social research

Research Findings
3/2015

The Scottish Government
Riaghaltas na h-Alba

CHILDREN, EDUCATION AND SKILLS

# Children's development at the start of school in Scotland and the progress made during their first school year: An analysis of PIPS baseline and follow-up assessment data

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## Main findings

The Scottish Government commissioned a secondary analysis of data from the Performance Indicators in Primary Schools (PIPS) assessment. This analysis investigated what children know and can do in Scotland when they start school in Primary 1, how much progress they make during the school year, how this compares to English pupils, and whether differences exist between pupils of different gender, sex or deprivation area. In addition to cognitive development, the analysis also investigated the personal and social development of the children. Trends over the last three years were also investigated. The main findings are:

- At the start of Primary 1, older children, on average, attained higher scores on the cognitive part of the assessment than younger ones, although the relationship between age and attainment was weak, with some younger children attaining high scores and vice versa. Children from the least deprived areas had higher scores than children from the most deprived areas by around 14 months of development although, as with age, there was variation.

Girls' development in early reading was three and a half months ahead of boys'. There was very little difference between the average early mathematics scores for the two groups. In all areas, the spread of scores was wider for boys than girls, meaning that a higher proportion of boys had very high and very low scores.

- By the end of Primary 1, children had made dramatic progress. This progress was more than the differences found between older and younger children, boys and girls, or children from affluent and deprived backgrounds found at the beginning of the year.
  Those living in the most affluent areas had made around two months' more progress in early reading and vocabulary than children from the most deprived areas. But for early mathematics, children from the most deprived areas had caught up a little with their peers from the most affluent areas. Girls had made slightly more progress than boys in reading, and vice versa for mathematics.
- Progress in Primary 1 varied from school to school by the equivalent of around twelve months development for reading and fourteen months for mathematics.
- The strongest areas of personal and social development at the start of Primary 1 were adjustment to the school setting and independence. Cultural awareness was relatively weaker at this stage. All aspects continued to improve during Primary 1 and children's cultural awareness was seen to increase rapidly.
- At the start of Primary 1, children in Scotland had slightly higher scores for cognitive development and personal and social development than children in England, age for age. Progress in mathematics was very similar in Scotland and England but the progress in reading was very slightly greater in England during the first year. Fair comparisons were not possible for progress in personal and social development because of missing data.
- Over the three year period between 2012/13 and 2014/15, the scores in Scotland for early reading and early mathematics at the start of Primary 1 declined slightly.
- The progress made by the end of Primary 1 in early reading and mathematics increased slightly over the three year period. These gains meant that there were no significant drops over the three years for mathematics levels at the end of Primary 1. For reading, a drop was still apparent although it was very small.

# Executive summary

## Aims of the research

There is wide recognition that children's early development and their progress during the first year of school are crucial for their later success. Policy makers, teachers and researchers are interested in knowing how well their children are doing at this key stage in their life. This research summary reports the findings from a secondary analysis of existing data from the Performance Indicators in Primary Schools (PIPS) On-entry Baseline and Follow-up assessment which was used to assess what children know and can do in Scotland when they start school in Primary 1 and the progress that they make up to the end of the school year.

The PIPS assessment provides a comprehensive picture of children's development at the start and end of Primary 1. PIPS is widely used by schools in Scotland for formative purposes and the data are returned to the Centre for Evaluation and Monitoring (CEM) for processing and school feedback. From the full data set, nationally representative samples of pupils were selected to explore the following questions:

- Focusing on children who started Primary 1 in the 2012/13 academic year, what were their levels of cognitive development and personal and social development at that stage? How did these measures vary by age, sex and deprivation?
- Again, focusing on the Primary 1 cohort in 2012/13, how much progress was made in these areas of development during the school year? How did this progress vary by age, sex and deprivation?
- How did children in Scotland from the 2012/13 cohort compare with children starting school in England in the 2011/12 academic year?
- How stable were the starting points and progress measures between 2012/13 and 2014/15?

## Samples

A nationally representative sample of around 6,500 children who started Primary 1 in the 2012/13 academic year was drawn from the total sample of pupils in Scotland who were assessed with PIPS during that academic year. This sample was analysed to explore what children knew and could do when they started school, and the progress made up to the end of Primary 1.

The same sample was compared with a nationally representative sample of around 6,500 children in England who were assessed during their first year of school (the Reception year) in 2011/12.

The trend analysis was conducted using data from nationally representative samples of pupils collected in 2012/13 – 2014/15, each of which included around 6,500 children. Data for both the start and end of Primary 1 were analysed for all pupils in the three cohorts.

Finally, the full sample of 24,473 pupils who were assessed at the start and end of the year 2014/15 was used to see if schools varied in their impact on equity by deprivation.

## The PIPS assessment

PIPS has two main parts: the first assesses cognitive development; and the second personal and social development.

The cognitive part comprises sections which assess vocabulary acquisition, phonological awareness, early reading and mathematics. Children are assessed on a one-to-one basis within the first few weeks of them starting school, usually by their class teacher but sometimes by a teaching assistant or other adult. At the end of Primary 1, the assessment is repeated to measure the progress that they have made. The personal and social development is completed by teachers who rate pupils in the school setting on the basis of their observations.

Children are assessed during their first few weeks of Primary 1 and again at the end of the year.

## Characteristics of the 2012/13 Scottish cohort

The average age of children at the start of school in Scotland was five years although a proportion of older children were noted, reflecting the practice of some parents opting to defer the entry of their child for one year. The small proportion of children who were older than five and a half when they started school had, on average, lower cognitive scores than would be expected for their age. They also had lower ratings of personal and social development.

### Start of Primary 1

At the start of Primary 1, children's vocabulary was at a level where they were typically able to point to objects such as a microscope, jewellery and a saxophone from picture scenes. They could identify several letters and single digits, and answer mathematics questions such as 'here are six ice creams, if I took three away, how many would be left?'.

There was a weak relationship between age and development resulting in a general trend of older children scoring more highly than younger ones.

Girls were ahead of boys in their vocabulary acquisition, phonological awareness and early reading by up to the equivalent of five months of development. Their mathematics scores were broadly similar to those of the boys. The boys' spread of scores was wider than the girls' on all four areas of cognitive development, meaning that there were proportionately more boys with very high and very low scores.

Children from the most affluent areas had higher scores than their peers from the least affluent areas by around 14 months' development. We did not find any evidence of either boys or girls being particularly affected by deprivation.

The strongest areas of personal and social development were adjustment to the school setting and independence. Cultural awareness was relatively weaker at this stage.

## Progress in Primary 1

Overall, children made an educationally as well as statistically significant amount of progress in their cognitive development. By the end of the year, many were competent in decoding many words and understanding their meaning, and performing arithmetic. In statistical terms, if children did not go to school, it is estimated that it would take them over four more years of natural maturation before they were able to read at the same level. Progress in mathematics was also significant, but less striking than reading.

Although statistically significant differences in progress were seen between boys and girls for early reading and early mathematics, these were very small in terms of gain in months. Girls made more progress than boys in early reading but the reverse held for early mathematics.

Children from the most affluent areas made more progress than those in the least affluent areas for early reading and picture vocabulary where, perhaps, they were receiving more enriched support in their homes. But for early mathematics, the children in the most deprived backgrounds made more progress and thus caught up a little with those from the most affluent backgrounds.

Personal and social development continued to improve and children's cultural awareness was seen to increase rapidly.

Progress varied from school to school by a substantial amount; up to twelve months of improvement in reading and fourteen months for mathematics.

But no evidence was found that the link between deprivation and progress varied between the schools in the sample. That is: there was no evidence that some of the schools did significantly better than others in addressing the attainment gap during Primary 1.

## Comparisons with England

Children in Scotland had higher scores for cognitive development and personal and social development at the start of school than children in England. This may have been due to in part to maturation, since they started school, on average, six months older than their English peers. But after taking age into account there were still slightly higher scores in Scotland and those higher scores may have been a reflection of an emphasis on enhancing personal and social development in pre-school within Scotland.

The progress made during primary 1 was very similar in Scotland and England for mathematics. The progress in reading was very slightly greater in England, but because pupils in Scotland had higher scores to start with, the average levels at the end of P1 were comparable.

### Trends over time

Over the three year period between 2012/13 and 2014/15, the start of Primary 1 mean scores for early reading and early mathematics declined slightly. Over the same period, the percentage of children with English as an additional language increased slightly and it may be that this influenced the cognitive development scores at the start of year. It may also be a reflection of a shift in pre-school policy and/or practice over this period. Other research (http://www.gov.scot/Resource/0048/00486755.pdf) found an increase in children's vocabulary acquisition at age three between 2004 and 2010 and a similar trend of increasing vocabulary might be expected within the current study. However, we found a drop in vocabulary over the three year period but it was very slight. Children's personal and social development at the start of Primary 1 remained stable over the three year period.

The progress made by the end of Primary 1 in early reading and mathematics increased slightly over the three year period. These gains meant that there were no significant drops over the three years for mathematics levels at the end of Primary 1. For reading, a drop was still apparent although it was very small. Again, the corresponding increase in the percentage of children with English as an additional language may be a factor in the explanation of this trend.

Children's personal and social development remained more or less stable at the start of Primary over the three years, although we did see a slight non-significant rise in all areas.

# How to access background or source data

The data collected for this social research publication cannot be made available by Scottish Government for further analysis as Scottish Government is not the data controller.





The views expressed in this report are those of the researcher and do not necessarily represent those of the Scottish Government or Scottish Ministers.

This report is available on the Scottish Government Publications Website (http://www.gov.scot/Publications/Recent)

The Scottish Government
St Andrew's House
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EH1 3DG

ISBN: 978-1-78544-895-9 (web only)
Published by the Scottish Government, December 2015

Produced for the Scottish Government by APS Group Scotland, 21 Tennant Street, Edinburgh EH6 5NA
PPDAS61557 (12/15)