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Report

Report on the PISA 2022 student sample in Scotland

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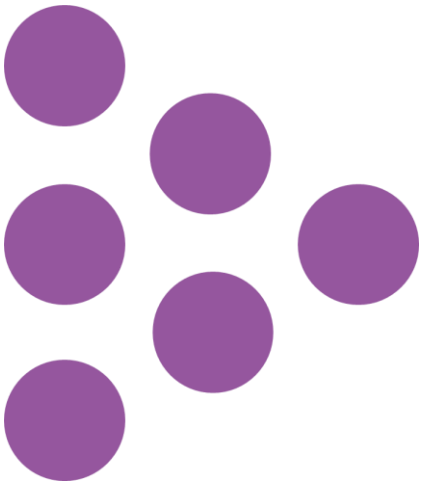

Report on the PISA 2022 student sample in Scotland

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Executive Summary

The Programme for International Student Assessment (PISA) is an International Large-Scale Assessment (ILSA) that is carried out in up to 81 countries. The aim of PISA is to assess 15-year-old students[1], from a wide range of education systems, on their ability to use their knowledge and skills to solve real-life problems. Students are assessed in reading, mathematics and science and complete a questionnaire on their attitudes to learning and their school environment, while headteachers also complete a questionnaire about the school context. PISA 2022 is the eighth time the study has been conducted since the year 2000. The PISA 2022 main survey, with a focus on students' maths skills and attitudes towards maths, took place in Scotland between 18 October 2022 and 22 December 2022. This report describes the PISA 2022 Main Survey in Scotland to provide useful background information to the national and international results.

Following a sampling process, agreed on by PISA, a sample of 121 schools was carefully selected to be representative of education in Scotland, including two Further Education colleges. Up to 40 students were then randomly selected from each of those schools and colleges. The sampling process helps to ensure that these students form a representative sample to report on the abilities and attitudes of all 15-year-old students in Scotland for comparison to other countries. In Scotland the engagement and co-operation from schools was very positive and Scotland achieved an excellent school participation rate of 96.7 per cent.

Test administrations were carried out as specified by PISA. However, fewer students than expected took part during the main PISA 2022 testing window. This was addressed, initially, by a series of follow-up sessions towards the end of the 2022 autumn term. Despite this, Scotland narrowly missed the student participation target of 80 per cent with a student participation rate of 79.4 per cent. Lower student participation, in what was the first PISA survey since the Covid-19 pandemic, proved to be an issue not just in Scotland, but internationally with more than ten participating countries failing to meet the student participation target[2].

In order to investigate if the participating students were fully representative of the sampled students, the OECD requested that Scotland, along with other countries, perform a student level non-response bias analysis (NRBA). This is a statistical test that looks at whether the students who completed the PISA test were representative of the abilities of all students selected for the test. The details and outcome of the NRBA provided in this report do indicate a that the population of students that participated in the test were slightly more able in terms of the available attainment measures[3] compared to all of the students sampled for Scotland and that this difference was statistically significant.

[1] Age range between 15 years and 3 months and 16 years and 2 months at the start of the national testing period.
[2] A total of twelve countries / entities did not achieve the targets for school and/or student participation. At least ten of these countries / entities were asked to complete an NRBA for student response rates of below 80 per cent. This compared to four countries who failed to meet the participation targets in PISA 2018.
[3] Achievement of Curriculum for Excellence Levels (ACEL) from P7 were used in this study (section 3.2).

The outcome of the NRBA is that the results for Scotland (and for the UK where they are combined) will be annotated in the PISA international report to indicate that there is some bias in Scotland's data and that this bias was most likely introduced by low student response rates[4].

[4] The wording used in the international report is "Entities that submitted technically strong analyses, which indicated that more than minimal bias was most likely introduced in the estimates due to low response rates".

1. Introduction

The National Foundation for Educational Research (NFER) was contracted to carry out the PISA 2022 survey in Scotland on behalf of the Scottish Government. This report describes the conduct of the main survey which took place in Scotland between October and December 2022.

1.1 International organisation

The overall administration of PISA 2022 was carried out on behalf of the OECD by an international consortium led by Educational Testing Service (ETS). The consortium was responsible for the development of tests, questionnaires and administration manuals and ensuring that all countries met the rigorous PISA quality standards. Table 1.1. lists the organisations in the consortium responsible for the different elements of the study.

Table 1.1 PISA consortium for PISA 2022

Consortium Tasks	Organisation
Design, development implementation and analysis	ETS
Framework development	RTI (maths) ETS (questionnaires) ACT (creative thinking)
Sampling and weighting	Westat (and ACER)
Linguistic quality assurance	cApStAn

1.2 The National Centre

The international consortium worked with PISA National Centres within each country, through the National Project Manager (NPM). For Scotland, the National Foundation for Educational Research (NFER) was the PISA National Centre.

NFER was responsible for making adaptations to instruments and manuals. NFER made appropriate adaptations to all PISA instruments and accompanying documentation, ensuring the language and terminology used in the cognitive instruments was appropriate for students in Scotland (for example, use of metric measures not imperial, use of British words, spellings or colloquialisms, references to Scottish school year groups or study programmes). They also conducted a series of checks and assessments on the electronic Student Delivery System (SDS) to ensure that it functioned as intended.

1.3 The PISA 2022 assessment materials

Participating students took computer-based assessments of mathematics, reading and science. Each subject assessment is divided into a number of different 'units'; each of which contains a number of questions based around a single topic, text or scenario. As mathematics was the main subject focus for 2022, there were both new and trend units[5] for mathematics. All reading and science assessments consisted of trend units only. The mathematics and reading units were delivered as an online multi-stage adaptive test (MSAT) with multiple possible test forms. For

[5] Units that have been administered in previous PISA cycles, allowing comparisons in performance over time to be made.

science, students were allocated a random selection from available units. Each student answered cognitive items from two of the three subject areas and completed an online student questionnaire, which included questions on attitudes to mathematics. The testing of the cognitive units took two hours and the student questionnaire about 45 minutes. The tests and student questionnaires were administered in schools by NFER-trained administrators. Headteachers were also asked to complete the online school questionnaire, which covered contextual school data and aspects of the teaching and learning environment.

2. Sampling and recruitment

2.1 Sampling strategy and procedures

Countries must follow strict international sampling procedures to ensure comparability of national samples. Sampling procedures used in Scotland met the criteria as set out in the PISA 2022 Technical Standards. School samples were selected by the PISA international consortium, and National Centres were responsible for supplying the information to allow them to select the sample of schools. Samples of students within participating schools were selected by NFER using software supplied by the consortium.

In each country participating in PISA, the minimum number of participating schools was 150, and the minimum number of students was 4,500; in some countries, the numbers exceeded these. In some cases, this was due to the need to over-sample some parts of the country. In the case of the UK, for example, larger samples were drawn for Wales, Scotland and Northern Ireland than would be required for a representative UK sample. Hence Scotland's agreed sample for 2022 consisted of 121 schools. This made it possible to provide separate PISA results for the 4 constituent countries of the UK. In some countries, additional samples were drawn for other purposes, for example, to enable reporting of results for a sub-group, such as a separate language group. In very small countries with fewer than 150 schools, the study was completed as a school census with all appropriate schools included.

The sampling strategy was developed by NFER and approved by Westat as the PISA consortium organisation responsible for sampling. To ensure the sample is properly representative of the country as a whole, key characteristics of the total population of schools, such as school type and region, must be taken into account. The first stage of sampling, therefore, was to agree the school stratification variables to be used for each country. Table 2.1 shows the variables which were used for sampling of schools in Scotland for PISA 2022.

Table 2.1 Stratification variables

Stratifier	Strata
Funding type (Explicit)	publicly funded non-FE, publicly funded FE, independent
School attainment (Explicit)	Standard Grade attainment (or equivalent), levels 1-5 1. lowest 20% 2. 2nd lowest 20% 3. middle 20% 4. 2nd highest 20% 5. highest 20% 6. unknown
Gender (Implicit)	male, mixed, female
Area type (Implicit)	large urban, other urban, accessible town, inaccessible town, accessible rural, inaccessible rural

This sampling strategy was the same as had been used for PISA 2018, except for the inclusion of Further Education (FE) colleges as a stratum in the funding type stratifier.

Countries are allowed to exempt schools from the sampling frame if it is expected that the majority of students would not be eligible to participate in PISA. In Scotland, the majority of schools that were excluded for PISA 2022 main survey were special schools (for students with disabilities not integrated into mainstream schools). In total, 106 such schools (equivalent to an estimated 763 students) were removed from the sampling frame. In addition, two schools were excluded based on the language of instruction.

Following agreement of the sampling plan and the establishment of population estimates in the age group, the list of all eligible schools and their populations was sent to the PISA consortium. The consortium examined and approved the sampling frame, then carried out the school sampling.

The PISA study has strict sampling requirements regarding both the acceptable participation rate and the methodology for the replacement of any schools which decline to participate. Within each country, three separate samples are selected, the first being the main sample and the other two back-up samples. In the back-up samples, each school is a replacement for a specific school in the main sample. So, if a main sample school declines to participate, there are two other schools which can be used as replacements for that school.

The schools which had been selected in the main sample were invited to participate, and replacement schools were invited as necessary for any schools in the main sample which declined to participate.

Table 2.2 sets out the size of each sample and the target number of schools and students for Scotland.

Table 2.2 Sample sizes and targets for Scotland

Sample	Number of schools in sample	Target number of schools	Target number of students
Main	121	103	3872
First replacement	115	-	
Second replacement	109	-	

Information on all eligible students (those who would be within the PISA age range at the time of the PISA assessment period in October/December 2022) was then collected either centrally from the National Pupil Database or, in some cases, directly from schools. The Keyquest software supplied by the PISA consortium was used to randomly select 40 students within each school from those who met the PISA age definition. The majority of students selected were in school years S4 and S5. Note that in Scotland, fifteen-year-old students in S5 are entitled to attend an FE college full time until they are 16 years old, hence the inclusion of two FE colleges in the school sample.

2.2 School response

According to the PISA sampling rules, 85 per cent of main sample schools are required to participate. If this percentage is achieved, it is not necessary to replace non-participating schools. If the response from the main sample is below 85 per cent but above 65 per cent, it is still possible to achieve an acceptable response rate by using replacement schools from the replacement samples. However, the target then moves upwards – for example, with a main sample response of 70 per cent, the after-replacement target is 93 per cent (rather than 85 per cent).

Achieved response rate

In total, 121 schools were drawn in the main sample (see Table 2.3). Of these, 110 agreed to participate and 109 returned completed tests and questionnaires. This included both of the sampled FE colleges. Eleven first replacement sample schools were contacted and all eleven participated. This gives a raw school response rate of 96.7 per cent. The weighted school response rate from Westat was 96.37 per cent.

Table 2.3 Achieved school response rates

Participation stage	Number of schools in main sample	Number of schools in first replacement sample	Number of schools in second replacement sample
Drawn in sample	121	115	109
Agreed to participate	110	11	N/A
Returned completed tests/questionnaires	109	11	N/A
Excluded for low student participation (less than 33%)	3	0	NA
Final number of participating schools	106	11	NA

The figures presented above are not weighted for school representativeness. Westat calculates the school weightings and applies these to the response rates to produce weighted response rates, at the school and student level. The weighted school response rates for Scotland are presented in Table 2.4.

Table 2.4 Weighted response rates

Country	Weighted school response rate *before* replacement (%)	Weighted school response rate after replacement (%)
Scotland	87.51	96.37

School participation in Scotland exceeded the 85 per cent recruitment threshold required by the PISA Technical Standards. Note that that is true even before replacement schools are considered, with a response rate of 87.51 per cent.

2.3 Student response rates

There is also a response rate requirement for students within each school. It is possible for students to be excluded from participation and not counted within the total because they have special needs such that they could not participate, because they have limited language skills, or because they are no longer at the school. The remaining students are deemed eligible for PISA participation, and at least 50 per cent of these must participate for the school to be counted as a participating school.

There are two requirements for student response rates by the consortium. These are specified as Technical Standard 1.7: that school-level exclusions and within-school exclusions combined do not exceed five per cent; and Technical Standard 1.12: that the final weighted student response rate is at least 80 per cent of all sampled students across responding schools.

The exclusion data for Scotland in 2022 is presented in Table 2.5. This shows that Scotland did exceed the exclusion threshold of five per cent and this was mainly due to within school exclusions.

Table 2.5 Weighted exclusion rates

Country	2022 School exclusion rate (%)	2022 Within-school exclusion rate (%)	2022 Overall exclusion rate (%)	2018 Overall exclusion rate (%)
Scotland	1.39	5.25	6.57	5.39

Student exclusions in 2022 exceeded the five per cent threshold. Although the five per cent threshold was also exceeded in 2018, it is clear that the exclusion rate has increased. Further review of the exclusion information suggests that the increase in within-school exclusions is likely driven by an increase in students excluded due to their Special Educational Needs (SEN) status which has increased from 3.8 per cent in 2018 to 4.7 per cent in 2022.

The student participation data is presented in Table 2.6.

Table 2.6 Student participation

Student categories	Number of students
Total sampled from participating schools	4652
Students classified as ineligible	316
Students classified as excluded	221
Students classified as absent	858
Students participating	3257
Eligible students (total sampled students - ineligible students - excluded students)	4115
Percentage participation (participating students / eligible students)	79.15
Weighted participation	79.36

As noted above, the required overall student response rate, in order to meet the strict international standards, was 80 per cent of students across all participating schools. During the main survey period, schools reported that since the Covid-19 pandemic, student absence is generally around 5 to 10 per cent and schools were finding it difficult to encourage all students to attend school. In order to mitigate this risk to student participation rates, NFER, the Scottish Government and the PISA consortium agreed an extended programme of follow-up sessions. There was an agreed extension to the window for follow-up sessions from the 9 December 2022 to 22 December 2022 and in total, 35 follow-up visits were undertaken and 116 additional students attended those sessions, which boosted participation towards 80 per cent. Nevertheless, the weighted response rate of 79.35 per cent fell marginally below the required standard.

Lower student participation proved to be an issue internationally in this post-Covid-19 survey. The PISA consortium requested that Scotland perform a student level non-response bias analysis (NRBA). The results and interpretation of the NRBA are provided in Section 3. It should be noted that lower school and student participation was observed for multiple countries in PISA 2022 and that NRBAs produced by other countries illustrated similar levels of sample bias. The fall in both

school and student participation following the Covid-19 pandemic appears to be an issue affecting a number of countries and needs to be considered in the planning of PISA and other studies going forward.

3. Non-response bias analysis (NRBA)

3.1 Purpose of this NRBA

The PISA Consortium sets out a number of Technical Standards (PISA 2022 Technical Standards, OECD 2020[6]) to be met for the inclusion of a country's data in the international report. The purpose of the technical standards is to ensure that the data produced from the survey is representative of the performance of a country's education system and therefore, that the results from countries can be meaningfully compared to one another.

Technical Standard 1.12 states that

…the final weighted student response rate is at least 80 per cent of all sampled students across responding schools.

In PISA 2022, Scotland narrowly missed attaining Standard 1.12 with a weighted student participation rate of 79.4 per cent. The PISA consortium requested that Scotland, along with several other countries that failed to meet this standard, perform a student level non-response bias analysis (NRBA). The purpose of the NRBA is to provide evidence of how representative the students who did complete the assessment were of the entire cohort that had been selected from the sampling process. The analysis links non-PISA attainment data and other contextual demographic variables to the students who were selected to participate. The analysis then compares these variables for participating students to the same variables for the whole cohort as a test of representativeness.

3.2 Analysis variables

The NRBA analysis was carried out by statisticians from the NFER Centre for Statistics. The specific analysis conducted was discussed extensively with researchers from Westat. This ensured that the analysis met the consortium's requirements for the NRBA and that the methodology was comparable to that performed by other countries that had been requested to conduct an NRBA. NFER also liaised closely with Education Analytical Services Division of the Scottish Government to ensure that the most appropriate available variables were used in the analysis. Before the NRBA was performed both Westat and the Scottish Government had agreed that the methodology and the variables were appropriate for the analysis.

3.1.1. Attainment variables

Education Analytical Services provided the following attainment variables which are considered to be strongly correlated to the PISA achievement scores. These variables are collected as part of the Achievement of Curriculum for Excellence Levels (ACEL) data collection. The data is based on teachers' professional judgements of individual student performance. Teacher professional judgements are based on all the evidence collected by teachers during the ongoing assessment of learners, including observing them at work, assessing their work in lessons and their performance in standardised assessments. The expected standards under the Curriculum for Excellence (CfE) are

[6] https://www.oecd.org/pisa/pisaproducts/PISA-2022-Technical-Standards.pdf

embedded in the Experiences and Outcomes; further to this Curriculum for Excellence Benchmarks[7] for literacy and numeracy provide a more explicit and clear statement of standards. The data is collected in June each year for learners in years P1, P4, P7 and S3 in publicly funded schools.

The variables that were provided for this analysis cover the following educational areas:

- English reading
- English writing
- English listening and talking
- numeracy
- general literacy.

For each variable, the following levels of performance were provided:

- **00** Not yet achieved early level
- **E** Early Level (expected level for P1)
- **01** First Level (expected level for P4)
- **02** Second Level (Expected level for P7)
- **03** Third Level (Expected level for S3)
- **04** Fourth Level (Higher than expected level for S3)
- **98** Learner following individual milestones, applied where young people have long-term significant and complex additional support needs
- **99** Not assessed (e.g. learner may have recently moved to the school and teacher was not able to assess).

For the NRBA, the most recently collected attainment variables would provide the most up-to-date information. In the case of the ACEL data, this would be the data collected in S3. However, due to the Covid-19 pandemic, the ACEL data collection did not occur at all in 2019/20 and in 2020/21 data was collected for primary schools only. As a result, S3 ACEL data was not collected for the students in the PISA 2022 cohort. Therefore, the analysis conducted for the NRBA used the next most recently available data which is the ACEL P7 attainment data of the 2022 PISA cohort. This data was collected in 2017/18 and 2018/19.

For this analysis, the ACEL performance levels were recoded into a numerical scale ranging from 0 to 5 (with 98 and 99 denoting absent scores), apart from the 'general literacy' variable which was supplied as a binary variable where a score of 0 means the learner had not achieved the expected level in all of reading, writing and listening and talking, and a score of 1 means that they had.

NFER then performed an analysis for unidimensionality of the English reading, English writing, English listening and numeracy variables. The strong correlation between the factors (Table 3.1) and the high reading for a single factor in the scree plot (Figure 3.1) indicates that all of the variables effectively measure the same factor and can be assumed to be unidimensional. As such, it is then possible to create a sixth variable of 'General attainment' by combining the reading, writing, talking and listening and numeracy scales.

Each of these four attainment variables was used in turn to examine differences between response and non-response (Table 3.2). Reliability (Chronbach's alpha) for General attainment was 0.9. The

[7] The benchmarks can be accessed via this hyperlink: Benchmarks | Curriculum for Excellence documents | Curriculum for Excellence | Education Scotland

last column of Table 3.2 shows that the alpha for the 4-item scale would diminish if any of the items would be removed.

Figure 3.1 Scree plot indicating unidimensionality

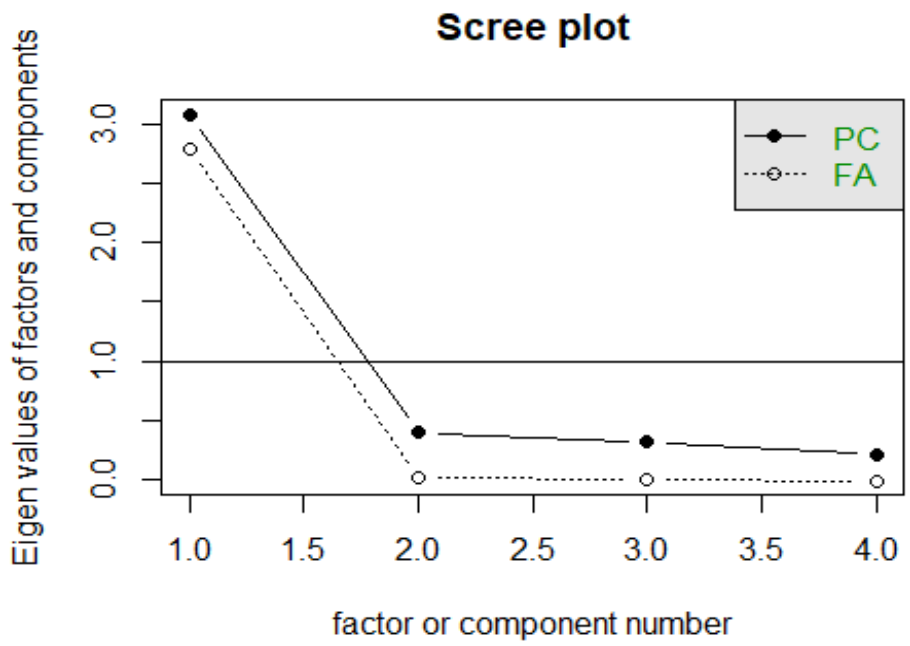


Table 3.1 Scale correlations

	Reading	Writing	Listening	Numeracy
Reading	1.00	0.78	0.72	0.70
Writing	0.78	1.00	0.67	0.68
Listening	0.72	0.67	1.00	0.61
Numeracy	0.70	0.68	0.61	1.00

Table 3.2 Reliability statistics

Variable	No. of matched students	No. of non-participants	% of un-matched	mean score	Standard deviation	min	max	Item to total correlation	Cronbach 's alpha
Reading	4272	380	8.2	2.8	0.43	0	4	0.84	0.84
Writing	4272	380	8.2	2.7	0.49	0	4	0.80	0.86
Listening	4273	379	8.1	2.9	0.39	0	4	0.74	0.88
Numeracy	4271	381	8.2	2.8	0.46	0	4	0.74	0.88

3.2.2 Demographic variables

The following deprivation variables were also provided by Education Analytical Services at the Scottish Government in order to further explore the assumption of no difference between respondents and non-respondents:

- Free School Meal (FSM) status
- Scottish Index of Multiple Deprivation (SIMD)
- Additional Support Need (ASN)

FSM and ASN were coded as a binary variable where 0 means not eligible and 1 means eligible (learners eligible for ASN need more support to that which is generally provided in educational establishments to children of the same age).

The SIMD was provided in deciles with a 1 to 10 range. SIMD decile 1 contains the most deprived ten per cent of data zones and decile 10 contains the least deprived ten per cent of data zones. For this analysis, the SIMD levels were recoded into a numerical scale of 0 to 9.

3.2.3 Matching variables to students

It should be noted that it was not possible to match all students in Scotland's PISA dataset to these national attainment and deprivation variables. Depending on the variable, between 4216 and 4293 cases were matched out of a PISA dataset comprising 4652 cases. This corresponds to between 90.63 and 92.28 per cent of cases matched. The proportion of matched to unmatched cases (based on the census year variable) across the PISA student status (denoting response, no response, excluded and ineligible) is shown in the table below. The significance of the differences between the column proportions is evidence that there is no relationship between response status and successful matching except for those that were ineligible in the first place. Consequently, the NRBA was carried forward with the matched data as it is (no imputation or other procedures were used to deal with the missing data). A table of descriptive statistics for all attainment and deprivation variables is shown in the Appendix.

Table 3.3 Matching the sample

Status	Number	Matched	Not matched	p-value
Response	3257	2979 (70%)	278 (73%)	0.20
Nonresponse	858	790 (18%)	68 (18%)	0.80
Excluded	221	203 (5%)	18 (5%)	0.99
Ineligible	316	301 (7%)	15 (4%)	0.03

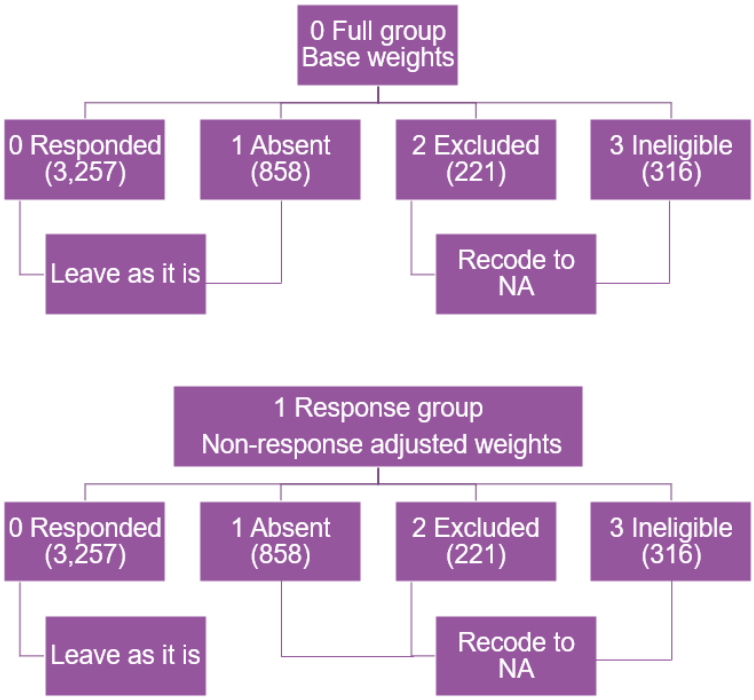
3.3 Hypotheses tests

3.3.1 Methodology

Following the procedure outlined by Westat, NFER created two copies of the data: a response plus non-response dataset (full group) and a response only dataset (response group) and appended them vertically (long file format). Different sets of weights were applied to each copy: non-response adjusted weights for the response group and base weights for the full group. The analysis variables (e.g. reading, writing, numeracy, etc.) were then substituted with NA for ineligible and excluded

students for both the full group and the response group and for absent students in the response group (see figure 3.2 below)[8]. For both the mean comparisons and the logistic regression, the variable used for analysis was the 'Copy of data' (0=full group; 1=response group) and not the response status variable.

Figure 3.2 Analysis datasets



Once that pre-processing was done, we ran t-tests taking into account the complex sample design: school clustering of the data, stratification, weighting and replicate weights procedure (BRR Fay = 0.5). In the table below, hypotheses tests of no difference between the full sample and the respondents only sample are presented.

[8] A minority of values for the analysis variables were already missing because of a failure to match and were left as NA

Table 3.4 Hypothesis tests across scale

Achievement	Number in full sample	Mean of full sample	Standard Deviation of full sample	Number in response sample	Mean of response sample	Standard Deviation of response sample	Difference in means	t-value	Degrees of freedom	p-value
Reading	3778	2.84	0.39	2988	2.87	0.35	0.03	1.9e+13	61	<0.001
Writing	3779	2.77	0.45	2988	2.81	0.42	0.03	2.5e+13	61	<0.001
Listening	3779	2.89	0.34	2988	2.91	0.30	0.03	1.9e+13	61	<0.001
Numeracy	3776	2.80	0.42	2986	2.84	0.39	0.03	1.7e+13	61	<0.001
General Literacy	3788	0.76	0.43	2993	0.80	0.40	0.03	1.1e+14	61	<0.001
General attainment	3775	11.31	1.38	2985	11.43	1.23	0.12	2.6e+13	61	<0.001
FSM	3769	0.16	0.36	2979	0.12	0.33	-0.03	-1.4e+14	61	<0.001
SIMD	3767	4.51	2.86	2978	4.70	2.84	0.19	3.7e+13	61	<0.001
ASN	3769	0.35	0.48	2979	0.32	0.47	-0.03	-4.9e+13	61	<0.001

3.3.2 Outcomes

All of the t-test hypothesis tests returned p-values of less than 0.001 per cent. This indicates that there were significant differences between the means of the full sample and the response sample for all of the variables tested. In the case of the attainment variables, the response sample means were higher than for the full sample. This indicates that the students in the response sample demonstrated slightly higher attainment levels than students in the full sample.

For the demographic variables, the means for FSM and ASN were lower for the response sample; indicative that the response sample were less likely to be eligible for FSM or ASN than the full sample. The mean for SIMD was higher for the response sample, indicating that students in the response sample were more likely to be in a higher SIMD decile than those in the full sample.

3.3.3 Logistic regression

A logistic regression was then run with membership group (full group vs response group) regressed on the attainment and deprivation variables, jointly taking into account the complex sample characteristics (as above). Regression coefficients and their p-values are presented below. As can be seen, all the variables entered in the regression model contributed to predict the outcome significantly.

Table 3.5 Logistic regression

Strata	Estimate	Std. Error	t value	p-val
(Intercept)	-0.6843	6.5e-14	-1.0e+13	<0.001
Reading	0.0041	6.9e-15	5.9e+11	<0.001
Writing	0.0639	4.7e-15	1.4e+13	<0.001
Listening	0.1169	1.4e-14	8.6e+12	<0.001
Numeracy	0.0477	6.2e-15	7.7e+12	<0.001
SIMD	0.0121	4.3e-16	2.8e+13	<0.001
FSM	-0.2004	2.4e-15	-8.2e+13	<0.001
ASN	-0.0234	4.6e-15	-5.1e+12	<0.001

3.4 Interpretation of the NRBA for Scotland in PISA 2022

This NRBA was submitted to the technical board of the PISA Consortium. This was considered alongside all of the other countries that had to complete an NRBA for PISA 2022. The outcome of the review is that the results for Scotland can be presented in the international report. This also applied to all of the other countries that submitted NRBAs.

The data for Scotland will be annotated with the following statement in the main report:

Caution is required when interpreting estimates because one or more PISA sampling standards were not met (see Reader's Guide, Annexes A2 and A4).

In the Reader's Guide it will be noted that Scotland is included as one of the in the following category

Entities that submitted technically strong analyses, which indicated that more than minimal bias was most likely introduced in the estimates due to low response rates.

Appendix

Table A1 Sample characteristics

Characteristic	1 Respondent, N = 3,257	2 Absent, N = 858	3 Excluded, N = 221	4 Ineligible, N = 316
Reading	2.87 (2,988)	2.74 (790)	2.37 (195)	2.58 (299)
Writing	2.81 (2,988)	2.65 (791)	2.28 (195)	2.50 (298)
Listening	2.91 (2,988)	2.79 (791)	2.49 (195)	2.69 (299)
Numeracy	2.83 (2,986)	2.69 (790)	2.33 (196)	2.54 (299)
Literacy	0.80 (2,933)	0.64 (795)	0.36 (203)	0.50 (302)
General attainment	11.43 (2,985)	10.87 (790)	9.47 (195)	10.31 (298)
SIMD	4.73 (2,987)	3.66 (789)	3.57 (203)	3.59 (246)
FSM	12% (2,979)	28% (790)	34% (203)	26% (301)
ASN	32% (2,979)	44% (790)	79% (203)	50% (301)

Table A2 Number of students in each characteristic response category

Characteristic	1 Respondent, N = 3,257	2 Absent, N = 858	3 Excluded, N = 221	4 Ineligible, N = 316
Reading				
0 [Not yet achieved]	0 / 2,988 (0%)	1 / 790 (0.1%)	2 / 195 (1.0%)	1 / 299 (0.3%)
1 [Early Level]	13 / 2,988 (0.4%)	13 / 790 (1.6%)	18 / 195 (9.2%)	6 / 299 (2.0%)
2 [First Level]	359 / 2,988 (12%)	176 / 790 (22%)	80 / 195 (41%)	110 / 299 (37%)
3 [Second Level]	2,613 / 2,988 (87%)	600 / 790 (76%)	95 / 195 (49%)	182 / 299 (61%)
4 [Third Level]	3 / 2,988 (0.1%)	0 / 790 (0%)	0 / 195 (0%)	0 / 299 (0%)
Missing	269	68	26	17
Writing				
0 [Not yet achieved]	0 / 2,988 (0%)	1 / 791 (0.1%)	4 / 195 (2.1%)	1 / 298 (0.3%)
1 [Early Level]	24 / 2,988 (0.8%)	20 / 791 (2.5%)	18 / 195 (9.2%)	7 / 298 (2.3%)
2 [First Level]	527 / 2,988 (18%)	237 / 791 (30%)	93 / 195 (48%)	132 / 298 (44%)
3 [Second Level]	2,432 / 2,988 (81%)	533 / 791 (67%)	80 / 195 (41%)	158 / 298 (53%)
4 [Third Level]	5 / 2,988 (0.2%)	0 / 791 (0%)	0 / 195 (0%)	0 / 298 (0%)
Missing	269	67	26	18
Listening				

Characteristic	1 Respondent, N = 3,257	2 Absent, N = 858	3 Excluded, N = 221	4 Ineligible, N = 316
0 [Not yet achieved]	0 / 2,988 (0%)	1 / 791 (0.1%)	3 / 195 (1.5%)	1 / 299 (0.3%)
1 [Early Level]	11 / 2,988 (0.4%)	10 / 791 (1.3%)	9 / 195 (4.6%)	3 / 299 (1.0%)
2 [First Level]	247 / 2,988 (8.3%)	144 / 791 (18%)	73 / 195 (37%)	83 / 299 (28%)
3 [Second Level]	2,728 / 2,988 (91%)	636 / 791 (80%)	110 / 195 (56%)	212 / 299 (71%)
4 [Third Level]	2 / 2,988 (<0.1%)	0 / 791 (0%)	0 / 195 (0%)	0 / 299 (0%)
Missing	269	67	26	17
Numeracy				
0 [Not yet achieved]	0 / 2,986 (0%)	1 / 790 (0.1%)	1 / 196 (0.5%)	1 / 299 (0.3%)
1 [Early Level]	18 / 2,986 (0.6%)	13 / 790 (1.6%)	19 / 196 (9.7%)	4 / 299 (1.3%)
2 [First Level]	459 / 2,986 (15%)	215 / 790 (27%)	90 / 196 (46%)	127 / 299 (42%)
3 [Second Level]	2,508 / 2,986 (84%)	561 / 790 (71%)	86 / 196 (44%)	167 / 299 (56%)
4 [Third Level]	1 / 2,986 (<0.1%)	0 / 790 (0%)	0 / 196 (0%)	0 / 299 (0%)
Missing	271	68	25	17
Literacy				
0 [Not yet achieved]	612 / 2,993 (20%)	285 / 795 (36%)	130 / 203 (64%)	151 / 302 (50%)
1 [Achieved]	2,381 / 2,993 (80%)	510 / 795 (64%)	73 / 203 (36%)	151 / 302 (50%)
Missing	264	63	18	14
FSM				
0 [Not in receipt of FSM]	2,608 / 2,979 (88%)	571 / 790 (72%)	134 / 203 (66%)	224 / 301 (74%)
1 [In receipt of FSM]	371 / 2,979 (12%)	219 / 790 (28%)	69 / 203 (34%)	77 / 301 (26%)
Missing	278	68	18	15
ASN				
0 [Does not have ASN]	2,018 / 2,979 (68%)	440 / 790 (56%)	43 / 203 (21%)	150 / 301 (50%)
1 [Has ASN]	961 / 2,979 (32%)	350 / 790 (44%)	160 / 203 (79%)	151 / 301 (50%)
Missing	278	68	18	15

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