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The Effective Provision of Pre-School Education [EPPE] Project

A longitudinal Study funded by the DfES (1997 – 2003)

Technical Paper 9

Report on age 6 assessment

A Longitudinal Study funded by the DfES

1997 – 2003

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Acknowledgement

The EPPE project is a major five year study funded by the DfES. The research would not be possible without the support and co-operation of the six Local Authorities (LAs) and the many pre-school centres, primary schools, children and parents participating in the research. The important contribution of the Regional Research Officers Anne Dobson, Isabella Hughes, Marjorie Jeavons, Margaret Kehoe, Katie Lewis, Maria Morahan, Sharon Sadler and our part-time Research Assistants, especially Wesley Welcomme and Annalise Clements, has been vital to the project's completion. We are grateful to both the project's Steering and Consultative Committees for their helpful advice on the study, in particular Deborah Jones (DfES Analytical Services).

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The EPPE Research is an Associate Project of the
ESRC Teaching and Learning Programme (TLRP).

First Published in November 2004 by the Institute of Education University of London
20 Bedford Way, London WC1H OAL

Pursuing Excellence in Education

ISBN 085473 660 X

Printed by Formara Ltd. Southend on Sea. Essex.

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Executive Summary

Background

The Effective Provision of Pre-school Education (EPPE) project explores the impact of pre-school centre provision on young children's cognitive progress and their social/behavioural development. The EPPE study was commissioned and funded by the DfES. The research has tracked a large sample of over 2700 young children and analysed their cognitive attainment and progress and social behaviour at the end of Year 2 (age 7 years plus). Earlier reports have examined cognitive attainment and social/behavioural development over the pre-school period. This paper investigates attainment, progress and social/behavioural development from entry to reception classes (age rising 5 years) until the end of Year 1 in primary school, when children were age 6 years plus. Technical Paper 11 describes the results of similar analyses conducted at the end of Year 2.

An educational effectiveness design was adopted which explores the impact of different child, family, and home learning environment factors on a range of child outcomes measured at the end of Year 1. The research investigates whether pre-school influences, found to be important in accounting for variations children's progress and development up to the time they start primary school, continue to show relationships with later outcomes. The analyses explore whether 'home' children (those who had very little or no pre-school centre experience) continue to lag behind other children, and whether duration of time, quality and effectiveness of pre-school attended still show significant positive effects on children's attainment and social behaviour at age 6 years (end of Year 1).

EPPE collected a wide range of data about children, their parents and home environments and the pre-school settings (individual pre-school centres) they attended. The study investigates the impact of a wide variety of child, parent and family factors, including amount of care outside the family, and aspects of the home learning environment provided by parents in the pre-school period. The research seeks to establish whether different types of pre-school settings differ in their impact and effectiveness. Measures of the quality of centres were collected from observations by trained researchers and were found to be important in accounting for young children's progress and development from age 3 to 5 years. In total 141 target pre-school centres were drawn randomly from within each of the five regions across England included in the study. Centres were sampled from six types of provision: nursery classes, playgroups, local authority day nurseries, private day nurseries, nursery schools and integrated centres (i.e. centres that combine both care and education and seek to meet the needs of parents and families). The research sought to draw approximately equal numbers of target centres from each of the main types of provision; with the exception of integrated centres, which were a relatively recent innovation and, of which only a small number existed at the start of the research. The five regions were chosen to cover a range of socio-economic and geographical areas including rural, metropolitan, shire county and inner-city. The regions were selected to include ethnically diverse and socio-economically disadvantaged communities.

This paper focuses on two measures of cognitive attainment assessed at the end of Year 1, reading and mathematics (measured by the National Foundation for Educational Research [NFER]-Nelson Primary Reading Level 1 and Maths 6 tests). Social/behavioural development was assessed by teachers using, an extended version of the Goodman (1997) Strengths and Difficulties Questionnaire. A range of statistical methods were used to analyse data for over 2760 children for whom at least one measure of attainment or social/behavioural outcome data was collected in Year 1, representing 90.6 per cent of the total child sample assessed at entry to primary school (n=3048 children with equivalent entry to primary school cognitive and/or social/behavioural measures).[1] Four measures of social behaviour are reported: Self-regulation,

[1] It should be noted that the sample size varies in different analyses because full outcome data was not available for every child on every measure. In addition, missing data on specific child, family or home learning environment measures also affects the sample size in different statistical models.

Positive social behaviour, Anti-social behaviour and Anxious behaviour. These are based on class teachers' ratings of individual children.

Main Findings

The analyses of child outcomes at the end of Year 1 point to the continued strength of background influences on young children's cognitive attainments and progress and also provide additional evidence concerning the impact of pre-school.

The impact of a child's background

The impact of child background factors is broadly in line with that found at earlier time points in the EPPE study (at age 3 years plus and rising 5 years). Multiple disadvantage continues to show significant negative associations with all outcomes in Year 1. However, the results now indicate that, taken together, background influences are relatively weaker in accounting for variations in reading and mathematics attainments at the end of Year 1, than was the case at earlier time points. Both pre-school and school influences may be important in reducing the power of background influences on attainment in subjects such as reading and mathematics, in comparison with assessments of General Cognitive Ability (GCA), which were measured at younger ages. It may also be that GCA is more susceptible to background influences than attainment in school subjects/skills such as literacy and numeracy. By contrast, the impact of background on social behaviour (which was much weaker during the pre-school period than was found for cognitive outcomes) shows somewhat stronger influences on two aspects, Positive social behaviour and Anti-social behaviour at the end of Year 1.

Home learning environment

Details of the home learning environment during the pre-school period were found to be important influences on cognitive development at younger ages (see EPPE Technical Paper 2 and 7). Given their importance it was decided to test whether such factors still show a significant influence on primary school outcomes. A number of aspects of the home learning environment remain significant predictors of better attainment and social behaviour, net of the influence of other child and family background influences such as gender, family socio-economic status (SES) and mothers' qualification levels. For example, parents reading to their child, teaching letters and numbers, visiting the library, and teaching songs and nursery rhymes, were all related to better outcomes at the end of Year 1.[2] The home learning environment index provides a summary measure of the quality of the home learning environment young children experienced during the pre-school period, based on parents' reports at interview. In Year 1 this still shows a powerful influence especially on reading and mathematics attainment as well as measures of Self-regulation and Positive social behaviour measured by teachers' ratings of individual children's social behaviour.

The continued impact of pre-school - Quantity, quality and effectiveness

Analyses explored cognitive attainment at the end of Year 1 and whether this relates to duration – in terms of number of months of pre-school experience. The duration of pre-school continued to show a significant positive link with children's attainments in reading and maths at age 6 years plus. A longer period of months of pre-school experience was associated with higher cognitive scores at age 6 years plus, even when other significant factors are controlled.

Taken together with the findings reported on the pre-school period, the results suggest that an extended period of pre-school experience has significant benefits in preparing young children for

[2] There are theoretical reasons to test the pre-school home learning environment measures at the end of Year 1 because the EPPE research seeks to explore pre-school influences, and identify whether the pre-school attended also shows a positive relationship with subsequent outcomes. If the pre-school period is seen to be of crucial importance to child development the home environment during these formative years is of particular interest. Although additional data on the child's activities in Key Stage 1 were collected again from parents via a questionnaire during Year 1 the lower response rate (80% rather than 97% would lead to a reduction in sample size in the analysis. Such measures will be tested in later papers as part of the EPPE3-11 follow up of school effects.

a better start to school and that such children continue to show better attainment during Key Stage 1.

Quality of pre-school provision is regarded as a vital feature of early years education and care. The EPPE study explored variation in the quality of individual centres using the Early Childhood Environment Rating Scale (total ECERS-E and ECERS-R scales). Trained researchers conducted detailed observations of centres to assess quality. Higher quality as assessed by the ECERS-E scale was significantly positively related to children's cognitive progress over the pre-school period in several areas. Likewise higher quality measured by ECERS-E and ECERS-R scales showed significant links with better social/behavioural outcomes at the start of primary school.

Children who had attended higher quality pre-school provision still tended to show better outcomes at the end of Year 1, although quality effects for cognitive outcomes were stronger where children had also attended for longer durations. This suggests that for high quality to show a strong continued impact it is important that it is combined with a longer duration for cognitive outcomes. A short time in high quality provision confers a smaller advantage for both reading and mathematics, than a longer duration (associated with an earlier pre-school start) in high quality. The advantages of a longer duration and high quality pre-school show a stronger impact for mathematics than reading attainment at age 6 years plus. For social behaviour, children who had attended high quality provision showed significantly better outcomes in terms of Self-regulation, Positive social behaviour and reductions in Anxious behaviour. For Anti-social behaviour children who had attended low quality provision showed significantly poorer outcomes than those who had attended high quality provision.

Children who do not experience pre-school

Data were collected for a group of 'home' children with none or only minimal pre-school centre experience. Comparison of the 'home' sample with children who had attended a pre-school centre showed that both the characteristics and attainments of 'home' children vary significantly from those who had been in pre-school (as a group 'home' children were relatively more likely to experience multiple disadvantage and poorer home learning environments, more had mothers who were not working or had no qualifications, were on lower incomes or of ethnic minority origins where English was an additional language). It is not possible to conclude with certainty that the much lower attainments of the 'home' group are directly due to lack of pre-school experience.[3] Nonetheless, earlier statistical analyses of attainment and social behaviour at the start of primary school which made statistical control for differences in background characteristics, strongly suggest that pre-schooling provided a significant cognitive boost at entry to reception especially for language and had benefits on most areas of social behaviour, particularly Positive social behaviour.

Contextualised multilevel analyses of attainments at the end of Year 1 explored the impact of child, parent and home environment factors. Even when these important influences are controlled, 'home' children's reading and mathematics attainments at age 6 years plus are poorer than those of children who had attended a pre-school centre. The results also point to a link between a longer duration of pre-schooling and higher cognitive attainments, in comparison with the 'home' group (who had no centre experience). These findings, combined with those on the advantages of an early start date, continue to suggest that pre-schooling has a strong positive impact on young children's cognitive attainment. The implication of these results is that children without pre-school experience remain at a disadvantage during their first years of primary school (it has been shown that on average children from more advantaged backgrounds, such as those whose mothers have a degree, spend on average 4-5 months longer in pre-school centres than those whose mothers have no qualifications).

[3] A controlled experiment (which would not be feasible on either ethical or practical grounds) would be needed to draw firm conclusions.

Further analyses conducted on the EPPE data, in a study intended to explore 'at risk' status in relation to special educational needs (SEN), indicate that 'home' children remain over-represented in the cognitive 'at risk' category in Year 1, compared with other EPPE children, even when the level of multiple disadvantage is held constant. In addition, proportionately more 'home' children were identified by their teachers as showing some form of SEN during Key Stage 1 (see EYTSEN Technical Paper 2 for details of the relationships between SEN, multiple disadvantage and the protective impact of pre-school).

Social/behavioural outcomes also continue to indicate that the positive pre-school impact is sustained through to the end of Year 1. 'Home' children show significantly poorer outcomes in all areas except Anti-social behaviour where there are no significant differences. The most positive social/behavioural outcomes are found for children who attended for 24-36 months rather than over 36 months for Positive social behaviour, reductions in Anxious behaviour and improved Self-regulation. Higher quality of pre-school attended in particular shows a positive impact in reducing Anti-social behaviour. There are, however, indications that a very long duration of pre-school (over 3 years associated with an earlier start age under 2 years) is related to an increase in scores on the Anti-social measure in Year 1. However, it should be noted that only a very small proportion of all children (under 5%) show any negative scores for Anti-social behaviour. For early starters slightly raised scores are mainly linked with those who had the very longest duration (starting at the target centre at age 12 months or younger). For this group 6.5% had raised scores for Anti-social behaviour. In contrast, the results indicate that Self-regulation, Positive social behaviour and reductions in Anxious behaviour are significantly associated with higher quality and more effective pre-school centre experience and are not negatively associated with longer duration.

Overall the Year 1 analyses indicate that the early boost given by pre-school has not washed out by age 6 years plus, nor have 'home' children caught up. The absence of pre-school can be seen to have a continued negative influence on cognitive and several social/behavioural outcomes, although children who had experienced a very long duration in pre-school show relatively poorer scores on the Anti-social measure in Year 1. These poorer scores should be placed in the context of very positive scores for most children on this and other aspects of behaviour such as reduced Anxiety and improved Positive social behaviour and Self-regulation.

This longitudinal study, which tracked EPPE children to the end of Year 1 in primary, confirms that pre-school continues to show a positive impact on most developmental outcomes at age 6 years plus. The findings lend support to earlier conclusions that this can play an important part in combating social exclusion and promoting inclusion by offering disadvantaged children, in particular, a better start to primary school. The duration of pre-school is especially influential for cognitive attainment in reading and mathematics, but both effectiveness and quality still show a positive impact on child outcomes. The research again points to the continuing and strong significant positive influence of the pre-school and home learning environment. This has implications for policies such as Sure Start, which may help promote greater parental engagement in learning activities with their children.

Methodology

EPPE uses statistical techniques (multilevel modelling) to measure the influence of different background factors on young children's attainments at different time points. Two main approaches are used, contextualised and value added analyses. Contextualised models examine how background factors influence children's attainments or social behaviour at different time points (ages). The contextualised multilevel analyses reported in this paper are equivalent to those conducted earlier when children entered primary school (see EPPE Technical Paper 8a & 8b). A comparison of the results of the analyses at the two different time points allows us to establish whether, taken together, background influences change (reduce or increase) over the first years of school. Contextualised analyses are used to identify the unique (net) contribution of particular characteristics to variation in children's outcomes, in this instance their attainments in different cognitive assessments or social/behavioural outcomes, while other influences are

controlled. Thus, for example, the impact of family SES was established while taking into account the influence of mother's qualification levels, low income, ethnicity, birth weight, home learning environment etc. It is of policy interest to establish the nature and strength of such background influences, individually and in total, because they are relevant to issues of equity and social inclusion.

Value-added multilevel models, in contrast, investigate children's progress over time by controlling for prior attainment, or prior social behaviour. The first phase of the study examined children's progress over the pre-school period. These analyses were used to create value added indicators of each pre-school centre's effectiveness in promoting progress in a given outcome (e.g. reading, mathematics and aspects of social behaviour) during the first phase of the study. Centres where children had made significantly greater progress than predicted on the basis of prior attainment and intake characteristics can be viewed as *more effective* (positive outliers in value added terms). Centres where children made less progress than predicted can be viewed as *less effective* (negative outliers in value added terms).

The multilevel value-added analyses over the pre-school period showed that variations in quality and extent of time in pre-school still had a significant impact on children's cognitive gains and social/behavioural gains. They indicated that higher quality and longer duration in months of pre-school experience have a positive impact. This paper builds on the earlier findings from the first phase of the study exploring whether the positive impacts of pre-school, identified when children started primary school, are still evident in child outcomes measured at the end of Year 1.

Findings concerning a sample of 'home' children, who had no pre-school centre experience before starting primary school, are reported for comparison with the pre-school sample. The contextualised multilevel analyses explore whether 'home' children are still at a disadvantage in terms of cognitive attainments at the end of Year 1 (reflecting differences evident when they first started primary school) and the extent to which any attainment gap can be attributed to the absence of pre-school experience, rather than to differences in their background characteristics. These analyses provide important evidence concerning the impact of pre-school provision. In addition analyses are reported which focus just on the sample of children who attended pre-school to further explore any continuing pre-school impact. Equivalent analyses of four social/behavioural measures (Self-regulation, Positive social behaviour, Anti-social behaviour and Anxious behaviour) are also reported.[4]

[4] For details of the social/behavioural measures see Appendix 5

Introduction

EPPE is a large scale longitudinal study funded by the Department for Education and Skills (DfES). It began in 1996 with the aim of investigating which kinds of Early Childhood provision were most 'effective' in promoting young children's progress and development during their time at pre-school, and to explore whether any pre-school effects continue to influence children after they start primary school up until the end of Key Stage 1 (age 7 plus years). The EPPE research is the first study of pre-schools in Europe to use an educational effectiveness design based on sampling children in a range of different pre-school settings and uses statistical approaches (multilevel modelling) that enable the identification of individual centre effects. Beginning around the age of 3 years (at entry to a target pre-school in the centre sample or at their third birthday for children who had already entered provision at a younger age), children were assessed and than followed up to entry to primary school. In this way, it has been possible to explore variations between centres in their impact on children's cognitive progress and social/behavioural development. Such analyses use 'value added' approaches, which make statistical control for differences in child intake characteristics in order to provide estimates of centre effectiveness in promoting different child outcomes.

The study follows children for five years from pre-school and across the infant period of primary education. It explores the impact of a wide variety of child, parent and family factors, including aspects of the home learning environment provided by parents before children started primary school.[5] The first phase of the research explored whether different types of pre-school settings differed in their impacts and effectiveness. It also identified variations between individual pre-school centres, in children's cognitive progress and social/behavioural development. Measures of the quality of pre-school settings (pre-school centres) were collected from observations by trained researchers. In total, 141 pre-school centres drawn from five regions across England formed the focus of the EPPE pre-school research. Centres were drawn from six types of provision (nursery classes, playgroups, local authority day nurseries, private day nurseries, nursery schools and integrated centres (i.e. combined centres which integrate education and care).

The EPPE study uses a mixed methods approach, including detailed statistical analyses of effectiveness and in-depth case studies of individual centres. Full details of the EPPE study have been provided in a series of Technical Papers. This paper is based on statistical analyses for a sample of 2760 children for whom at least one valid cognitive or social/behavioural measure was collected at the end of Year 1. This represents 90.6 percent of the children in the EPPE sample for whom valid baseline data had been collected on attainment or social behaviour at entry to primary school (n=3048 children with equivalent entry to primary school cognitive and/or social/behavioural measures).[6] The paper focuses on children's attainment, progress and social/behavioural development from entry to primary school (age rising 5 years) to the end of Year 1 (age 6 years plus). It builds on earlier analyses of pre-school effects measured at entry to primary school and explores whether there is continued evidence of positive pre-school influences on children's subsequent educational outcomes in Key Stage 1. A wide range of information has been drawn on, including individual assessments of children's attainments at entry to school and again at the end of Year 1, as well as teachers' assessments of

[5] There are theoretical reasons to test the pre-school home learning environment measures at the end of Year 1 because the EPPE research seeks to explore pre-school influences, and identify whether the pre-school attended also shows a positive relationship with subsequent outcomes. If the pre-school period is seen to be of crucial importance to child development the home environment during these formative years is of particular interest. Although additional data on the child's activities in Key Stage 1 were collected again from parents via a questionnaire during Year 1, the lower response rate (80% rather than 97%) would lead to a reduction in sample size in the analysis. Such measures will be tested in later papers as part of the EPPE 3-11 follow up study of primary school effects.

[6] It should be noted that the sample size varies in different analyses because full outcome data was not available for every child on every measure. In addition, missing data on specific child, family or home learning environment measures also affects the sample size in different statistical models.

social/behavioural development and information about child, family and home learning environment characteristics collected from parental interviews when children were recruited to the study.

Aims

The aims of the multilevel analyses are:

- To model young children's cognitive attainment, progress and social development during Key Stage 1.
- To explore the impact of child, parent and home characteristics on children's attainment and their social/behavioural development.
- To investigate any continuing impact of pre-school, including any variations in children's outcomes for those who attended different types of pre-school (and those who received no pre-school provision, the 'home' sample).
- To explore the impact of measures of pre-school process, particularly measures of duration of pre-school (in months), quality and effectiveness, on later child outcomes .

Methods

The analyses employ a range of statistical techniques from descriptive and correlation analysis to multilevel (hierarchical) regression methods to examine children's attainment, progress and social/behavioural development. Multilevel models provide more accurate assessments of the impact of different child or centre-level characteristics, and enabled the calculation of value added estimates (residuals) of individual centre-level effects for the EPPE child sample who attended a pre-school centre (see EPPE Technical Papers 8a & 8b for details). These value added measures of centre effectiveness have been included in analyses of children's educational outcomes at the end of Year 1 in primary school to establish whether the effectiveness of the pre-school attended continues to show an impact on later cognitive attainment or social behaviour during the first years of primary school. The analyses of progress from entry to primary school (reception) to the end of Year 1 was not used to calculate measures of centre effectiveness as was done in the pre-school period. This would not be appropriate because the sample was now clustered at the primary school level. The primary school identifier was therefore used as level 2 in the multilevel analysis. Measures relating to pre-school experience (duration, quality and effectiveness) were instead tested in the fixed effects part of the analysis, allowing comparison with the impact of child, family and home learning environment factors.[7]

Background information about child, parent and family characteristics, was obtained through parent interviews during the pre-school period.[8]

In-depth parent interviews were conducted soon after children were recruited to the study. It should be noted, that most interviews were with children's mothers and usually took place at the child's pre-school centre, although for some working parents telephone interviews were found to be more convenient. All parents had already agreed to their child taking part in the EPPE study and signed consent forms. The parent interviews were designed to obtain information about a child's health and care history, details of family structure and parent's own educational and occupational backgrounds as well as some indications of parent-child activities and routines. Parents were assured of confidentiality and anonymity in presenting results. An excellent

[7] Cross-classified multilevel analyses have the potential to separate level 2 variance attributable to different institutions. However, due to the large number of schools to which the EPPE pre-school sample transferred at reception (over 860) and the relatively small sample, there were many schools with only 1 or 2 EPPE children attending in a given year group. Given this complication it was decided to use a simpler level 2 structure and to test key pre-school characteristics as fixed effects.

[8] Given the theoretical importance of pre-school experience to the study and the higher response rate to the interview rather than the primary school follow up parental questionnaire the analysis has focussed on measures of the child, family and home learning environment derived from the first parental interview in this paper.

response rate (97%) to the interview was achieved, although in some instances particular questions had a slightly lower rate of response (e.g. related to occupations). In most cases the parent interviews were conducted within 10 weeks of recruiting a child to the study, though for a small number of children in 'hard to reach' groups a longer time gap sometimes occurred

This report describes the results of analyses of young children's cognitive attainment and social/behavioural development during Key Stage 1. Progress has also been measured using baseline assessments taken at entry to primary school. This paper focuses on two measures of cognitive attainment assessed at the end of Year 1, reading and mathematics (measured by the NFER-Nelson Primary Reading Level 1 and the Maths 6 tests). Social/behavioural development was assessed by a teacher-completed instrument, an extended version of the Goodman (1997) Strengths and Difficulties Questionnaire. Four measures of social behaviour were identified using Principal Components analyses of teachers' ratings of individual children on this instrument. These cover Self-regulation, Positive social behaviour, Anti-social behaviour and Anxious behaviour (see Appendix 5). Multilevel models have analysed data for approximately 2760 children for whom one or more cognitive or social/behavioural outcome measure was collected at the end of Year. Outcome data are linked with information on child, family and home environment, and on duration of time in pre-school and quality and effectiveness of pre-school centres. The 'home' group (314 children recruited at entry to primary school) are included in models to enable comparison of outcomes for children who had not attended a pre-school centre.

Structure of Report and Analyses

This report is divided into three sections. The first provides some descriptive statistics concerning the characteristics of the EPPE sample and investigates whether particular groups of pupils show differences in their attainment and social/behavioural development at the end of Year 1 in school.

The second section addresses the question of the extent to which different child, family and home environment background characteristics account for variation in these children's reading and mathematics attainments at age 6 years plus. This section uses multilevel modelling techniques so that the net influence of different background factors on children's attainments at different ages can be ascertained. These contextualised analyses are equivalent to those conducted at entry to primary school. A comparison of the results of the analyses at the two different time points allows us to establish whether background influences change (reduce or increase) over Key Stage 1. Contextualised analyses are used to identify the unique (net) contribution of particular characteristics to variation in children's outcomes, in this instance their attainments in different cognitive assessments, while other influences are controlled. Thus, for example, the impact of family socio-economic status (SES), is established while taking into account the influence of mother's qualification levels, low income, ethnicity, birth weight, home learning environment, etc. It is of policy interest to establish the nature and strength of such background influences individually and in total, because they are relevant to issues of equity and social inclusion.

The third section describes the results of similar analyses of four different aspects of social/ behavioural development, as assessed by teacher ratings of items in an expanded version of the Goodman (1997) Strengths and Difficulties Questionnaire.

Measures of pre-school centre influence including duration of pre-school attended (ranging from none for the 'home' group to over 3 years for early starters), observed quality of pre-school provision (measured by the ECERS-E & ECERS-R scales) and centre effectiveness (based on value added residual estimates based on cognitive progress or social/behavioural gains during the pre-school period) are also tested.

The inclusion of a sample of 'home' children enables the study to provide further information about the impact of pre-school provision as a whole (rather than just examining variations

amongst children who attended different settings and types of provision). 'Home' children were found to be at a significant cognitive disadvantage when they started primary school (age rising 5 years). They also showed poorer social/behavioural development at entry to primary school and were more likely to be identified as 'at risk' for special educational needs than other children. These differences were not fully accounted for by differences in background (see EPPE Technical Papers 8a & 8b and, for details on SEN see EYTSEN Technical Paper 2). The comparisons based on the first phase of the EPPE research, which focussed on the pre-school period, indicated that pre-school centre experience gave children a significantly better start to school. Lack of pre-school experience was found to be an additional disadvantage, particularly for more vulnerable groups of young children. Further analyses of outcomes at the end of Year 1 explore whether there is evidence of a continuing attainment gap at age 6 years plus, when differences in the characteristics of 'home' children, compared with the main EPPE pre-school sample, are controlled. In addition, differences in social behaviour based on teachers' ratings are also investigated. The last section of the paper summarises the results drawing together the main findings and conclusions.

Section 1: Characteristics of the Sample at the end of Year 1

The research design used to recruit the sample for the EPPE study is described in detail in EPPE Technical Paper 1. In summary, six English Local Authorities (LAs) in five regions participated in the research with children recruited from six main types of pre-school provision (nursery classes, playgroups, private day nurseries, local authority day nurseries, nursery schools and integrated [combined] centres). In order to enable comparisons of centre and type of provision effects, the project recruited 500 children, 20 in each of 20-25 centres, from the various types of provision. In some LAs certain forms of provision are less common and others more typical. Within each LA, centres of each type were selected by stratified random sampling and, due to the small size of some centres in the project (e.g. rural playgroups), more of these centres were recruited than originally proposed, bringing the sample total to 141 centres.[9] A total of 2857 children in the pre-school sample were tracked to entry to reception (over 90% of those originally recruited). An additional sample of 314 'home' children (those who had not attended a pre-school setting) was recruited at entry to primary school for comparison with those who had attended a pre-school centre, bringing the total sample to 3171. The results for the analyses of the impact of pre-school are reported in EPPE Technical Papers 8a and 8b.

Children were followed up to the end of Year 1 in primary school (age 6 years plus). In all, 2760 of the sample assessed at entry to reception were tracked to the end of Year 1 and had at least one valid cognitive or social/behavioural assessment (90.6% of the total). In all 2743 children (90%) were assessed in reading and mathematics at the end of Year 1. Table 1.1 provides a brief summary of selected characteristics of children in the sample for whom cognitive assessment data were collected at the end of Year 1. Family SES was based on the highest SES of either father or mother's occupation.

Table 1.1: Selected Characteristics of the Year 1 Sample - 'Home' Children Compared with Children Who Had Attended a Pre-school Centre

		Children from target pre-school centres		'Home' Children	
		n	%	n	%
Gender	boy	1282	52.0	131	47.0
	girl	1182	48.0	148	53.0
Ethnicity	White UK	1885	76.6	152	54.7
	White European	100	4.1	3	1.1
	Black Caribbean	88	3.6	0	0
	Black African	52	2.1	2	0.7
	Black Other	18	0.7	0	0
	Indian	47	1.9	12	4.3
	Pakistani	54	2.2	90	32.4
	Bangladeshi	17	0.7	12	4.3
	Chinese	4	0.2	0	0
	Other	44	1.8	2	0.7
	Mixed Heritage	153	6.2	5	1.8
English as an Additional Language (EAL)		174	7.1	105	37.9
Free School Meals (FSM)		532	21.6	88	31.5
3 or more siblings		332	13.7	97	38.5
Mother has no formal qualification		437	18.1	129	55.4

[9] Only a small number of integrated centres were recruited because nationally there were few examples of this relatively recent form of pre-school provision in existence at the start of the project. For further details see EPPE Technical Papers 5 and 6.

Area	East Anglia	517	21.0	87	31.2
	Shire Counties	531	21.6	7	2.5
	Inner London	522	21.2	9	3.2
	North-East	459	18.6	65	23.3
	Midlands	435	17.7	111	39.8
Family SES[10]	Professional non-manual	236	9.7	6	2.4
	Other Professional	661	27.3	28	11.2
	Skilled non-manual	812	33.5	48	19.1
	Skilled manual	303	12.5	97	38.6
	Semi-skilled	306	12.6	41	16.3
	Unskilled	54	2.2	15	6.0
	Never worked	51	2.1	16	6.4
Totals		2464		279	

Note : total sample of 2743 children with a test score in Year 1. This represents 90% of children for whom reception entry measures were obtained

Cognitive Assessments

This paper examines child outcomes in both cognitive and social/behavioural assessments made at the end of Year 1. Cognitive attainment was measured by the NFER-Nelson Primary Reading Level 1 and Maths 6 tests. These assessments were internally standardised for the EPPE sample by the NFER (in line with procedures adopted at earlier time points in the study). The sample with cognitive outcome data for Year 1 totalled 2743 children (out of 2760 children with any valid cognitive or social/behavioural data tracked to the end of Year 1) from 767 primary schools.

All EPPE children were assessed at entry to primary school, providing a measure of current attainment at exit from pre-school and a baseline measure for entry to primary school. The assessments are shown in Table 1.2 and were specifically designed to be compatible with the Desirable Outcomes for Pre-School Education (DfEE, 1996) that have since been replaced by the Early Learning Goals/Curriculum Guidance for the Foundation Stage.

Table 1.2: Cognitive Assessments at Entry to Primary School

Name of Assessment	Assessment Content	Administered one-to-one by:
British Ability Scales Second Edition (BASII) (Elliot et al., 1996):	Cognitive development battery	
• Verbal Comprehension	• Verbal skills	EPPE Researcher
• Picture Similarities	• Non-verbal reasoning skills	EPPE Researcher
• Naming Vocabulary	• Verbal skills	EPPE Researcher
• Pattern Construction	• Spatial awareness/reasoning	EPPE Researcher
• Early Number Concepts	• Reasoning ability	EPPE Researcher
Letter Recognition	Lower case letters	EPPE Researcher
Phonological Awareness (Bryant and Bradley, 1985)	Rhyme and Alliteration	EPPE Researcher
Children not fluent in English: Assessed only on two of the non-verbal BAS II scales (Picture Similarity and Pattern Construction). In addition they were assessed on BAS II Copying, a measure of spatial ability, (Elliot et al., 1996), also administered by the EPPE researcher		

[10] Family SES data were available for 2674 of the sample of children for whom Year 1 outcome measures were collected, giving a figure for missing data of approximately 3%.

A number of the assessments were added together to form 'composite' outcomes, for example, the two verbal BAS II scales; Verbal Comprehension and Naming Vocabulary. The pre-reading composite is formed by adding together the scores for phonological awareness (rhyme and alliteration) and letter recognition (for further details of school entry assessments see EPPE Technical paper 8a).

Correlations can be used to explore associations between children's attainments in different outcomes and over time.[11] Children's attainments in the Year 1 assessments were positively correlated (r=0.58), indicating that children who have higher reading scores tend to do well in mathematics also at age 6 years plus. Table1.3 shows the correlations between children's scores on the Year 1 reading and mathematics tests and their prior attainment in the different primary school reception entry assessments. All the correlations are moderately high.

Table 1.3: Correlations between Children's Primary School Entry Assessments and Attainment in Year 1

	Primary school entry assessments		
Year 1 outcome measures	**Pre-reading**	**Early number concepts**	**Language**
Primary Reading standardised score	**0.52**	**0.45**	**0.41**
Maths 6 standardised score	**0.50**	**0.55**	**0.53**

All correlations are significant at the 0.01 level

Differences in attainment for different groups of children

Earlier analyses at entry to pre-school and later at entry to primary school had revealed significant differences in cognitive attainment related to various child, family and home learning environment characteristics. Such characteristics were much more weakly associated with different aspects of young children's social/behavioural development. This section provides a summary of some of the differences in attainment in reading and mathematics evident at the end of Year 1. Subsequent sections provide more detailed statistical analyses of these patterns using multilevel models to explore the net contribution of different factors and reports the associated effect sizes[12]. Table 1.4 shows average mean scores for girls and boys at this age.

Table 1.4: Gender differences in Children's Scores on the EPPE Year 1 Cognitive Assessments

	All			Girls			Boys		
Year 1 outcome measures	**N**	**mean**	**sd**	**N**	**mean**	**sd**	**N**	**mean**	**sd**
Primary Reading standardised score	**2740**	**99.3**	**15.0**	**1328**	**100.4**	**14.3**	**1412**	**98.3**	**15.5**
Maths 6 standardised score	**2731**	**99.7**	**15.7**	**1325**	**100.6**	**15.2**	**1406**	**98.9**	**16.0**

It can be seen that girls' scores, on average, are slightly higher for each assessment in Year 1. Nonetheless, the differences are small and there is considerable overlap in the performance of the two groups. These findings are in line with those identified at entry to pre-school (age 3 years plus in terms of General Cognitive Ability measured by the British Ability Scales), and again at entry to primary school (age rising 5 years).

Free school meals provide an indicator of low family income (although it is recognised that not all children take up their entitlement, especially at Key Stage 1 when home dinners are more likely to be taken than for older age groups). Table 1.5 shows that there is a clear attainment gap of

[11] A correlation is a measure of statistical association that ranges from +1 to –1.

[12] Effect sizes (ES) provide a measure of the strength of the relationships between different predictors and the child outcomes under study. For further discussion see Elliot & Sammons (2004)

nearly half a standard deviation in the average attainment of children who receive free meals, compared with children from relatively more socio-economically advantaged families.

Table 1.5: Differences in Children's Scores on the Year 1 Cognitive Assessments and Low Income (Free school meals) Indicator

Year 1 outcome measures	Receive FSM			Do not Receive FSM		
	n	mean	sd	n	mean	sd
Primary Reading standardised score	619	94.3	14.6	2044	100.9	14.8
Maths 6 standardised score	614	93.8	15.3	2043	101.7	15.4

Language

The attainments of children for whom English was an additional language (EAL) were lower than for those children for whom English was the first language (Table 1.6). The difference was slightly larger for mathematics (9.6 standardised points, nearly three quarters a of standard deviation) than reading at just over 8 standardised points.

Table 1.6: Distribution of Children's Scores on Year 1 Cognitive Assessments by Language

Year 1 outcome measures	English as Mother Tongue			English as an Additional Language		
	n	Mean	sd	n	mean	sd
Primary Reading standardised score	2460	100.13	14.7	278	91.9	15.5
Maths 6 standardised score	2455	100.7	15.5	274	91.1	14.7

Mother's qualification level

The analyses of children's BAS scores at entry to both pre-school and primary school revealed that mother's qualification level showed a strong association with children's cognitive attainment (EPPE Technical Paper 7 and 8a). Table 1.7 summarises the findings of the main qualification groups when attainment at the end of Year 1 is analysed. As at earlier time points, children whose mothers have no formal qualifications showed the lowest cognitive scores, while those whose mothers have degrees or higher degrees had the highest average scores.

Table 1.7: Distribution of Children's Scores Year 1 Cognitive Assessments by Mother's Highest Qualification Level

Year 1 outcome measures	No Qualifications			Vocational Qualification			Academic Qualification at 16 years		
	N	mean	sd	N	mean	sd	N	mean	sd
Primary Reading standardised score	566	93.6	14.6	380	99.0	14.1	989	98.6	14.4
Maths 6 standardised score	560	92.7	15.0	380	99.6	14.4	986	98.9	15.1
Year 1 outcome measures	**Academic qualification at 18 years**			**Degree or equivalent**			**Higher degree**		
	N	mean	sd	N	mean	sd	N	mean	sd
Primary Reading standardised score	224	102.9	13.5	329	106.4	14.5	116	108.4	13.8
Maths 6 standardised score	225	104.1	15.0	328	109.4	11.7	115	109.6	11.7

Categories not known and 'other professional' and 'miscellaneous' excluded due to the small numbers.

Family SES

As at previous time points (entry to pre-school age 3 years plus and entry to primary school, rising 5 years), family SES (highest of father or mother's current or most recent employment status) showed a significant association with children's cognitive scores at the end of Year 1. Table 1.8 shows the trend in average attainment across SES groups. Those whose highest family SES was Professional non-manual showed the highest scores, whereas those from semi or unskilled manual backgrounds showed much lower average scores (a difference of around 14 standardised points equivalent to around 1 sd).

Table 1.8: Distribution of Children's Scores Year 1 Cognitive Assessments by Family SES

Family SES (highest of mother's or father's SES)	Professional non-manual			Intermediate non-manual			Skilled non-manual		
	N	mean	sd	N	mean	sd	N	mean	sd
Primary Reading standardised score	242	107.2	13.6	689	103.5	14.4	859	99.5	14.7
Maths 6 standardised score	241	109.9	13.4	686	105.0	15.0	858	99.3	14.8
	Skilled manual			**Semi-skilled manual**			**Unskilled manual**		
	N	mean	sd	N	mean	sd	N	mean	sd
Primary Reading standardised score	398	94.0	13.3	347	93.8	14.9	69	93.2	13.2
Maths 6 standardised score	396	94.9	14.6	347	93.9	15.0	69	89.2	14.6
	Never worked								
	N	mean	sd						
Primary Reading standardised score	67	94.1	14.0						
Maths 6 standardised score	66	91.3	15.9						

Pre-school type

Table 1.9 reports descriptive statistics on numbers of children and average scores in the Year 1 cognitive assessments by type of pre-school experience.

Table 1.9: Cognitive Attainments at end of Year 1 by Type of Pre-school Provider

	Primary Reading standardised score			Maths 6 standardised score		
	N	mean	sd	N	mean	sd
Nursery Class	543	96.6	14.9	543	98.0	15.4
Playgroup	520	100.1	13.9	521	101.2	14.8
Private Day Nursery	443	105.3	14.5	441	106.5	14.4
Local Authority	357	100.5	15.8	364	98.9	15.6
Nursery School	446	99.5	14.3	446	100.4	15.2
Integrated Centre	144	97.5	14.1	139	97.3	16.2
'Home' children	277	92.2	14.1	277	90.8	15.0

It should be noted that there are marked differences in the intake characteristics of those attending different types of pre-school (see EPPE Technical paper 4 and 8a). For example, significantly more 'home' children were recorded as having English as an Additional Language (EAL). In addition, more had mothers who were not working and had no qualifications, than children who had attended pre-school. Many more were identified as 'at risk' of SEN when they started primary school than children who had attended a pre-school setting. Children who attended integrated settings also experienced significantly more disadvantage than those from any other type of pre-school, and more were 'at risk' of SEN at entry to pre-school, age 3 years plus. Local authority day nurseries also served relatively high numbers of disadvantaged children, while private day nurseries served children from more socio-economically advantaged backgrounds. In analyses over the pre-school period the extent of advantage (measured by the % children whose mothers had a degree or above) as well as individual children's characteristics was found to have a significant relationship with better cognitive outcomes, suggesting that contextual effects can be important. Given this, it is important to recognise the importance of intake differences in any comparisons of the impact of type of provision.

Multiple disadvantage

Table 1.10 summarises differences using an index of multiple disadvantage by type of pre-school attended (for details of the calculation of this index, based on a combination of child, family and less positive home learning environment factors associated with low attainment at age 3 years plus, see Appendix 1). Multiple disadvantage showed a significant relationship with children's cognitive attainment during the pre-school period. It remains significantly negatively, correlated with attainment in reading (r=-0.30) and mathematics (r=-0.34) at age 6 years plus.

Table 1.10 indicates that the mean reading and mathematics scores of children with a multiple disadvantage score of zero (0), the most advantaged group, are significantly higher than those scoring on 5 or more factors (the most disadvantaged group). For reading, the difference is equivalent to approximately 14 standardised points, just about 1 standard deviation. For mathematics the difference is nearly 17 standardised points, just over 1 standard deviation.

Table 1.10: Cognitive Attainments of Sample at end of Year 1 by Multiple Disadvantage

Multiple Disadvantage Index	Primary Reading standardised score			Maths 6 standardised score		
	N	mean	sd	N	mean	sd
0	588	104.1	13.7	587	106.7	14.3
1	679	102.7	14.2	680	102.7	15.0
2	532	98.8	15.0	531	99.8	14.9
3	336	96.2	13.7	333	96.1	14.7
4	221	92.1	15.0	219	90.0	13.6
5 plus	167	89.9	13.9	165	89.9	14.6
All	2532	99.6	15.0	2515	100.2	15.6

Cases with any missing data excluded

When the home learning environment is examined separately from multiple disadvantage it also shows a significant positive correlation with reading (r=0.27) and mathematics (r=0.30). This again is in line with findings at earlier time points in the EPPE study (at entry to pre-school and again at entry to primary school) that children whose parents engaged more actively with their children in reading, teaching songs and nursery rhymes, etc. tended to show better cognitive outcomes.

The extent of variation in the characteristics of children who had different types of pre-school experience is illustrated in Table 1.11 below. This shows the percentages of children from different types of provider according to their scores on the index of multiple disadvantage. It provides an indication of relative differences in the disadvantage levels of children attending the six different types of provision and the equivalent statistics for the no provision (i.e. the 'home') group. For example, over 44 % of children in the private day nursery group are in the most advantaged category for the multiple disadvantage index (score zero), whereas only 12% of the children who had attended integrated centres and only 4% of the 'home' group were from this category.

Table 1.11: Multiple Disadvantage by Type of Pre-school Experience

Multiple Disadvantage Index	Nursery class		Playgroup		Private day nursery		Integrated Centre		Nursery school		Local authority day nursery		'Home' children	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
0	107	19.0	111	19.0	219	44.2	21	12.4	109	22.9	68	17.7	9	4.1
1	165	29.4	166	17.2	168	34.0	33	19.4	138	29.1	87	22.7	23	10.6
2	110	19.6	154	28.5	75	15.1	38	22.4	121	25.4	80	20.8	35	16.1
3	74	13.2	87	6.4	26	5.2	34	20.0	67	14.0	60	15.6	43	19.7
4	66	11.7	41	7.0	4	0.8	27	15.9	28	5.9	47	12.2	44	20.2
5 plus	40	7.1	24	4.1	4	0.8	17	10.4	13	2.7	42	10.9	64	29.4

Cases with any missing data excluded

Due to the different characteristics of children who had attended different types of pre-school provision it is not possible to explore any continuing influence of pre-school on subsequent educational outcomes in Year 1 unless proper statistical control is made of the impact of child, family and home learning environment influences. Multilevel statistical analyses presented in subsequent sections of the report explore these influences in more depth and investigate the continuing impact of pre-school, net of the influence of child, parent and home environment influences.

Social/behavioural Assessments

The study of young children's social/behavioural as well as their cognitive development is an important feature of the EPPE research. The Adaptive Social Behavioural Inventory (ASBI, Hogan et al, 1992) was used to measure different features of children's social behaviour at entry to the pre-school study (age 3 years plus). This checklist was completed by a pre-school worker who knew the child well (for details see EPPE Technical Papers 4 & 7). During the first few weeks of primary school (age rising 5 years) the child's class teacher completed the Child Social Behaviour Questionnaire (CSBQ), an expanded form of the ASBI. Principal Components analysis was used to identify the main underlying dimensions of social behaviour for each of these time points. Young children's developmental gains (changes in social behaviour) were analysed over the pre-school period and details are reported in EPPE Technical Paper 8b. The four main aspects of social behaviour identified at entry to primary school were Independence & Concentration, Cooperation & Conformity, Peer Sociability, and Anti-social/Worried behaviour. The four dimensions identified at the end of Year 1 were Self-regulation, Positive social behaviour, Anti-social behaviour and Anxious behaviour (see Appendix 5 for details).

Characteristics of children by mean social/behavioural factor scores

This sub-section explores differences in the teacher measures of social behaviour in Year 1 and selected background characteristics of the sample. Social behaviour has been found to show only small differences related to child, family and home environment factors at earlier time points. In comparison with equivalent tables showing the associations for reading and mathematics, reported earlier in this section, it can be seen that differences are relatively small. Overall, higher scores indicate better behaviour for the measures Self-regulation and Positive social behaviour. By contrast, lower mean scores indicate better behaviour (in terms of lower incidence reported by teacher ratings) for Anti-social behaviour or Anxious behaviour. It should be noted that, as at earlier time points, scores on all measures of social behaviour in Year 1 are skewed towards the positive end of the four point scale. This is especially marked for Anti-social and Anxious behaviour for which teacher ratings indicate they are only evident for a small minority of children (5.9% for Anxious and 4.9% for Anti-social).

Gender

The figures in Table 1.12 show that the mean scores for girls are somewhat higher for Self-regulation and Positive Social behaviour. Also teacher ratings indicated that girls showed less Anti-social behaviour than boys, but there was some suggestion that they showed more Anxious behaviour, although the differences were small.

Table 1.12: Gender differences in measures of social behaviour at the end of year 1

Gender	Self-regulation			Positive social behaviour			Anti-social behaviour			Anxious behaviour		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Boy	1373	2.19	0.55	1373	2.33	0.48	1372	1.39	0.42	1370	1.31	0.39
Girl	1304	2.43	0.48	1304	2.56	0.42	1304	1.22	0.30	1304	1.34	0.41
Total	2677	2.30	0.53	2677	2.44	0.47	2676	1.31	0.37	2674	1.32	0.40

Low income

Low family income as measured by the free school meals indicator shows a weak association with each of the four dimensions of behaviour collected in Year 1 as can be seen in Table 1.13. Children from low income families show less favourable behaviour in terms of average scores, according to their class teachers' ratings.

Table 1.13: Differences in measures of social behaviour at the end of year 1 by Low Family Income (Free School Meals Indicator)

Free School Meals	Self-regulation			Positive social behaviour			Anti-social Behaviour			Anxious behaviour		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Yes	594	2.14	0.55	594	2.33	0.50	594	1.41	0.44	592	1.37	0.41
No	2005	2.35	0.51	2005	2.47	0.45	2004	1.28	0.35	2004	1.31	0.39
Total	2599	2.30	0.53	2599	2.44	0.47	2598	1.31	0.37	2596	1.32	0.40

Language

For language the results indicate that children for whom English as an additional language are rated somewhat less favourably in terms of Self-regulation and Positive social behaviour in Year 1.

Table 1.14: Language differences in social behaviour at the end of Year 1

	Self-regulation			Positive social behaviour			Anti-social Behaviour			Anxious behaviour		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
English as Mother Tongue	2417	2.32	0.53	2417	2.45	0.46	2416	1.31	0.37	2414	1.32	0.40
English as an Additional Language	258	2.18	0.53	258	2.32	0.49	258	1.32	0.38	258	1.35	0.42
Total	2675	2.30	0.53	2675	2.44	0.47	2674	1.31	0.37	2672	1.32	0.40

Mother's qualification level

Mother's qualification level similarly showed an association with differences in teacher ratings of child behaviour in Year 1. The differences are most notable comparing children whose mother's have a degree or higher degree level qualification and those with no qualifications for the factor Self-regulation (see Table 1:15). Those whose mothers have degrees or higher degrees have higher average scores for Self-regulation whereas those whose mothers have no qualifications have the lowest mean scores for this measure.

Table 1.15: Mother's Qualification level and social behaviour at the end of Year 1

Mother's qualification level	Self-regulation			Positive social behaviour			Anti-social Behaviour			Anxious behaviour		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
None	547	2.14	0.55	547	2.35	0.48	547	1.39	0.43	546	1.36	0.42
16 vocational	52	2.19	0.61	52	2.27	0.61	52	1.37	0.49	52	1.32	0.40
16 academic	980	2.32	0.53	980	2.47	0.47	979	1.29	0.36	979	1.33	0.41
18 vocational	322	2.29	0.52	322	2.42	0.45	322	1.34	0.37	322	1.30	0.39
18 academic	220	2.33	0.52	220	2.47	0.45	220	1.26	0.32	220	1.29	0.37
Degree or equivalent	312	2.50	0.45	312	2.57	0.42	312	1.20	0.27	312	1.29	0.37
Higher degree	111	2.51	0.44	111	2.50	0.42	111	1.25	0.34	111	1.25	0.32

Categories not known and 'other professional' and 'miscellaneous' excluded due to the small numbers

Family SES

There are indications that family SES (measured by highest SES of either parents' employment) is associated with teachers' ratings of child behaviour in Year 1. The mean differences are largest for the factor Self-regulation. Interestingly, this factor has the strongest links with cognitive attainment which shows significant differences related to SES. Children from Professional non-manual backgrounds have a higher mean score for Self-regulation, while those whose parents never worked have the lowest average score in Year 1. This trend again mirrors patterns found when children were younger during the pre-school period. Children from low SES groups are also rated slightly less favourably in terms of Anti-social behaviour.

Table 1.16: Family SES and differences in social behaviour at the end of Year 1

Family SES	Self-regulation			Positive social behaviour			Anti-social Behaviour			Anxious behaviour		
	n	mean	sd	n	mean	sd	n	mean	Sd	n	mean	sd
Professional non-manual	229	2.50	0.45	229	2.53	0.44	229	1.25	0.35	229	1.29	0.34
Other Professional non-manual	675	2.42	0.49	675	2.51	0.44	675	1.24	0.32	674	1.28	0.38
Skilled non-manual	839	2.31	0.52	839	2.46	0.46	838	1.30	0.36	838	1.32	0.40
Skilled manual	388	2.22	0.52	388	2.41	0.46	388	1.34	0.40	388	1.35	0.40
Semi-skilled	345	2.12	0.58	345	2.32	0.53	345	1.38	0.42	345	1.38	0.45
Unskilled	69	2.15	0.50	69	2.40	0.45	69	1.37	0.42	68	1.35	0.40
Never worked	62	2.06	0.57	62	2.17	0.46	62	1.47	0.44	62	1.37	0.45
Total	2607	2.31	0.53	2607	2.45	0.44	2606	1.30	0.37	2604	1.32	0.40

Multiple disadvantage has been shown to be related to cognitive attainment at the end of Year 1. The correlations with social behaviour are weaker but still statistically significant. The

correlations are negative for Self-regulation (r=-0.24) and Positive social behaviour (r=-0.18) but higher scores on multiple disadvantage are weakly associated with higher scores for Anti-social behaviour (r=0.15) and Anxious behaviour (r=0.07). Table 1.17 shows the mean scores for different levels of multiple disadvantage.

Table 1.17: Total Multiple Disadvantage and differences in social behaviour at the end of Year 1

No. of factors	Self-regulation			Positive social behaviour			Anti-social Behaviour			Anxious behaviour		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
0	575	2.47	0.46	575	2.54	0.41	575	1.25	0.31	575	1.29	0.39
1	666	2.37	0.50	666	2.50	0.44	666	1.27	0.34	665	1.30	0.40
2	526	2.29	0.54	526	2.42	0.48	525	1.30	0.37	525	1.33	0.40
3	329	2.24	0.55	329	2.42	0.50	329	1.35	0.41	329	1.32	0.40
4	211	2.10	0.55	211	2.33	0.48	211	1.37	0.44	211	1.43	0.44
5 plus	168	2.05	0.54	168	2.23	0.50	168	1.43	0.43	167	1.34	0.42
Total	2475	2.31	0.53	2475	2.45	0.47	2474	1.30	0.37	2472	1.32	0.40

As with cognitive outcomes the home learning environment, measured during the pre-school period by the HLE index, continues to show a significant positive association with better social/behavioural development in three of the four measures. Correlations (shown in Table 1.18) reveal that the association is strongest for Self-regulation in Year 1 but that there is no significant link between HLE and Anxious behaviour in Year 1.

Table 1.18: Correlations between Home Learning Environment Index and Children's Social Behaviour at the End of Year 1

	Self-regulation	Positive social behaviour	Anti-social behaviour	Anxious behaviour
HLE Index	0.23	0.18	-0.15	0.02 ns

p<0.05 unless otherwise indicated

It is possible to examine differences in social behaviour scores by type of pre-school experience, however, due to the differences in characteristics of children attending different types of provision outlined earlier in this section (or the 'home' group who had not attended a pre-school centre), differences must be treated with caution. It can be seen that the 'home' group show poorer social behaviour in terms of Self-regulation, Positive social behaviour and Anxious behaviour, but for the Anti-social measure the Local Authority day nursery group have a relatively higher mean score (see Table 1.19). Multilevel analyses reported in later sections examine the impact of pre-school (duration and quality) while controlling for the combined influence of significant child, family and home environment factors.

Table 1.19: Social behaviour at end of Year 1 by Type of Pre-school Provider

Type of pre-school	Self-regulation			Positive social behaviour			Anti-social behaviour			Anxious behaviour		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Nursery Class	519	2.32	0.53	519	2.49	0.47	519	1.28	0.34	519	1.32	0.40
Playgroup	509	2.33	0.52	509	2.47	0.46	508	1.29	0.35	507	1.31	0.40
Private Day Nursery	432	2.43	0.49	432	2.48	0.44	432	1.28	0.36	432	1.26	0.35
Local Authority	356	2.22	0.56	356	2.37	0.47	356	1.42	0.44	355	1.35	0.42
Nursery School	438	2.30	0.55	438	2.45	0.48	438	1.30	0.38	438	1.30	0.38
Combined Centre	144	2.32	0.51	144	2.45	0.46	144	1.29	0.39	144	1.33	0.42
'home' children	279	2.15	0.52	279	2.32	0.48	279	1.31	0.37	279	1.43	0.45
Total	2677	2.30	0.53	2677	2.44	0.47	2676	1.31	0.37	2674	1.32	0.40

There are moderate to strong correlations between the different measures of social behaviour collected at entry to primary school and those collected at the end of Year 1, as can be seen in Table 1.20. The strongest association is between Independence & Concentration at school entry and later scores on Self-regulation (r=0.54). Higher teacher ratings on Independence & Concentration at the start of primary school are negatively associated with subsequent Anti-social behaviour scores at the end of Year 1. Similarly, children with high scores on Co-operation and Conformity at entry to primary school showed reduced scores for Anti-social behaviour in Year 1. By contrast, children rated as showing more Anti-social/worried behaviour at primary school entry are also more likely to show raised scores for Anti-social behaviour at the end of Year 1 (r=0.43). Interestingly the associations between Peer Sociability and later Positive social behaviour are somewhat weaker (r=0.27).

Table 1.20: Correlations Between Measures of Children's Social Behaviour at Primary School Entry and at End of Year1

Year 1 outcome measures	Entry to Primary school Measures			
	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti -social/worried
Self-regulation	0.54	0.46	0.30	-0.28
Positive social behaviour	0.39	0.41	0.27	-0.26
Anti-social behaviour	-0.43	-0.47	-0.08	0.43
Anxious behaviour	-0.12	-0.08	-0.23	0.05 ns

All correlations are statistically significant at the 0.01 level unless indicated ns

Table 1.21 shows the associations between cognitive attainment at the end of Year 1 and the teacher measures of social behaviour. It can be seen that the strongest associations are

between Self-regulation and attainment, particularly in mathematics (r=0.52). Both Anti-social behaviour and Anxious Behaviour are found to be negatively correlated with attainment in Year 1, although the associations are weak.

Table 1.21: Correlations between Children's Attainment and Measures of Social Behaviour at End of Year 1

Year 1 outcome measures	Self-regulation	Positive social behaviour	Anti-social behaviour	Anxious behaviour
Primary Reading standardised score	**0.42**	**0.24**	**-0.21**	**-0.14**
Maths 6 standardised score	**0.52**	**0.31**	**-0.26**	**-0.18**

All correlations are significant at the 0.01 level

Earlier analyses have shown that relationships between child, parent and home environment characteristics and social behaviour are generally much weaker than those found for cognitive attainment. Although significant differences are identified, the differences are relatively modest. Nonetheless, both multiple disadvantage and the home learning environment continue to show a significant impact particularly for Self-regulation which is more closely related to attainment in Year 1 than other measures of social behaviour. Multilevel analyses are used to identify the net impact of different child, family and home environment factors in sections 2 and 3 of this Technical Paper. These analyses are also used to test whether pre-school continues to show a relationship with children's attainment and social behaviour at the end of Year 1, net of the impact of background.

Section 2: Children's Cognitive Attainments at the end of Year 1 in Primary School Results From Contextualised Multilevel Analyses

This section presents the results of a contextualised multilevel analysis establishing the pattern of relationships between various child, family and home environment characteristics and children's cognitive attainments at the end of Year 1. Background details about children's earlier childcare experiences, health, family and home learning environment were obtained from parental interviews conducted when children entered the EPPE study.

This paper investigates whether the associations between cognitive attainments and various child, family and home environment factors at primary school entry are similar to the patterns found when children are older, at the end of Year 1 (age 6 years plus). In particular, the analyses seek to establish whether, taken together, the power of such factors to account statistically for the variation between children in their attainment in Year 1 is weaker or stronger than at the start of primary school. The extent of differences in Year 1 attainment attributable to a child's background is of interest, given the equity implications for later progress at school, and the challenges facing early years teachers.

Multilevel models provide a method of exploring the extent of variation in children's cognitive attainments (and progress) which can be attributed to differences between individual children and group attributes such as the area in which they live or the institution they attend.[13] In terms of the contextualised analysis reported here and in Section 3, the multilevel models allow an exploration of the variation in children's attainments in Year 1 assessments in terms of the contribution of individual explanatory measures such as particular child, family and home environment characteristics, while taking into account any clustering related to the primary school attended.

Table 2.1 shows the null models (i.e. with no explanatory variables included) for the two cognitive outcomes. The intra-centre correlation measures the extent to which the scores of children in the same primary school resemble each other as compared with those from children at different schools. The intra-centre correlations for mathematics and reading indicate that approximately 16 to 26 percent of the variation in children's scores is related to differences between schools, while the majority reflects differences between individual children. These proportions are in line with those reported in earlier studies of primary school aged children (see for example Mortimore et al., 1988; Tymms et al, 19897; Sammons and Smees, 1998; Strand, 1997). The results do not take account of the impact of differences between schools in pupil intake characteristics, these . are investigated in subsequent tables.

Table 2.1: Null model showing pre-school centre and child level variance

	Primary reading standardised score Estimate (se)	Maths 6 standardised score Estimate (se)
School level variance: estimate (se)	**57.945 (6.726)**	**38.759 (5.647)**
Child level variance: estimate (se)	**168.176 (5.224)**	**205.241 (6.221)**
Intra-centre correlation	**0.256**	**0.160**
Number of children (number of schools)	**2740 767**	**2731 763**

[13] Multilevel models are a generalised form of regression analysis, particularly suited to the study of educational and social data exhibiting a hierarchical structure (Paterson and Goldstein, 1991; Goldstein, 1995).

The results from a contextualised analysis, where explanatory variables related to child, family and home environment characteristics are added to the multilevel model to control for the influence of background characteristics, are reported in Table 2.2. The results show the proportion of total variance in Year 1 attainment accounted for by such predictor measures. Overall, background factors account for around 15 percent of the total variance in reading attainment in Year 1. For mathematics, the proportion is similar but slightly higher at just under 19 percent. The intra-school correlation for reading remains similar, suggesting around a quarter of the variation in attainment is still associated with the school attended. For mathematics, the intra-school correlation is roughly halved, being reduced from around 16 to just under 8 percent (Tables 3.1 and 3.2 in Appendix 3 show the fixed effects results for individual predictors found to be statistically significant in the multilevel models).

Table 2.2: Contextualised models of Cognitive Attainment at the end of Year 1 showing primary school and child level variance

	Primary reading standardised score Estimate (se)	Maths 6 standardised score Estimate (se)
School level variance: estimate (se)	48.045 (6.226)	15.770 (3.6662)
Child level variance: estimate (se)	145.362 (4.822)	181.915 (5.661)
Intra-school correlation	0.2484	0.0798
% Reduction in school level variance	17.09	59.31
% Reduction in child level variance	13.57	11.37
% Reduction in total variance	14.47	18.65
Number of children (number of schools)	2550 767	2546 763

The proportion of variance at the child level accounted for by child, family and home factors is similar for reading and mathematics, at around 11 to 14 percent, being slightly higher for reading. Whilst this represents a significant proportion, it is clear that the majority of the variation in children's scores in reading and mathematics in Year 1 is not attributable to the influence of factors such as gender, ethnicity, language or socio-economic status. In other words, such attributes related to a child's background should not be regarded as the only determinants of educational outcomes nor be used to lower expectations for particular pupil groups.

The impact of child, family and home factors on attainment at the end of Year 1 in primary school entry can be compared to the impact of these factors on attainment at earlier time points (see EPPE Technical Paper 8a for details). In terms of entry to primary school measures, it was found that taken together around 33 to 46 percent of the variance in attainment was accounted for by child, family and home environment characteristics. Such factors accounted for more of the variance in language scores (46%) than in early number concepts (33%) or pre-reading skills (37%) when children started school.

These findings suggest that, taken together, there is a relative reduction in the importance of background factors as predictors of children's reading and mathematics results at age 6 years compared with earlier time points although this is partly due to the use of age standardised scores in this analysis.[14] It is possible, that primary school influences (possibly related to the introduction of the National Literacy [NL] and National Numeracy [NN] strategies) may also have

[14] Age standardised scores are not used in the equivalent analyses of national assessment results at the end of Key Stage 1 (Year 2). These results are reported in EPPE Technical Paper 11 and also point to a net reduction in the strength of background factors as predictors of attainment.

a part to play. During the time period that the EPPE children were in KS1, there was a marked increase in national assessment results in reading and mathematics in England particularly amongst schools in disadvantaged areas, and recent international comparisons such as the IEA's International Reading Literacy Study of Primary schools (PIRLS) likewise suggest an improving trend at age 11 years.

The net influence of different child, family and home environment factors is summarised below. Appendix 3 gives details of the multilevel estimates and effect sizes for each predictor found to be statistically significant.

Child Measures

The impact of a child's age in months in Year 1 is found to be statistically significant in terms of correlations with raw scores, with older children showing significantly higher attainments, the association with age being slightly stronger for mathematics (r=0.16 for reading and r=0.19 for mathematics). Interestingly, the correlations between age and attainment at entry to primary school were stronger (r=0.26 for Pre-reading and r=0.33 for Early number concepts) .It should be noted that the effects of age on attainment are taken into account before the testing of other factors in the multilevel models through the use of age standardised scores as outcome measures.

Gender differences in attainment in favour of girls were identified for both reading and mathematics though the differences were more marked for reading. These differences, though significant, were small to moderate in size (ES 0.15 reading, ES 0.09 mathematics).

Children with low birth weight[15] had significantly lower attainments at the end of Year 1. For reading and mathematics differences were only statistically significant for the very low birth weight group. The differences were very much stronger for mathematics than reading (ES 0.60 for mathematics, 0.18 for reading). In both cases, the very low birth weight children obtained scores of 8 to 9 standardised points lower than children with normal birth weight, equivalent to half a standard deviation. This is in line with findings at earlier time points.

As a group, children from larger families (with 3 or more siblings) showed significantly lower scores for reading, (ES 0.24)and results verged on the statistically significant for mathematics. Again this mirrors earlier findings for the pre-school period.

Interestingly, children with English as an additional language (EAL) attained significantly lower scores on the mathematics assessment (ES 0.30), but the differences were not statically significant for reading when other factors, including ethnic group and social disadvantage are controlled. This is in line with earlier findings reported for pre-reading skills at entry to primary school that indicated no significant differences for EAL children. For ethnicity, the relationships (in comparison with the white UK group) indicated that reading attainment for two groups, Bangladeshi and White European were significantly lower. Again, this is in line with the pre-reading results at entry to primary school. However, ethnic differences in attainment were not significant for mathematics results in Year 1.

It should be stressed that these ethnic and language differences are net of the influences of all other factors in the model, including SES and mother's qualification in which there are also significant differences between ethnic groups.

[15] Babies born weighing 2500 grams (5lbs 8oz) or less are defined as below normal birth weight: foetal infant classification is below 1000 grams, very low birth weight is classified as 1001-1005 grams and low birth weight is classified as 1501-2500 grams (Scott & Carran 1989).

Family Measures

The free school meals (FSM) measure of low income showed a negative relationship with attainment in Year 1. The differences were relatively small (ES 0.15) and only significant for reading being similar in size to those found for gender.

Mother's education as measured by highest level of qualification continued to show a consistent pattern of strong and positive effects. The categories degree and higher degree showed the strongest (compared with the group that had no qualifications). For example, in terms of point scores the net impact was three times the size of the gender gap for reading, in terms of effect size the results were as follows (for reading, ES 0.44 for mother a degree versus no qualification, ES 0.54 for mathematics). This is equivalent to a difference of around 6 to 7 standardised points, just under half a standard deviation. In addition, academic qualifications at age 18 and other professional qualifications also showed a significant positive impact. Mother's qualification level showed a stronger link with children's cognitive attainment than the equivalent qualification measure for fathers.

Fathers' employment status during the pre-school period was statistically significant for both reading and mathematics attainment in Year 1. Those whose fathers were unemployed showed significantly lower mathematics attainment (ES 0.20), and for reading differences verged on the significant. Children whose fathers were in full-time employment showed higher reading attainments than those in a combination of self employed/part-time work. [16]

In terms of parents' highest social class of occupation (family SES), compared with professional occupations (Class I), all other categories were associated with lower attainment levels. Significant differences in terms of children's attainment were identified between children whose parents' highest social class of occupation is professional Class I and the following groups: children from families where the highest social class of occupation is skilled non-manual III, skilled manual III and semi & unskilled manual IV/V. The net attainment gap was around 6 standardised points between the professional non-manual I and the semi-skilled manual IV groups for both reading and mathematics (ES between these groups 0.5 for reading, 0.44 for mathematics) For mathematics the differences between the professional non-manual 1 and the unskilled manual group was larger (ES 0.68) than for reading.

Overall, these results show that children whose parents highest SES is non-manual professional and other managerial (classes I and II) continue to have significantly higher attainment levels.

Home Environment Measures

A number of measures provide an indication of aspects of the home learning environment. These are based on the frequency of specific activities involving the child, as reported by parents when children were recruited to the study during the pre-school period. Different aspects of the home learning environment were found to be significant predictors of cognitive attainment at age 3 years and at entry to primary school (age rising 5 years). The multilevel analyses of attainment at the end of Year 1 confirm that specific measures continue to show an impact on subsequent outcomes, net of the influence of other factors. For example, the frequency with which parents reported that the child was taught the alphabet during the pre-school period, compared with the never category showed a strong positive relationship with later attainment in reading and

[16] When variables measuring mother's employment status are tested individually in the contextualised model, a significant positive relationship for mother's working full time is noted. However mother's employment status is no longer statistically significant when other parent variables (such as mother's highest qualification) are added to the contextualised model.

mathematics. Likewise, those whose parents reported that their children played with letters and numbers more frequently also showed higher reading attainment in Year 1.

Reported frequency of library visits also showed a small but significant positive impact on reading and mathematics. Frequency with which parents reported that they taught their child songs or nursery rhymes also showed a weak positive impact on mathematics attainment, after controlling for other factors. Interestingly, the frequency parents reported reading to their child was related to better mathematics attainment, but was no longer significant when other factors are controlled for reading in Year 1.[17]

When the overall HLE index was tested rather than individual measures separately, it was found that the overall quality of the pre-school home learning environment remains a powerful predictor of better cognitive attainment at age 6 years. The ES for mathematics between the highest and lowest scoring groups on the HLE index was 0.74 net of other child and family factors including family SES and mother's highest qualification level, while for reading the ES was 0.62. The results, in line with findings during the pre-school period, illustrate the continued importance of early learning experiences at home.

Table 2.3: Cognitive Attainments of EPPE Sample at End of Year 1 by Home Learning Environment (iHLE) Net of the Impact of Other Factors

Compared with highest score (33-45)	Primary Reading standardised score	Maths 6 standardised score
	Estimate (se) ES	Estimate (se) ES
0-13	*-7.481 (1.254) 0.616	*-9.958 (1.340) 0.739
14-19	*-4.645 (0.988) 0.382	*-5.764 (1.048) 0.428
20-24	*-3.732 (0.944) 0.307 .-	*-5.209 (1.000) 0.386
25-32	-2.539 (0.875) 0.209	*-3.138 (0.932) 0.233 (

Where ES = Effect Size, of pupils =2534 reading, n=2545 mathematics, * p<0.05.

Other Measures

Parents were asked, in the interviews at entry to the study, if their child had any developmental problems. As a group, children whose parents reported no developmental problems with their children at entry to the study, showed higher subsequent attainment in reading and mathematics when followed up in Year 1 (ES 0.28 for 1 developmental problem reported versus none reported for both mathematics and for reading).

Summary of Background Influences

The fully contextualised models tested the net impact of different child, parent and home learning environment measures while controlling for all other measures simultaneously and thus provides rigorous and conservative estimates of statistical significance for specific background characteristics. It does not imply that measures are not of educational or policy importance if they are not statistical predictors after control for other, related measures. For example, parents' occupational status is related to mother's educational qualification level but both are shown to have a separate and measurable impact on attainment levels. Likewise, measures of the home environment are inter-related but have a strong net impact distinct from other factors. The contextualised model shows which set of measures, taken together, provides the best

[17] The EPPE study was designed to explore pre-school influences and for theoretical and methodological reasons the research seeks to compare the impact of pre-school attended with other pre-school influences such as the home learning environment experienced during these formative years, rather than measures of the home learning environment during Key Stage 1. The follow up study EPPE 3-11 will investigate changes in parents' reported involvement in home learning when children were at primary school.

explanation of differences in children's attainment and which measures show a specific impact over and above other influences.

The contextualised analyses provide important evidence concerning the strength of background influences on young children's cognitive attainments at the end of Year 1, age 6 years plus. They illustrate that a range of child, parent and home environment factors continue to show a significant relationship with cognitive outcomes echoing earlier findings reported at entry to pre-school, and entry to primary school. Nonetheless, the findings show that taken together, background characteristics are somewhat less strongly associated with reading and mathematics attainment in Year 1 than they were with earlier measures of general cognitive ability, pre-reading, language and early number concepts during the pre-school period and at entry to primary school. This change is partly related to the use of age standardised assessments in Year 1 as outcome measures (in previous analyses age standardised outcomes were not used and age effects were modelled directly). Nonetheless, the findings also indicate that the power of background influences taken together appears to be reducing as children grow older and spend more time at school. Few studies have followed up the relative impact of different child, parent and home environment influences in recent years. Past studies such as the 1970 Birth Cohort Study are very dated and can therefore give little indication of current pre-school and primary school influences on young children's development and results are not yet available for the Millennium Cohort study. One study which tracked children from age 7 to 11 years in Inner London (Mortimore et al, 1988, also followed up by Sammons et al, 1993), has shown background factors accounted for significantly less variation in children's reading and mathematics scores at age 11 years than had been the case at age 7 years. The present EPPE findings are in line with this trend, but cover a larger sample of children with more varied characteristics drawn from five regions across England and have investigated a more detailed set of measures of child, family and home learning environment measures. This issue is explored in more detail in Technical Paper 11 for attainment at the end of Key Stage 1.

The Impact of Pre-school

The contextual analyses reported above demonstrate that child, family and home learning environment characteristics continue to show significant relationships with cognitive attainment at the end of Year 1, although relationships overall were somewhat weaker than at earlier time points.

An important feature of the EPPE study's findings for the pre-school period relate to the positive impact of the pre-school centre experience on children's cognitive attainment and social/behavioural development, and also on progress over and developmental gains during the pre-school period.

Two forms of multilevel analysis were used to explore pre-school influences.

1. Comparisons were made between children who had attended different types of pre-school and a 'home' group at entry to primary school. Contextual models, controlling for the important influences of child, family and home environment characteristics, were used to establish whether duration of time in the target pre-school setting (compared with none, for the 'home' group) showed a significant impact over and above the influence of background characteristics. Similarly, each type of pre -school was compared with the 'home' group. The results indicated that the 'home' group were at a significant disadvantage in cognitive attainment and most aspects of social behaviour. Differences were especially marked for language, pre-reading, early number, peer sociability and independence and concentration when children started primary school.

2. Value added analyses of progress or developmental gains were also conducted for children in the 141 pre-school centre sample (excluding the 'home' group). These analyses showed that there were significant differences in effectiveness between individual pre-school centres. In addition, the analyses revealed that while more effective centres were found in all

types of provision, as a whole some types were associated with better child outcomes. The value added analyses also revealed that measures of centre quality (measured by the ECERS and Child Interaction Scale [CIS] observation instruments) showed a significant positive impact on child outcomes measured at entry to primary school.

Given earlier findings that pre-school experience led to a better start to primary school, an important aim of the Year 1 analyses is to establish whether there is evidence of any continuing pre-school influence at the end of Year 1, or whether the advantage of pre-school is relatively short lived. Three aspects are considered, quality, duration and effectiveness of pre-school centre provision.

Duration and quality of pre-school experience

Contextualised models were used to see whether, after controlling for child, family and home learning environment factors (noted above) children who had attended a pre-school still showed significantly better attainments in reading and mathematics at age 6 years plus.

Results indicated that attending a pre-school centre compared with none (the 'home' group) remains associated with significantly better attainment levels, after statistical control for the influence of child, family and home environment differences. Table 2.4 shows the net impact of attending any pre-school centre versus none (the 'home' group), when background factors are taken into account in the multilevel models. The results indicate that the pre-school group continue to show a significant advantage and that the effect size is larger for mathematics (ES 0.38). The difference is larger than the gender gap in terms of standardised points for both outcomes. In addition, it is found that each type of pre-school attended showed positive results in comparison with the 'home' group for both mathematics and reading, although differences did not always reach statistical significance.[18]

Table 2.4: Cognitive Attainments of EPPE Sample at end of Year 1 by whether attended a pre-school centre

Compared with none i.e. the 'home' group	Primary Reading standardised score			Maths 6 standardised score		
	Estimate	(se)	ES	Estimate	(se)	ES
Attended pre-school centre	***2.740**	**(1.223)**	**0.227**	***5.150**	**(1.203)**	**0.383**

Where ES = Effect Size, n of pupils =2534 reading, n=2545 mathematics, * p<0.05

Further analyses were conducted to explore the impact of pre-school. The duration (in months) of time a child attended the target pre-school centre showed a significant positive impact as figures in Table 2.4 illustrate. It should be noted that these analyses control for differences in child, family and home environment factors found to be significant in the contextualised analyses described above. The estimates represent the impact of duration 'net' of other influences. It can be seen that time in pre-school shows the strongest relationship with mathematics attainment at age 6 years plus. Two to three years in pre-school compared with none shows an impact equivalent to 6-7 standardised points for mathematics, around half a standard deviation. This is similar to the impact of mother having a degree versus no qualification. For reading attainment, the differences are somewhat smaller. This result is in line with findings at entry to primary school which found that duration of pre-school showed the strongest link with Language, then Early Number Concepts followed by Pre-reading. This may be because individual pre-schools vary more in the extent to which specific pre-reading skills are developed. It may also be that primary schools vary in the extent to which they emphasise literacy development in reception and Year 1 classes (as the higher intra-school correlation for reading reported earlier suggests).

[18] In particular, the number of children retained in the sample who had attended integrated centres was lower than for other groups and only 139 had valid mathematics scores in year 1 and 144 valid reading scores. To reach statistical significance therefore a stronger effect would be required in comparison with other types of provision.

Earlier research by Tymms et al (1997) on the reception year age group has suggested that there is much variation in effectiveness at the class/teacher level in progress over the reception year. The greater the variation between primary schools and classes the more likely it is that any continuing pre-school influence may be reduced or masked.

Table 2.5: Cognitive Attainments of EPPE Sample at End of Year 1 by Duration of Pre-school, Net of the Impact of Other Factors

Compared with none i.e. the 'home' group	Primary Reading standardised score			Maths 6 standardised score		
	Estimate	(se)	ES	Estimate	(se)	ES
Under 12 months	*3.132	(1.354)	0.260	*4.311	(1.338)	0.321
12-24 months	2.028	(1.272)	0.169	*4.775	(1.255)	0.355
24-36 months	*3.100	(1.312)	0.258	*6.187	(1.295)	0.461
Over 36 months	*4.237	(1.505)	0.352	*6.978	(1.502)	0.519

Where ES = Effect Size, n of pupils =2534 reading, n=2545 mathematics, * p<0.05.

Analyses at entry to reception and over the pre-school period also pointed to the positive impact of higher quality pre-school provision. Analyses divided the sample into groups of children whose pre-school experience could be classified as ranging from no quality (i.e. the 'home' group approx 10% of the sample) through low (14%), medium (54%) and high quality (22%), based on centres' ECERS-E scores. The results in Year 1 indicate that there are statistically significant differences in attainment between the no quality and the high quality groups. The experience of high quality pre-school provision shows a continuing positive impact on reading attainment at age 6 years plus (ES=0.23). For mathematics, the impact of high quality compared with none is somewhat stronger (ES=0.35). However, there were no statistically significant differences between the high and either the low or the medium quality groups in this analysis (see Table 2.6).

Table 2.6: Cognitive Attainments of EPPE Sample at end of Year 1 by Quality of Pre-school

Compared with high quality	Primary Reading standardised score			Maths 6 standardised score		
	Estimate	(se)	ES	Estimate	(se)	ES
None i.e. 'home' group	*-2.789	(1.383)	0.232	*-4.711	(1.337)	0.350
Low quality	-1.365	(1.110)	0.113	-0.676	(1.0676)	0.050
Medium quality	0.340	(0.835)	0.028	0.563	(0.803)	0.042

Where ES = Effect Size, n of pupils =2548 reading, n=2559 mathematics, * p<0.05.

Given that EPPE has already demonstrated the importance of both duration and quality on progress over the pre-school period and on attainment at entry to primary school, it is appropriate to investigate their joint effects. Further analyses were conducted to explore the impact of different combinations of quality and duration of pre-school experience. The comparison group is the 'home' sample (defined as having no duration and thus no quality of pre-school centre experience). The results are shown in Table 2.7.

Table 2.7: Cognitive Attainments of EPPE Sample at end of Year 1 by Duration and Quality of Pre-school

Compared with none i.e. the 'home' group	Primary Reading standardised score			Maths 6 standardised score		
	Estimate	(se)	ES	Estimate	(se)	ES
Low quality, under 24 months	1.544	(1.709)	0.128	*5.355	(1.734)	0.399
Low quality, 24-36 months	1.772	(1.585)	0.147	*5.562	(1.562)	0.415
Low quality, over-36 months	1.260	(2.542)	0.105	*7.241	(2.601)	0.540
Medium quality, under 12 months	2.884	(1.488)	0.239	*3.78	(1.474)	0.282
Medium quality, 12-24 months	2.270	(1.343)	0.188	*4.703	(1.327)	0.351
Medium quality, 24-36 months	*3.886	(1.391)	0.323	*7.276	(1.379)	0.523
Medium quality, over 36 months	*4.664	(1.610)	0.387	*6.448	(1.611)	0.481
High quality, under 12 months	*3.618	(1.651)	0.300	*4.08	(1.601)	0.304
High quality, 12 - 24 months	2.120	(1.547)	0.176	*5.108	(1.502)	0.391
High quality, 24 - 36 months	2.933	(2.234)	0.243	1.446	(2.244)	0.11
High quality, over 36 months	*5.725	(2.489)	0.475	*9.806	(2.564)	0.731

Where ES = Effect Size, n of pupils =2534 reading, n=2545 mathematics, * $p<0.05$.

It can be seen that the effect sizes for duration and quality of pre-school are generally larger for mathematics attainment at the end of Year 1 than is the case for reading. This is a similar pattern to that found at younger ages (rising 5 years). Stronger effects had been found previously at entry to primary school when attainments in Pre-reading and Early number concepts were analysed in the same way (at this stage the Effect Size for pre-school on Language and Early number was found to be stronger than for pre-reading). The results indicate that, in general, longer duration in pre-school (in months) is associated with better cognitive outcomes in Year 1 for each level of quality. Medium quality tends to shows better effects than low quality for similar durations. For the category high quality and long duration, (3 years plus) the results are particularly strong (ES 0.48 for reading and 0.73 for mathematics). However, the results for one group, high quality 24-36 months duration, though positive do not conform to this trend. It should be noted, that these analyses do not take account of differences in the quality of primary school experiences, because no data were collected on primary schools during Key Stage 1 as this was not a focus of the original EPPE research.

The results indicate that for mathematics pre-school experience shows particular benefits in terms of latter attainment in Year 1. They confirm that 'home' children continue to show significantly poorer attainment at the end of Year 1, even when control is made for the influence of significant child, family and home environment influences. The EPPE results suggest that in

order to gain maximum cognitive benefit from higher quality pre-school, it should be experienced over a relatively longer period. For the most vulnerable groups (those scoring highly in terms of multiple disadvantage whose characteristics place them at greater risk of poor attainment) the combination of longer duration and higher quality offers the best prospect of helping to reduce the attainment gap (in terms of effect sizes the impact of high quality and long duration is larger than that of mother having a degree versus none, or of family SES professional non-manual versus semi or unskilled manual, for example).

It is of interest to establish whether duration and quality influences are also evident when the pre-school sample is considered separately, in other words excluding the 'home' group. Given the differences in background of the 'home' group, this comparison can be seen to strengthen the research, because it focuses on variation within the pre-school sample. In isolation, the differences in quality no longer showed a statistically significant impact on attainment, net of other background influences, although the pre-school group who had experienced the lowest quality did show poorer results in reading than those who had experienced the highest quality. However, when considered separately from quality, all categories of lower duration compared with high duration (3 years plus) showed a negative impact for the pre-school sample, which was significant for the largest category those attending for under 24 months for both mathematics and reading (see Table 2.8). Given this correspondence in findings between the comparisons including the 'home' group and those made on the pre-school sample alone, it appears that duration of pre-school over a longer period (more than two years i.e. starting under three years of age) is associated with longer term benefits on later attainment at age 6 years plus. This confirms earlier findings at entry to the study, also noted again at entry to primary school, that an earlier start at pre-school (age 2 to 2.5 years) tends to confer significant cognitive benefits which are sustained over several years.

Table 2.8: Cognitive Attainments of EPPE Pre-school Sample at end of Year 1 by Duration of Pre-school

Compared with high duration over 36 months	Primary Reading standardised score			Maths 6 standardised score		
	Estimate	(se)	ES	Estimate	(se)	ES
Under 12 months	-1.349	(1.152)	0.113	*-2.69	(1.166)	0.201
12 - 24 months	*-2.464	(1.029)	0.204	*-2.176	(1.048)	0.163
24 - 36 months	-1.491	(1.051)	0.124	-0.824	(1.076)	0.062

Where ES = Effect Size, n of pupils =2315 reading, n=2329 mathematics, * p<0.05

Effectiveness of pre-school centre experience

The value added analysis of the cognitive progress of children who had attended a pre-school centre, controlling for their prior attainment at entry to the study and background influences, produced estimates of centre effectiveness (value added residuals which measure relative gains over the pre-school period compared to those predicted by the multilevel model). For details of these analyses, see EPPE Technical Paper 8a. It should be noted that examples of more and of less effective centres were found within each type of provision. For this reason in tracking continuing influence of pre-school, residual measures of centre effectiveness were analysed in the same way as those for duration and quality. In order to establish whether the effectiveness of the pre-school setting attended shows any continuing impact on attainment further multilevel analyses were conducted on the Year 1 reading and mathematics outcomes. These analyses focus first on the pre-school sample, because the 'home' group by definition had not attended a pre-school centre. In these analyses the centre level residuals are treated as continuous variables.

Results after controlling for child, family and home environment influences indicate that centre effectiveness still shows a relatively small but statistically significant impact on children's attainment at age 6 years (see Table 2.9). Centre effectiveness in promoting early number concepts shows stronger positive effects on attainment in mathematics in Year 1 than on reading. In line with the value added findings for the pre-school period, the results indicate that the individual pre-school centre attended continues to influence children's later outcomes, with those who had attended more effective settings showing better outcomes at age 6 years plus.

Table 2.9: Cognitive Attainments of EPPE Pre-school Sample at end of Year 1 by Effectiveness of Pre-school centre attended

Residual effectiveness estimate for pre-school centre attended	Primary Reading standardised score	Maths 6 standardised score
	Estimate (se) ES	Estimate (se) ES
Early number	***0.956 (0.477) 0.108**	***1.347 (0.447) 0.153**
Language	**0.890 (0.547) 0.092**	***1.182 (0.533) 0.110**
Pre-reading	Sig< 0.07 **0.300 (0.164) 0.107**	**0.208 (0.155) 0.067**

Where ES = Effect Size, of pupils =2331 reading, n=2344 mathematics, * p<0.05.

For further comparison, centre effectiveness categories were used to enable the 'home' sample to be added to the analysis as a comparison group. The centre level residuals were divided into five groups ranging from most effective (significant positive centre outliers) to least effective (significant negative outlier centres). Table 2.10 summarises the results in terms of direction and significance for simplicity. It can be seen that a pattern emerges indicating that, in comparison with the 'home' group, those who attended pre-school settings of average to above average effectiveness generally show significantly better outcomes at the end of Year 1. However, the least effective centres on each of the three pre-school outcomes analysed do not show a significant advantage over the 'home' group for children's later reading attainment. It should be noted that there was greater variation between individual pre-school centres in their effectiveness in promoting young children's pre-reading progress identified in earlier analyses (see EPPE Technical Papers 8a) than was the case for progress in either Early number or Language.

Table 2.10: Summary of Comparisons of the impact of centre effectiveness categories with 'home' group

Residual effectiveness estimate for pre-school centre attended compared with none i.e. the 'home' group	Primary Reading standardised score	Maths 6 standardised score
Early number		
Lowest	Positive ns	**Positive sig**
Below average	Positive ns	**Positive sig**
Average	Positive ns	**Positive sig**
Above average	**Positive sig**	**Positive sig**
High	**Positive sig**	**Positive sig**
Language		
Lowest	Positive ns	**Positive sig**
Below average	Positive ns	Positive ns
Average	**Positive sig**	**Positive sig**
Above average	**Positive sig**	**Positive sig**
High	**Positive sig**	Positive ns
Pre-reading		
Lowest	Positive ns	Positive ns
Below average	**Positive sig**	**Positive sig**
Average	**Positive sig**	**Positive sig**
Above average	**Positive sig**	**Positive sig**
High	**Positive sig**	**Positive sig**

Where ES = Effect Size, of pupils =2534 reading, n=2545 mathematics, * $p<0.05$.

These results support the conclusion that the effectiveness of the pre-school attended continues to show a modest but measurable and significant impact on young children's subsequent attainments at the end of Year 1. Taken together with earlier findings on quality and duration the findings on effectiveness support the conclusion that there remains evidence of significant benefits of pre-school for children's cognitive attainment at age 6 years plus. However, the cognitive boost is larger where children attend better provision (more effective or higher quality for relatively longer periods of time in months).

Section 3: Children's Social/behavioural Development at the end of Year 1 in Primary School: Results From Contextualised Multilevel Analyses

This section presents the results of a contextualised multilevel analysis establishing the pattern of relationships between child, family and home environment characteristics and children's social/behavioural development at the end of Year 1. The models followed the same pattern as those described in Section 2 for cognitive outcomes, linking background details about child family and home learning environment with four factors measuring different aspects of social behaviour.

This paper investigates whether the associations between social behaviour and various child, family and home environment factors evident at primary school entry are similar to the patterns found when children are older, at the end of Year 1 (6 years plus). As with the cognitive analyses, multilevel models are used to explore the net impact of different predictors.

Table 3.1 shows the null models (i.e. with no explanatory variables included) for the four social/behavioural outcomes. The intra-centre correlation measures the extent to which the scores of children in the same primary school resemble each other as compared with those from children at different schools. The intra-centre correlations indicate that approximately 6 to 11 percent of the variation in children's scores is related to differences between primary schools, while the majority reflects differences between individual children. The results do not take account of the impact of differences in pupil intake characteristics. It can be seen that there is significantly less school level variation in social/behavioural outcomes at the end of Year 1 than was found for the equivalent analyses of reading and mathematics attainments. The greatest variation between primary schools is for Positive social behaviour and the least for Self-regulation.

Table 3.1: Null model showing pre-school centre and child level variance

	Self-regulation Estimate (se)	Positive social behaviour Estimate (se)	Anti-social behaviour Estimate (se)	Anxious behaviour Estimate (se)
School level variance:	0.017023 (0.00443)	0.023256 (0.00405)	0.009677 (0.00258)	0.013131 (0.00266)
Child level variance:	0.26526 (0.00789)	0.194255 (0.00582)	0.130747 (0.00398)	0.146175 (0.00435)
Intra-school correlation	0.060	0.107	0.069	0.082
Number of children	2677	2677	2676	2674
(number of schools)	762	762	762	762

The results from a contextualised analysis, where explanatory variables related to child, family and home environment characteristics are added to the multilevel model to control for the influence of background characteristics, are reported in Table 3.2. The results show the proportion of total variance in Year 1 social/behavioural outcomes accounted for by such predictor measures. Overall, background factors account for around 14 percent of the total variance in Self-regulation in Year 1 and for slightly lower proportions for Positive social behaviour and Anti-social behaviour. For Anxious behaviour, however, background accounts for under 1 per cent of total variance. It can be concluded that such factors do not explain much of the differences amongst the child sample in this aspect of behaviour. The intra-centre correlations range between 0.06 to 0.12 indicating that there is significant variation between primary schools in pupils' social/behavioural outcomes, taking into account the influence of background factors. It is interesting that when background is controlled the variation between schools in Anti-social behaviour increases. This may suggest that this outcome is particularly

likely to be affected by differences between schools (for example in behaviour climate/expectations and peer influences etc).

Table 3.2: Contextualised models of Social Behaviour at the end of Year 1 showing primary school and child level variance

	Self-regulation Estimate (se)	Positive social behaviour Estimate (se)	Anti-social behaviour Estimate (se)	Anxious behaviour Estimate (se)
School level variance:	**0.015140 (0.00393)**	**0.022716 (0.00392)**	**0.009808 (0.00242)**	**0.013032 (0.00270)**
Child level variance:	**0.226422 (0.00694)**	**0.170445 (0.00534)**	**0.112672 (0.00357)**	**0.144998 (0.00438)**
Intra-school correlation	**0.063**	**0.118**	**0.080**	**0.083**
% Reduction in school level variance	**11.1**	**2.3**	**No reduction school level variance increased 10.1**	**0.8**
% Reduction in child level variance	**14.6**	**12.3**	**13.8**	**0.8**
% Reduction in total variance	**14.4**	**11.2**	**12.8**	**0.8**
Number of children (number of schools)	**2560**	**2535**	**2528**	**2613**

Whilst a significant proportion, it is clear that, as with cognitive attainment, the majority of the variation in children's social behaviour in Year 1 is not attributable to factors such as gender, ethnicity, language or socio-economic status.

The impact of child, family and home factors on social behaviour at the end of Year 1 can be compared to the impact of these factors on similar measures of social behaviour collected at earlier time points (see EPPE Technical Paper 8b for details). The social/behavioural factors were slightly different at entry to primary school. In terms of the entry to primary school measures, it was found that background accounted for slightly more of the variance in Independence & concentration (16.3%) than for Self-regulation in Year 1. For Peer sociability background accounted for only 7.1 percent of the variance at entry to primary school. This is lower than the Year 1 figure for Positive social behaviour (11.2%). The same pattern is evident for Anti-social behaviour. At primary school entry background factors taken together accounted for 7.4 percent of total variance in this measure, but in Year 1 the figure increased to nearly 13 percent. Overall, these findings suggest that background influences increase over Key Stage 1 for some aspects of social behaviour, in contrast to the findings for reading and mathematics.

The net influence of different child, family and home environment factors is summarised below. Appendix 4 gives full details of the multilevel estimates for each factor tested.

Child Measures

The correlation between a child's age in months in Year 1 was statistically significant, for two of the social/behavioural measures, in terms of raw scores, with older children showing more positive ratings by teachers, the association with age being slightly stronger for Self-regulation (r=0.13) and positive, but weakly negative for Anxious behaviour (r=-0.12). These correlations are a little weaker than those found with the two attainment outcomes at the end of Year 1. Interestingly, age showed a similar level of association with social behaviour at entry to primary school (r=0.10) being strongest for the measure Cooperation and Conformity. When age is

included in the multilevel models and the net effect analysed the ES was strongest for Self-regulation (ES 0.30) and somewhat weaker for Anxious behaviour (ES 0.23)

Girls showed better behaviour in terms of teachers' assessments for Self-regulation at the end of Year 1, taking account of other factors (the ES was 0.48). This aspect of behaviour is associated with higher attainment, and may help to account for the gender gap in achievement. They also showed higher scores in terms of Positive social behaviour (ES 0.53). In addition, there was a gender effect on Anti-social behaviour with girls showing more positive outcomes (lower scores) in this aspect (ES 0.50). However, there were indications that girls were slightly more likely to show increased Anxious behaviour (ES 0.10). It should be stressed that very few children showed raised scores for either Anti-social or Anxious behaviour (around 5 %). Appendix 6 shows the distribution of scores for each of the four measures.

There were few statistically significant ethnic differences in ratings on any measure except Positive social behaviour where Bangladeshi and Pakistani children were rated less highly than the White UK group (it should be noted that significantly more children in these two groups were 'home' children and the absence of pre-school experience may have influenced social development and adjustment to primary school). Black African children were less likely to be rated as showing Anxious behaviour than other groups (ES 0.32) It should be stressed that these ethnic differences are net of the influences of all other factors included in the model, in which there are also significant differences between ethnic groups.

Family Measures

The free school meals (FSM) measure of low income showed a significant negative relationship with Self-regulation (ES 0.20) and Positive social behaviour (ES 0.20). It was also associated with increased scores on the Anti-social measure (ES 0.24).

Mother's education as measured by highest level of qualification showed a consistent pattern of positive effects for Self-regulation, in broad accord with findings at younger ages and in line with findings for cognitive attainment. The categories mother's highest level of qualification degree, higher degree and other professional qualification showed the strongest impact (compared with the group no qualifications) with ES ranging from 0.33-0.46. Mother's qualification level showed stronger links with behaviour than the equivalent qualification measure for fathers. Mothers' higher qualification levels showed a negative relationship with increased Anti-social behaviour (in other words children whose mothers had academic qualifications at age 16 or higher all showed lower scores on this measure, the ES were stronger at higher qualification levels such as degree ES 0.38)

In terms of parents' highest social class of occupation (family SES), compared with professional occupations (Class I), those from the group parents never worked showed significantly lower scores for Self-regulation (ES 0.52) as did those in semi skilled-manual work (ES 0.43). A very similar pattern emerged for the Positive social behaviour measure.

There were indications that children whose mothers worked full time during the pre-school period showed slightly increased Anti-social behaviour scores at the end of Year 1 (ES 0.18), however there were no differences for those who worked part-time or were self-employed. For Anxious behaviour children whose mothers had worked part-time during the pre-school period showed better outcomes than either those who had not worked or who had worked full time. Children whose parents were married and living with a spouse during the pre-school period showed slightly lower scores for Anti-social behaviour compared with separated/divorced parents (ES 0.15). There were no statistically significant differences between the separated/divorced group and those who were single parents or living with a partner.

Home Environment Measures

Several measures related to the home learning environment measured during the pre-school period showed significant effects for social behaviour at the end of Year 1, in line with findings at earlier time points and findings for cognitive outcomes in Year 1. For example, the frequency with which parents reported visiting the library, was positively related to better scores on Self-regulation and Positive social behaviour. Teaching songs and nursery rhymes was associated with better scores for Positive social behaviour. Reading to the child more frequently was also linked with more favourable scores for Positive social behaviour and reduced Anti-social behaviour. The HLE index provides a summary measure of the quality of the home learning environment as measured by parents' reported activities with their child (for details of estimates see Appendix 4). The relationships were strongest with Self-regulation and Positive social behaviour. For example, the ES was 0.45 for difference between children in the group with the lowest compared with the highest scores on the HLE index on Self-regulation in Year 1 and 0.36 for Positive social behaviour.

These results indicate that greater reported involvement by parents in activities with the child that are indicative of a better home learning environment during the pre-school period, has positive effects on later social behaviour as well as on cognitive attainment that are independent of background characteristics including age, gender, family SES and mother's qualification levels.

Other Measures

Parents were asked in the interviews at entry to the study if their child had any developmental problems or behaviour problems. As a group, children whose parents reported no developmental problems were rated more favourably for Self-regulation by teachers in Year 1 than other children. The difference was largest for Self-regulation comparing children reported to have 2 or developmental problems compared with none reported (ES 0.45). Likewise, children whose parents' had reported earlier behaviour problems showed less favourable scores for Self-regulation at the end of Year 1 (ES 0.28). Those whose parents had reported a behaviour problem scored less highly in terms of Positive social behaviour (ES 0.24). The differences, as might be expected, were much stronger for children who had been reported as having behaviour problems during the pre-school period (ES 0.66 for those identified as having 2 or more behaviour problems before starting primary school, and 0.46 for those reported to have had one problem at a younger age.) in relation to higher teacher ratings for Anti-social behaviour. They also were more likely to have higher scores for Anxious behaviour, although the ES was small (0.14).

Summary of Background Influences

The contextualised models tested the net impact of different child, parent and home learning environment measures for social behaviour, following the same strategy used to analyse cognitive attainments. The contextualised model shows which set of measures, taken together, provides the best statistical explanation of variations in different measures of children's social behaviour at the end of Year 1.

The results are in line with findings at earlier time points and indicate that a range of child, parent and home environment factors continue to show a significant relationship with different aspects of social behaviour. Self-regulation shows the strongest links with background factors, and the patterns are similar to those found for cognitive attainment at this age . Anxious behaviour is very poorly predicted by background factors by contrast.

The Impact of Pre-school

Duration and quality

Contextualised analyses were used to see whether, controlling for child, family and home learning environment factors children who had attended a pre-school showed significantly better social/behavioural outcomes at age 6 years plus.

Results indicated that attending a pre-school centre compared with none (the 'home' group) remained associated with significantly better social behaviour, net of child, family and home environment differences for two areas. Table 3.3 shows the net impact of attending any pre-school centre versus none (the 'home' group), after control for background factors. The results indicate that the pre-school group continue to show a statistically significant advantage for Self-regulation and a reduced incidence of Anxious behaviour. The impact for Positive social behaviour is associated with better outcomes, but is weak only verging on the significant ($p<0.09$). There was no significant difference between the pre-school and the 'home' sample for Anti-social behaviour in Year 1.

In addition, each type of pre-school attended showed generally positive significant results in comparison with the 'home' group except the category Local Authority Day nursery for Self-regulation, where results were only weakly positive but not statistically significant. For Positive social behaviour all types of pre-school showed positive effects but they were only statistically significant in comparison with the 'home' group for integrated centres, nursery classes and playgroups. All types of pre-school were significantly associated with less Anxious behaviour in comparison with the 'home' group. For Anti-social behaviour there were no significant differences between 'home' children and those who attended pre-school for all types except Local Authority day nurseries. As at entry to primary school, children who had attended this form of provision showed slightly increased Anti-social scores.

Table 3.3: Social/behavioural outcomes of EPPE Sample at end of Year 1 by whether attended a pre-school centre or not

Compared with none i.e. the 'home' group	Self-regulation	Positive social behaviour	Anti-social behaviour	Anxious behaviour
	Estimate (se) ES	Estimate (se) ES	Estimate (se) ES	Estimate (se) ES
Attended pre-school centre	*0.1065 (0.041) 0.224	0.0653 (0.038) 0.159	0.0401 (0.030) 0.121	*-0.1076 (0.032) 0.282

Where ES = Effect Size, n of pupils =2534 self-regulation, 2524 Positive social behaviour, 2514 Anti-social behaviour, 2596 Anxious behaviour, * $p<0.05$

Further analyses were conducted to explore the impact of pre-school in more detail. The duration (in months) of time a child attended the target pre-school centre showed a significant positive impact on most measures of social behaviour, although in contrast to results for cognitive attainment there was little evidence that impact was 'dose related' in any clear way (see Table 3.4). It should be noted that these analyses control for differences in child, family and home environment factors found to be significant in the contextualised analyses described above. The estimates represent the impact of duration 'net' of other influences. It can be seen that the impact of time in pre-school shows a distinct relationship with reductions in Anxious behaviour. Children who had spent any time in pre-school were likely to be rated as significantly less anxious by teachers in Year 1. The only 'dose' related finding was for Anti-social behaviour. Children who were early starters under age 2 years (spending more than 36 months in the target pre-school) showed increased scores in teacher ratings (ES 0.33) although it should be stressed that the vast majority of this group of early starters were still rated positively for this measure. This result is in line with findings reported previously at entry to primary school (see Technical

Paper 8b). However, children who had attended pre-school for three years or less did not show significantly different behaviour for the Anti social measure than the 'home' group.

Interestingly, at entry to primary school the duration of time in pre-school had shown a particularly marked positive impact on Peer sociability. The nearest equivalent dimension in Year 1, Positive social behaviour, however showed a less clear relationship. Attending pre-school rather than none showed a weak positive impact but there was no longer evidence that this was stronger for a longer duration.

Table 3.4: Social/behavioural outcomes of EPPE Sample at end of Year 1 by Duration of Pre-school

Compared with none i.e. the 'home' group	Self-regulation	Positive social behaviour	Anti-social behaviour	Anxious behaviour
	Estimate (se) ES	Estimate (se) ES	Estimate (se) ES	Estimate (se) ES
Under 12 months	*0.1092 (0.046) 0.230	*0.1062 (0.043) 0.258	0.0136 (0.036) 0.041	*-0.1072 (0.036) 0.281
12-24 months	*0.0917 (0.0426) 0.193	0.0502 (0.040) 0.122	0.0525 (0.031) 0.156	*-0.0886 (0.033) 0.232
24-36 months	*0.1414 (0.044) 0.298	Sig< 0.08 0.07332 (0.0415) 0.178	0.0311 (0.032) 0.093	*-0.1197 (0.034) 0.314
Over 36 months	0.0688 (0.051) 0.145	0.01851 (0.048) 0.045	*0.1093 (0.038) 0.326	* -0.1097 (0.039) 0.288

Where ES = Effect Size, n of pupils =2534 self-regulation, 2524 Positive social behaviour, 2514 Anti-social behaviour, 2596 Anxious behaviour, * $p<0.05$

Earlier analyses at entry to primary school and over the pre-school period have pointed to the positive impact of higher quality pre-school provision for both cognitive and social/behavioural outcomes (age rising 5 years). For the analyses the sample was divided into groups of children whose pre-school experience could be classified as ranging from no experience of pre-school centre quality (i.e. the 'home' group approx 10% of the sample) through low (14%), medium (54%) and high quality (22%), based on centres' ECERS-E scores. The results indicated that there were statistically significant differences between the no quality and the high quality groups for Self-regulation (ES 0.28) and for Positive social behaviour (ES 0.22). Importantly, the Anti-social scores of children who had attended high quality provision were not significantly different from the 'home' group, whereas those of the low and medium quality groups showed significant differences with slightly increased ratings for Anti-social behaviour (ES 0.18 for low quality versus 'home', ES 0.12 for medium quality versus 'home') . For Anxious behaviour the difference between the 'home' and the high quality group was significant and positive (ES 0.38), whereas children who had attended low and medium quality centres did not show significantly different outcomes for Anxious behaviour in Year 1 than those who had attended high quality provision. Taken together, these comparisons suggests that the experience of high quality pre-school provision shows a continuing positive impact on several aspects of social behaviour at age 6 years plus, in comparison with the 'home' sample, when control is made for child, family and home environment influences.

Table 3.5: Social/behavioural outcomes of EPPE Sample at end of Year 1 by Quality of Pre-school

Compared with high quality group	Self-regulation	Positive social behaviour	Anti-social behaviour	Anxious behaviour
	Estimate (se) ES	Estimate (se) ES	Estimate (se) ES	Estimate (se) ES
No quality i.e. 'home' group	*-0.1317 (0.045) 0.277	*-0.0912 (0.043) 0.222	-0.0059 (0.034) 0.018	*0.1006 (0.035) 0.381
Low quality	-0.0350 (0.036) 0.074	-0.0382 (0.04) 0.093	*0.0587 (0.027)) 0.175	0.0090 (0.029) 0.024
Medium quality	-0.0286 (0.027) 0.060	-0.0316 (0.026) 0.077	*0.0405 (0.020) 0.121	-0.010 (0.022) 0.03

Where ES = Effect Size, n of pupils =2560 self-regulation, 2539 Positive social behaviour, 2528 Anti-social behaviour, 2613 Anxious behaviour, * p<0.05

Analyses have already demonstrated the importance of both duration and quality on progress over the pre-school period and on attainment at entry to primary school and in Year 1. Further analyses were therefore conducted to explore the impact of different combinations of quality and duration of pre-school experience for social behaviour at the end of Year 1. The comparison group was the 'home' sample (defined as having no duration and thus no quality of pre-school centre experience). The results indicate that attendance at pre-school, especially of medium to high quality generally benefits Self-regulation and Positive social behaviour and reduces Anxious behaviour. However very long duration (over 3 years, associated with starting under age 2 years) has a significant negative relationship with increased Anti-social behaviour. Overall, the findings did not suggest that high quality combined with long duration compared to none gave significantly better social/behavioural outcomes, in contrast to the findings for cognitive attainment reported earlier.

Due to limitations in comparisons made primarily in terms of the 'home' group versus others further analyses were conducted. It is of interest to establish whether any duration and quality influences are also evident when the pre-school sample is considered separately, in other words excluding the 'home' group. In these analyses, both duration and quality are treated as continuous measures and tested separately. For cognitive outcomes a longer duration is found to show a significant positive impact for attainment in both mathematics and reading in Year 1. For social/behavioural outcomes, however, longer duration showed a weak negative relationship with two of the four outcomes: Positive social behaviour (ES 0.10) and Anti-social behaviour (0.12). In both cases, longer duration was associated with poorer outcomes. However, a longer duration was not significant for the pre-school sample for Anxious behaviour or Self-regulation. By contrast, quality shows a small but statistically significant positive impact for better teacher ratings of children for the measure of Anti-social behaviour (ES 0.12), in other words controlling for background influences higher quality is associated with reductions in Anti-social behaviour. The effect sizes for both duration and quality were weak but significant and similar in strength. [19]

Table 3.6: Social/behavioural outcomes of EPPE Pre-School Sample at end of Year 1 by Quality and Duration of Pre-school (only significant results shown)

a) Quality

[19] The ECERS-E quality measure is strongly correlated with the ECERS-R scale (r=0.79) and when the ECERS-R scale was tested the results mirrored those found for the ECERS-E measure (ES 0.11).

	Anti-social behaviour
	Estimate (se) ES
ECERS-E quality measure	***-0.01944 (0.0083) 0.116**

N = 2309, p<0.05

b) Duration

	Positive social behaviour	Anti-social behaviour
	Estimate (se) ES	Estimate (se) ES
Duration of pre-school in months	***-0.0019 (0.0009) 0.101**	***0.0018 (0.0007) 0.116**

N = 2301 Positive social behaviour, n=2295 Anti-social behaviour.

Taking together the results of analyses comparing the 'home' group with the pre-school sample, and those based only on the pre-school sample, it appears that a longer duration of pre-school shows important benefits in terms of providing children with a better start to primary school and also benefits later attainment in reading and mathematics. Higher quality pre-school experience also shows benefits for later social behaviour and cognitive attainment. However, the two measures Positive social behaviour and Anti-social behaviour both show weak negative effects associated with longer duration. Nonetheless, both these aspects of behaviour are improved when children attended a higher quality pre-school, in comparison with 'home' children. For the pre-school sample, higher quality is also linked with all but significant reductions in Anti-social scores. In combination, the findings indicate that an early start to pre-school has long-term cognitive benefits, particularly combined with high quality provision. For social behaviour those who attended higher quality provision show better outcomes for three measures in Year 1 than the 'home' group. Those who attended low quality provision, by contrast, showed relatively poorer scores for Anti-social outcomes in Year 1 and slightly poorer scores on Positive social behaviour. An early start, under age 2 years is associated with raised scores for Anti-social behaviour in Year 1, in line with findings at two earlier time points. The policy implication is that for children starting pre-school under the age of two years it is particularly important to ensure the highest quality levels possible.

Effectiveness of pre-school centre experience

The value added analysis of the social/behavioural gains made by children who had attended a pre-school centre, controlling for their prior social behaviour at entry to the study and background influences, produced estimates of centre effectiveness (residuals which measure relative gains over the pre-school period compared to those predicted by the multilevel model). For details of these analyses, see EPPE Technical Paper 8b. In order to establish whether the effectiveness of the pre-school setting attended shows any continuing impact on social behaviour further analyses were conducted on the Year 1 outcomes. These analyses focus first on the pre-school sample, because the 'home' group by definition had not attended a centre. In these analyses, the centre level residuals are treated as continuous variables.

The results of analyses which control for child, family and home environment influences, indicate that pre-school centre effectiveness still shows a significant positive impact on children's later social/behavioural outcomes at age 6 years (see Table 3.7). In each case, the pre-school effectiveness measures were tested separately to establish their relationship with social/behavioural outcomes at the end of Year 1. It should be noted in interpreting these results that the residual estimates of effectiveness implies an increase in the outcomes studied. Thus in Table 3.5 significant positive results for Self-regulation and Positive social behaviour imply better child outcomes in teacher ratings of these measures at the end of Year 1. Conversely, for the

two measures Anti-social and Anxious behaviour increased scores indicate relatively worse child outcomes, while negative relationships signify better child outcomes for these two measures. It can be seen that there is a consistent pattern that children who had attended pre-school centres which were more effective in promoting Independence & concentration showed significantly better outcomes in Year 1 in three measures of behaviour.

For children who had attended centres that were more effective in promoting developmental gains for Peer sociability and for Cooperation and conformity during the pre-school period, results were also better in Year 1 for all four social/behavioural measures. By contrast, children who had attended centres that were less effective (i.e. had promoted increased Anti-social behaviour outcomes during the pre-school period) subsequently showed significantly poorer behavioural outcomes on all areas in Year 1. The result is strongest for the Anti-social behaviour measure (ES 0.28).

Table 3.7: Social/behavioural outcomes of EPPE pre-school sample at end of Year 1 by Effectiveness of Pre-school centre

Pre-school centre effectiveness VA residual	Self-regulation	Positive social behaviour	Anti-social behaviour	Anxious behaviour
	Estimate (se) ES	Estimate (se) ES	Estimate (se) ES	Estimate (se) ES
Independence & concentration	*0.4201 (0.100) 0.200	*0.2584 (0.097) 0.143	*-0.2855 (0.075) 0.193	-0.1177 (0.082) 0.072
Peer sociability	*0.4723 (0.103) 0.216	*0..3796 (0.098) 0.201	*-0.1999 (0.077) 0.130	#-0.1627 (0.084) 0.095
Cooperation & Conformity	*0.4454 (0.112) 0.188	*0.4772 (0.106) 0.234	*-0.3993 (0.082) 0.240	*-0.1886 (0.090) 0.103
Anti-social	#-0.2405 (0.127) 0.089	*-0.3219 (0.120) 0.138	*0.5422 (0.092) 0.284	0.1757 (0.102) 0.082

Where ES = Effect Size, of pupils =2329 self-regulation, 2316 Positive social behaviour, 2309 Anti-social behaviour, 2364 Anxious behaviour, * $p<0.05$, #$p<0.06$

In addition to testing pre-school centre effectiveness in terms of social/behavioural outcomes, centre effectiveness in promoting cognitive progress was also tested to see if this predicted better or worse social/behavioural outcomes in Year 1. Relationships were not statistically significant for pre-reading or language. However, centre effectiveness in promoting progress for early number concepts was positively and significantly related to better outcomes in terms of Self-regulation and reduced Anti-social behaviour in Year 1.

For further comparison centre effectiveness categories were used to enable the 'home' sample to be added to the analysis as a comparison group. The centre level residuals were divided into five groups ranging from most effective (significant positive centre outliers) to least effective (significant negative outlier centres). Table 3.8 summarises the results. For simplicity, the table shows whether results were positive or negative and reports statistical significance. As with the cognitive findings reported earlier in Section 2, a pattern emerges indicating that, in comparison with the 'home' group, those who attended pre-school settings of average to above average effectiveness for three measures of pre-school effects continue to show significantly better social/behavioural outcomes at the end of Year 1. However, the least effective centres on each of the four pre-school outcomes analysed do not show a significant advantage over the 'home' group. As noted above it should be remembered that for Anti-social, the pre-school effectiveness

category 'High' relates to significantly increased anti-social behaviour over the pre-school period. Only this category showed significantly different results in comparison with the 'home' group.

Table 3.8: Summary of Comparisons of the impact of centre effectiveness categories with 'home' group for social/behavioural outcomes in Year 1

Effectiveness Measure Residual value added estimate for pre-school centre attended compared with none i.e. the 'home' group	**Self-regulation**	**Positive social behaviour**	**Anti-social behaviour**	**Anxious behaviour**
	Year 1	**Year 1**	**Year 1**	**Year 1**
Independence & Concentration				
Lowest	Positive ns	Positive ns	Positive ns	Negative ns
Below average	Positive ns	Positive ns	Positive ns	**Negative sig**
Average	**Positive sig**	**Positive sig**	Positive ns	**Negative sig**
Above average	**Positive sig**	**Positive sig**	Positive ns	**Negative sig**
High	**Positive sig**	**Positive sig**	Negative ns	**Negative sig**
Cooperation & Conformity				
Lowest	Positive ns	Positive ns	**Positive sig**	Negative ns
Below average	Positive ns	Positive ns	**Positive sig**	**Negative sig**
Average	**Positive sig**	Positive ns	Positive ns	**Negative sig**
Above average	**Positive sig**	**Positive sig**	Negative ns	**Negative sig**
High	**Positive sig**	**Positive sig**	Negative ns	**Negative sig**
Peer sociability				
Lowest	Positive ns	Positive ns	Negative ns	Negative ns
Below average	Positive ns	Positive ns	**Positive sig**	**Negative sig**
Average	**Positive sig**	Positive ns	Positive ns	**Negative sig**
Above average	**Positive sig**	**Positive sig**	Positive ns	**Negative sig**
High	**Positive sig**	**Positive sig**	Positive ns	**Negative sig**
Anti-social				
Lowest	**Positive sig**	**Positive sig**	Negative ns	Negative ns
Below average	**Positive sig**	**Positive sig**	Negative ns	**Negative sig**
Average	**Positive sig**	Positive ns	Positive ns	**Negative sig**
Above average	**Positive sig**	Positive p<0.08	Positive ns	**Negative sig**
High	**Negative sig**	Negative ns	**Positive sig**	Negative ns

Where ES = Effect Size, n of pupils =2534 reading, n=2545 mathematics, * p<0.05

Taken together, these results of the multilevel analyses of effectiveness support the conclusion that different features of pre-school experience continue to show a measurable and significant impact on young children's subsequent social behaviour at the end of Year 1. For three areas there are significantly better social/behavioural outcomes in comparison with the 'home' group , but for the minority those who had attended pre-school centres associated with 'high' Anti-social outcomes in pre-school, there remained significantly poorer Anti-social scores in Year 1.

Section 4: Exploring Progress and Social/behavioural Gains

Young children's cognitive progress and social/behavioural gains were investigated over the pre-school period from age 3 years plus to primary school entry at rising 5 years (EPPE Technical Papers 8a & 8b). The results were used to identify measures of pre-school centre effects based on value added analyses, tested earlier in sections 2 and 3 of this report in relation to attainment or social/behavioural outcomes at the end of Year 1.

Further analyses were conducted to explore progress and developmental gains from primary school entry to the end of year 1. The school entry assessments provide the baseline measures for these analyses. The results of the simple value added models control only for prior cognitive attainments (for reading and mathematics) or prior social behaviour (for Self-regulation, Positive social behaviour, Anti-social, or Anxious behaviour).

Table 4.1 summarises the results for reading and mathematics progress. It can be seen that more of the total variance in children's mathematics attainments at the end of year 1 is accounted for by prior attainment at entry to school, than is the case for reading. Interestingly, far less of the variance between schools is accounted for by children's prior attainments, only 15 percent, compared with nearly 43 percent for mathematics. The intra-school correlation is a measure of the variation in progress attributable to the school level. It is much larger for reading. It is speculated that this may reflect differences in teaching approaches and emphasis in the reception year and year 1 (Tymms et al, 1997 have found considerable variation in children's reading progress in the reception year for example).

The existence of significant variation between schools makes the study of primary school as well as pre-school effects on the educational outcomes of young children extremely relevant. The longer-term follow up of the sample over Key Stage 2 will investigate such school effects in more detail.

Table 4.1: Simple value-added of cognitive progress from primary school entry to the end of Year 1 showing primary school and child level variance

	Primary reading standardised score **Estimate (se)**	**Maths 6 standardised score** **Estimate (se)**
School level variance: Estimate (se)	**49.1644 (5.2962)**	**22.2684 (3.7796)**
Child level variance: estimate (se)	**106.1210 (3.552)**	**123.2690 (4.1800)**
Intra-school correlation	**0.3166**	**0.1530**
% Reduction in school level variance	**15.15**	**42.55**
% Reduction in child level variance	**36.90**	**39.94**
% Reduction in total variance	**31.33**	**44.45**
Number of children	**2474**	**2298**

Table 4.2 shows the estimates for the influence of General Cognitive Ability (GCA) measured by BAS scales at entry to school, and to the relevant prior attainment measure (pre-reading for later reading outcomes and early number for later mathematics scores). It is clear that GCA shows a much stronger relationship with later mathematics results at age 6 years than is the case for reading.

Table 4.2: Multilevel model estimates of prior attainment measures on Year 1 attainment in reading and mathematics

Prior attainment measures at entry to primary school	Primary reading standardised score Estimate (se)	Maths 6 standardised score Estimate (se)
Intercept	*100.3735 (0.4341)	*101.1286 (0.3269)
Early number concepts standardised score	Not tested	*0.4235 (0.0322)
General Cognitive Ability (BAS)	*0.3138 (0.0299)	*0.6517 (0.0341)
General Cognitive Ability (BAS) squared	*-0.0045 (0.0018)	Not significant
Pre-reading standardised score	*0.61626 (0.0302)	Not tested
Pre-reading standardised score squared	0.0104 (0.0022)	Not tested

* $p<0.05$

There was little evidence that key measures of pre-school (duration, quality and effectiveness), which showed a continuing relationship with better attainment in Year 1 in the contextualised analyses (presented in section 2), had an additional positive impact on progress rates during primary school. Taking together the contextualised results at entry to school and in Year 1 and the earlier findings on progress during pre-school, the results support the view that pre-school experience significantly benefits cognitive progress before children enter primary school, and that the higher attainment benefit continues to remain significant at the end of Year 1 (there is no wash out of the pre-school effect). Pre-school influences do not lead to greater progress once children start school. In other words, there remains a significant attainment gap, but subsequent progress during time at school is not increased. However, the value-added results point to the existence of significant school level variation in progress over the first years in primary school and this suggests that primary schools do vary in their effectiveness, especially in promoting reading progress for this age group.

Similar value-added analyses were conducted for the four social/behavioural measures to explore 'gains' or changes in social behaviour during the first years of primary school. The models controlled for the relevant social/behavioural measures collected at entry to primary school. The results of the simple value added analyses are shown in Table 4.3.

Table 4.3: Simple value-added of social/behavioural progress from primary school entry to the end of Year 1 showing primary school and child level variance

	Self-regulation Estimate (se)	Positive social behaviour Estimate (se)	Anti-social behaviour Estimate (se)	Anxious behaviour Estimate (se)
School level variance: Estimate (se)	**0.01814 (0.0039)**	**0.02050 (0.0036)**	**0.00802 (0.0020)**	**0.01142 (0.0025)**
Child level variance: estimate (se)	**0.18229 (0.0057)**	**0.15590 (0.0048)**	**0.09666 (0.0030)**	**0.14153 (0.0043)**
Intra-school correlation	**0.0905**	**0.1162**	**0.0766**	**0.0746**
% Reduction in school level variance	**No reduction increase by 6.6%**	**11.86**	**17.10**	**13.06**
% Reduction in child level variance	**30.86**	**20.26**	**27.34**	**3.18**
% Reduction in total variance	**29.00**	**18.90**	**25.33**	**4.00**
Number of children	**2474**	**2530**	**2528**	**2536**

It can be seen that significant school level variation remains for each of the four social/behavioural measures in year 1. This indicates that primary schools in the sample vary in their impact on young children's social/behavioural development, taking into account their social behaviour profile at the start of primary school. The intra-school correlations reveal that the greatest variance at the school level is for Positive social behaviour, and this may reflect the influence of peer group or school culture.

Table 4.4 shows which measures of prior social behaviour, at entry to primary school, are significant predictors of the four main measures of social behaviour identified from teachers' ratings at the end of Year 1. It can be seen that for Self-regulation the earlier measure of Independence and Concentration is the strongest predictor. For Positive social behaviour the earlier measure of Peer empathy shows the strongest association. For Anti-social behaviour the earlier measure of Cooperation and Conformity is the strongest predictor, the link being negative.

Table 4.4: Multilevel model estimates of prior social behaviour measures on end of Year 1 social/behavioural outcomes

Prior social/behavioural measures at entry to primary school	Self-regulation Estimate (se)	Positive social behaviour Estimate (se)
Intercept	*2.2734 (0.0127)	*2.4299 (0.0107)
Independence & concentration	*0.3216 (0.0119)	*0.0700 (0.0175)
Peer sociability	*0.0722 (0.0151)	*Not significant
Peer sociability squared	*0.0297 (0.0114)	*Not significant
Cooperation & conformity	Not significant	*0.1090 (0.0231)
Peer empathy	Not significant	*0.1170 (0.0160)
Anti-social/worried	Not significant	Not significant
Anti-social/worried squared	Not significant	Not significant

* p<0.05

Prior social/behavioural measures at entry to primary school	Anti-social behaviour Estimate (se)	Anxious behaviour Estimate (se)
Intercept	*1.2966 (0.0099)	*1.3163 (0.0095)
Independence & concentration	*-0.0864 (0.0146)	Not significant
Peer sociability	Not significant	*-0.1339 (0.0143)
Peer sociability squared	Not significant	Not significant
Cooperation & conformity	*-0.1714 (0.0209)	Not significant
Peer empathy	Not significant	*0.0267 (0.0129)
Anti-social/worried	0.0468 (0.0174)	Not significant
Anti-social/worried squared	0.0595 (0.0132)	Not significant

* p<0.05

Further analyses indicated that measures of pre-school experience (duration, quality and effectiveness) did not show any significant positive relationships when tested in the value-added models. As with the analyses of cognitive progress it appears that the positive benefits of pre-school on three measures (Self-regulation, Positive social behaviour and reductions in Anxious behaviour) remain evident at the end of Year 1 (as illustrated in the contextualised models), but there is no additional impact in promoting further cognitive or behavioural progress subsequently. At this stage therefore, it appears that the benefits of pre-school impact seems to operate chiefly by providing young children with a better start at school, and that the benefits continue to remain significant up to the end of Year 1. Further analyses of outcomes at the end of Key Stage 1 (Year 2) are reported in EPPE Technical Paper 11.

Section 5: Summary and Conclusions

This paper has explored evidence of continuing pre-school effects at the end of Year 1 using a number of different measures of child outcomes at age 6 years plus. The cognitive assessments are standardised tests of reading and mathematics designed to be compatible with the national curriculum. Social/behavioural development was assessed by teachers using an extended version of the Goodman (1997) Strengths and Difficulties Questionnaire. A range of statistical methods was used to investigate results for around 2760 children for whom at least one attainment or social/behavioural outcome measure was collected in Year 1, representing 90.6 percent of the total child sample assessed at entry to primary school (n=3048 children with equivalent entry to primary school cognitive and/or social behaviour measures). Four measures of social behaviour were explored in Year 1: Self-regulation, Positive social behaviour, Anti-social behaviour and Anxious behaviour.

Multilevel models were used to investigate the influence of different background factors on young children's attainments at the end of Year 1. These contextualised multilevel analyses are equivalent to those conducted earlier when children entered primary school (see EPPE Technical Papers 8a & 8b). A comparison of the results of the analyses at the two different time points allows us to establish whether background influences change (reduce or increase) over the first years of school. Contextualised analyses identify the unique (net) contribution of particular characteristics to variation in children's outcomes, in this instance their attainments in different cognitive assessments or social/behavioural outcomes, while other influences are controlled. Thus, for example, the impact of family SES, is established while taking into account the influence of mother's qualification levels, low income, ethnicity, birth weight, home learning environment etc.

Value-added indicators of each pre-school centre's effectiveness in promoting progress in a given outcome (e.g. pre-reading, early number concepts, language or different aspects of social behaviour) were calculated during the first phase of the study (over the pre-school period). Centres where children had made significantly greater progress than predicted on the basis of prior attainment and intake characteristics can be viewed as *more effective* (positive outliers in value-added terms). Centres where children made less progress than predicted can be viewed as *less effective* (negative outliers in value-added terms).

The multilevel valued-added analyses over the pre-school period showed that variations in quality and extent of time in pre-school had an impact on children's cognitive gains and social/behavioural gains. They indicated that higher quality and longer pre-school experience had a positive impact. This paper extends the earlier findings by establishing whether the evidence of continuing positive impact of pre-school is still evident in child outcomes (attainment and social behaviour) at the end of Year 1.

Findings concerning a sample of 'home' children, who had no pre-school centre experience before starting primary school, provide important comparisons with the pre-school sample. The contextualised multilevel analyses indicate that 'home' children are still at a significant disadvantage in terms of cognitive attainments at the end of Year 1 (reflecting differences evident when they started primary school). They suggest that the attainment gap can be attributed to the absence of pre-school experience, rather than to other differences in their background characteristics. [20] These analyses provide additional evidence concerning the impact of pre-school provision. As well as comparisons with the 'home' group, additional analyses have focused just on the sample of children who attended pre-school to further explore any continuing pre-school impact.

Main Findings

[20] Analyses of progress indicate that 'home' children made relatively greater gains than other children from a much lower starting point, but that the attainment gap remained significant and effect size analyses indicate that it remains of a similar size to that found at entry to primary school.

The analyses of child outcomes at the end of Year 1 point to the continued strength of background influences on young children's cognitive attainments and progress and also provide additional evidence concerning the impact of pre-school.

The impact of a child's background

The impact of child background factors is broadly in line with that found at earlier time points. Multiple disadvantage continues to show significant negative associations with all outcomes in Year 1. However, the results indicate that, taken together, background influences are relatively weaker in accounting for variations in reading and mathematics attainments at the end of Year 1 than was the case at earlier time points. Both pre-school and school influences may be acting together to help reduce the power of background influences on attainment in subjects such as reading and mathematics, in comparison with assessments of General Cognitive Ability (GCA). By contrast, the impact of background on social behaviour (which was much weaker during the pre-school period than was found for cognitive outcomes) shows somewhat stronger influences on Positive Social behaviour and Anti-social behaviour as children move through their first year at school.

Home learning environment

Aspects of the home learning environment continue to show strong and significant positive effects on both attainment and social behaviour (particularly Self-regulation and Positive social behaviour), net of the influence of child and family background influences such as family SES and mothers' qualification levels. This is in line with findings reported during the pre-school period. It may be that the pre-school period is especially sensitive to home learning environment influences, or that parents who provide a higher quality home learning environment in the pre-school period are likely to continue to do so as children move into primary school.

The continued impact of pre-school – Quantity, quality and effectiveness

Analyses explored cognitive attainment at the end of Year 1 and whether this relates to duration (in terms of number of months) of pre-school experience. The duration of pre-school continued to show a significant positive link with children's attainments in reading and mathematics at age 6 years plus. A longer period in months of pre-school experience was associated with higher attainment levels, even when other significant factors are controlled.

Taken together with the findings reported on the pre-school period, the results suggest that an extended period of pre-school experience has significant benefits in preparing young children for a better start to school and that such children continue to show better attainment during Key Stage 1.

Variation in the quality of individual pre-school centres was explored using detailed observations by trained researchers. Higher quality as assessed by the ECERS E scale was significantly positively related to children's cognitive progress over the pre-school period in several areas. Likewise higher quality measured by ECERS-E and ECERS-R scales showed significant links with better social/behavioural outcomes (see EPPE Technical Paper 6).

Children who had attended higher quality pre-school provision also tended to show better outcomes at the end of Year 1, although the benefits appear to be mediated by duration of pre-school experience. High quality shows the strongest impact on later cognitive attainment, when it is combined with a longer duration. A short time in high quality provision (under 1 year) does not appear to confer a significant advantage, whereas a longer duration (3 years plus associated with an earlier pre-school start) with high quality has a greater impact on cognitive attainment still evident at age 6 years plus.

In addition, measures of the effectiveness of the pre-school centre attended, in promoting cognitive progress or social/behavioural gains before children start primary school, are also associated with significantly better child outcomes at the end of Year 1.

Children who do not experience pre-school

Data were collected for a group of 'home' children with none or only minimal pre-school centre experience. Comparison of the 'home' sample with children who had attended a pre-school centre showed that the characteristics and attainments of 'home' children vary significantly from those who had been in pre-school. It is not possible to conclude with certainty that the much lower attainments of the 'home' group are directly due to lack of pre-school experience.[21] Nonetheless, earlier statistical analyses of attainment and social behaviour at primary school strongly suggest that, controlling for background, pre-schooling provided a significant cognitive boost at entry to reception and had benefits on most areas of social behaviour, particularly Peer sociability.

Contextualised multilevel analyses of attainments at the end of Year 1 explored the impact of child, parent and home environment factors. In line with earlier findings, the results show that even when these important influences are controlled, 'home' children's cognitive attainments are poorer than those of children who had attended a pre-school centre. The results also point to a link between a longer duration of pre-schooling and higher cognitive attainments, in comparison with the 'home' group (who had no centre experienced). These findings, combined with those on the advantages of an early start date, support the earlier conclusion that pre-schooling has a strong positive impact on young children's cognitive attainment. The implication of these results is that children without pre-school experience remain at a significant disadvantage during their first year of primary school. Further analyses conducted on the EPPE data sets, exploring 'at risk' status in relation to special educational needs, indicate that 'home' children remain over-represented in the cognitive 'at risk' category in Year 1, compared with other EPPE children, even when the level of multiple disadvantage is held constant. In addition, proportionately more 'home' children were identified by their teachers as showing some form of SEN during Key Stage 1 (see EYTSEN Technical Paper 2 for details).

Social/behavioural outcomes also continue to indicate that the positive pre-school impact is generally sustained through to the end of Year 1. High quality shows a positive impact in reducing Anti-social behaviour, however, there are indications that very long duration of pre-school (associated with an earlier start age under 2 years) is related to an increase in scores on the Anti-social measure and some reduction in the Positive social behaviour measure in Year 1. Self-regulation, Positive social behaviour and reductions in Anxious behaviour are linked to experience of higher quality and to more effective pre-school centre experience. Longer duration shows no disadvantage for Self-regulation, or Anxious behaviour.

Overall, the Year 1 analyses indicate that the early cognitive boost given by pre-school has not washed out by age 6 years plus, nor have 'home' children caught up. In terms of effect sizes the boost is between 0.17-0.35 for reading in Year 1 and 0.32-0.52 for mathematics, depending on duration, and these figures are only slightly lower in size to those found at entry to primary school.[22] Thus the absence of pre-school can be seen to have a continued negative influence on cognitive and several social/behavioural outcomes, although children who had a very long duration in pre-school tend to show relatively higher scores in the Anti-social measure in Year 1. These higher scores should be placed in the context of very positive scores for most children on this aspect of behaviour (only around 5 per cent of all children show raised scores compared with 6.5% of the earliest starters, those under 12 months at entry to a pre-school centre). The majority of early starters show very favourable teacher ratings on the Anti-social scale in Year 1, in line with the results for other children, reflecting the highly skewed nature of this scale (which is typical of such measures because most children are not identified as showing behaviour difficulties in primary school).

[21] A controlled experiment (which would not be feasible on either ethical or practical grounds) would be needed to draw firm conclusions.

[22] Full details are given in EPPE Technical Papers 8a and 8b, but for comparison, the strongest cognitive effects were for long duration for pre-reading at 0.48 and 0.55 for early number. Language effects were largest at entry to primary school at 0.63.

The longitudinal follow up of EPPE children in Year 1 confirms that pre-school continues to show a generally positive impact on a range of developmental outcomes. This supports earlier conclusions that it can play an important part in combating social exclusion and promoting inclusion by offering disadvantaged children, in particular, a better start to primary school. The duration of pre-school is especially influential for cognitive attainment in reading and mathematics. There are indications, however, as at entry to primary school, that a longer duration in pre-school (associated with an early start under age 2 years) may raise children's scores on Anti-social behaviour, though this seems to be mainly linked to one form of provision (Local authority day nurseries) and the very earliest starters (mainly those under 12 months). Such children may have other characteristics and experiences which make them more vulnerable in terms of Anti-social behaviour.

Both effectiveness of pre-school centre attended and observed quality still show a positive impact on several child outcomes at the end of Year 1. The research again points to continuing strong and significant positive influence of the pre-school home learning environment, and this suggests that policies which promote greater parental involvement in their children's learning at home during this crucial time period are likely to reap longer term benefits as children progress through primary school.

In terms of policy implications, the research supports the view that greater access to pre-school has continued benefits in terms of later child outcomes. An earlier start (at age 2 years) seems particularly beneficial in giving a lasting boost to cognitive development. The combination of higher quality and longer duration shows the most positive impact. The results also indicate that pre-school continues to benefit most aspects of social behaviour in Year 1, although effects are smaller than at school entry. Given the adverse impact of a range of child, and family measures associated with multiple disadvantage, particular care to ensure that such children experience the highest quality of provision is needed. The research, in line with findings at entry to primary school and in other studies such as NICHD (2002) points to an association between very long duration of pre-school and later increased scores for Anti-social behaviour, though it should be noted that the majority of early starters show very positive scores in teachers' ratings for this aspect. Higher quality and more effective pre-school provision appears to offer some protection being associated with significantly lower scores for the Anti-social measure in Year 1. Further research on the impact of a very early start, particularly for babies under 12 months may be beneficial to identify the characteristics of provision associated with better long-term outcomes for this group.

In interpreting the EPPE evidence of continuing pre-school influences on child outcomes, it should be noted that long term effects may depend both on the magnitude of the original effect and also 'on the impact of subsequent schools or of particular teachers and/or teaching devices, especially during the primary years. The stronger the subsequent effects, the more likely they are to attenuate potential long-term effects of earlier teachers and devices' (Bressoux & Bianco, 2004, p332). The follow up of the sample across Key Stage 2 as part of the EPPE 3-11 continuation study has been designed to shed further light on this issue, by examining measures of school as well as of pre-school centre effectiveness.

Appendix 1

Analyses were conducted to investigate the impact of 'multiple disadvantage' as part of the Early Years Transition and Special Educational Needs Project (EYTSEN), which focused on the identification of children 'at risk' of SEN. An index was created based on 10 indicators in total: three child variables, six parent variables, and one related to the home learning environment. All the variables were chosen because they related to low baseline attainment when looked at in isolation (as described above). Where indicators were closely related, such as first language and ethnicity, only the most significant was included.[23]

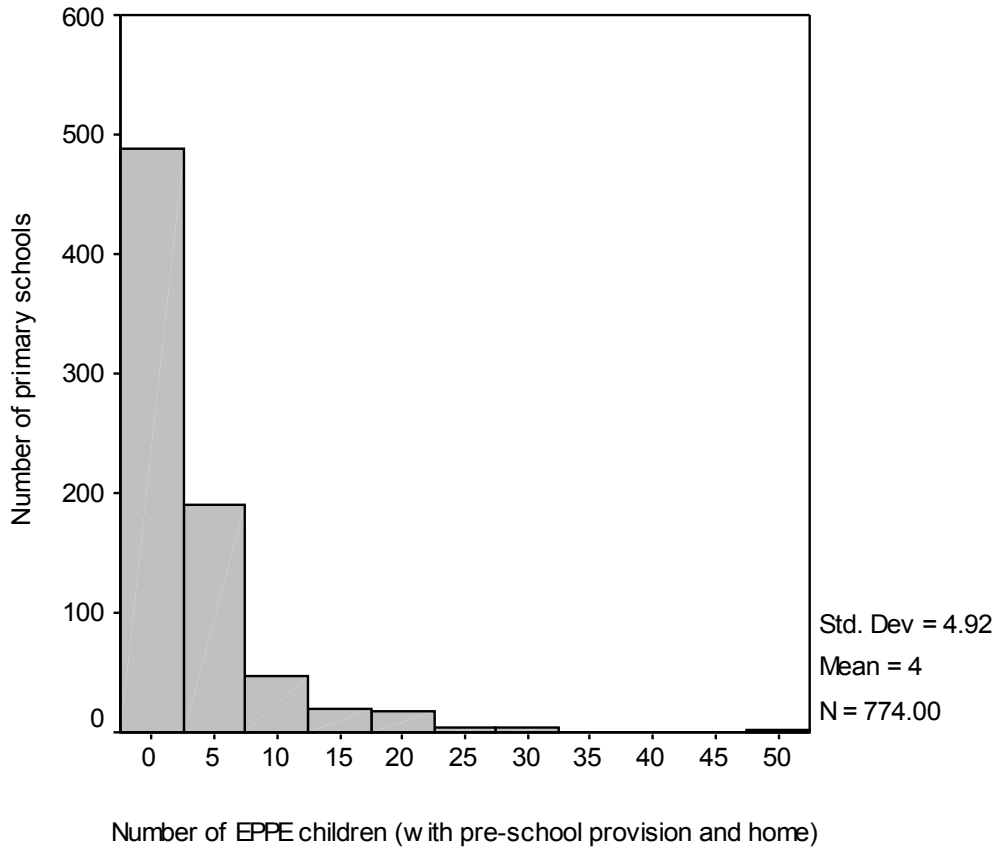
EYTSEN Multiple disadvantage indicators

Child variables	Disadvantage indicator
• First language • Large family • Pre-maturity/low birth weight	English not first language 3 or more siblings Premature at birth or below 2500 grams
Parent variables	
• Mother's highest qualification level • Social class of Father's occupation • Father's employment status • Young mother • Lone parent • Mother's employment status	No qualifications Semi-skilled, unskilled, never worked, absent father Not employed Age 13-17 at birth of EPPE/EPPE-E child Single parent Not working/Unemployed
Home environment variables	
• Home environment scale	Bottom quartile

[23] For further details concerning the identification and characteristics of children 'at risk' or identified as having SEN during Key Stage 1 see EYTSEN Technical Papers 1-3.

Appendix 2

Chart: 1 Distribution of the number of EPPE children (with pre-school provision and 'home') in each primary school*



*Note the minimum number of children in a school with a valid year 1 score was 1.

Appendix 3

Appendix Table 3.1: Reading Contextualised Model with 'home' children
(Impact of child, parent, home environment and other measures on NFER - Nelson Primary Reading Test Level 1 attainment at Year 1 in primary school)

		Estimate	SE	Effect Size
Gender (boys compared to girls)		-1.768*	.521	0.147
Ethnicity (compared to white UK)	White European	-3.250*	1.492	0.269
	Black Caribbean	-0.704	1.640	0.058
	Black African	2.337	2.018	0.194
	Indian	-0.729	2.240	0.060
	Pakistani	-3.260	2.067	0.270
	Bangladeshi	-6.137*	2.969	0.509
	other	-0.513	1.868	0.043
	mixed	-0.455	1.179	0.038
No. of siblings (compared to none)	1-2	0.332	0.675	0.028
	3+	-2.872*	0.921	0.238
Birthweight (compared to average/above average)	very low	-8.991*	2.225	0.184
	low	-0.566	1.026	0.047
Free School Meal Eligibility (compared to not eligible)				
	not known	-1.568	1.760	0.130
	eligible	-1.790*	0.771	0.148
Mother's highest level of qualification	vocational	0.493	0.956	0.041
(compared to no qualifications)	academic age 16	0.831	0.780	0.069
	academic age 18	2.966*	1.173	0.246
	degree	5.298*	1.171	0.439
	higher	5.850*	1.654	0.485
	other	7.119*	2.350	0.590
Father's employment (compared to full-time employment)				
	not employed	-1.670#	0.944	0.138
	employed part-time	-1.383	1.511	0.115
	self-employed/part-time combination	-3.033*	0.843	0.251
	father absent	-0.315	0.821	0.026
Family SES (compared to professional non-manual)				
	intermediate non-manual	-1.299	1.077	0.108
	skilled non-manual	-2.626*	1.185	0.218
	skilled manual	-4.915*	1.317	0.407
	semi-skilled manual	-6.190*	1.385	0.513
	unskilled manual	-6.253*	2.073	0.518
	never worked	-4.818*	2.145	0.399
Frequency of library visits (compared to never)				
	special occasions	-0.911	0.920	0.076
	monthly	2.024*	0.771	0.168
	fortnightly	1.213	0.885	0.101
	weekly	0.662	0.928	0.055
Frequency parent teaches letters/numbers	never	-2.696*	0.896	0.223
(compared to daily)	1-3 times a week	-1.198#	0.699	0.099
	4-6 times a week	-0.875	0.810	0.073
Frequency parent teaches abc (compared to never)				
	1-2 times a week	3.221*	0.837	0.267
	3 times a week	5.045*	0.982	0.418
	4-7 times a week	5.136*	0.976	0.426
Developmental problems (compared to none)				
	1 developmental problem	-3.317*	0.837	0.275
	2+ developmental problems	-1.867	2.455	0.155

*Statistically significant at 0.05 level # Just failed to reach statistical significance at 0.05 level

Appendix Table 3.2: Mathematics Contextualised Model with 'home' children
(Impact of child, parent, home environment and other measures on NFER - Nelson maths 6 attainment at Year 1 in primary school)

		Estimate	SE	Effect Size
Gender (boys compared to girls)		-1.245*	0.557	0.093
Birthweight (compared to average/above average)	very low	-7.982*	2.443	0.597
	low	-2.116#	1.104	0.158
English as mother tongue (compared to English as an additional language)		3.997*	1.178	0.299
Free School Meal Eligibility (compared to not eligible)	not known	-4.793*	1.849	0.359
	eligible	-1.385	.825	0.104
Mother's highest level of qualification (compared to no qualifications)	vocational	1.402	1.020	0.105
	academic age 16	1.093	0.838	0.082
	academic age 18	3.999*	1.249	0.299
	degree	7.203*	1.240	0.539
	higher	5.833*	1.730	0.437
	other	5.205*	2.512	0.390
Father employment (compared to full-time employment)	not employed	-2.622*	1.010	0.196
	employed part-time	-0.591	1.621	0.044
	self-employed/part-time combination	-0.539	0.892	0.040
	father absent	-1.412	0.855	0.106
Family SES (compared to professional non-manual)				
	intermediate non-manual	-1.521	1.146	0.114
	skilled non-manual	-3.747*	1.257	0.280
	skilled manual	-5.243*	1.403	0.392
	semi-skilled manual	-5.871*	1.479	0.439
	unskilled manual	-9.078*	2.226	0.679
	never worked	-4.964*	2.316	0.372
Frequency parent reads to child (compared to daily)	Never/rarely	-2.021	1.683	0.151
	weekly	-4.238*	1.955	0.317
	several times a week	-0.431	0.707	0.032
	twice daily	0.880	0.948	0.066
Frequency parent teaches songs/poems/nursery rhymes at home (compared to never)	1-2 times a week	2.025#	1.128	0.152
	3-5 times a week	3.262*	1.076	0.244
	6 times a week	3.563*	1.154	0.267
	7+ times a week	3.559*	1.155	0.266
Frequency of library visits (compared to never)	special occasions	0.558	0.981	0.042
	monthly	2.767*	0.829	0.207
	fortnightly	2.314*	0.955	0.173
	weekly	0.905	0.997	0.068
Frequency parent teaches abc (compared to never)				
	1-2 times a week	2.678*	0.909	0.200
	3 times a week	4.317*	1.062	0.323
	4-7 times a week	4.835*	1.062	0.362
Developmental problems (compared to none)				
	1developmental problem	-3.683*	0.890	0.276
	2+ developmental problems	-1.564	2.625	0.117

*Statistically significant at 0.05 level #Just failed to reach statistical significance at 0.05 level

Appendix 4

Appendix Table 4.1: 'Self-regulation' Contextualised Model
(Impact of child, parent, home environment, developmental and other measures on 'Self-regulation' at the end of Year 1 in Primary School)

		Estimate	SE	Effect Size
Gender (boys compared to girls)		-0.226	0.020*	0.481
Age at outcome test (centred around mean)		0.020	0.003*	0.303
Free School Meal Eligibility (compared to not eligible)				
	not known	-0.061	0.062	0.129
	eligible	-0.094	0.027*	0.201
Mother's highest level of qualification	vocational	0.019	0.036	0.041
(compared to no qualifications)	academic age 16	0.073	0.030*	0.155
	academic age 18	0.025	0.045	0.052
	degree	0.157	0.044*	0.334
	higher	0.170	0.062*	0.361
	other	0.215	0.086*	0.457
Family SES (compared to professional non-manual)				
	Other professional non-manual	-0.028	0.041	0.060
	skilled non-manual	-0.083	0.044#	0.176
	skilled manual	-0.131	0.050*	0.280
	semi-skilled manual	-0.202	0.051*	0.429
	unskilled	-0.109	0.077	0.232
	never worked	-0.244	0.080*	0.520
Developmental problems (compared to none)				
	1 developmental problem	-0.088	0.032*	0.188
	2+ developmental problems	-0.212	0.092*	0.452
Behavioural problems (compared to none)				
	1 behavioural problem	-0.132	0.034*	0.281
	2+ behavioural problems	-0.101	0.073	0.214
Home Learning Environment (HLE) Index				
(compared to 33-45)	0-13	-0.212	0.047*	0.451
	14-19	-0.120	0.037*	0.256
	20-24	-0.106	0.036*	0.225
	25-32	-0.060	0.033#	0.127

*Statistically significant at 0.05 level #Just failed to reach statistical significance at 0.05 level-

Appendix Table 4.2: 'Positive social behaviour' Contextualised Model
(Impact of child, parent, home environment, developmental and other measures on 'Positive social behaviour' at the end of Year 1 in Primary School)

		Estimate	SE	Effect Size
Gender (boys compared to girls)		-0.219	0.018*	0.530
Age at outcome test (centred around mean)		0.006	0.003*	0.108
Free School Meal Eligibility (compared to not eligible)				
	not known	-0.018	0.056	0.043
	eligible	-0.081	0.024*	0.196
Mother's employment (compared to not employed)				
	employed full time	-0.032	0.027	0.077
	employed part-time	0.045	0.022*	0.109
	self-employed/part-time combination	0.000	0.046	0.000
Family SES (compared to professional non-manual)				
	Other professional non-manual	-0.026	0.034	0.063
	skilled non-manual	-0.066	0.034#	0.161
	skilled manual	-0.087	0.039*	0.210
	semi-skilled manual	-0.167	0.041*	0.405
	unskilled	-0.073	0.065	0.176
	never worked	-0.246	0.067*	0.595
Ethnicity (compared to white UK)	White European	-0.046	0.049	0.110
	Black Caribbean	-0.018	0.052	0.043
	Black African	0.024	0.071	0.057
	Any other ethnic minority	-0.025	0.064	0.061
	Indian	0.054	0.070	0.131
	Pakistani	-0.143	0.055*	0.345
	Bangladeshi	-0.285	0.095*	0.690
	mixed	-0.008	0.041	0.019
Behavioural problems (compared to none)				
	1 behavioural problem	-0.100	0.030*	0.242
	2+ behavioural problems	-0.069	0.065	0.168
Home Learning Environment (HLE) Index				
(compared to 33-45)	0-13	-0.150	0.041*	0.362
	14-19	-0.079	0.033*	0.190
	20-24	-0.100	0.032*	0.243
	25-32	-0.043	0.030	0.103

*Statistically significant at 0.05 level #Just failed to reach statistical significance at 0.05 level-

Appendix Table 4.3: 'Anti-social behaviour' Contextualised Model
(Impact of child, parent, home environment, developmental and other measures on 'Anti-social behaviour' at the end of Year 1 in Primary School)

		Estimate	SE	Effect Size
Gender (boys compared to girls)		0.168	0.014*	0.503
Free School Meal Eligibility (compared to not eligible)				
	not known	0.017	0.045	0.049
	eligible	0.081	0.021*	0.244
Mother's employment (compared to not employed)				
	employed full time	0.058	0.022*	0.175
	employed part-time	-0.018	0.017	0.055
	self-employed/ part-time combination	0.033	0.037	0.100
Mother's highest level of qualification (compared to no qualifications)	vocational	-0.009	0.026	0.025
	academic age 16	-0.061	0.021*	0.184
	academic age 18	-0.077	0.031*	0.231
	degree	-0.128	0.029*	0.384
	higher	-0.089	0.041*	0.266
	other	-0.124	0.060*	0.371
Mother's marital status (compared to separated/divorced)				
	never married, single parent	0.023	0.030	0.068
	never married, living with partner	0.000	0.029	0.001
	married, live with spouse	-0.050	0.025*	0.150
Behavioural problems (compared to none)				
	1 behavioural problem	0.155	0.024	0.463
	2+ behavioural problems	0.220	0.051	0.658
Home Learning Environment (HLE) Index (compared to 33-45)	0-13	0.065	0.034#	0.196
	14-19	0.034	0.027	0.101
	20-24	0.028	0.026	0.083
	25-32	0.012	0.024	0.036

*Statistically significant at 0.05 level #Just failed to reach statistical significance at 0.05 level-

Appendix Table 4.4: 'Anxious behaviour' Contextualised Model
(Impact of child, parent, home environment, developmental and other measures on 'Anxious behaviour' at the end of Year 1 in Primary School)

		Estimate	SE	Effect Size
Gender (boys compared to girls)		-0.037	0.016*	0.098
Age at outcome test (centred around mean)		-0.012	0.002*	0.232
Mother's employment (compared to not employed)				
	employed full time	-0.059	0.023	0.155
	employed part-time	-0.044	0.019*	0.156
	self-employed/part-time combination	-0.040	0.040*	0.106
Ethnicity (compared to white UK)	White European	-0.026	0.044	0.070
	Black Caribbean	-0.004	0.046	0.010
	Black African	-0.121	0.063#	0.319
	Any other ethnic minority	0.013	0.055	0.034
	Indian	-0.049	0.061	0.128
	Pakistani	0.028	0.046	0.073
	Bangladeshi	0.036	0.086	0.095
	mixed	-0.012	0.037	0.032
Behavioural problems (compared to none)				
	1 behavioural problem	0.055	0.027*	0.144
	2+ behavioural problems	0.055	0.058	0.145

*Statistically significant at 0.05 level #Just failed to reach statistical significance at 0.05 level

Appendix 5

Social/behavioural assessments at end of Year 1 (age 6) and Year 2 (age 7/end of Key Stage 1) in Primary School: Adapted from Goodman's (1997) 'The Strengths and Difficulties Questionnaire'

This questionnaire consists of 45 (51 in year 2) items rated on a 3-point scale:

1 = not true 2 = somewhat true 3 = certainly true

A principal components factor analysis of these 45 (51 in year 2) items resulted in the extraction of 6 (7 in year 2) underlying factors (as detailed below). Factor scores for each child were calculated by averaging the ratings given by the teacher for the questions that form each factor. Internal consistency scores, using Cronbach alpha measuring whether respondents respond to items in a systemic way across the items, are also given. As a rule of thumb, values above 0.60 are considered appropriate.

Factor 1: Self-regulation (Cronbach alpha = 0.91)
15. Easily distracted, concentration wanders (note that this item is reversed in the analysis)
26. Can behave appropriately during less structured situations
30. Can move to a new activity on completion of a task
31. Can independently select and return equipment as appropriate
36. Can work easily in a small peer group
39. Perseveres in the face of difficult or challenging tasks
40. Likes to work things out for self; can work independently
44. Shows leadership in group work
45. Can take responsibility for a task

Factor 2: Positive social behaviour (Cronbach alpha = 0.90)
1. Considerate of other people's feelings
4. Shares readily with other children (treats, toys, pencils etc.)
9. Helpful if someone is hurt, upset or feeling ill
17. Kind to younger children
20. Often volunteers to help others (teachers, other children)
29. Will invite others to join a game
34. Says 'please' and 'thank you'
41. Apologises spontaneously
42. Offers to help other children having difficulties with a task
43. Is sympathetic towards other children when they are upset

Factor 3: Anti-social behaviour (Cronbach alpha = 0.84)
2. Restless, overactive, cannot stay still for long
5. Often has temper tantrums or hot tempers
10. Constantly fidgeting or squirming
12. Often fights with other children or bullies them
18. Often lies or cheats
22. Steals from home, school or elsewhere
35. Is calm and easy going (note that this item is reversed in the analysis)
37. Teases other children, calls them names
38. Prevents other children from carrying out routines

Factor 4: Anxious behaviour (Cronbach alpha = 0.76)
3. Often complains of headaches, stomach-aches or sickness
8. Many worries, often seems worried
13. Often unhappy, down-hearted or tearful
16. Nervous or clingy in new situations, easily loses confidence
24. Many fears, easily scared

Factor 5: Social Isolation (Cronbach alpha = 0.84)
6. Rather solitary, tends to play alone
7. Generally obedient, usually does what adults request (note that this item is reversed in the analysis)
19. Picked on or bullied by other children
21. Thinks things out before acting (note that this item is reversed in the analysis)
23. Gets on better with adults than with other children
25. Sees task through to the end, good attention span (note that this item is reversed in the analysis)

Factor 6: Social Skills (Cronbach alpha = 0.78)
11. Has at least one good friend
14. Generally liked by other children
27. Is open and direct about what s/he wants Is confident with others
28. Is confident with others
32. In social activities, tends to just watch others (note that this item is reversed in the analysis)
33. Will join a group of children playing

Factor 7: Deviant Behaviour (only at year 2)
49. Vandalises property or destroys things
50. Shows inappropriate sexual behaviour
51. Has been in trouble with the law

Appendix 6

Chart 6.1: Distribution of year one reading scores

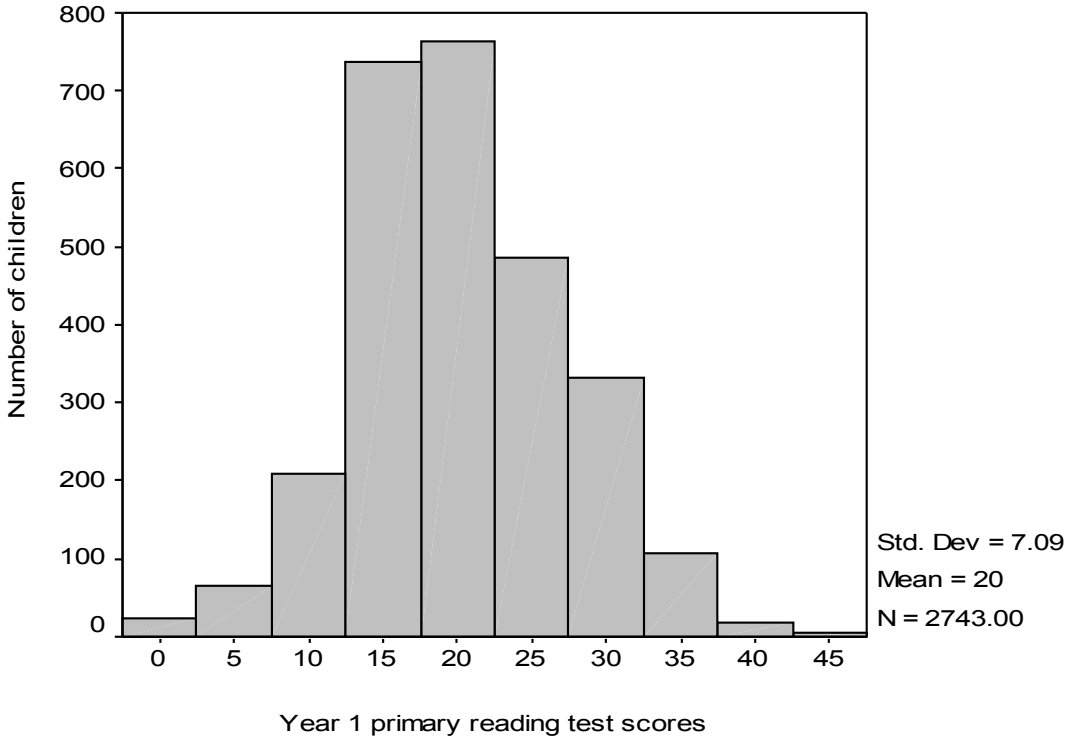


Chart 6.2: Distribution of year one mathematics scores

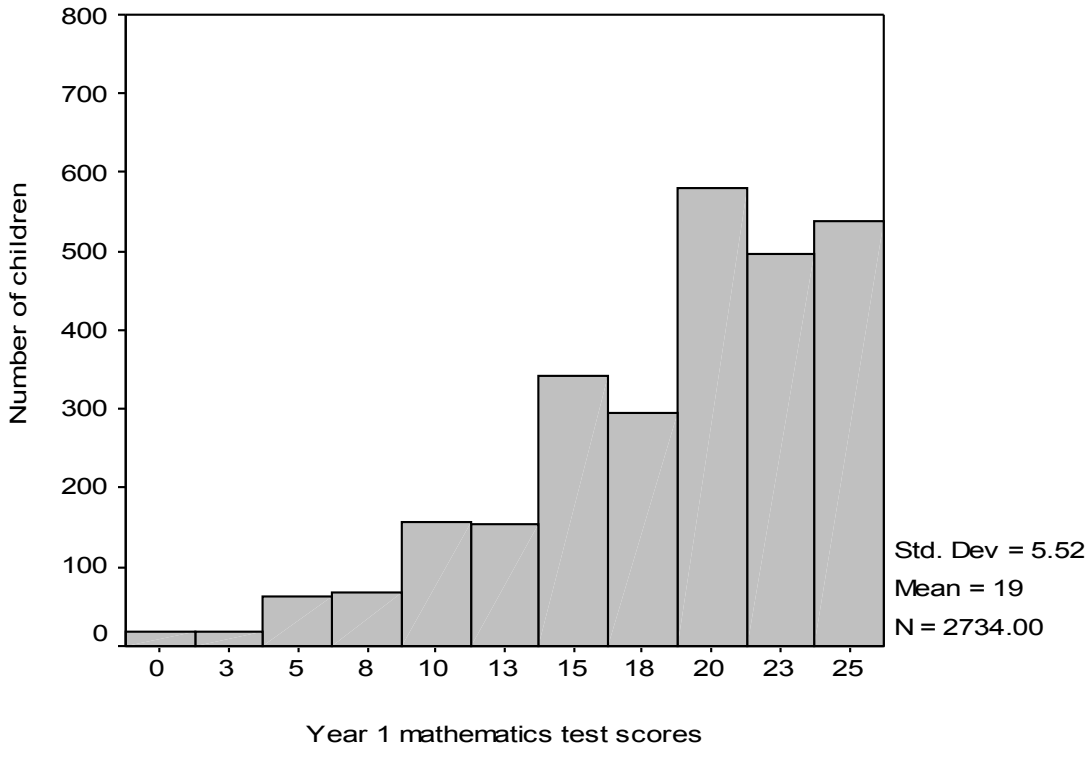


Chart 6.3: Distribution of year one social/behavioural factor 1: Self-regulation

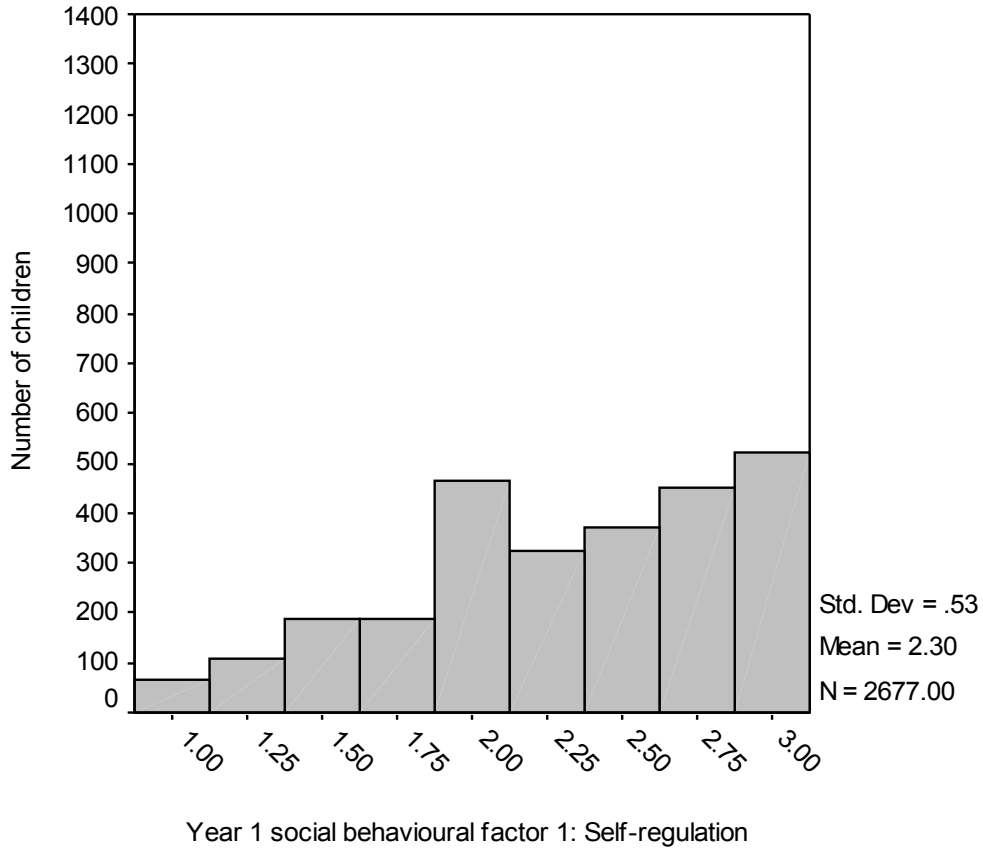


Chart 6.4: Distribution of year one social/behavioural factor 2: Positive social behaviour

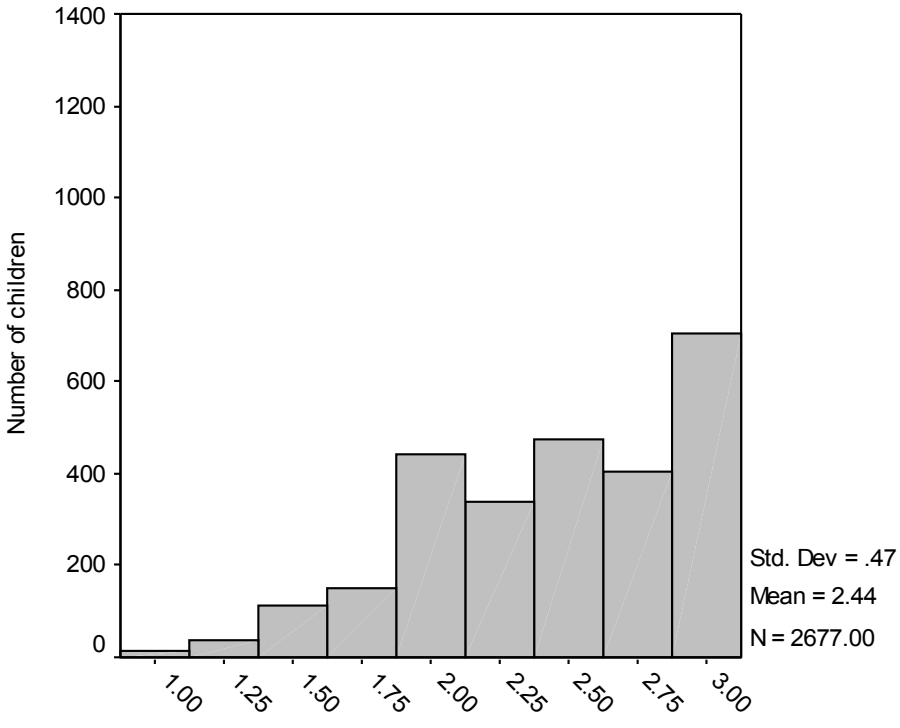


Chart 6.5: Distribution of year one social/behavioural factor 3: Antisocial behaviour

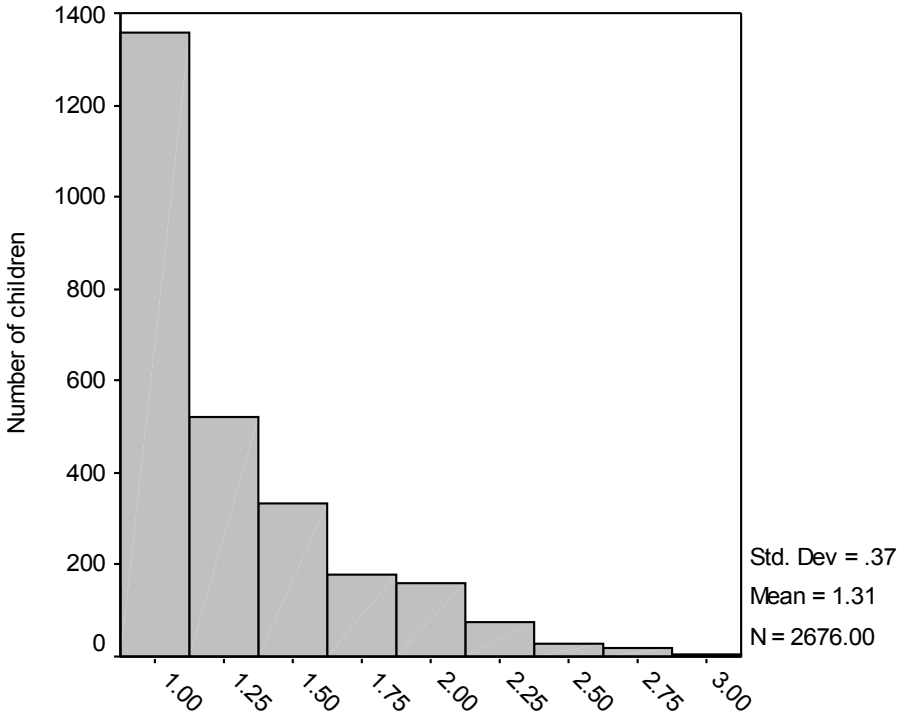


Chart 6.6: Distribution of year one social/behavioural factor 4: Anxious behaviour

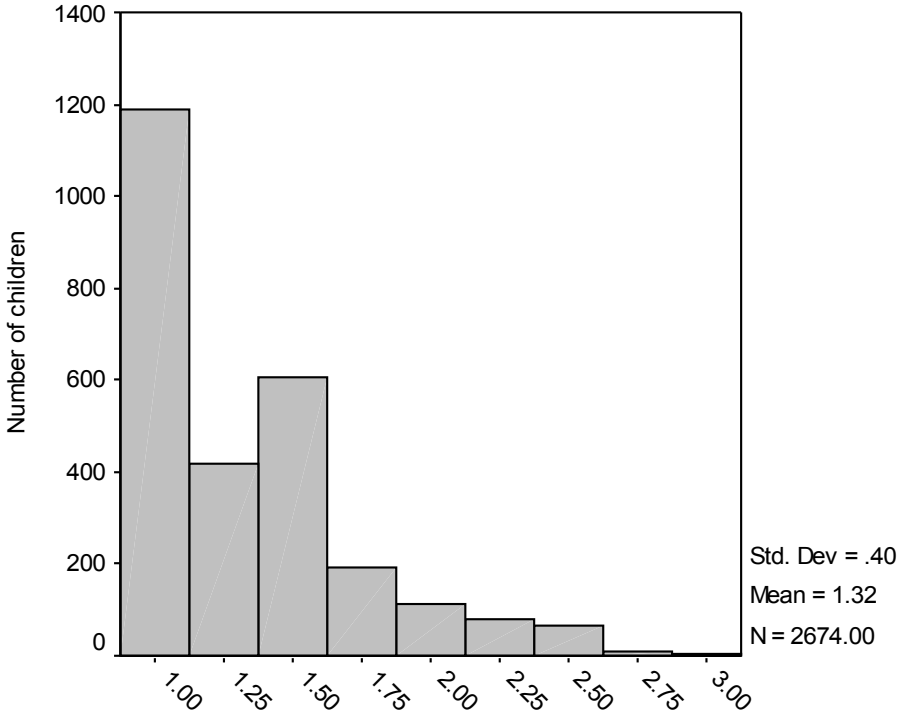


Chart 6.7: Distribution of year one social/behavioural factor 5: Social isolation

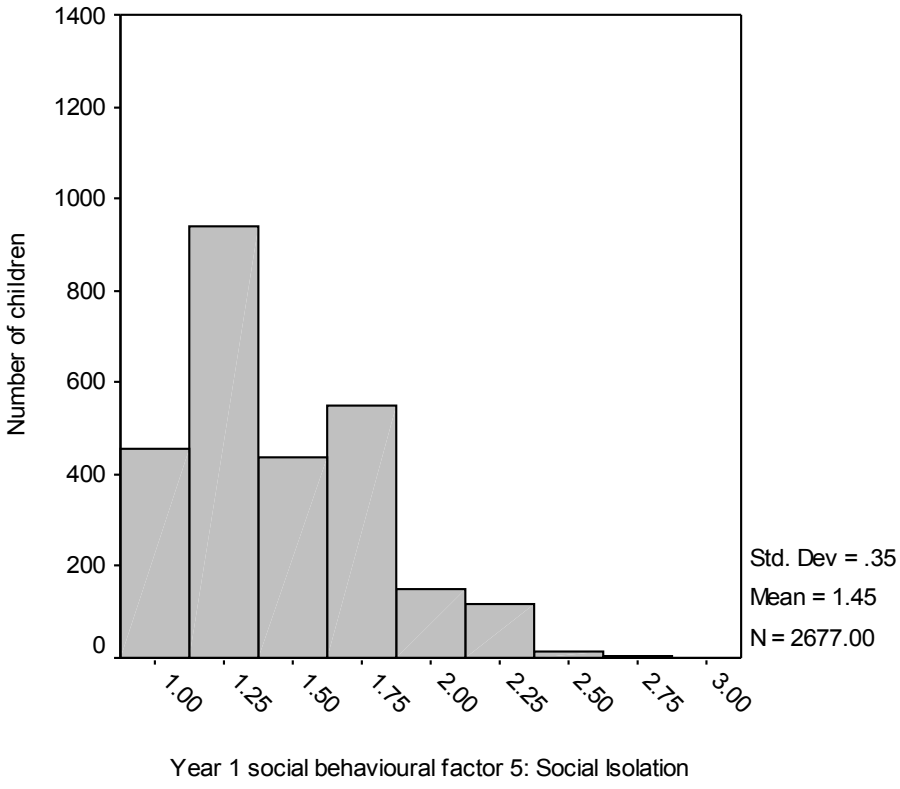
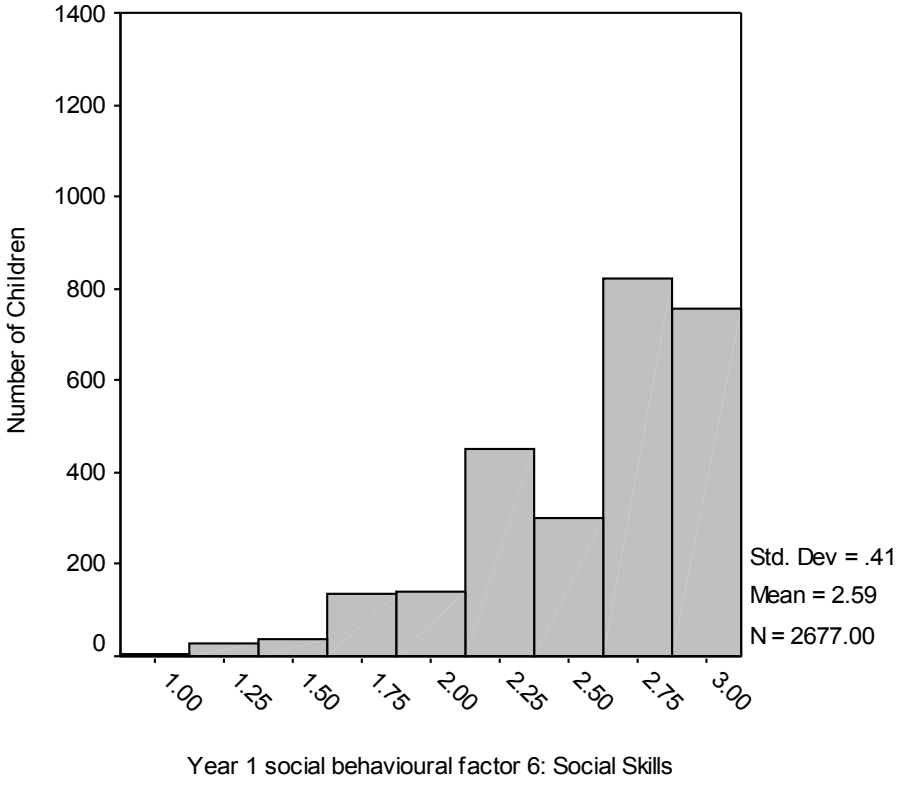


Chart 6.8: Distribution of year one social/behavioural factor 6: Social skills



Glossary of terms

Age standardised scores Assessment scores that have been adjusted to take account of the child's age at testing. This enables a comparison to be made between the performance of an individual pupil, and the relative achievement of a representative sample of children in the same age group throughout the country or, in this case, the relative achievement of the EPPE sample.

ASBI The Adaptive Social Behaviour Inventory (ASBI) (Hogan et al., 1992) is a rating scale consisting of 30 items completed by a caregiver of a child. The items can be combined to produce factors that are measures of different aspects of the child's social behaviour. For further details, see EPPE Technical Paper 8b.

'at risk' The ETYSEN report acknowledges that the term 'at risk' is a complex one which will differ depending on the particular criteria used. In the ETYSEN study cognitive risk is defined as 1 sd below national average and strong cognitive risk as1 sd below sample average. These provide definitions of children who may be seen to be 'at risk' on the basis of their cognitive attainment at entry to pre-school.

Attendance The number of sessions attended at the target centre by an EPPE child from entry to study (BAS assessment) until start of primary school (from attendance records of pre-school centre). This measure provides a crude indicator of amount of pre-school experience.

Baseline measures Assessments taken by the EPPE child at entry to the study. These assessment scores are subsequently employed as prior attainment measures in a value-added analysis of pupils' cognitive outcomes.

Birthweight Babies born weighing 2500 grams (5lbs 8oz) or less are defined as below normal birth weight: foetal infant classification is below 1000 grams, very low birthweight is classified as 1001-1005 grams and low birthweight is classified as 1501-2500 grams (Scott and Carran, 1989).

British Ability Scales (BAS) This is a battery of assessments specially developed by NFER-Nelson to assess very young children's abilities. The assessments used at entry and end of pre-school / entry to reception were:
Block building - Visual-perceptual matching, especially in spatial orientation (only entry to pre-school)
Naming Vocabulary - Expressive language and knowledge of names
Pattern construction - Non-verbal reasoning and spatial visualisation (only end of pre-school)
Picture Similarities - Non-verbal reasoning
Early number concepts - Knowledge of, and problem solving using pre-numerical and numerical concepts.
Copying - Visual-perceptual matching and fine-motor co-ordination. Used specifically for children without English
Verbal comprehension - Receptive language: understanding of oral instructions involving basic language concepts.

***Child background* factors** Child background characteristics such as age, gender, ethnicity.

***Confidence intervals at the 95%* level** A range of values which can be expected to include the 'true' value in 95 out of 100 samples (i.e. if the calculation was repeated using 100 random samples) used to identify outlier centres in value-added models.

Contextualised models Cross-sectional multilevel models exploring children's cognitive attainment at entry to primary school, controlling for child, family and home learning environment characteristics (but not prior attainment).

Controlling for Several variables may influence an outcome and these variables may themselves be associated. Multilevel statistical analyses can calculate the influence of one variable upon an outcome having allowed for the effects of other variables. When this is done the net effect of a variable upon an outcome controlling for other variables can be established.

CSBQ The Child Social Behaviour Questionnaire (CSBQ) is an extension of the ASBI and has 45 items concerning a child's social behaviour rated by caregivers. Several subscales can be computed from these items as measures of independence/ concentration, cooperation/conformity, peer sociability, antisocial/worried behaviour, confidence and peer empathy. For further details see EPPE Technical Paper 8b

Duration In terms of the value added models, the duration of pre-school covers the time period between date of BAS assessment at entry to the EPPE study until entry to primary school[25]. In the contextualised models, duration of pre-school refers to the time period between entry to the target pre-school until entry to primary school. These duration measures provide a crude indication of length of pre-school experience.

ECERS-R and ECERS-E The American Early Childhood Environment Rating Scale (ECERS-R) (Harms, Clifford and Cryer, 1998) is based on child centred pedagogy and also assesses resources for indoor and outdoor play. The English rating scale (ECERS-E) (Sylva, Siraj-Blatchford and Taggart, 2003) was intended as a supplement to the ECERS-R and was developed specially for the EPPE study to reflect the Desirable Learning Outcomes (which have since been replaced by the Early Learning Goals), and more importantly the Curriculum Guidance for the Foundation Stage which at the time was in trial stage.

Educational effectiveness Research design which seeks to explore the effectiveness of educational institutions in promoting a range of child / student outcomes (often academic measures) while controlling for the influence of intake differences in child / student characteristics.

Effect sizes (ES)
To illustrate the impact of different factors on attainment or social behaviour in Year 1 effect sizes (ES) were calculated. Effect sizes are most commonly used in experimental studies and essentially measure the strength of mean differences. Glass et al (1981) define ES as:

ES = (mean of experimental group)-(mean of control group)/pooled standard deviation

Or $$\Delta = \frac{X_{Exp} - X_{Cont}}{SD_{pooled}}$$

Effect sizes were calculated for different child outcomes, using both the child level variance and coefficients for predictors included in the multilevel statistical models adopting the formulae outlined by Tymms et al (1997).

For categorical predictors (e.g.gender or ethnic group) the effect size was calculated as:

ES = categorical predictor variable coefficient / √child level variance

Or

$$\Delta = \frac{\beta_1}{\sigma_e}$$

For continuous predictor variables (e.g. child age in months), the effect size describes the change on the outcome measure produced by a change of +/-one standard deviation on the continuous predictor variable, standardised by the within school SD, adjusted for covariates in the model – the level 1 SD:

$$\Delta = \frac{2\,\beta_1 * sd_{x1}}{\sigma_e}$$ where $_{x1}$=continuous predictor variable

Effect sizes can be useful for comparisons between different studies but interpretations must be made with caution and with reference to the outcomes concerned and controls used in models (Elliot & Sammons, 2003). For further discussion of effect sizes see Coe (2002). Effect sizes for some categorical measures in the EPPE research are large but apply to small numbers of children (e.g. the very low birth weight group or specific ethnic groups).

Family factors Examples of family factors are mother's qualifications, father's employment and family SES.

Home learning environment factors Measures derived from reports from parents (at interview) about what children do at home, for example, playing with numbers and letters, singing songs and nursery rhymes.

Intra-centre correlation The intra-centre correlation measures the extent to which the scores of children in the same centre resemble each other as compared with those from children at different centres. The intra-centre correlation provides an indication of the extent to which unexplained variance in children's progress (i.e. that not accounted for by prior attainment) may be attributed to differences between pre-school settings. This gives an indication of possible variation in pre-school effectiveness.

Language Two of the BAS subscales (naming vocabulary and verbal comprehension) were combined to give a measure of language ability.

Multilevel modelling A methodology that allows data to be examined simultaneously at different levels within a system (e.g. young children, pre-school centres, LEAs), essentially a generalisation of multiple regression.

Multiple regression A method of predicting outcome scores on the basis of the statistical relationship between observed outcome scores and one or more predictor variables.

Net effect The unique contribution of a particular variable upon an outcome while other variables are controlled.

Outliers Pre-school centres where children made significantly greater/less progress than predicted on the basis of prior attainment and other significant child, family and home learning environment characteristics.

Pre-reading attainment Composite formed by adding together the scores for phonological awareness (rhyme and alliteration) and letter recognition.

Prior attainment factors Measures which describe pupils' achievement at the beginning of the phase or period under investigation (e.g. taken on entry to primary or secondary school or, in this case, on entry to the EPPE study).

Quality Measures of pre-school centre quality collected through observational assessments (ECERS-R, ECERS-E and CIS) made by trained researchers.

Sampling profile / procedures The EPPE sample was constructed of:

- Five regions (six LEAs) randomly selected around the country, but being representative of urban, rural, inner city areas.
  - Pre-schools from each of the 6 types of target provision (nursery classes, nursery schools, local authority day nurseries, private day nurseries, play groups and integrated centres) randomly selected across the region.

School level variance The proportion of variance in a particular child outcome measure (e.g. reading scores in year 1 of primary school) attributable to differences between individual schools rather than differences between individual children.

Significance level Criteria for judging whether differences in scores between groups of children or centres might have arisen by chance. The most common criteria is the 95% level ($p<0.05$) which can be expected to include the 'true' value in 95 out of 100 samples (i.e. the probability being one in twenty that a difference might have arisen by chance).

Social/behavioural development A child's ability to 'socialise' with other adults and children and their general behaviour to others.

Socio-Economic Status (SES) Occupational information was collected by means of a parental interview when children were recruited to the study. The Office of Population Census and Surveys (OPCS) (1995) Classification of Occupations was used to classify mothers and fathers current employment into one of 8 groups:
Professional I, Other professional non-manual II, skilled Non-manual III, skilled manual III, semi-skilled manual IV, unskilled manual V, never worked, no response. Family SES was obtained by assigning the SES classification based on the parent with the highest occupational status.

Standard deviation (sd) A measure of the spread around the mean in a distribution of numerical scores. In a normal distribution, 68 percent of cases fall within one standard deviation of the mean and 95 percent of cases fall within two standard deviations.

Target centre A total of 141 pre-school centres were recruited to the EPPE research covering 6 types of provision. The sample of children were drawn from these target centres.

Value-added models Longitudinal multilevel models exploring children's cognitive progress over the pre-school period, controlling for prior attainment and significant child, family and home learning environment characteristics.

Value-added residuals Differences between predicted and actual results for pre-school centres (where predicted results are calculated using value added models).

References

Arnett, J. (1989), 'Caregivers in Day-Care Centres: Does training matter?' *Journal of Applied Developmental Psychology, 10,* 541-552.

Bressoux, P & Bianco, M (2004) Long-term teacher effects on pupils' learning gains, *Oxford Review of Education*, 30 (3) 327-345.

Butler, N. R. (1980), 'Child, Health and Education in the Seventies: Some results on the 5 year follow-up of the 1970 British Births Cohort.' *Health Visitor, 53,* 81-82.

Centre for Longitudinal Studies, Bedford Group for Lifecourse and Statistical Studies, Dex, S. and Joshi, H. (eds.) (2004), *Millennium Cohort Study: First Survey - A User's Guide to Initial Findings*. London: Institute of Education / University of London.

Coe, R. (2002), 'What is an effect size?' *Journal of the Economic & Social Research Council Teaching and Learning Programme Research Capacity Building Network,* 6-8.

DfEE. (1996), *Nursery education: Desirable outcomes for children's learning on entering compulsory education*. London: Department for Education & Employment.

Elliot, K. & Sammons, P. (2004) Exploring the use of effect sizes to evaluate the impact of different influences on child outcomes: possibilities and imitations, Chapter 2 in Ian Schagen & Karen Elliot (Eds) But What Does it Mean? *The use of effect sizes in educational research*, Slough: NFER.

Glass, G. V., McGaw, B. & Smith, M. L. (1981), *Meta-Analysis in Social Research*. London: Sage.

Goldstein, H. (1995), *Multilevel Statistical Models*. (2nd ed.). London: Arnold.

Goodman, R. (1997), 'The Strengths & Difficulties Questionnaire: A Research Note'. *Journal of Child Psychology & Psychiatry, 38,* 581-586.

Harker, H. (2001, 13-15 September), *The Effects of Student Composition on School Outcomes.* Paper presented at the British Educational Research Association, Annual Conference, Leeds.

Harms, T., Clifford, M. and Cryer, D. (1998), *Early Childhood Environment Rating Scale, Revised Edition (ECERS-R)*. Vermont: Teachers College Press.

Hogan, A. E., Scott, K. G. and Baurer, C. R. (1992), 'The Adaptive Social Behaviour Inventory (ASBI): A new assessment of social competence in high risk three year olds.' *Journal of Psychoeducational Assessments, 10,* 230-239.

Melhuish, E. C., Sylva, K., Sammons, P., Siraj-Blatchford, I., Taggart, B., Dobson, A., Jeavons, M., Lewis, K., Morahan, M. and Sadler, S. (1999), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 4 - Parent, Family and Child Characteristics in Relation to Type of Pre-school and Socio-Economic Differences.* London: DfEE / Institute of Education, University of London.

Melhuish, E. C., Sylva, K., Sammons, P., Siraj-Blatchford, I. and Taggart, B. (2001), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 7 - Social/Behavioural and Cognitive Development at 3-4 Years in Relation to Family Background.* London: DfEE / Institute of Education, University of London.

Melhuish, E. C., Quinn, L., Sylva, K., Sammons, P., Siraj-Blatchford, I., Taggart, B. and Currie, G. (2002), *Pre-school experience and social / behavioural development at the start of primary school*. Belfast: Stranmillis University College.

Melhuish, E. C., Quinn, L., Sylva, K., Sammons, P., Siraj-Blatchford, I., Taggart, B. and Shields, C. (2002), *Pre-school experience and cognitive development at the start of primary school*. Belfast: Stranmillis University College.

Mortimore, P., Sammons, P., Stoll, L., Lewis, D. and Ecob, R. (1988), *School Matters: The Junior Years*. Wells: Open Books.

NICHD. (2002), 'Early Child Care and Children's Development Prior to School Entry: results from the NICHD Study of Early Child Care.' *American Educational Research Journal, 39,* (1): 133-164.

Office of Population Censuses and Surveys. (1995), *Classification of occupations and coding index*. London: HMSO.

Paterson, L. and Goldstein, H. (1991), 'New statistical methods of analysing social structures: an introduction to multilevel models'. *British Educational Research Journal, 17, (4):* 387-393.

Qualifications and Curriculum Authority. (1999), *The Early Learning Goals*. London: QCA.

Qualifications and Curriculum Authority and Department for Education and Employment. (2000), *Curriculum Guidance for the Foundation Stage*. London: QCA/DFEE.

Sammons, P. and Smees, R. (1998), 'Measuring Pupil Progress at Key Stage 1: using baseline assessment to investigate value added'. *School Leadership and Management, 18,* 389-407.

Sammons, P., Nuttall, D. and Cuttance, P. (1993), 'Differential School Effectiveness: Results from a reanalysis of the Inner London Education Authority's Junior School Project data'. *British Educational Research Journal, 19,* 381-405.

Sammons, P., Sylva, K., Melhuish, E. C., Siraj-Blatchford, I., Taggart, B., Smees, R., Dobson, A., Jeavons, M., Lewis, K., Morahan, M. and Sadler, S. (1999), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 2 - Characteristics of the Effective Provision of Pre-School (EPPE) Project sample at entry to the study*. London: DfEE / Institute of Education, University of London.

Sammons, P., Sylva, K., Melhuish, E. C., Siraj-Blatchford, I., Taggart, B. and Elliot, K. (2002), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 8a - Measuring the Impact of Pre-School on Children's Cognitive Progress over the Pre-School Period*. London: DfES / Institute of Education, University of London.

Sammons, P., Sylva, K., Melhuish, E. C., Siraj-Blatchford, I., Taggart, B. and Elliot, K. (2003), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 8b - Measuring the Impact of Pre-School on Children's Social/Behavioral Development over the Pre-School Period*. London: DfES / Institute of Education, University of London.

Sammons, P., Sylva, K., Melhuish, E. C., Siraj-Blatchford, I., Taggart, B., Elliot, K. and Marsh, A. (2004), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 11 - Report on the continuing effects of pre-school education at age 7*. London: DfES / Institute of Education, University of London.

Sammons, P., Smees, R., Taggart, B., Sylva, K., Melhuish, E. C., Siraj-Blatchford, I. and Elliot, K. (2002), *The Early Years Transition and Special Educational Needs (EYTSEN) Project: Technical Paper 1 - Special Needs Across the Pre-School Period*. London: DfES / Institute of Education, University of London.

Sammons, P., Smees, R., Taggart, B., Sylva, K., Melhuish, E. C., Siraj-Blatchford, I. and Elliot, K. (2004), *The Early Years Transitions and Special Educational Needs (EYTSEN) Project: Technical Paper 2 - Special Educational Needs in the Early Primary Years: Primary school entry up to the end of Year One*. London: DfES / Institute of Education, University of London.

Scarr, S. (1998), 'American child care today'. *American Psychologist, 53,* 95-108.

Scott, K. and Carran, D. (1989), 'Identification and referral of handicapped infants'. In M. C. Wang, M. C. Reynolds and H. J. Walberg (eds), *Handbook of Special Education Research and Practice/Vol.3, Low Incidence Conditions* (pp. 227-242).

Siraj-Blatchford, I., Sylva, K., Melhuish, E. C., Sammons, P., Taggart, B. and Jennings, R. (1999), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 3 - Contextualising EPPE: Interviews with local Authority co-ordinators and centre managers*. London: DfEE / Institute of Education, University of London.

Strand, S. (1997), 'Pupil Progress during Key Stage 1: A Value added analysis of school effects'. *British Education Research Journal, 23,* (4): 471-487. Strand, S. (1999), 'Pupil background and Baseline assessment results at age 4'. *Journal of Research in Reading, 22, (1):* 14-26.

Strand, S. (2000), *Pupil Mobility in Key Stage 1: A Case Study in Caution.* Paper presented at the British Educational Research Association Conference, Cardiff.

Sylva, K., Sammons, P., Melhuish, E. C., Siraj-Blatchford, I. and Taggart, B. (1999), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 1 - An Introduction to The Effective Provision of Pre-School Education (EPPE) Project*. London: DfEE / Institute of Education, University of London.

Sylva, K., Siraj-Blatchford, I., Melhuish, E. C., Sammons, P., Taggart, B., Evans, E., Dobson, A., Jeavons, M., Lewis, K., Morahan, M. and Sadler, S. (1999), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 6 - Characteristics of the Centres in the EPPE Sample: Observation Profiles*. London: DfEE / Institute of Education, University of London.

Sylva, K., Siraj-Blatchford, I., Melhuish, E. C., Sammons, P., Taggart, B., Evans, E., Dobson, A., Jeavons, M., Lewis, K., Morahan, M. and Sadler, S. (1999), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 6A - Characteristics of Pre-School Environments*. London: DfEE / Institute of Education, University of London.

Sylva, K., Siraj-Blatchford, I. and Taggart, B. (2003), *Assessing Quality in the Early Years: Early Childhood Environment Rating Scale Extension (ECERS-E): Four Curricular Subscales*. Stoke on Trent: Trentham Books.

Taggart, B., Sylva, K., Siraj-Blatchford, I., Melhuish, E. C., Sammons, P. and Walker-Hall, J. (2000), *The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 5 - Characteristics of the Centres in the EPPE Sample: Interviews.* London: DfEE / Institute of Education, University of London.

Taggart, B., Sammons, P., Smees, R., Sylva, K., Melhuish, E. C., Siraj-Blatchford, I. and Elliot, K. (2004), *The Early Transition & Special Educational Needs (EYTSEN) Technical Paper 3: Special Educational Needs: The Parents' Perspective*. London: DfES / Institute of Education, University of London.

Tizard, P., Blatchford, P., Burke, J., Farquhar, C. and Plewis, I. (1988), *Young Children at School in the Inner City*. Hove: Lawrence Erlbaum Associates Ltd.

Tymms, P., Merrell, C. and Henderson, B. (1997), 'The First Year at School: A quantitative Investigation of the Attainment and Progress of Pupils'. *Educational Research and Evaluation, 3, (2):* 101-118.