EFFECTIVE PRE-SCHOOL PROVISON IN NORTHERN IRELAND (EPPNI)
PRE-SCHOOL EXPERIENCE AND KEY STAGE 2 PERFORMANCE IN
ENGLISH AND MATHEMATICS

KEY FINDINGS

The research found a number of significant effects of independent variables upon children's educational attainment in English and mathematics at the end of Key Stage 2. Some variables influence attainment and some influence both attainment at age 11 and progress over the primary school years.

Child Variables

- **Birth Weight:** A child's birth weight influences attainment in English and mathematics, but not progress. This suggests that the effect on attainment at Key Stage 2 is through the effects on a child's attainment up to start of primary school.

- **Gender:** For English girls do better than boys in attainment at Key Stage 2 and in progress over the primary school years, but there are no gender effects for mathematics with girls and boys doing similarly well at Key Stage 2.

- **Early Developmental Problems:** Where a child had a developmental problem early in life, the effects of this are still apparent in terms of decreased attainment and progress in Key Stage 2 English and mathematics.
• **Age:** A child's age in relation to others in the school year is an important predictor of both attainment and progress in English and mathematics, with older pupils doing distinctly better.

**Socio-Economic Status Variables**

• **Parental Socio-Economic Status:** Household socio-economic status is related to attainment in English and mathematics. For English and mathematics children where the household SES is unskilled, semi-skilled or skilled (or unemployed for mathematics) do significantly less well in attainment. For mathematics the unskilled, semi-skilled or skilled groups also do less well in progress over the primary school years than the professional group.

• **Area Child Poverty Mean:** Children from areas where there is more poverty attained lower levels of attainment in English and mathematics. There were no subsequent effects on progress indicating that these effects are absorbed in start of school performance.

**Parental Variables**

• **Mothers' Education/Qualifications:** Lower maternal education is associated with lower attainment and progress in English and mathematics, indicating that the effects continue across the primary school years.

• **Fathers' Education/Qualifications:** Lower paternal education is associated with lower attainment in English and mathematics. There are no significant effects upon progress over the primary school years and the effects are less significant than those for mother's education.

**Home Variables**

• **Home Learning Environment:** The Home Learning Environment (HLE) is related to attainment in English and mathematics at Key Stage 2; the higher the HLE the better the child's attainment. The effects are stronger for English and the HLE is also related to progress over the primary school years in English.
Pre-School Variables

- **Type of Pre-school:** After allowing for the effects of background factors there is clear evidence of pre-school effects persisting to the end of Key Stage 2 for children who attended a nursery school/class or playgroup. The beneficial effects for children who attended nursery school/classes or playgroups appear to be the result of the generally higher quality of these types of provisions. There were no significant effects associated with other types of pre-school.

- **Quality of Pre-school:** After allowing for the effects of background factors there is clear evidence of quality of pre-school effects persisting to the end of Key Stage 2. High quality pre-schools show consistent effects that are reflected not only in improved attainment in Key Stage 2 English and mathematics, but also improved progress in mathematics over the primary school years. Children who attended high quality pre-schools were 2.4 times more likely in English, and 3.4 times more likely in mathematics, to attain level 5 than children without pre-school experience.

- **Pre-school Peer Group Composition:** Where the pre-school had a higher percentage of children whose mothers had a degree then attainment in Key Stage 2 English tended to be higher. This finding suggests that there are peer group influences upon child attainment. The effect was only just statistically significant.
INTRODUCTION

1. The Effective Pre-school Provision in Northern Ireland (EPPNI) project is a longitudinal research study of children’s progress and development from age three to eleven years, and how progress relates to their pre-school centre experience and family background. A parallel study is being carried out in England (Effective Pre-school and Primary Education – EPPE). The EPPNI and EPPE projects are the first large-scale studies in the UK to investigate the effects of different kinds of pre-school provision, and to relate experience in pre-school centres to child development.

2. At the beginning of the Northern Ireland study parents were interviewed concerning child and family characteristics. Children were also assessed on social/behavioural and cognitive development. The data provided can be used to investigate educational attainment in relation to a range of parental, family, child, home and preschool factors.

3. This latest stage of the research considers children’s educational attainment (English and mathematics) at the end of Key Stage 2, and the progress from entry to primary school to the end of primary school, relating children’s attainment and progress to child, parental, family, home and childcare history variables.

4. The EPPNI project has investigated three issues with implications for policy and practice, and that have been dealt with in a number of previous reports:
   - the effects on children of different types of pre-school provision;
   - the ‘structural’ (eg adult-child ratios) and ‘process’ characteristics (eg interaction styles) of more effective pre-school centres; and
   - the interaction between child, family and pre-school provision.

AIMS AND OBJECTIVES OF THE RESEARCH

5. The aims of the EPPNI research project were:
   - To compare and contrast the developmental progress of 800+ children from a wide range of social and cultural backgrounds who have differing pre-school experiences;
To establish whether some forms of pre-school experience are more effective than others in promoting children's cognitive and social/emotional development during the pre-school years (ages 3-4) and the primary years (up to age 11 years);

To discover the pre-school characteristics found to be most effective;

To investigate differences in the progress of different groups of children, e.g. children from disadvantaged backgrounds and both genders;

To investigate the effects of pre-school education on educational performance in primary school in a way which allows the possibility of longitudinal follow-up at later ages to establish any long-term effects.

**MAIN FINDINGS**

6. The latest research found a number of significant effects of independent variables upon children's educational attainment in English and mathematics at the end of Key Stage 2. These are summarised below after allowing for other child, parent, home and pre-school characteristics. In considering these results it is clear that some variables influence attainment and some influence both attainment at age 11 and progress over the primary school years.

7. Where an analysis of attainment indicates that some factor influences children's development, but the analysis of progress does not reveal a significant effect for that factor, this indicates that the significant effect for that variable probably occurred prior to school entry and that during the time in primary school no further effect has occurred.

8. Where both attainment and progress analyses reveal significant effects this indicates that the variable has had an effect up to the end of Key Stage 2 (11 years), and that the overall attainment at the end of Key Stage 2 is affected because the variable continues to exert an effect across the primary school years sufficient to boost performance beyond the level of similar children.

9. Attainment at Key Stage 2 is influenced by a range of background factors that include, child age, birth weight, gender, early developmental problems, lone parent status, mother's and father's qualification, family socio-economic status, area level child poverty and the home learning environment. Of
these background factors some affect attainment only and some also affect progress across the primary school years.

Child Variables

- **Age:** The child’s age in relation to others in the school year is an important predictor of both attainment and progress in English and mathematics, with older pupils doing better. The odds of attaining level 5 (as compared with level 3) increase by 13-14% for each month of age.

- **Birth Weight:** A child’s birth weight continues to show its effects in terms of attainment in English and mathematics, but not progress. Children with a birth weight of 3500 grammes or more are 4.5 to 5 times more likely than a child with a birth weight of 2500 grammes or less to attain level 5 in English or mathematics.

- **Gender:** For English girls do better than boys in attainment and in progress over the primary school years, being almost twice as likely to attain level 5 in English as boys.

- **Early Developmental Problems:** where a child had a developmental problem early in life, the effects of this are still apparent in terms of decreased attainment and progress in Key Stage 2 English and mathematics. Children who had an early developmental problem are 4 times less likely to attain level 5 in English and 5 times less likely for mathematics.

Parent Variables

- **Lone Parent:** where the child has a lone parent the attainment and progress is likely to be lower in English at Key Stage 2, with a child of a lone parent being 4 times less likely to attain level 5 than a similar child with dual parents.

- **Mothers’ Education/Qualifications:** where the mother has lower educational qualifications then the child is likely to do less well in both attainment and progress in English and mathematics. Where a mother has no qualifications her child is 12 times less likely, than a similar child of a mother with a degree, to attain level 5 in Key Stage 2 English, (6 times for mathematics).
Fathers’ Education/Qualifications: there is also a similar but weaker effect for father’s education upon attainment only.

Parental Socio-Economic Status: the socio-economic status of the household, defined in terms of the highest occupational status of either parent, is also related to attainment in English and mathematics. For English and mathematics children where the household SES is unskilled, semi-skilled, or skilled (unemployed also for mathematics) do significantly less well in attainment than where household SES is professional. Children from the unskilled/semi-skilled group are almost 8 times less likely for English and 5 times less likely for mathematics to attain level 5 than children from the professional group. The intermediate SES group do not significantly differ from the professional group. For mathematics the unskilled, semi-skilled, or skilled groups also do less well in progress over the primary school years than the professional group (statistically significant in pre-school and type of pre-school models and almost significant in quality of pre-school models).

Home Learning Environment (HLE): related to attainment in English and mathematics at Key Stage 2; the higher the HLE the better the child’s attainment. The effects are stronger for English and the HLE also related to progress over the primary school years in English. Children from a home in highest 20% for HLE are over 5 times more likely for English and almost 3 times more likely for mathematics to attain level 5 than children from homes in the lowest 20% for HLE.

Child Poverty Mean: where the child lives in an area of greater deprivation (measured by the child poverty index) they show lower levels of attainment in English and mathematics. For those in the most deprived 20% areas they are over 2.5 times for English, and over 3.5 times for mathematics, less likely to attain level 5 at Key Stage 2, than similar children in the 20% most advantaged areas.
Pre-school

- **Pre-school Versus No Pre-school**: having allowed for background variables, there is a significant beneficial effect of attending a pre-school for attainment in Key Stage 2 mathematics but not English, with the pre-school group being twice as likely to attain level 5 as the no pre-school group. However there is no effect of pre-school for progress.

- **Type of Pre-school**: allowing for background variables, there is a significant beneficial effect of attending a nursery school/class for Key Stage 2 English attainment, with the nursery school/class group being over 3 times more likely to attain level 5 as the no pre-school group. Also playgroup children are about twice as likely to attain level 4 as the no pre-school group. There is a significant beneficial effect of attending a nursery school/class or playgroup for attainment in Key Stage 2 mathematics, with the nursery school/class group being almost 3 times as likely to attain level 5, while the playgroup children are over twice as likely to attain level 5, as the no pre-school group.

- **Quality of Pre-school**: having allowed for background variables, there is a significant beneficial effect of attending a high quality pre-school for attainment in Key Stage 2 English. The high quality group is 2.4 times as likely to attain level 5 as the no pre-school group. The low and medium quality pre-schools do not show statistically significant effects. There is a significant beneficial effect of attending a high quality pre-school for attainment in Key Stage 2 mathematics, with the high quality group being 3.4 times as likely to attain level 5 as the no pre-school group. The benefits of high quality pre-school persist into progress in numeracy over the primary school years.

- **Pre-school Group Only Analyses**: of the pre-school characteristics: pre-school adult/child ratio, pre-school staff qualifications, pre-school group composition in terms of average cognitive ability of children in the pre-school at the start of the study, and percentage of children's mothers with a degree, only pre-school group composition in terms of percentage of children's mothers with a degree showed any significant effect. The effect was only just statistically significant and applied only to the comparison between attaining level 3 or below versus level 5 for Key Stage 2 English.

CONCLUSION

10. In a technologically sophisticated world a population's educational attainment is likely to be increasingly important for a nation’s economic development.
This study shows the factors that can influence such attainment. The effects associated with various child and family background variables in this study are very similar to those frequently reported in other studies. In addition, pre-school education is important. In Northern Ireland, certain types of pre-school, in particular nursery classes/schools and playgroups, have an influence upon academic attainment at the end of primary school and these effects are linked to high quality pre-school experience for the children. The beneficial effects of high quality pre-school are seen more strongly for mathematics and can even produce greater progress in mathematics during the primary school years. This indicates that high quality pre-school not only improves children’s ability at the start of school but also can improve the capacity for learning in subsequent years. Hence high quality pre-school is an important part of a nation’s infrastructure for education of the population and economic development.

METHODOLOGY

11. The research design for the EPPNI project was chosen to enable investigation of the progress and development of individual children (including the impact of personal, socio-economic and family characteristics), and the effect of pre-school centres on children’s outcomes. In order to maximise the likelihood of identifying the effects of various types of provision, the EPPNI sample was stratified by type of centre and geographical location.

12. 683 children were recruited from 80 pre-school centres from all Education and Library Boards in Northern Ireland. Children and their families were selected randomly in each centre to participate in the EPPNI project. In order to examine the impact of no pre-school provision, 151 children without pre-school experience were recruited from the Year 1 classes attended by EPPNI children. The progress and development of the children has been followed from age 3 until the end of Key Stage 2 of primary school.

13. Both qualitative and quantitative methods have been used to explore the effects of pre-school experience on children’s cognitive attainment and social/behavioural development.

14. When children were in the last year of primary school they were assessed by the Northern Ireland Key Stage 2 assessments. The children’s attainment on the Key Stage 2 assessments for English and mathematics were obtained for 770 of the EPPNI children.
THE RESEARCH PROJECT

This latest stage of the EPPNI research was led by Professor Edward Melhuish of the EPPNI Research Team and was funded by the Department of Education (DE).

FULL REPORT

The full research report entitled ‘Pre-school Experience and Key Stage 2 performance in English and Mathematics’ is available on the Department of Education website at http://www.deni.gov.uk

A 69-page report summarising the EPPNI research prior to this latest stage is available on the Department of Education website at http://www.deni.gov.uk/researchreport41.pdf

Technical papers published by the EPPNI Research Team can be found at http://anu.stran.ac.uk/eppni

This paper is a summary of the research report and as such any views expressed are those of the authors and not necessarily those of the Department of Education.
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