=0.63$
FSM ever 6 eligibility: $\chi 2(ndf = 1.86, ddf = 147) = 7.16, p=0.00$
SEN status: $\chi 2(ndf = 1.84, ddf = 145) = 9.2, p=0.00$
Note: pupils were weighted by their pupil base weights.

Source: OECD, PISA 2022, Department of Education, 2022.

Non-response adjusted participating pupil final sample

In this section, the distribution of the participating pupils (N = 2,384) before and after non-response weighting adjustments are compared. Where the data were available the distribution is also compared to estimated study population of 15-year-olds.

School-level categorical variables

Table A.14 and Table A.15 show the differences in school-level characteristics between the final sample of pupils compared to the group of participating pupils after the application of non-response adjusted weights. These tables show that there was no evidence of bias in the participating sample of pupils after non-response weighting adjustments by school type (Table A.14) or by school gender (Table A.15). However, the remains some evidence of bias in the participating sample of pupils after non-response weighting adjustments by school region with pupils from the Southern region overrepresented, and by school attainment band with pupils in schools in the lowest attainment band under-represented and pupils in schools in Attainment band 4 over-represented in the participating sample.

Table A.14: Percentage distribution of pupils in the estimated study population of 15-year-olds compared to Northern Ireland's final participating sample for PISA 2022 after adjusting for non-response by explicit stratification variables

School characteristic	Original sample %	Participating sample %	Bias	Relative bias
Grammar	39.9	39.9	0	0.00
Non grammar	60.1	60.1	0	0.00
Belfast	20.1	19.1	1	0.05
North Eastern	22.3	21.9	0	0.02
South Eastern	18.7	17.6	1	0.06
Southern	21.5	25.5	-4	-0.19
Western	17.4	15.9	1	0.09

Base: Original sample: n = 5075; Participating pupils: n = 2,384;
Note: Bias is calculated as the difference between the estimates of the proportion of participating pupils and the estimates of the study-population proportion of pupils in the original sample. Relative bias is calculated as the bias divided by the estimate from the original sample. pupils were weighted by their pupil base weights after adjusting for non-response. The final sample is weighted by the school base weight multiplied by the number of eligible pupils enrolled in the school.

Source: OECD, PISA 2022, Department of Education, 2022.

Table A.15: Percentage distribution of pupils in the estimated study population of 15-year-olds compared to Northern Ireland's final participating sample for PISA 2022 after adjusting for non-response by implicit stratification variables

School characteristics	Original sample %	Participating sample %	Bias	Relative bias
School gender: Mixed	77.6	79.2	-2	-0.02
School gender: Single	22.4	20.8	2	0.07
School attainment band: Low 1	20.6	15.0	6	0.27
School attainment band: 2	19.2	19.1	0	0.01
School attainment band: 3	18.7	16.8	2	0.10
School attainment band: 4	22.1	27.0	-5	-0.22
School attainment band: High 5	19.6	21.0	-1	-0.07
School attainment band: Missing	NA	1.1	NA	NA

Base: Original sample: n = 5075; Participating pupils: n = 2,384;
Note: Bias is calculated as the difference between the estimates of the proportion of participating pupils and the estimates of the study-population proportion of pupils in the original sample. Relative bias is calculated as the bias divided by the estimate from the original sample. pupils were weighted by their pupil base weights after adjusting for non-response. The final sample is weighted by the school base weight multiplied by the number of eligible pupils enrolled in the school.

Source: OECD, PISA 2022, Department of Education, 2022.

Pupil characteristics

Table A.16 shows the distribution of pupil characteristics in the group of participating pupils after the application of non-response adjusted weights, compared to before the application of these weights and in comparison to the non-participating pupils in the participating schools. The table shows that the application of the non-response adjusted weights did not address the evidence for the over-representation of pupils who have been eligible for FSM in the last 6 years and the proportion of pupils who have or do not have SEN.

Table A.16: Percentage distribution of pupils in Northern Ireland's final participating sample for PISA 2022 before and after adjusting for non-response by pupil characteristics

Pupil characteristic	Participating pupils (original base weights	Non-participating pupils in participating schools	Participating pupil (non-response adjusted weights)
Female	49.9	49.0	49.9
Male	50.1	51.0	50.1
Not eligible for FSM in the past 6 years	59.0	58.0	58.6
Eligible for FSM in the past 6 years	38.6	36.5	38.7
FSM eligibility in the past 6 years unknown	2.5	5.4	2.7
No SEN	80.4	81.1	80.1
SEN	17.2	13.5	17.2
SEN unknown	2.5	5.4	2.7

Base: Participating pupils: n = 2,384; non-participating pupils: n = 790.
Note: pupils were weighted by their pupil base weights both before and after adjusting for non-response.

Source: OECD, PISA 2022, Department of Education, 2022.

Summary

Overall, this analysis suggests a potential source of bias related to school attainment in the final sample of schools which participated in PISA in 2022 in Northern Ireland.

We first investigated non-response bias at the school level, finding that the final sample does not differ in a statistically meaningful way from the original sample in terms of school gender, or in terms of the percentage of pupils eligible for free school meals within the last 6 years, the percentage of pupils who have SEN, and the percentage of Newcomer pupils. However, there was evidence of potential bias in relation to school attainment bands, which was an indicator of pupil attainment whereby schools were divided into quintiles (based on the academic performance of the pupils at GCSE in 2019). The application of non-response adjusted weights had little effect on this potential source of bias.

Similarly, we investigated non-response bias at the pupil level, which supported the findings of the analysis at the school level. There was evidence of potential bias in relation to the proportion of pupils in schools by region in Northern Ireland and by school attainment bands. The pupil-level analysis showed that the final sample does differ significantly from the estimated study population of 15-year-olds in terms of the proportion of pupils eligible for FSM in the past 6 years and those pupils who have SEN. The non-response bias adjustments also had little effect on these differences.

Appendix B Data tables for mathematics, reading and science

Accessible versions of the data tables can be found at PISA 2022 National Report for Northern Ireland | Department of Education (education-ni.gov.uk)

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