9. Characteristics of pupils and their homes

Chapter summary

This chapter considers the relationship between children's home circumstances in Northern Ireland and their performance on the PIRLS 2011 reading assessment and the TIMSS 2011 mathematics and science assessments. Within each sub-section, findings for reading are presented first, followed by findings for mathematics and science. Outcomes for Northern Ireland are compared with international averages, and with comparator countries of interest where relevant.

Key findings

- A higher proportion of children in Northern Ireland reported having many resources for learning at home compared with the average internationally. Pupils with access to more home resources for learning had higher average achievement in reading, mathematics and science.
- Teachers of pupils in Northern Ireland were more likely to report pupils' lack of sleep as limiting their teaching compared with pupils' lack of nutrition.
- The proportion of pupils whose teachers reported lack of sleep as a limiting factor was greater in Northern Ireland than the international average for all subjects.
- Pupils in Northern Ireland whose teachers reported that pupils' lack of basic nutrition and lack of sufficient sleep limited teaching had lower average achievement in reading, mathematics and science than those whose teachers reported not having these limitations. This pattern was also seen in the international data.

9.1 Home resources for learning

Interpreting the data: indices and scales

In order to summarise data from a questionnaire, responses to several related items are sometimes combined to form an index or scale. The respondents to the questionnaire items are grouped according to their responses and the way in which responses have been categorised is shown for each index or scale. The data in an index or scale is often considered to be more reliable and valid than the responses to individual items.

Access to resources, as well as indicators of socio-economic status such as parents' education level and occupation, are associated with educational achievement (OECD, 2012). In order to acquire information about these background factors, which are referred to in the international data and report as *Home Resources for Learning*, the TIMSS & PIRLS 2011 *Learning to Read Survey* asked parents of children involved in TIMSS and PIRLS to report on the availability of three key home variables highly related to achievement in school:

- parents' education
- parents' occupation and
- number of children's books in the home.

In addition, children were asked (among other things) about:

- number of books in the home and
- availability of key study supports at home: an internet connection and their own room.

Table 9.1 in this section presents the results for the PIRLS and TIMSS 2011 *Home Resources for Learning* scale, which was created based on parents' and children's reports about the variables listed above. Results on this scale are shown for all three subjects for countries that administered the *Learning to Read* questionnaire.[1]

Pupils were categorised into three groups, according to the availability of the *Home Resources for Learning* (details of how responses were categorised during analysis is given in Figure 1, below Table 9.1).

In Northern Ireland, 30 per cent of children were in the *Many Resources* category, 68 per cent were in the *Some Resources* category, and a very small proportion (2 per cent) were in the *Few Resources* category. A higher proportion of children were reported to have *Many Resources* in Northern Ireland than internationally. In Table 9.1, the percentages of children in each category are the same for the three assessments since they refer to the same pupils, but the data on average achievement is different for each assessment.

In Northern Ireland, there were patterns of achievement across the different categories of resources. Children who were in the *Many Resources* category scored higher in all three subjects than those who were in the *Some Resources* category.[2] This was also the case on average internationally. No comparisons could be made between achievement of children in the *Many Resources* and *Few Resources* categories (for all subjects) because only 2 per cent of children in Northern Ireland were categorised as having *Few Resources*.

1 This was typically countries that administered both TIMSS and PIRLS assessments to the same pupils, which was the case in Northern Ireland and most of Northern Ireland's comparator countries. The exception was England, where the *Learning to Read (Parent) Questionnaire* was not administered. The response rates for the parent questionnaires in Northern Ireland and some other comparator countries were below 70 per cent.

2 The differences in achievement have not been tested for statistical significance in this international analysis but, based on the size of the standard errors, are likely to be significant.

Table 9.1 Home resources for learning in Year 6*

Reported by Parents, except Number of Books and Study Supports Reported by Students

Students were scored according to their own and their parents' responses concerning the availability of five resources on the *Home Resources for Learning* scale. Students with **Many Resources** had a score of at least 11.9, which is the point on the scale corresponding to students reporting they had more than 100 books in the home and two home study supports, and parents reporting that they had more than 25 children's books in the home, that at least one parent had finished university, and that at least one parent had a professional occupation, on average. Students with **Few Resources** had a score no higher than 7.3, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home and neither of the two home study supports, and parents reporting that they had 10 or fewer children's books in the home, that neither parent had gone beyond upper-secondary education, and that neither parent was a small business owner or had a clerical or professional occupation, on average. All other students were assigned to the **Some Resources** category.

Reading

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland s	30 (1.6)	607 (4.2)	68 (1.6)	560 (3.2)	2 (0.3)	~ ~	10.9 (0.07)
International Avg.	18 (0.2)	571 (0.7)	73 (0.2)	510 (0.4)	9 (0.1)	448 (1.4)	

Mathematics

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland s	30 (1.5)	617 (4.7)	68 (1.6)	564 (3.9)	2 (0.4)	~ ~	10.9 (0.07)
International Avg.	17 (0.2)	555 (0.9)	74 (0.2)	497 (0.6)	9 (0.1)	436 (1.8)	

Science

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
Northern Ireland s	30 (1.5)	562 (3.4)	68 (1.6)	518 (3.2)	2 (0.4)	~ ~	10.9 (0.07)
International Avg.	17 (0.2)	559 (0.9)	74 (0.2)	495 (0.6)	9 (0.1)	428 (2.0)	

* Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because this item was included in the PIRLS Home Questionnaire completed by parents.

Centre point of scale set at 10.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "s" indicates data are available for at least 50% but less than 70% of the students.

Source: Exhibit 4.1, international PIRLS report , Exhibit 4.1 international mathematics report and Exhibit 4.1 international science report.

Figure 1 The Home Resources for Learning scale

Number of books in the home (students):

1) 0-10
2) 11-25
3) 26-100
4) 101-200
5) More than 200

Number of children's books in the home (parents):

1) 0-10
2) 11-25
3) 26-100
4) 51-100
5) More than 100

Number of home study supports (students):

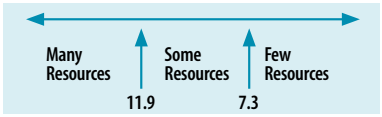
1) None
2) Internet connection or own room
3) Both

Highest level of education of either parent (parents):

1) Finished some primary or lower secondary or did not go to school
2) Finished lower secondary school
3) Finished upper secondary school
4) Finished post-secondary education
5) Finished university or higher

Highest level of occupation of either parent (parents):

1) Has never worked outside the home for pay, general laborer, or semi-professional (skilled agricultural or fishery worker, craft or trade worker, plant or machine operator)
2) Clerical (clerk or service or sales worker)
3) Small business owner
4) Professional (corporate manager or senior official, professional, or technician or associate professional)



Source: Exhibit 4.1, international PIRLS report and international mathematics and science reports.

Table 9.2 provides supporting detail about the availability of the specific home resources included in the *Home Resources for Learning* scale. It shows that in Northern Ireland, 31 per cent of children reported having more than 100 books in their home. This was higher than the international average and similar to countries such as Singapore, Republic of Ireland and England. In Northern Ireland, 83 per cent of children had more than 25 children's books in their home. This was also higher than the international average.

In Northern Ireland, 70 per cent of pupils reported having both their own room and an internet connection at home. This was higher than the international average and similar to countries such as Australia, Finland, England, Republic of Ireland and New Zealand.

As reported by parents, in Northern Ireland 35 per cent of children had at least one parent with a university degree or higher. This was just above the international average and was similar to countries such as the Republic of Ireland and Singapore. The percentage was slightly higher in Finland and Australia.

In Northern Ireland, around half of children had at least one parent in a professional occupation. This was higher than the international average (36 per cent).

Table 9.2 Components of the Home Resources for Learning scale*[3]

Reading

Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents

Country	Per cent of Students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At least One Parent with a University Degree or Higher	At least One Parent in a Professional Occupation**	More than 25 Children's books in Their Home
Northern Ireland	31 (1.4)	70 (1.1)	s 35 (1.7)	s 49 (1.6)	s 83 (1.2)
International Avg.	31 (0.2)	36 (0.2)	59 (0.2)	27 (0.2)	55 (0.2)

Mathematics

Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents

Country	Per cent of Students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher	At Least One Parent in a Professional Occupation**	More than 25 Children's Books in Their Home
Northern Ireland	31 (1.4)	70 (1.1)	s 35 (1.7)	s 50 (1.7)	s 83 (1.2)
International Avg.	25 (0.2)	52 (0.2)	30 (0.2)	36 (0.2)	58 (0.2)

Science

Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents

Country	Per cent of Students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher	At Least One Parent in a Professional Occupation**	More than 25 Children's Books in Their Home
Northern Ireland	31 (1.4)	70 (1.1)	s 35 (1.7)	s 50 (1.7)	s 83 (1.2)
International Avg.	25 (0.2)	52 (0.2)	30 (0.2)	36 (0.2)	58 (0.2)

* Data reported in columns 3-5 were from the PIRLS Home Questionnaire completed by parents, so data are available only for countries that administered both TIMSS and PIRLS to the same fourth grade students.

** Includes corporate manager or senior official, professional, and technician or associate professional.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "s" indicates data are available for at least 50% but less than 70% of the students.

Source: Exhibit 4.2, international PIRLS report and international mathematics and science reports

3 Although parents who responded to the questionnaire were based on a single sample, percentages may vary slightly across subjects for the parent-reported data. The reasons for this are not certain. It may be due to patterns of non-response across questions, or to rounding.

9.2 Pupil level factors that limit teaching

Interpreting the data: percentages in tables

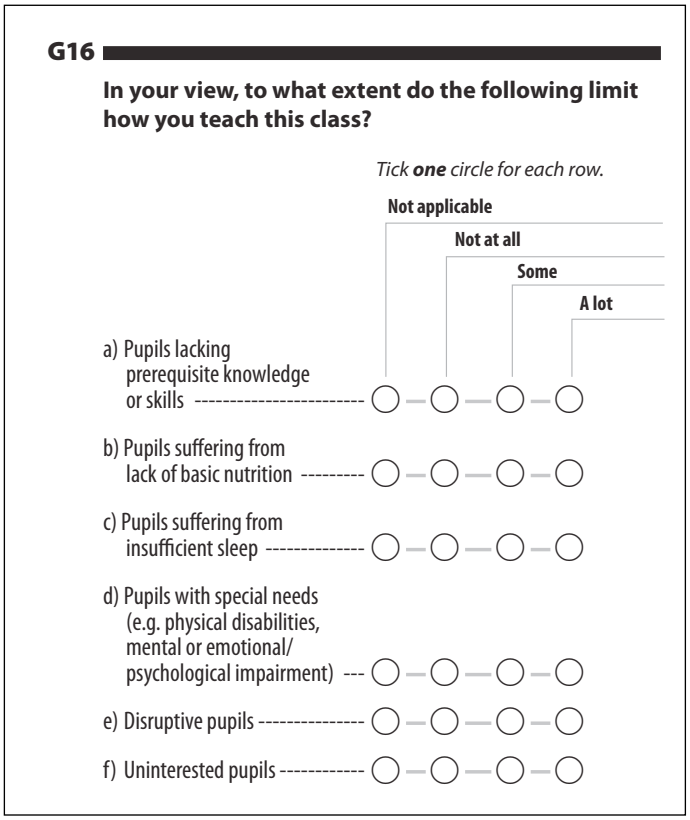
Some of the data in this chapter is derived from teacher reports. Reported percentages refer to pupils and can usually be interpreted as the percentage of pupils whose teachers reported a particular practice or circumstance.

Y6 pupils were sampled by class. The Y6 teacher questionnaire would, in most cases therefore, have been completed by the class teacher of the sampled class. However, in some cases, it might have been completed by different teachers who teach these pupils reading, mathematics and/or science separately.

This means that the teacher-derived data for reading, mathematics and science may differ slightly as the sample of teachers in each group is not necessarily the same or the distribution of pupils within the sample of teachers may differ by subject.

Teachers were asked to report the extent to which a number of pupil level factors limited their teaching. The question to which teachers responded is shown in Figure 2 below. This section is concerned with the first three elements of the question: teachers' perceptions of pupils' lack of prerequisite skills and knowledge, pupils' lack of basic nutrition and pupils suffering from not enough sleep. Table 9.3 presents teachers' reports on the extent to which pupils' lack of prerequisite knowledge or skills limited teaching, and Table 9.4 presents the equivalent findings relating to teachers' reports of the impact on their teaching of pupils suffering from a lack of basic nutrition and pupils suffering from not enough sleep.

Figure 2 The limitations on teaching question



Source: adapted from the international version of the PIRLS and TIMSS 2011 Teacher Questionnaire [4]

Pupils lacking prerequisite knowledge or skills

Table 9.3 shows that in Northern Ireland, over two thirds of pupils were taught by teachers who reported that their teaching was limited by pupils lacking prerequisite knowledge or skills to *some* extent, while around a quarter reported that their teaching was *not at all* limited by pupils' lack of prerequisite skills.

In all comparator countries for all subjects, the percentage of pupils whose teachers reported that their teaching was limited to *some* extent by pupils' lack of prerequisite knowledge or skills, was similar to or lower than for Northern Ireland. However, in the majority of comparator countries, the percentage of pupils whose teachers reported that their teaching was limited *a lot* by pupils' lack of prerequisite knowledge or skills was higher than in Northern Ireland.

Table 9.3 suggests an association between attainment and teachers' reports of limitations based on pupils' lack of prerequisite knowledge or skills. It is likely that these associations are significant [5] across the international sample as a whole, but not within Northern Ireland.[6]

4 http://timssandpirls.bc.edu/pirls2011/index.html, http://timssandpirls.bc.edu/timss2011/index.html

5 Throughout this report, findings listed as 'significant' are statistically significant.

6 The differences in achievement have not been tested for statistical significance in this international analysis but, based on the size of the standard errors, the apparent differences in Northern Ireland are not likely to be significant.

Table 9.3 Year 6 teaching limited by pupils' lacking prerequisite knowledge or skills

Reading

Reported by Teachers

Country		Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
		Not At All		Some		A Lot	
		Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r	26 (3.7)	573 (5.4)	68 (3.9)	557 (3.6)	6 (2.1)	541 (9.6)
International Avg.		28 (0.5)	526 (0.9)	61 (0.5)	512 (0.5)	11 (0.3)	485 (1.6)

Mathematics

Reported by Teachers

Country		Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
		Not At All		Some		A Lot	
		Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r	26 (3.6)	574 (7.4)	68 (3.9)	560 (4.2)	6 (2.1)	543 (14.9)
International Avg.		27 (0.5)	506 (1.0)	61 (0.5)	489 (0.6)	12 (0.3)	467 (1.9)

Science

Reported by Teachers

Country		Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
		Not At All		Some		A Lot	
		Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r	25 (3.6)	530 (7.1)	69 (3.8)	514 (3.4)	6 (2.1)	500 (9.6)
International Avg.		28 (0.5)	501 (1.1)	60 (0.5)	485 (0.7)	11 (0.3)	460 (2.1)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 8.9 PIRLS international report, Exhibit 8.19, international mathematics report, Exhibit 8.19, international science report

Pupils suffering from a lack of basic nutrition/lack of sufficient sleep

In the international analysis (see Table 9.4), the response categories *some* and *a lot* were combined, both for pupils suffering from a lack of basic nutrition and for pupils suffering from not enough sleep. In Northern Ireland, the percentage of pupils whose teachers reported that their teaching was *not at all* limited by pupils' lack of basic nutrition was similar in all three subjects (around 80 per cent). In comparison to Northern Ireland, the percentage was consistently higher, for all three subjects, in Finland, Hong Kong and Singapore while it was consistently lower in Australia and New Zealand and similar in England and Republic of Ireland.

Teachers of pupils in Northern Ireland were more likely to report pupils' lack of sleep as limiting their teaching compared with pupils' lack of nutrition. In Northern Ireland, just under two thirds of pupils were taught by teachers who reported that their teaching was limited to *some* extent or *a lot* by pupils' lack of sleep, for all three subjects. Among comparator countries, the percentage of pupils whose teachers reported that their teaching was limited to *some* extent or *a lot* by pupils' lack of sleep was consistently lower in Hong Kong and Singapore, for all three subjects.

Pupils in Northern Ireland whose teachers reported that pupils' lack of basic nutrition and lack of sufficient sleep limited teaching appeared to have lower average achievement in reading, mathematics and science than those whose teachers reported not having these limitations.[7]

Table 9.4 Teaching limited by pupils suffering from lack of basic nutrition/not enough sleep

Reading

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 80 (3.1)	567 (3.0)	20 (3.1)	535 (7.3)	r 40 (4.7)	573 (3.6)	60 (4.7)	552 (3.8)
International Avg.	73 (0.4)	519 (0.6)	27 (0.4)	495 (1.0)	51 (0.5)	518 (0.6)	49 (0.5)	507 (0.7)

Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 81 (2.9)	571 (3.9)	19 (2.9)	532 (6.8)	r 41 (4.8)	580 (4.4)	59 (4.8)	551 (5.0)
International Avg.	71 (0.4)	498 (0.7)	29 (0.4)	472 (1.1)	53 (0.5)	497 (0.7)	47 (0.5)	486 (0.8)

Science

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
Northern Ireland	r 80 (3.1)	524 (3.4)	20 (3.1)	489 (5.7)	r 39 (4.7)	532 (3.9)	61 (4.7)	507 (4.3)
International Avg.	71 (0.4)	493 (0.8)	29 (0.4)	467 (1.1)	54 (0.5)	492 (0.7)	46 (0.5)	481 (0.9)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 8.10 PIRLS international report, Exhibit 8.21, international mathematics report, Exhibit 8.21, international science report

9.3 Conclusion

Children involved in PIRLS and TIMSS 2011, and their parents and teachers, were asked about a number of factors relating to children's home background which may have impacted upon their achievement. These included key resources available at home, and parents' occupation and level of education. Teachers were also asked about a number of pupil-level factors which may limit classroom teaching, including pupils' lack of prerequisite knowledge and skills, and pupils' lack of basic nutrition and lack of sufficient sleep.

7 Tests of statistical significance have not been carried out in this international analysis but, given the size of the standard errors, it is likely that these differences are statistically significant.

Overall, the majority of children in Northern Ireland were categorised as having access to *Some* or *Many Resources*, and parents' level of education and occupational status were higher than the international averages. However, there were considerable differences in achievement between children categorised as having *Many Resources* or *Some Resources*, in all subjects, in Northern Ireland and on average internationally.

In Northern Ireland, a high proportion of teachers reported that their teaching was limited to *some* extent by pupils' lack of prerequisite knowledge or skills, in all subjects. This was consistent with the international averages. The majority of pupils were taught by teachers who reported that their teaching was *not at all* limited by pupils' lack of nutrition. However, teachers of more pupils reported that pupils' lack of sleep limited teaching, compared with those reporting lack of basic nutrition to be a problem. A similar pattern was also seen in the international averages. The average achievement of pupils whose teachers reported that pupils' lack of basic nutrition and/or sleep limited their teaching was lower than that of pupils whose teachers reported that these factors did not limit their teaching at all.