

Effective Pre-school and Primary
Education 3-11 Project (EPPE 3-11)

Influences on Children's Development and Progress in Key Stage 2: Social/behavioural Outcomes in Year 6

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Executive Summary

The Effective Pre-school and Primary Education Project 3-11 (EPPE 3-11) is a large scale longitudinal study of the impact of pre-school and primary school on children's cognitive and social/behavioural development. EPPE 3-11 began in 1996 with the original aims of investigating the influence of a range of Early Childhood settings on young children's progress and development during their time at pre-school¹, and exploring whether any pre-school effects continue to influence children at the start of primary school. A second phase of research investigates both primary school and pre-school influences up to the end of Key Stage 2 (age 11). Details of the mixed methods research design of the study are reported by Sammons et al. (2005) and Siraj-Blatchford et al. (2006). In summary, six English Local Authorities (LAs) in five regions participated in the research with children recruited from six types of pre-school provision (nursery classes, playgroups, private day nurseries, local authority day nurseries, nursery schools and integrated centres [that combine education and care]). There were 2,857 children in the EPPE pre-school sample. An additional sample of 315 'Home' children (who had not attended a pre-school setting) was identified at entry to primary school, for comparison with those who had attended a pre-school centre. Therefore, the original sample totalled 3,172 EPPE children.

EPPE 3-11 involves the collection and analysis of a wide range of measures of children's development, child, family and home learning environment (HLE) characteristics and the characteristics of the pre-schools attended. In addition, value added measures of primary school academic effectiveness have been derived from independent statistical analyses of National assessment data sets conducted for all primary schools in England (Melhuish et al., 2006). These have been incorporated into the EPPE 3-11 child database to provide indicators of the academic effectiveness of the particular primary school an EPPE 3-11 child attended and they complement the measures collected earlier concerning the quality and effectiveness of the pre-school setting attended.

This report describes the results of analyses on children's social/behavioural outcomes at the end of Key Stage 2 (i.e., at age 11 years) and investigates social/behavioural development across Key Stage 2 (from Year 2 to Year 6). A separate report describes the results of analyses on children's English² and Mathematics attainment at age 11 years (Sammons et al., 2008).

Key Findings

- Variations in children's social/behavioural outcomes in Year 6 (i.e., 'Self-regulation', 'Pro-social' behaviour, 'Hyperactivity' and 'Anti-social' behaviour) can still be accounted for by Child, Family and Early years Home Learning Environment (HLE, when children were ages 3-4) characteristics. The results are broadly in line with findings on the influence of these factors when children were younger.

¹ Group, centre based provision of education and care for 3 and 4 year olds.

² In Key Stage 2 (age 11 years) the English National assessment test consists of a Reading test (based on reading comprehension), a Writing test and a Spelling test.

- The background characteristics are found to be better predictors of 'Self-regulation' than other social/behavioural outcomes. In addition, gender effects are particularly strong for 'Pro-social' behaviour and 'Hyperactivity' outcomes, whereas mother's qualification has the strongest effect for 'Self-regulation' and 'Hyperactivity' outcomes.
- In terms of pre-school attendance, a positive effect of attending any pre-school (compared with not attending) is still found for children's 'Pro-social' behaviour. However, there is no significant long lasting effect of just attending a pre-school for other social/behavioural outcomes.
- Overall, pre-school quality³ and effectiveness⁴ is more important than just having attended any pre-school. Children who previously attended a higher quality pre-school centre or one identified as highly effective show the most benefit in all aspects of their subsequent social/behavioural development. These results are in accord with earlier findings at younger ages.
- In addition, for all social/behavioural outcomes in Year 6 there is also a different impact of attending high quality pre-school for different groups of children. Boys, children who were identified as showing some form of special education need (SEN) in primary school, and highly disadvantaged children, are benefiting more than girls, children who were never identified as having an SEN in primary school, and less disadvantaged children.
- Contrary to the findings for cognitive development, primary school academic effectiveness was not found to have a statistically significant impact on children's social/behavioural outcomes in Year 6. However, a statistically significant impact of attending an academically effective primary school was evident for certain groups of children: those who were identified as having SEN during primary school and children of mothers with low qualifications. The results suggest that these children will particularly benefit from attending a more academically effective primary school and these benefits are evident in terms of increased 'Self-regulation' and reduced 'Anti-social' behaviour in Year 6. Children who are never identified as having SEN, or children with mothers of medium and high qualifications have the same level of social/behavioural development regardless of academic effectiveness of primary school attended. These results suggest that school influences may be more influential for certain aspects of children's development.

³ Pre-school quality was measured using the ECERS-R and ECERS-E observational instruments (see Sylva et al., 1999). ECERS-R is a measure of quality related to the 'caring' aspects of the pre-school experience, whereas ECERS-E is a measure of quality related to the educational aspects of the pre-school.

⁴ During pre-school, children's cognitive progress was analysed from age 3 to rising 5 years. These analyses provided measures of pre-school academic effectiveness. Separate pre-school indicators of effectiveness were calculated for the different social/behavioural dimensions at pre-school. These included: 'Independence and Concentration', 'Peer sociability', 'Co-operation and Conformity' and reduction in 'Anti-social' behaviour'.

- In combination with pre-school quality, primary school academic effectiveness showed a significant impact on 'Self-regulation'. Children who attend a low or even medium effective primary school but had attended a high quality pre-school showed better outcomes in terms of having higher levels of 'Self-regulation' at the end of Key Stage 2. This suggests that previous experience of a high quality pre-school provides some protection against a differential impact of subsequently attending a primary school of lower academic effectiveness. Similarly, attending a high academically effective primary school will benefit those children who either did not attend any pre-school or those who attended a low quality pre-school in terms of having higher levels of 'Self-regulation' in Year 6.
- The combination of high Early years HLE and attending a medium or high quality pre-school is a strong predictor of higher levels of 'Self-regulation' at the end of Key Stage 2. Also, experiencing a high Early years HLE seems to be a protective factor for children who do not attend pre-school by promoting later 'Self-regulation' in Key Stage 2 of primary school. Similarly, attending a high quality pre-school seems to protect against the negative impact of a low Early years HLE and predicts higher levels of 'Self-regulation' at age 11.

Aims

The aims of this report are:

- To explore the impact of child, family, and home learning environment (HLE) characteristics on children's social/behavioural outcomes at age 11.
- To investigate any continuing impact of pre-school, including any variations in children's social/behavioural outcomes for those who attended pre-school and those who had not attended a pre-school centre - the 'Home' sample.
- To explore the impact of any continuing pre-school influence, in terms of the quality and effectiveness of the pre-school setting attended, on children's social/behavioural development at the end of Key Stage 2.
- To investigate the combined impact of the Early years home learning environment (HLE) and pre-school characteristics on children's social/behavioural outcomes at age 11.
- To investigate the net influence of primary school academic effectiveness on social/behavioural outcomes at the end of Key Stage 2, controlling for child and family and HLE characteristics.
- To investigate the interactive effect of pre-school experience and primary school academic effectiveness on social/behavioural outcomes in Year 6.
- To explore any changes in children's social/behavioural development across Key Stage 2 controlling for prior social/behavioural development measured in Year 2 (age 7; end of Key Stage 1).

Methods

The analyses include all EPPE 3-11 children for whom data on social/behavioural outcomes were collected in Year 6 of primary school (N=2,664). A wide range of information has been incorporated in the Year 6 data set. This included teachers' assessments of social/behavioural development, information about child, family and home learning environment (HLE) characteristics collected from parental interviews when children were recruited to the study and again in Key Stage 1 (KS1), measures of pre-school quality and effectiveness collected during the first phase of the study, and independent measures of primary school academic effectiveness derived from value-

added analyses of National assessment data for all English primary schools for three successive full pupil cohorts (2002-2004)⁵.

In line with earlier analyses of children's social behaviour at younger ages, the research uses multilevel models to explore the predictive power of different factors in accounting for variation in children's social/behavioural outcomes at age 11. Contextualised multilevel models were used to identify the unique (net) contribution of different background characteristics to children's social/behavioural development at different time points. These contextualised multilevel analyses are equivalent to those conducted during the first phase of the research when children entered pre-school and again when they started primary school (see Sammons et al., 1999; Melhuish et al., 2001; Sammons et al., 2002; 2003), and subsequently at the end of Year 1 (see Sammons et al., 2004a), Year 2 (see Sammons et al., 2004b) and Year 5 (see Sammons et al., 2007a). Value added multilevel models were used to investigate children's developmental progress over time by including *prior* social/behavioural measures obtained in Year 2 in addition to information about children's background characteristics in the statistical analysis.

Previous EPPE analyses over the pre-school period showed that variations in quality and the extent of time (duration) in pre-school had an impact on children's cognitive and social/behavioural gains at entry to primary school and that pre-school influences remained evident in KS1 and KS2. This paper extends the earlier findings on the pre-school, KS1 period and Year 5 of KS2 by investigating the extent to which the positive impact of pre-school is still evident in child outcomes measured at the end of KS2 (age 11 years).

Findings for a sample of 'Home' children, who had no pre-school centre experience before starting primary school, are also reported for comparison with the pre-school sample. The contextualised multilevel analyses explore whether 'Home' children remain at a disadvantage in terms of social/behavioural development at the end of Year 6, as has been found at younger ages.

Analyses conducted at earlier time points in the EPPE research showed significant associations between cognitive attainment and social/behavioural development (especially for 'Self-regulation'); these value added indicators of primary school academic effectiveness have thus been included in the analyses for this report to examine whether going on to attend a more academically effective primary school influences a child's social/behavioural development at age 11. In a separate report (see Sammons et al., 2008) we describe the links between a school's academic effectiveness and the individual child's attainment and progress in English and Mathematics at age 11.

The impact of child, family and home learning environment (HLE) characteristics on children's social/behavioural development at the end of Year 6

'Self-regulation'

Gender, early developmental problems (as reported by parents at the start of the study), mother's qualifications, family earned income and Early years HLE were the strongest

⁵ Independent indicators of primary school academic effectiveness for the schools attended by EPPE 3-11 children were obtained from the analyses of National assessment data for several cohorts across all primary schools in England (Melhuish et al., 2006). Mean value added scores of school academic effectiveness across the years 2002 to 2004 were calculated for each primary school in England and then extracted for schools attended by children in the EPPE 3-11 sample. These value added measures provide indicators of a school's academic effectiveness in terms of National assessment performance.

predictors of 'Self-regulation' in Year 6. Early behavioural problems, Eligibility for free school meals (FSM) and father's qualifications had smaller but significant effects. Ethnicity and need of English as an additional language (EAL) support was also strongly associated with 'Self-regulation', suggesting that children of Pakistani heritage and Bangladeshi heritage had higher levels of 'Self-regulation' than children of White UK heritage. Children in need of EAL support in Year 6 had lower levels of 'Self-regulation' than others. However, the group sizes for these categories are relatively small and, therefore, the results should be treated with caution.

In summary, girls, children with no early developmental or behavioural problems (as reported by parents at the start of the study), and children from families with higher parents' qualifications, higher family earned income and higher scores on the Early years HLE have better 'Self-regulation' in Year 6 than others.

'Pro-social' behaviour

Gender and mother's qualifications were the strongest predictors of 'Pro-social' behaviour in Year 6. Early behavioural problems (as reported by parents at the start of the study), family earned income, mother's marital status and Early years HLE had a small but significant effect on children's outcomes in 'Pro-social' behaviour. Children of Black Caribbean heritage had lower levels of 'Pro-social' behaviour than children of White UK heritage, but, as mentioned previously, the group sizes for these categories are relatively small and, therefore, the results should be treated with caution.

Girls, children with no early behavioural problems (as reported by parents at the start of the study), and children from families with higher mother's qualifications, higher family earned income and higher scores on the Early years HLE have better 'Pro-social' behaviour in Year 6 than others.

'Hyperactivity'

Similar to results focused on the two positive social/behavioural outcomes, gender and mother's qualifications were the strongest predictors of 'Hyperactivity' in Year 6. Early behavioural problems (as reported by parents at the start of the study), father's qualifications, family earned income, eligibility for free school meals (FSM), mother's change in marital status and Early years HLE had small to moderate effects on children's outcomes in 'Hyperactivity'. Children of Indian, Pakistani and Bangladeshi heritage had lower levels of 'Hyperactivity' than children of White UK heritage. Children in need of English as an additional language (EAL) support in Year 6 had higher levels of 'Hyperactivity'.

In summary, girls, children with no early behavioural problems (as reported by parents at the start of the study), and children from families with higher mother's qualifications, higher family earned income and higher scores on the Early years HLE have lower 'Hyperactivity' levels in Year 6 than others. In addition, children whose mothers' marital status changed, from being single to either being married or living with a partner, had higher 'Hyperactivity' levels in Year 6.

'Anti-social' behaviour

Contrary to other social/behavioural outcomes, background influences were found to be weaker predictors for 'Anti-social' behaviour in Year 6. Gender had the strongest effect on 'Anti-social' behaviour, but early behavioural problems, mother's qualifications, eligibility for free school meals (FSM), family socio-economic status (SES) and mother's change in marital status also had statistically significant but small effects on children's

outcomes in terms of 'Anti-social' behaviour measure. Children of Indian heritage had lower levels, whereas children of Black Caribbean heritage had relatively higher scores on the 'Anti-social' behaviour measure in comparison to children of White UK heritage, controlling for other influences. As mentioned above, the results for ethnicity cannot be generalised since the group sizes for different ethnic groups are small.

Overall, girls, children with no reported early behavioural problems (as reported by parents at the start of the study), and children from families with higher mother's qualifications, higher family socio-economic status (SES), and not eligible for free school meals (FSM), have lower 'Anti-social' behaviour scores in Year 6 than others. Similar to findings for the 'Hyperactivity' outcome, children whose mothers' marital status changed from being single to either being married or living with a partner were also found to have higher 'Anti-social' behaviour scores in Year 6, suggesting that changes in family structure can have a disruptive influence on this aspect of behaviour.

The impact of pre-school and primary school experiences

The findings have shown that some pre-school influences, identified as important for child outcomes at earlier time points (ages 5, 6, 7 and 10) still remain evident after six years in primary school. However, at this stage just having attended a pre-school is not sufficient to ensure better social/behavioural development in the longer term, except for 'Pro-social' behaviour where longer term benefits remain. Similar to findings for Year 5 (see Sammons et al., 2007a), at the end of Year 6 there are no longer statistically significant net effects on social/behavioural outcomes for the most basic indicators of pre-school experience such as differences in type of pre-school attended, duration in attending pre-school or age of starting pre-school. The analyses indicate that it is the quality and effectiveness of the pre-school attended that generally predicts better social/behavioural development. Poor quality pre-school, however, does not improve social/behavioural development at age 11 years, whereas medium and especially high quality continues to provide a lasting benefit for most outcomes. Children who attended high quality pre-school show the strongest advantage and high quality settings are also found to be particularly beneficial for boys (there is a significant interaction between gender of a child and pre-school quality). Also there are greater benefits of high quality pre-school for children who are later identified as showing some form of special education need (SEN) in primary school and also for children who are experiencing high levels of multiple disadvantage (see Appendix 5 for more information on multiple disadvantage).

However, there are some indications that earlier experience of attending a poor quality pre-school may adversely affect certain aspects of social/behavioural development, particularly 'Hyperactivity' in Year 6. There were no statistically significant differences between 'home' children and children who attended poor quality pre-school on the social/behavioural measures, with the exception of 'Pro-social' behaviour and 'Hyperactivity'. Children who attended a poor quality pre-school showed increased 'Pro-social' behaviour compared to the 'home' group. In addition, 'home' children had significantly lower levels of 'Hyperactivity' than children who attended poor quality pre-school.

The effectiveness of the pre-school centre a child attended, in terms of promoting better social behaviour at entry to primary school, shows a continued positive impact on later social/behavioural development at age 11 years for children who attended pre-school in comparison with the 'Home' group. It is particularly interesting that attending a pre-school identified as effective in helping to reduce 'Anti-social' behaviour at a younger age

(between 3 and 5 years) still shows a long term benefit in terms of reduced 'Anti-social' behaviour at age 11.

The findings on both quality and effectiveness of pre-schools and their longer term benefits on social/behavioural development at age 11 complement and extend the findings reported on cognitive outcomes in English and Mathematics in Year 6 (see Sammons et al., 2008). It appears therefore that high quality, effective pre-school continues to offer benefits to 'all round' child development until the end of Key Stage 2.

Analyses explored the way the Early years HLE interacts with pre-school quality in shaping social/behavioural development at age 11. As found in previous reports (see Sammons 2007a), there is a strong combined impact of Early years HLE and pre-school quality on later 'Self-regulation'. Controlling for other background characteristics, a combination of high Early years HLE and attending medium or high quality pre-school predicts better 'Self-regulation' at the end of Key Stage 2. In addition, experiencing a high Early years HLE seems to be a protective factor for children who had not attended pre-school, helping them achieve higher levels of 'Self-regulation' in primary school. Similarly, attending high quality pre-school seems to protect against experiencing a low Early years HLE, thus helping children achieve higher levels of 'Self-regulation' at a later time point.

In contrast to the findings for the quality and effectiveness of pre-school centre experience, the results did not indicate that, by itself, the academic effectiveness of the primary school has an influence on social/behavioural development at the end of Year 6. This is also in contrast to the findings for cognitive attainment and progress in Key Stage 2 (see Sammons et al., 2008). However, differential effects of attending an academically effective primary school were evident for children who were identified as having an SEN during primary school and children of mothers with low qualifications. This suggests that these children will particularly benefit from attending a primary school that has a high academic effectiveness in terms of increasing their 'Self-regulation' and reducing their 'Anti-social' behaviour at the end of Key Stage 2 compared to children who were never identified as having an SEN or children with mothers of medium and high qualifications.

Nonetheless, a high academic effective primary school seems to be especially important for those children who did not go to pre-school (the lowest scores are for the no pre-school group who went on to a low academically effective primary school) in terms of promoting higher 'Self-regulation', which again relates to similar findings on children's cognitive outcomes in primary school. Similarly, attending a high quality pre-school seems to act as a moderate to strong protective factor for children who subsequently attend a less academically effective primary school, but only for 'Self-regulation'. Overall, these findings suggest that attending higher quality and higher effectiveness pre-school, especially in combination with attending a higher effectiveness primary school later on, will lead to positive social/behaviour outcomes at the end of Key Stage 2.

The findings on mobility showed that KS2 mobility, and particularly if a child changed schools during both KS1 and KS2, is associated with poorer social/behavioural outcomes in Year 6: lower levels of 'Self-regulation' and 'Pro-social' behaviour and higher levels of 'Hyperactivity' and 'Anti-social' behaviour. However, these results do not show whether or not KS1 and/or KS2 mobility causes poorer social/behavioural outcomes; these results only show that mobility during primary school is associated with poorer children's outcomes. Mobility might reflect unmeasured family characteristics that might mediate the association between mobility and social/behavioural outcomes. For

example, movement might be job related, or due to family breakdown, or increase in family size. However, it is also possible that poor social/behavioural development might dispose parents to move their child to another school.

Implications

The research presented here demonstrates the extent to which individual child, family and home learning environment (HLE) background factors continue to predict children's social/behavioural development in Key Stage 2. This is relevant to the debate on equity in education, and to policies that seek to raise standards, reduce the equity gap and promote inclusion. The research indicates that much of the apparent raw difference in social/behavioural outcomes associated with certain characteristics, for example, ethnicity, is attributable to the impact of other socio-economic and demographic factors (e.g. income, language, family SES, parents' qualification levels and home learning environment). Such findings are important for policy and practical strategies that may help to enhance outcomes for disadvantaged or vulnerable groups. Earlier EPPE 3-11 results have contributed to the evidence base for the Government's Equalities Review.⁶

In line with findings for cognitive outcomes at age 11 (reported separately in Sammons et al., 2008) the present findings further support the conclusion that good (high quality and effective) pre-school still matters. There is new evidence of continuing pre-school effects in terms of continued, enhanced social/behavioural development for children in their last year of primary school. Taken together the results indicate that attending any pre-school seems to have long term benefits only for 'Pro-social' behaviour. However, it is more important to attend a better quality pre-school than just to attend any kind of pre-school. We found that those children who attended low quality pre-school no longer show benefits and low quality pre-school is associated with poorer social/behavioural development in some areas. Thus, quality and effectiveness of pre-school are especially relevant for lasting benefits. Therefore, improving access to high quality and more effective pre-school is likely to benefit children in the longer term by improving social adjustment to school and promoting cognitive development. These benefits are thus likely to contribute to the aims of both raising standards and the social inclusion agendas.

Primary school academic effectiveness (calculated independently by value added analyses using National assessment data sets matched between Key Stage 1 and 2 over three years) did not have a significant influence on social/behavioural outcomes. However, in combination with pre-school quality it did have a significant influence on 'Self-regulation' and for certain groups of children on 'Self-regulation' and 'Anti-social' behaviour (those identified as having some form of SEN and those whose mothers have a low qualification level). The present research provides new evidence concerning the combined effects of pre-school and primary school in shaping children's later social/behavioural outcomes at the end of Key Stage 2. Raising the effectiveness and quality of both pre-school and primary school will help to improve children's all round development.

It is important to note that no one factor is the key to enhancing children's social/behavioural development and other educational outcomes in the longer term up to the end of Key Stage 2. What matters is the combination of experiences over time. The child who has a better Early years home learning environment (HLE), goes to a high quality, effective pre-school setting and who then goes on to attend a more academically

⁶ <http://www.theequalitiesreview.org.uk>

effective primary school appears to have a combination of 'protective' and enhancing experiences that tend to reduce the risk of low attainment and also similarly tend to benefit social/behavioural development. High quality and more effective pre-schools seem to support better outcomes in longer term cognitive and social/behavioural domains. Likewise, we also find that a higher quality home learning environment (HLE) benefits both cognitive and social/behavioural development throughout pre-school and primary school. The implication of these findings is that policy should promote strategies to support improvements in Early years HLE, especially for vulnerable groups, and also work to improve the quality and effectiveness of pre-school provision. Such pre-schools are well placed to identify children who may need extra support if they do not experience a high quality home learning environment (HLE) and could be guided to work with parents to improve Early years HLE.

As with conclusions related to cognitive outcomes (see Sammons et al., 2008) the social/behavioural findings again suggest that, in order to help reduce differences in social/behavioural outcomes for different disadvantaged groups, actions to improve their home learning environment (HLE), the quality and effectiveness of pre-school, and primary school experiences, will need to be tackled collectively, since, as mentioned above, the accumulation and combination of positive experiences over time leads to sustainable improvement of children's social/behavioural outcomes. In addition, it is likely that specially targeted interventions for children who are identified as well behind their peers in cognitive or social/behavioural profiles at the start of primary school will also be necessary to prevent a widening of the gap during Key Stage 1 (KS1) and Key Stage 2 (KS2) and hopefully improve individual pupil's trajectories (see for example, Hurry and Sylva., 2007; Sylva et al., 2008). This has implications for baseline assessment and SEN identification and the development of well founded, evidence based interventions.

Introduction

The Effective Pre-school and Primary Education Project 3-11 (EPPE 3-11) is a large scale longitudinal study of the impact of pre-school and primary school on children's cognitive and social/behavioural development. The study has followed children from the start of pre-school (at age 3 years plus) through to the end of Key Stage 2 (KS2). This report describes the results of analyses on children's social/behavioural outcomes and progress at the end of Key Stage 2 (age 11 years). A separate report describes the results of analyses on children's English⁷ and Mathematics attainment at age 11 years (Sammons et al., 2008).

Background

EPPE 3-11 began in 1996 with the aims of investigating the influence of a range of Early Childhood settings on young children's progress and development during their time at pre-school⁸, and exploring whether any pre-school effects continue to influence children at the start of primary school. At the time, it was the first study of pre-schools in Europe to use a longitudinal, mixed method, educational effectiveness design based on sampling children in a range of different pre-school settings and using statistical approaches that enable the identification of individual pre-school centre effects. For further discussion of the research design see Sammons et al., (2005) and Siraj-Blatchford et al., (2006). In summary, six English Local Authorities (LAs) in five regions participated in the research with children recruited from six types of group pre-school provision (nursery classes, playgroups, private day nurseries, local authority day nurseries, nursery schools and integrated centres [that combine education and care]). There were 2,857 children in the EPPE pre-school sample. An additional sample of 315 'Home' children (who had not attended a pre-school setting) was identified at entry to primary school, for comparison with those who had attended a pre-school centre. Therefore, the original sample totalled 3,172 EPPE children.

EPPE 3-11 involves the collection and analysis of a wide range of measures of children's development, child, family and home learning environment (HLE) characteristics and the characteristics of the pre-schools attended. In addition, value added measures of primary school academic effectiveness have been derived from independent statistical analyses of National assessment datasets for all primary schools in England (Melhuish et al., 2006). These have been incorporated into the EPPE 3-11 child database to provide indicators of the academic effectiveness of the particular primary school an EPPE 3-11 child attended and they complement the measures collected earlier concerning the quality and effectiveness of the pre-school setting attended.

Children's Educational Outcomes at the end of Key Stage 2

Data on social/behavioural outcomes and cognitive attainment was collected at different time points: the start of primary school and at the end of Years 1, 2, 5 and 6. Previous reports on cognitive (Sammons et al., 2007b) as well as social/behavioural outcomes (Sammons et al., 2007a) focused on children's educational outcomes at the end of Year 5 (age 10) and progress from the end of Year 1 (age 6) to the end of Year 5 (age 10) in primary school. A wide variety of child, parent, and family factors were explored as predictors of attainment, including aspects of the Early years home learning environment (HLE) and aspects of the later HLE during Key stage 1 of primary school. Pre-school and primary school influences were also investigated.

This report focuses on the analyses of children's social/behavioural outcomes when children were a year older, in Year 6. Social/behavioural development was assessed by teachers using an extended version of the Goodman (1997) *Strengths and Difficulties Questionnaire*. Similar to

⁷ In Key Stage 2 (age 11 years) the English National assessment test consists of a Reading test (based on reading comprehension), a Writing test and a Spelling test.

⁸ Group, centre-based provision of education and care for 3 and 4 year olds.

the analyses of Year 5 data, the analyses for this paper focused on children's social/behavioural development at the end of Year 6 (age 11) and progress from the end of Year 2 (age 7) to the end of Year 6 (age 11) in primary school. As in the reports on Year 5 data, a wide range of information has been drawn upon, including teachers' assessments of social/behavioural development at ages 7 and 11; information about child, family and the Early years HLE as well as Key stage 1 HLE characteristics; measures of pre-school quality and indicators of pre-school effectiveness collected during the first phase of the study; and independent indicators of primary school academic effectiveness derived from analyses of National assessment data for several cohorts (Melhuish et al., 2006).

The goal of this report is to explore various influences on children's social/behavioural outcomes at Year 6 (age 11) and examine the evidence of any continuing impact of pre-school, and extent of primary school effects on children's social/behavioural outcomes, controlling for background characteristics (i.e., child, family, and HLE).

Aims

The aims of this report are:

- To explore the impact of child, family, and home learning environment (HLE) characteristics on children's social/behavioural outcomes at age 11.
- To investigate any continuing impact of pre-school, including any variations in children's social/behavioural outcomes for those who attended pre-school and those who had not attended a pre-school centre - the 'Home' sample.
- To explore the impact of any continuing pre-school influence, in terms of the quality and effectiveness of the pre-school setting attended, on children's social/behavioural development at the end of Key Stage 2 (KS2).
- To investigate the combined impact of the Early years Home Learning Environment (HLE) and pre-school characteristics on children's social/behavioural outcomes at age 11.
- To investigate the net influence of primary school academic effectiveness on social/behavioural outcomes at the end of Key Stage 2 (KS2), controlling for child and family and HLE characteristics.
- To investigate the interactive effect of pre-school experience and primary school academic effectiveness on social/behavioural outcomes in Year 6.
- To explore any changes in children's social/behavioural development across Key Stage 2 (KS2) controlling for prior social/behavioural development measured in Year 2 (age 7; end of KS1)

Methods

The analyses include all EPPE 3-11 children for whom data on social/behavioural outcomes were collected in Year 6 of primary school (N=2,664). A wide range of information has been incorporated in the Year 6 data set. This includes teachers' assessments of social/behavioural development, information about child, family and home learning environment (HLE) characteristics collected from parental interviews when children were recruited to the study and again in Key Stage 1 (KS1), measures of pre-school quality and effectiveness collected during the first phase of the study, and independent measures of primary school academic effectiveness derived from value-added analyses of National assessment data for all English primary schools for three successive full pupil cohorts (2002-2004)⁹.

⁹ Independent indicators of primary school academic effectiveness for the schools attended by EPPE 3-11 children were obtained from the analyses of National assessment data for several cohorts across all primary schools in England (Melhuish et al., 2006). Mean value added scores of school academic effectiveness across the years 2002 to 2004 were calculated for each primary school in England and then extracted for schools attended by children in the EPPE 3-11 sample. These value added measures provide indicators of a school's academic effectiveness in terms of National Assessment performance.

In line with earlier analyses of children's social behaviour at younger ages, the research uses multilevel models to explore the predictive power of different factors in accounting for variation in children's social/behavioural outcomes at age 11. Contextualised multilevel models were used to identify the unique (net) contribution of different background characteristics to children's social/behavioural development at different time points. These contextualised multilevel analyses are equivalent to those conducted during the first phase of the research when children entered pre-school and again when they started primary school (see Sammons et al., 1999; Melhuish et al., 2001; Sammons et al., 2002; 2003), and subsequently at the end of Year 1 (see Sammons et al., 2004a), Year 2 (see Sammons et al., 2004b) and Year 5 (see Sammons et al., 2007a). Value added multilevel models were used to investigate children's developmental progress over time by including *prior* social/behavioural measures obtained in Year 2 in addition to information about children's background characteristics in the statistical analysis.

Previous EPPE analyses over the pre-school period showed that variations in quality and the extent of time (duration) in pre-school had an impact on children's cognitive and social/behavioural gains at entry to primary school and that pre-school influences remained evident in Key Stage 1 (KS1) and Key Stage 2 (KS2). This paper extends the earlier findings on the pre-school, KS1 period and Year 5 of KS2 by investigating the extent to which the positive impact of pre-school is still evident in child outcomes measured at the end of KS2 (age 11 years).

Findings for a sample of 'Home' children, who had no pre-school centre experience before starting primary school, are also reported for comparison with the pre-school sample. The contextualised multilevel analyses explore whether 'Home' children remain at a disadvantage in terms of social/behavioural development at the end of Year 6, as has been found at younger ages.

Analyses conducted at earlier time points in the EPPE research showed significant associations between cognitive attainment and social/behavioural development (especially for 'Self-regulation'); these value added indicators of primary school academic effectiveness have thus been included in the analyses of this report to examine whether going on to attend a more academically effective primary school influences a child's social/behavioural development at age 11. In a separate report (see Sammons et al., 2008) we describe the links between a school's academic effectiveness and the individual child's attainment and progress in English and Mathematics at age 11.

Overview of the report

Section 1: This section describes the sample of EPPE children for whom data on social/behavioural outcomes was collected in Year 6 of primary school and which was used in the analyses.

Section 2: This section provides a brief description of data, the items included and the method used to derive the social/behavioural measures in Year 6.

Section 3: This section describes the results of contextualised multilevel analyses that were used to identify the unique (net) contribution of particular background characteristics (i.e., child, family and HLE) to the statistical explanation of variation in children's social/behavioural outcomes at the end of KS2. 'Net' impact is reported in terms of effect sizes (ES), which are statistical measures of the relative strength of different predictors in the final model.

Section 4: This section describes the results of value added multilevel analyses which included prior (Year 2) developmental levels of social/behavioural development and background characteristics to predict social/behavioural outcomes in Year 6. These analyses thus explore developmental change over time. Results of analyses report on factors which had a statistically significant effect on changes in children's social/behavioural outcomes between Year 2 to Year 6.

Section 5: This section describes the results of multilevel analyses that explored the impact of pre-school and primary school characteristics on children's later social/behavioural outcomes at the end of KS2.

The final section summarises the main results and conclusions.

Section 1: Description of the Sample at the end of Key Stage 2

Out of the total EPPE sample of 3,172 children, who were originally in the sample at entry to primary school, 502 children did not have any social/behavioural data for Year 6 and for 5 children there were too many (more than 40%) items with missing data, on the social/behavioural questionnaire, to include their data in the analyses. Therefore, the final sample for analysis of Year 6 social/behavioural data is 2,664. Table 1.1 provides a brief summary of background characteristics for this sample compared to the original sample.

Out of 2,664 children in this sample, almost fifty-two per cent of children were male and the majority (74%) was of White UK heritage. Ten per cent of children had English as an Additional Language (EAL) and two per cent of children still required EAL support at age 11. With respect to family structure, the majority of children (70%) lived with one or two siblings, just over fifteen per cent were singletons, and fourteen per cent were part of larger families with 3 siblings or more.

A number of measures collected at the entry to the study, from parent interviews, provided an indication of the Home Learning Environment (HLE) in the Early years (for further details see Appendix 7 and Melhuish et al., 2008a). The Early years HLE measure is based on the frequency of engagement in specific activities involving the child, such as teaching the alphabet, reading to the child, taking the child to the library etc. Table 1.1 shows that just under half (42%) of children had relatively high scores (25+) in an index of Early years home learning environment (HLE) measured in the pre-school period. A substantial minority of children (31%) were from families where scores on the Early years HLE index were relatively low (below 20).

In terms of family background characteristics, about seventeen per cent of mothers and eighteen per cent of fathers had a degree or higher degree level qualification. The large majority, however, were educated to GCSE level or below – three quarters of mothers and fifty per cent of fathers (note that 23% of children were in families where the father was recorded as absent and this contributed to the difference here). Overall, a fifth (21%) of children's mothers were recorded as having no qualifications. In terms of family socio-economic status (SES), sixteen per cent of children come from families where parents were reported as unemployed, eleven per cent from unskilled or semi-skilled families, thirty-eight per cent were in the medium (skilled manual or skilled non manual) SES group and thirty-four per cent were identified as from the higher (professional) SES groups. Almost a fifth of children in the sample (19%) lived in households where parents reported no earned income, while for almost seventeen per cent the family earned income was reported to be under £17,500 (data were collected towards the end of KS1 when children were aged around 6 years old). Seventeen per cent of children were recorded as eligible for free school meals (FSM). On an index of multiple disadvantage twenty-six per cent were identified as of medium to high disadvantage (3+ disadvantages).

Overall, the sample used in this analysis (2,664) is not noticeably different when compared to the total original sample (3,172); variations in the distributions of background variables are generally within 1%. There is a somewhat higher proportional representation of children who live with one or two siblings (2.1%) and children whose family earned income is either 'none' or lower than £17,500 (2.5%) in comparison with the characteristics of the original EPPE sample.

It is important to note that not all 2,664 children had valid data for every social/behavioural outcome in Year 6 used in the analyses. For 'Self-regulation' and 'Anti-social' behaviour outcomes at Year 6 there are 2,661 children with valid data, whereas for the 'Pro-social' behaviour outcome there are 2,663 children and for 'Hyperactivity' 2,664 children with valid data. Therefore, the sample size slightly varies depending on the outcome used in the analyses, but the differences are too small to affect the interpretation of results.

Table 1.1: Characteristics of children with valid Year 6 data compared to total EPPE sample at entry to primary school

Some figures do not include non-response to questions therefore the total is not always 2,664 (100%)

	Year 6 N=2,664		Total sample N=3,172	
	n	%	n	%
Gender				
Male	1379	51.8	1636	51.6
Female	1285	48.2	1536	48.4
Ethnicity				
White UK Heritage	1966	73.9	2295	72.4
White European Heritage	88	3.3	122	3.8
Black Caribbean Heritage	104	3.9	116	3.7
Black African Heritage	54	2.0	66	2.1
Indian Heritage	58	2.2	67	2.1
Pakistani Heritage	144	5.4	177	5.6
Bangladeshi Heritage	31	1.2	40	1.3
Mixed Heritage	154	5.8	192	6.1
Any Other Ethnic Minority Heritage	62	2.3	93	2.9
English as an Additional Language (EAL)	268	10.1	354	11.2
Child needs EAL support at Year 6 (missing 8.8%)	62	2.3	65	2.1
Number of siblings in the house at KS1				
No siblings	407	15.3	502	15.8
1 - 2 siblings	1860	69.8	2147	67.7
3+ siblings	366	13.7	455	14.3
Early years Home Learning Environment (HLE) Index (missing 4%)				
0 – 13	248	9.3	308	9.7
14 – 19	564	21.2	665	21.0
20 – 24	610	22.9	727	22.9
25 – 32	823	30.9	960	30.3
33 – 45	302	11.3	346	10.9
Type of Pre-School				
Nursery class	470	17.6	588	18.5
Playgroup	523	19.6	609	19.2
Private day nursery	456	17.1	516	16.3
Local Authority day nursery	358	13.4	433	13.7
Nursery schools	448	16.8	519	16.4
Integrated (Combined) centres	154	5.8	192	6.0
Home	255	9.6	315	9.9

Mother's Qualifications				
None	532	20.7	647	21.4
Vocational	389	15.2	442	14.6
16 Academic	953	37.2	1118	37.0
18 Academic	210	8.2	257	8.5
Degree or equivalent	325	12.7	381	12.6
Higher degree	116	4.5	131	4.3
Other professional	39	1.5	46	1.5
Father's Qualifications				
None	416	16.0	484	15.8
Vocational	296	11.4	346	11.3
16 academic	583	22.5	676	22.1
18 academic	187	7.2	223	7.3
Degree or equivalent	336	13.0	378	12.3
Higher degree	129	5.0	165	5.4
Other professional	29	1.1	32	1.1
No father information	618	23.8	757	24.7
Family Highest SES				
Professional Non Manual	340	12.8	398	12.5
Other Professional Non manual	574	21.5	670	21.1
Skilled Non Manual	488	18.3	588	18.5
Skilled Manual	535	20.1	615	19.4
Semi-Skilled	277	8.7	215	8.1
Unskilled	49	1.8	64	2.0
Unemployed / Not working	426	16.0	483	15.2
FSM at Year 6 (or earlier)				
Free School Meals (FSM) (at Year 6 or earlier)	449	16.9	564	17.8
Family earned income				
No salary	511	19.2	569	17.9
£ 2,500 – 17,499	440	16.5	485	15.3
£ 17,500 – 29,999	371	13.9	411	13.0
£ 30,000 – 37,499	245	9.2	271	8.5
£ 37,500 – 67,499	427	16.0	470	14.8
£ 67,500 – 132,000+	164	6.2	173	5.5
No salary data	505	19.0	792	25.0
Total Multiple Disadvantage Index				
0 (low disadvantage)	574	21.5	644	20.3
1	667	25.0	781	24.6
2	533	20.0	613	19.3
3	322	12.1	391	12.3
4	192	7.2	257	8.1
5 plus (high disadvantage)	174	6.5	213	6.7

Section 2: Social/behavioural measures in Year 6

An extended version of the Strengths and Difficulties Questionnaire (Goodman, 1997) was used to measure different features of children's social/behavioural development in Year 1, 2, 5 and 6. This social/behavioural child profile was completed by the EPPE 3-11 child's class teacher (or in some cases by another member of staff who knew the EPPE 3-11 child well). Similar to the analysis of Year 5 social/behavioural data (see Sammons et al., 2007a), both principal component analysis and confirmatory factor analysis were used to identify the main underlying dimensions of social behaviour in Year 6 and to see if the social/behavioural factors were similar to Year 5 results (details of these analyses are in Appendix 2). Both analyses replicated the Year 5 findings in defining the main four aspects of social behaviour: 'Self-regulation', 'Pro-social' behaviour, 'Hyperactivity' and 'Anti-social' behaviour. The specific questionnaire items found to be associated with each of the four social/behavioural dimensions are presented in Box 1.

Box 1: The specific items associated with each social/behavioural dimension in Year 6 (age 11)

<p>'Self-regulation' ($\alpha=0.87$)</p> <ol style="list-style-type: none"> 1. Likes to work things out for self; seeks help rarely 2. Does not need much help with tasks 3. Chooses activities on their own 4. Persists in the face of difficult tasks 5. Can move on to a new activity after finishing a task 6. Open and direct about what she/he wants 7. Confident with others 8. Shows leadership in group work 9. Can take responsibility for a task 	<p>'Pro-social' behaviour ($\alpha=0.87$)</p> <ol style="list-style-type: none"> 1. Considerate of other people's feelings 2. Shares readily with other children (treats, toys, etc.) 3. Helpful if someone is hurt, upset or feeling ill 4. Kind to younger children 5. Often volunteers to help others (teachers, other children) 6. Offers to help others having difficulties with a task 7. Sympathetic to others if they are upset 8. Apologises spontaneously
<p>'Hyperactivity' ($\alpha=0.87$)</p> <ol style="list-style-type: none"> 1. Restless, overactive, cannot stay still for long 2. Constantly fidgeting or squirming 3. Easily distracted, concentration wanders 4. Thinks things out before acting 5. Sees tasks through to the end, good attention span 6. Quickly loses interest in what she/he is doing 7. Gets over excited 8. Easily frustrated 9. Impulsive, acts without thinking 10. Can behave appropriately during less structured sessions 11. Fails to pay attention 12. Makes careless mistakes 	<p>'Anti-social' behaviour ($\alpha=0.75$)</p> <ol style="list-style-type: none"> 1. Often fights with other children or bullies him 2. Often lies or cheats 3. Steals from home, school or elsewhere 4. Vandalises property or destroys things 5. Shows inappropriate sexual behaviour toward others 6. Has been in trouble with the law

For further analyses of social/behavioural data, scores on each social/behavioural dimension were calculated as a mean of all items corresponding to each dimension. Higher scores indicate better behaviour for 'Self-regulation' and 'Pro-social' behaviour. By contrast, lower scores indicate better behaviour (in terms of lower incidence reported by teacher ratings) for 'Hyperactivity' and 'Anti-social' behaviour. Note that scores on all social/behavioural measures are skewed towards the more desirable end of the scale. This is especially important for the more negative aspects of social behaviour where raised scores indicating potential maladaptive behaviour (using the cut-off point suggested by Goodman) are only evident for a very small minority of children (only 3.9%) can be considered as showing abnormal levels of 'Anti-social' behaviour and similarly a small proportion (7.4%) of children as showing abnormal 'Hyperactivity' levels in Year 6. Similarly, just under ten per cent (9.8%) of children show extremely low levels of 'Pro-social' behaviour and just under twelve per cent (11.5%) of children show very low levels of 'Self-regulation' in Year 6. It is important to note that very few (only 1.9%) of children had abnormal scores on both 'Hyperactivity' and 'Anti-social' behaviour. Similarly, very few (only 1.2%) of children had abnormal scores on all four aspects of social behaviour. Most children are

rated positively by their teachers in terms of these features of social behaviour, and the results are in line with other research on social behaviour and with the distribution of scores for social/behavioural measures for the EPPE 3-11 sample at younger ages.

2.1 Associations between social/behavioural development and cognitive attainment and between the different aspects of social behaviour over time

In order to explore the relationships between children’s social/behavioural and cognitive outcomes at the end of Year 6, and between different aspects of social behaviour over time correlations were calculated on available data. Children’s self regulating behaviour was strongly and positively correlated with both English ($r=0.60$) and Mathematics ($r=0.57$), indicating those who show higher ‘Self-regulation’ also do well in English and Mathematics at the end of Year 6. These correlations are notably stronger than those found at younger ages suggesting that this feature of social behaviour is likely to become more important for academic success as children move through primary school. Other aspects of social behaviour were also significantly correlated with cognitive attainment in the expected direction, but the correlations between these dimensions of social behaviour and attainment were of noticeably smaller magnitude in comparison to ‘Self-regulation’ (See Table 2.1). The high correlations between cognitive attainment and ‘Self-regulation’ is expected since similar results were obtained in previous years (see Sammons et al., 2007a) and, as hypothesized before, it may indicate a stronger cognitive component to ‘Self-regulation’ in comparison to other aspects of social behaviour.

Table 2.1: Correlations between social behaviour and cognitive attainment in Year 6 (age 11)

	‘Self-regulation’	‘Pro-social’ behaviour	‘Hyperactivity’	‘Anti-social’ behaviour	English	Mathematics
‘Self-regulation’	1					
‘Pro-social’ behaviour	0.59* (N=2660)	1				
‘Hyperactivity’	-0.66* (N=2661)	-0.61* (N=2663)	1			
‘Anti-social’ behaviour	-0.40* (N=2658)	-0.54* (N=2660)	0.57* (N=2661)	1		
English	0.60* (N=2347)	0.31* (N=2349)	-0.47* (N=2350)	-0.25* (N=2348)	1	
Mathematics	0.57* (N=2354)	0.22* (N=2356)	-0.38* (N=2357)	-0.22* (N=2356)	0.69* (N=2664)	1

* $p < 0.01$

The social/behavioural scales are moderately to strongly associated with each other. The presence of correlations between the social behaviour measures is to be expected since different aspects of social behaviour are likely to be associated with each other. The point of interest here is the specific associations and their magnitude. The highest association is a negative association between ‘Hyperactivity’ and ‘Self-regulation’ ($r=-0.66$), indicating that children who are more hyperactive are also likely to have lower ‘Self-regulation’ in Year 6. Similarly strong correlations are found between ‘Hyperactivity’ and ‘Pro-social’ behaviour ($r= -0.61$), and ‘Self-regulation’ and ‘Pro-social’ behaviour ($r=0.59$), indicating that children who show higher levels of ‘Pro-social’ behaviour are also less hyperactive and have higher levels of ‘Self-regulation’. ‘Anti-social’ behaviour is most strongly correlated with ‘Hyperactivity’ ($r=0.57$), which was expected, indicating that children who exhibit ‘Anti-social’ behaviour are also more likely to be highly hyperactive. ‘Anti-social’ behaviour is also negatively correlated with ‘Pro-social’ behaviour and ‘Self-regulation’, indicating that children who exhibit ‘Anti-social’ behaviour are also more likely to have reduced levels of positive social behaviour. Correlations between ‘Anti-social’ behaviour and cognitive attainment in Year 6 are significant but relatively lower, which was expected since the results are similar to analyses of data on younger age groups (see Sammons et al., 2004a; see Sammons et al., 2004b; Sammons et al., 2007a).

Table 2.2 presents correlations between different aspects of social behaviour between the end of Key Stage 2 (Year 6) and end of Key Stage 1 (Year 2). The diagonal (shaded) represents the correlations between the same social construct at different points in time. High correlations on this diagonal relative to the rest indicate that a given construct is measuring the same aspect of social behaviour over time.

Table 2.2: Correlations between social behaviour in Year 2 (age 7) and in Year 6 (age 11)

Year 6 \ Year 2	Year 6: 'Self-regulation'	Year 6: 'Pro-social' behaviour	Year 6: 'Hyperactivity'	Year 6: 'Anti-social' behaviour
Year 2: 'Self-regulation'	0.55* (N=2345)	0.34* (N=2347)	-0.41* (N=2348)	-0.22* (N=2345)
Year 2: 'Pro-social' behaviour	0.38* (N=2345)	0.42* (N=2347)	-0.41* (N=2348)	-0.31* (N=2345)
Year 2: 'Hyperactivity'	-0.48* (N=2346)	-0.38* (N=2348)	0.54* (N=2349)	0.31* (N=2346)
Year 2: 'Anti-social' behaviour	-0.28* (N=2340)	-0.34* (N=2342)	0.36* (N=2343)	0.43* (N=2340)

* p < 0.01

Fairly strong to moderate relationships are found for all four aspects of social behaviour over time: 'Self-regulation' (r=0.55), 'Hyperactivity' (r=0.54), 'Anti-social' behaviour (r=0.43) and 'Pro-social' behaviour (r=0.42). All aspects of social behaviour show stronger correlations with themselves over time than with the other aspects of social behaviour. In order to provide stronger evidence that the same aspect of social behaviour is measured over time we conducted multilevel analyses using prior social/behavioural measures as predictors of Year 6 social/behavioural outcomes. Table 2.3 shows which measures of prior social/behavioural development, at the end of Year 2, are significant predictors of the four main measures of social/behavioural development identified from teachers' ratings at the end of Year 6.

Table 2.3: Multilevel model estimates of prior social/behavioural development measured at Year 2 (age 7) on Year 6 (age 11) social/behavioural outcomes

	Year 6: 'Self-regulation'	Year 6: 'Pro-social' behaviour	Year 6: 'Hyperactivity'	Year 6: 'Anti-social' behaviour
	Estimate (standard error) N=2337	Estimate (standard error) N=2339	Estimate (standard error) N=2340	Estimate (standard error) N=2337
Intercept	1.921 (0.100)***	2.315 (0.107)***	1.088 (0.091)***	0.763 (0.058)***
Year 2: 'Self-regulation'	0.388 (0.023)***	Not significant	-0.057 (0.021)**	Not significant
Year 2: 'Pro-social'	Not significant	0.234 (0.024)***	-0.081 (0.021)***	-0.041 (0.013)**
Year 2: 'Hyperactivity'	-0.209 (0.026)***	-0.166 (0.028)***	0.399 (0.023)***	0.068 (0.015)***
Year 2: 'Anti-social'	-0.090 (0.032)**	-0.205 (0.035)***	0.140 (0.030)***	0.283 (0.019)***

*** p < 0.001; ** p < 0.01; * p < 0.05

As expected, each aspect of social behaviour measured at the earlier time point was the strongest predictor of the same aspect measured at Year 6. Although predicting the same social behaviour over time, earlier 'Self-regulation' was not a significant predictor of 'Pro-social' and

'Anti-social' behaviour and was a very weak, but still significant, predictor of later 'Hyperactivity'. Similarly, 'Pro-social' behaviour was not a significant predictor for later 'Self-regulation' and was a very weak predictor of later negative aspects of social behaviour in Year 6 (i.e., 'Hyperactivity' and 'Anti-social' behaviour). These results also indicate that earlier 'Pro-social' behaviour is not a good indicator for increase or reduction in negative aspects of social behaviour over time or for improvement in 'Self-regulation' over time. Similarly, earlier 'Self-regulation' is not a good indicator for improvement in 'Pro-social' behaviour or for reduction of 'Hyperactivity' or 'Anti-social' behaviour between Year 2 and Year 6.

2.2 School and child level variations in Social/behavioural outcomes at Year 6

As mentioned before, this research uses multilevel models in order to take into account clustering within a sample (e.g., in our sample children are clustered within a Year 6 primary school) and therefore, the total outcome variance can be partitioned into individual and school level variance. In order to show what amounts of variation in social/behavioural outcomes exist between primary schools in our sample at the end of Key Stage 2, we fitted the null models with no explanatory variables included for the four social/behavioural outcomes (see Table A.4.1 in Appendix 4). The intra-school correlation measures the extent to which the scores of children in the same primary schools resemble each other as compared with those from children at different schools. The intra-school correlations for the social/behavioural measures indicate that approximately six to seventeen per cent of the variation in children's social behaviour is related to differences between individual primary schools; while the majority of the variation reflects differences between individual children. These proportions are of similar magnitude to those identified for the social/behavioural outcomes in previous years. The greatest variation between primary schools is for 'Pro-social' behaviour (17%) and the least for 'Anti-social' behaviour (6%). Caution is needed in interpreting the intra-school correlations because approximately sixty per cent of the primary schools in our analysis had only one EPPE 3-11 child in attendance and the average number of EPPE 3-11 children per school is 2.6 (maximum = 40). The observed intra-school correlations for this sample therefore, are likely to be a conservative estimate of the extent of any differences between schools. Nonetheless, for all four outcomes there is evidence of school level variation and, therefore, it is appropriate to use multilevel analyses as this improves the estimation of the impact of different child, family and HLE influences (the fixed effects at level 1).

Section 3: The Impact of Child, Family and Home Learning Environment on Social/Behavioural Outcomes in Year 6

This section presents the results of analyses which explored the impact of various background characteristics on children’s social behaviour in Year 6. Contextualised multilevel analyses were conducted in order to identify which child, family and home learning environment (HLE) characteristics, measured in the EPPE 3-11 study, had a significant relationship with EPPE 3-11 children’s outcomes at the end of Key Stage 2. For each significant predictor we calculated an effect size (ES) in order to present a ‘net’ impact (effect size), showing the unique contribution of a given predictor to a child’s outcome after controlling for all other predictors. Detailed results of final contextualised models for each social/behavioural outcome are presented in Appendix 3.

The following measures were used in the analyses:

- Child factors (e.g. gender, ethnicity, early developmental problems, early behavioural problems, need for EAL support)
- Family factors (e.g. eligibility for free school meals [FSM], socio-economic status [SES], parent’s qualification, family earned income),
- Home Learning Environment (HLE) in the early years (how often parents read to the child, teach the child the alphabet, play with letters and numbers, teach songs and nursery rhymes, paint and draw etc.) before starting primary school,
- Parental activities during Key Stage 1 (KS1) such as the frequency of reading to the child, taking the child out on educational visits, computing activities, play, etc. (see Appendix 5 for details of these measures).

3.1 Child Measures

Gender

Table 3.1 provides descriptive statistics comparing boys and girls on social/behavioural development at Year 6. There are marked gender differences on all measures of social/behavioural development (Table 3.1).

Table 3.1: Gender differences in social/behavioural development at the end of Year 6 (age 11)*

		Male	Female	Total
‘Self-regulation’	Mean	2.27	2.42	2.34
	S.d.	0.50	0.44	0.48
	Net Effects (ES)	0	0.30	
‘Pro-social’ behaviour	Mean	2.34	2.63	2.48
	S.d.	0.50	0.39	0.47
	Net Effects (ES)	0	0.71	
‘Hyperactivity’	Mean	1.73	1.45	1.60
	S.d.	0.47	0.34	0.43
	Net Effects (ES)	0	-0.71	
‘Anti-social’ behaviour	Mean	1.16	1.07	1.11
	S.d.	0.30	0.18	0.25
	Net Effects (ES)	0	-0.38	

* ‘Male’ as the comparison category

On average teachers rated boys as displaying more Hyperactive and ‘Anti-social’ behaviour than girls, whereas girls were rated more highly on ‘Self-regulation’ and ‘Pro-social’ behaviour than boys. Differences between the genders are especially large for ‘Pro-social’ behaviour and

'Hyperactivity' where the effect size is 0.71 for both measures. As noted above, the effect sizes for each significant predictor were calculated from the contextualised models controlling for other significant background characteristics. Therefore, it is evident that even after controlling for other background factors the gender differences on social/behavioural measures remain strong. These findings of gender differences are in line with those found at younger ages in the EPPE 3-11 research.

Ethnic Groups

Ethnic group was tested as a predictor variable in contextualised models for each social/behavioural outcome. However, several ethnic groups are very small in size and therefore their results should be treated with caution. Nonetheless, ethnic differences in teachers' ratings of social/behavioural development were significant for all four social/behavioural outcomes in Year 6 and the results are in line with findings from other studies (see Table 3.2).

Table 3.2: Differences among ethnic groups in social/behavioural development at the end of Year 6*

Ethnic groups		White UK	White European	Black Caribbean	Black African	Any other Ethnic	Indian	Pakistani	Bangladeshi	Mixed Race
'Self-regulation'	Mean	2.36	2.22	2.34	2.29	2.33	2.35	2.27	2.33	2.27
	S.d.	0.47	0.49	0.43	0.42	0.48	0.50	0.48	0.49	0.53
	Net Effects (ES)	0	-0.18	0.11	0.01	0.08	0.02	0.29	0.37	-0.15
'Pro-social' behaviour	Mean	2.50	2.40	2.36	2.37	2.36	2.51	2.42	2.41	2.42
	S.d.	0.47	0.48	0.51	0.44	0.47	0.47	0.46	0.54	0.47
	Net Effects (ES)	0	-0.18	-0.26	-0.21	-0.28	0.05	0.07	0.06	-0.17
'Hyperactivity'	Mean	1.59	1.65	1.65	1.65	1.69	1.49	1.60	1.47	1.67
	S.d.	0.43	0.41	0.46	0.45	0.47	0.38	0.43	0.34	0.46
	Net Effects (ES)	0	0.05	0.02	0.01	0.13	-0.34	-0.45	-0.55	0.16
'Anti-social' behaviour	Mean	1.11	1.10	1.18	1.13	1.16	1.06	1.13	1.09	1.11
	S.d.	0.25	0.19	0.30	0.24	0.28	0.13	0.31	0.21	0.25
	Net Effects (ES)	0	-0.09	0.22	-0.01	0.13	-0.27	-0.12	-0.27	0.08
Total N		1966	88	104	54	62	58	144	31	154

* White UK as the comparison category¹⁰

Even though the raw differences between some ethnic groups are generally small, after controlling for other background characteristics there were significant effects for certain ethnic groups on each social/behavioural outcome¹¹. In particular, children of Pakistani heritage and Bangladeshi heritage had significantly higher scores in 'Self-regulation' than children of White UK

¹⁰ Any category of a predictor variable can be used as a reference group. The overall calculations (e.g. model's variance, model fit, etc.) are not affected by the choice of reference group; the absolute differences (in terms of effect size) between the different categories of the predictor variable also remain the same. The statistical models show the relative differences between categories in relation to the outcome measure. We select the category as a reference group that would show the pattern of association between the predictor variable and the outcome measure in the clearest possible way, the only restriction that the reference category is of a reasonable size. When the relationship is linear we would typically choose the lowest or the highest performing group as a reference category (e.g. highest qualification or none). If the relationship is non-linear we would select the largest category (e.g. ethnicity: White UK as the reference group). Occasionally we would select the category that is of most interest (e.g. pre-school quality: low quality) regardless of the type of association.

¹¹ Note: findings regarding ethnicity should be interpreted with caution, as the numbers of children in some of the ethnic groups are relatively small.

heritage (ES=0.29 and ES=0.37, respectively). Similarly, children of Indian (ES=-0.34), Pakistani heritage (ES=-0.45) and Bangladeshi heritage (ES=-0.55) had lower levels of 'Hyperactivity' in Year 6 than children of White UK heritage.

In regards to 'Pro-social' behaviour, there was a significant net effect for children of Black Caribbean heritage (ES=-0.26), Mixed race heritage (ES=-0.17) and Any other ethnic minority heritage (ES=-0.28) suggesting that children from these minority groups tend to be rated by teachers as showing lower levels of 'Pro-social' behaviour in Year 6 than children of White UK heritage. In addition, children of Black Caribbean (ES=0.22) heritage are rated as showing higher levels of 'Anti-social' behaviour, whereas children of Indian (ES=-0.27) heritage and Bangladeshi heritage (ES=-0.27) tend to be rated as showing lower levels of 'Anti-social' behaviour than children of White UK heritage and these differences are statistically significant for this sample.

It should be stressed that these differences relating to ethnicity are calculated net of the influences of all other factors in the model, including socio-economic status (SES) and mother's qualification level in which there are also significant differences between ethnic groups. The differences reported here are in line with other findings.

Language

English as an Additional Language (EAL) was a significant predictor of both cognitive and social/behavioural outcomes at earlier ages for this sample, but not at age 10 or age 11. Only about two per cent of children in the EPPE 3-11 sample were identified as needing EAL support in Year 6 (see Section 1). Therefore, further analysis was conducted using 'Need of EAL support' as an indicator.

Need of EAL support was found to be an important predictor of 'Self-regulation' and 'Hyperactivity' at age 10 (see Sammons et al., 2007a). The same results are found at age 11. When all other factors are taken into account, differences between the groups were statistically significant and moderately strong for 'Self-regulation' (ES=-0.65) and 'Hyperactivity' (ES=0.46). The findings suggest that children still in need of EAL support at age 11 are rated by their teachers as having lower levels of 'Self-regulation' and higher levels of 'Hyperactivity'.

Early behavioural and developmental problems

Early behavioural and developmental problems reported by parents during the pre-school period (during parent interviews) are still shown to be significant predictors of social/behavioural outcomes in Year 6. Children who had early behavioural problems had significantly lower levels of 'Self-regulation' (ES=0.25) and 'Pro-social' behaviour (ES=0.24) and significantly higher levels of 'Hyperactivity' (ES=0.31) and 'Anti-social' behaviour (ES=0.24) in Year 6. In contrast, having early developmental problems was found to be a significant predictor only for 'Self-regulation' (ES=-0.47), suggesting that children who had one or more early developmental problems had lower levels of 'Self-regulation' in Year 6. Similar findings were found in analyses of the child sample at younger ages.

Child's Age

Child's age in months was used in all contextualised models in order to control for potential differences in social/behavioural outcomes in Year 6. Age had a relatively small but significant relationship with 'Self-regulation' (ES=0.17) and 'Hyperactivity' (ES=-0.10). Children who are older for their school year (autumn born) had higher levels of 'Self-regulation' and lower levels of 'Hyperactivity'. This was expected since 'Self-regulation' has strong links with cognitive outcomes and age is known to influence children's attainment (hence the development of age standardised tests), therefore it may be expected that as children get older their 'Self-regulation' tends to increase. Similarly, levels of 'Hyperactivity' tend to reduce for older children in a year group. One of the factors that may help account for the lower attainment of children who are young for their year (in comparison with other children in their school year) may be differences in 'Self-regulation'.

Summary of child measures

Overall, gender, ethnicity and early behavioural problems (as reported by parents at the start of the study) had a significant relationship with all social/behavioural outcomes in Year 6. In addition, early developmental problems (as reported by parents at the start of the study) and need of English as an additional language (EAL) support had a significant association with 'Self-regulation' but not with other social/behavioural measures, with the exception of the need of EAL support being a significant predictor of 'Hyperactivity'. Other child measures such as early health problems (as reported by parents at the start of the study), birth weight, and number of siblings living in the house were not found to be significant predictors of social/behavioural outcomes in Year 6 after controlling for other child factors. This suggests that having early health problems (as reported by parents at the start of the study), low birth weight, and not having any siblings are no longer associated with negative social/behavioural outcomes in Year 6 in contrast to findings for the sample in previous analyses in Key Stage 1 and 2 (see Sammons et al., 2007a).

3.2 Family Measures

Mother's Qualifications

After controlling for all other demographic factors, in terms of child and family characteristics, mother's qualification level was found to be a strong predictor for all four social/behavioural outcomes in Year 6. The associations between mother's qualification levels with each social/behavioural outcome appear to be fairly linear (see Table 3.3). The findings suggest that with higher mother's qualification levels children have higher 'Self-regulation' (ES=0.55) and 'Pro-social' behaviour (ES=0.36) as well as lower levels of 'Hyperactivity' (ES=-0.45) and 'Anti-social' behaviour (ES=-0.27). These findings are in line with the results of analyses for previous years (see Sammons et al., 2007a), but they show a stronger effect of mother's qualification level on Year 6 outcomes, suggesting that the influence of mother's qualification level appears to be stronger for later social/behavioural outcomes as children move through primary school.

Table 3.3: Mother's qualifications and differences in social/behavioural development at the end of Year 6*

Mother's Highest Qualification level		None	Vocational	16 Academic	18 Academic	Degree	Higher degree	Other professional
'Self-regulation'	Mean	2.15	2.29	2.35	2.46	2.53	2.59	2.47
	S.d.	0.48	0.49	0.47	0.44	0.39	0.35	0.41
	Net Effects (ES)	0	0.09	0.25	0.38	0.45	0.55	0.31
'Pro-social' behaviour	Mean	2.37	2.44	2.51	2.53	2.58	2.58	2.55
	S.d.	0.48	0.49	0.47	0.44	0.45	0.43	0.44
	Net Effects (ES)	0	0.07	0.22	0.27	0.36	0.31	0.28
'Hyperactivity'	Mean	1.74	1.64	1.57	1.52	1.46	1.42	1.43
	S.d.	0.47	0.45	0.42	0.36	0.35	0.35	0.35
	Net Effects (ES)	0	-0.11	-0.27	-0.33	-0.41	-0.45	-0.53
'Anti-social' behaviour	Mean	1.17	1.14	1.10	1.08	1.06	1.05	1.07
	S.d.	0.31	0.29	0.23	0.18	0.16	0.17	0.20
	Net Effects (ES)	0	-0.04	-0.20	-0.23	-0.27	-0.21	-0.19
Total N		532	389	953	210	325	116	39

* 'No qualifications' as the comparison category

Father's Qualifications

Father's qualification level did not appear to be as strong a predictor of social/behavioural development in Year 6 as mother's qualification level. In addition, in our sample there are twenty-four per cent of children living without a father and there is no information on qualification level for these fathers. Nevertheless, after controlling for other background factors, father's qualification level appeared to be a significant predictor for 'Self-regulation' (ES=0.29) and 'Hyperactivity' (ES=-0.30) in Year 6. Contrary to the findings for mother's qualification level, the association between father's qualifications and teacher's ratings of children's 'Self-regulation' and 'Hyperactivity' levels was not linear. However, the findings suggest that children whose father has a degree or higher degree have higher levels of 'Self-regulation' and lower levels of 'Hyperactivity' in Year 6 than children whose father has no qualifications.

Family earned income

Family earned income, reported by parents when their children were in Key Stage 1, was a significant predictor of 'Self-regulation', 'Pro-social' behaviour and 'Hyperactivity' in Year 6, even after controlling for all other background characteristics, such as eligibility for free school meals (FSM) and parent's qualification levels. The net effects in Table 3.4 show that children who come from families with medium and high earned income have higher levels of 'Self-regulation' and 'Pro-social' behaviour in Year 6 than children who come from families with low income or no earned income. In addition, children who come from families with low-medium income level have lower levels of 'Hyperactivity' in Year 6 than children who come from families with low income or no earned income. These findings were expected since in previous reports family earned income had a moderate effect as a predictor of better children's outcomes in earlier years.

Table 3.4: Differences in social/behavioural development at the end of Year 6 (age 11) by family earned income*

Family earned income		No Salary	£2,500 to £17,499 Low	£17,500 to £29,999 Low-Medium	£30,000 to £37,499 Medium	£37,500 to £67,499 High	£67,500 to £132,000+ Very High
'Self-regulation'	Mean	2.23	2.31	2.40	2.43	2.51	2.53
	S.d.	0.47	0.48	0.46	0.44	0.41	0.37
	Net Effects (ES)	0	0.13	0.27	0.33	0.38	0.29
'Pro-social' behaviour	Mean	2.39	2.47	2.55	2.54	2.57	2.58
	S.d.	0.46	0.48	0.46	0.46	0.44	0.43
	Net Effects (ES)	0	0.10	0.25	0.23	0.22	0.17
'Hyperactivity'	Mean	1.69	1.63	1.51	1.56	1.48	1.49
	S.d.	0.45	0.45	0.39	0.42	0.39	0.36
	Net Effects (ES)	0	0	-0.24	-0.08	-0.13	-0.02
'Anti-social' behaviour	Mean	1.16	1.12	1.08	1.09	1.06	1.05
	S.d.	0.29	0.25	0.21	0.23	0.18	0.16
	Net Effects (ES)	ns	ns	ns	ns	ns	ns
Total N		505	440	371	245	427	164

*'No Salary' as comparison category

Free school meals (FSM)

The eligibility for free school meals (FSM), as an indicator of poverty, was a significant predictor for 'Self-regulation' (ES=-0.23), 'Hyperactivity' (ES=0.21) and 'Anti-social' behaviour (ES=0.27) in Year 6, even after controlling for other background characteristics such as family earned income. The findings suggest that children who are eligible for FSM have poorer behaviour, according to their teachers' behaviour ratings, compared to those who are not eligible for FSM. On average,

children eligible for FSM have lower levels of 'Self-regulation' and higher levels of 'Hyperactivity' and 'Anti-social' behaviour. The findings are similar to previous reports on earlier years.

Socio-Economic Status (SES)

After controlling for other background characteristics, family socio-economic status (SES) was a significant predictor for 'Anti-social' behaviour only. The findings suggest that children who come from families in professional non-manual group (i.e., highest SES group) have lower levels of teacher rated 'Anti-social' behaviour than children who come from families in skilled non-manual (ES=0.23), unskilled manual (ES=0.28) and unemployed (ES=0.20) groups. These findings are similar to the findings from earlier years (see Sammons et al., 2004b).

Marital status and change in marital status

Mother's marital status at the end of Key Stage 1 was a significant predictor of 'Pro-social' behaviour in Year 6. The findings suggest that children of separated or divorced mothers have lower levels of teacher rated 'Pro-social' behaviour at the end of Key Stage 2 (ES=-0.18) than children of married mothers. In addition, we looked at the predictive influence of association of change in marital status (i.e., change in marital status from when children were in a pre-school period to when children were in Key Stage 1) with children's social/behavioural outcomes in Year 6. Changes in marital status were coded into four categories: (1) couple at both times, (2) single at both times, (3) change from couple to single and (4) change from single to couple.

Interestingly, after controlling for other background characteristics there were significant differences in 'Hyperactivity' and 'Anti-social' behaviour among children coming from different marital status change groups. The findings suggest that children whose mothers made a change from being single to either getting married or living with a partner have higher levels of 'Hyperactivity' (ES=0.24) and 'Anti-social' behaviour (ES=0.25) than children whose mother's were married or living with a partner at both times. This finding is in line with other research on families where it was found that parent's transition into new marriage is linked with children's increased negative behaviour (Dunn et al., 1998; Dunn, 2002).

Summary of family measures

Out of all of the family factors, mother's qualification level has the strongest effect on all four of the EPPE 3-11 children's social/behavioural outcomes in Year 6. Father's qualification level, family earned income, children's eligibility for FSM, and marital status and change in marital status also had small but significant effects on children's outcomes. Family highest social-economic status (SES) was an important predictor of 'Anti-social' behaviour only. Other family measures, such as having an absent father and mother's employment status, did not have a statistically significant predictive effect on any of the four social/behavioural outcomes in Year 6 over and above the background characteristics already included in the final contextualised models.

3.3 Home Learning Environment (HLE)

Early years Home Learning Environment (HLE)

A number of measures collected at the entry to the study from parent interviews provided an indication of the Home Learning Environment (HLE) in the early years (for further details see Appendix 5 and Melhuish et al., 2008). The Early years HLE measure is based on the frequency of engagement in specific activities involving the child, such as teaching the alphabet, reading to the child, taking the child to the library etc. The scores on the overall Early years HLE index can range from 0 (very low Early Years HLE) to 45 (very high Early Years HLE).

Table 3.5: Differences in social/behavioural development at the end of Year 6 (age 11) by Early years HLE groups*

Early years Home Learning Environment (HLE)		0-13 (very low)	14-19	20-24	25-32	33-45 (very high)
'Self-regulation'	Mean	2.15	2.28	2.31	2.40	2.55
	S.d.	0.50	0.47	0.47	0.47	0.41
	Net Effects (ES)	0	0.14	0.10	0.22	0.42
'Pro-social' behaviour	Mean	2.31	2.44	2.47	2.52	2.61
	S.d.	0.50	0.45	0.48	0.47	0.43
	Net Effects (ES)	0	0.15	0.11	0.17	0.22
'Hyperactivity'	Mean	1.75	1.65	1.61	1.54	1.46
	S.d.	0.48	0.44	0.42	0.42	0.38
	Net Effects (ES)	0	-0.11	-0.11	-0.20	-0.23
'Anti-social' behaviour	Mean	1.17	1.14	1.11	1.09	1.06
	S.d.	0.32	0.28	0.25	0.22	0.17
	Net Effects (ES)	ns	ns	ns	ns	ns
Total N		248	564	610	823	302

*'0-13' (very low) as comparison category

After controlling for child and family characteristics, Early years HLE had a significant net effect on children's 'Self-regulation', 'Pro-social' behaviour and 'Hyperactivity' in Year 6 (see Table 3.5). For all three outcomes, children with a score of 25+ on the Early years HLE had significantly more positive ratings of their behaviour than children with a score below 14 on the Early years HLE. The findings suggest that children with higher Early years HLE have higher levels of 'Self-regulation' (ES=0.42) and 'Pro-social' behaviour (ES=0.22) and lower levels of 'Hyperactivity' (ES=-0.23). These findings show that a child's Early years HLE has a continuing effect on their later social/behavioural development and that this is moderately strong for 'Self-regulation'.

In addition to the Early years HLE, we also tested to see whether later HLE, measured during Key Stage 1, had a significant impact on social/behavioural outcomes in Year 6. Contrary to what was expected none of the KS1 HLE factors were related to children's social/behavioural outcomes in Year 6. The findings suggest that the Early years HLE is a better predictor of later children's outcomes than KS1 HLE.

3.4 Influence of neighbourhood environment

Two sets of measures of neighbourhood environment were used as potential predictors for social/behavioural outcomes in Year 6. A number of measures collected at the entry to the study from parent interviews (when children were in Key Stage 1) provided indicators of neighbourhood safety and social cohesion. Neighbourhood safety was derived from questions asking parents about the frequency of violence and crime in the neighbourhood they lived in and sense of safety walking alone after dark. Neighbourhood social cohesion was derived from questions about the extent to which neighbours do favours for each other, share information on schools or children's activities and visit each other's houses. In addition to these two measures, we also tested to see whether the 2004 Index of Multiple Deprivation (IMD) scores add to the explanation of variance of social/behavioural outcomes in Year 6. The IMD 2004 measure is a nationwide index combining weighted measures of levels of crime, barriers to housing, living environment, education and skills training, health deprivation and disability, employment and income. Each

child was assigned an IMD score based on their home address (postcode) when they joined the study.

Controlling for child, family and HLE characteristics, none of the neighbourhood measures had statistically significant effects on any of the four social/behavioural measures at Year 6. Considering that in these models we controlled for specific family level characteristics, it is likely that these specific family level predictors suppressed any neighbourhood effects. Similar findings were evident for the sample of children from all schools in England where census-derived data had a stronger effect on children’s educational outcomes and therefore suppressed any IMD effects (Melhuish et al., 2006).

3.5 Summary of background influences on each social/behavioural outcome

The contextualised multilevel models tested the net impact of different child, parent and HLE measures while controlling for all other measures simultaneously and thus provide rigorous and conservative estimates of statistical significance for specific background characteristics. The contextualised model shows which set of measures, taken together, provides the best set of predictors of children’s social/behavioural outcomes and which measures show a specific impact over other influences. Summary tables are created for each social/behaviour outcome separately, showing which are the significant predictors in the final contextualised models and helps us understand the relative importance of different sources of influence.¹²

‘Self-regulation’

Gender, early developmental problems (as reported by parents at the start of the study), mother’s qualification level, family earned income and the Early years HLE were the strongest predictors of ‘Self-regulation’ in Year 6 (Table 3.6). Early behavioural problems (as reported by parents at the start of the study), eligibility for free school meals (FSM) and father’s qualification level had smaller but significant effects. Ethnicity and need of EAL support were also strongly associated with ‘Self-regulation’, but the group sizes for these categories are relatively small and, therefore, the interpretation should be treated with caution. In summary, girls, children with no early developmental or behavioural problems (as reported by parents at the start of the study), and children coming from families with higher parent’s qualifications, higher family earned income and higher scores on the Early years HLE have better ‘Self-regulation’ in Year 6 than others.

Table 3.6: ‘Self-regulation’ – factors with significant Net effect at the end of Year 6

Factor	Effect size	Description
Gender	0.30	Girls have higher ‘Self-regulation’ than boys
Ethnicity	0.37	Children of Pakistani heritage and Bangladeshi heritage have higher scores on ‘Self-regulation’ than children of White UK heritage
Early Developmental problems	0.47	Developmental problems a predictor for lower ‘Self-regulation’
Early Behavioural problems	0.25	1 Early behavioural problem = reduced ‘Self-regulation’
Need of EAL support	0.65	Need of EAL support a predictor for lower ‘Self-regulation’
Mother’s qualifications	0.55	Linear: Increasing ‘Self-regulation’ with increasing qualifications
Father’s qualifications	0.29	High qualification = higher ‘Self-regulation’
FSM	0.23	FSM a predictor of lower ‘Self-regulation’
Family income	0.38	Linear: Increasing ‘Self-regulation’ with increasing salary
Early years HLE	0.42	Linear: Increasing ‘Self-regulation’ with increasing HLE scores

¹² The effect sizes in the summary tables are presented without an algebraic sign, but the direction of change is explained in the text.

‘Pro-social’ behaviour

Gender and mother’s qualification level were the strongest predictors of ‘Pro-social’ behaviour in Year 6 (Table 3.7). Early behavioural problems (as reported by parents at the start of the study), family earned income, mother’s marital status and the Early years HLE had a small to moderate effect on children’s outcomes in ‘Pro-social’ behaviour. Ethnicity was also associated with this outcome, but, as mentioned previously, the group sizes for these categories are relatively small and, therefore, the interpretation should be treated with caution. In summary, girls, children with no early behavioural problems (as reported by parents at the start of the study), and children coming from families with higher mother’s qualifications, higher family earned income and higher scores on the Early years HLE have better ‘Pro-social’ behaviour in Year 6 than others.

Table 3.7: ‘Pro-social’ behaviour – factors with significant Net effect at the end of Year 6

Factor	Effect size	Description
Gender	0.71	Girls have higher scores on ‘Pro-social’ behaviour than boys
Ethnicity	0.28	Some minority groups have lower scores than children of White UK heritage e.g., children of Black Caribbean heritage
Early Behavioural problems	0.24	1 Early behavioural problem = reduced ‘Pro-social’ behaviour
Mother’s Qualifications	0.36	Linear: Increasing ‘Pro-social’ behaviour with increasing qualifications
Family income	0.25	Middle and high income band = increased ‘Pro-social’ behaviour
Marital Status	0.18	Separated/Divorced mother a predictor of lower ‘Pro-social’ behaviour
Early years HLE	0.22	High Early years HLE scores = increased ‘Pro-social’ behaviour

‘Hyperactivity’

Similar to positive social/behavioural outcomes, gender and mother’s qualification level were the strongest predictors of ‘Hyperactivity’ in Year 6 (Table 3.8). Early behavioural problems (as reported by parents at the start of the study), father’s qualification level, family earned income, eligibility for free school meals (FSM), mother’s change in marital status and the Early years HLE had small to moderate effects on children’s outcomes in ‘Hyperactivity’. Ethnicity and need of EAL support in Year 6 were also associated with this outcome, but, again, the interpretation should be treated with caution due to small numbers for some groups. In summary, girls, children with no early behavioural problems (as reported by parents at the start of the study), and children coming from families with higher mother’s qualification level, higher family earned income and higher scores on the Early years HLE have lower ‘Hyperactivity’ levels in Year 6 than others. In addition, children whose mothers changed their marital status from being single to either being married or living with a partner had higher ‘Hyperactivity’ levels in Year 6.

Table 3.8: ‘Hyperactivity’ – factors with significant Net effect at the end of Year 6

Factor	Effect size	Description
Gender	0.71	Boys higher on ‘Hyperactivity’ than girls
Ethnicity	0.55	Children of Indian, Pakistani and Bangladeshi heritage were rated by teachers as lower for ‘Hyperactivity’ than children of White UK heritage
Early Behavioural problems	0.31	1+ Early behavioural problems = predictor for increased ‘Hyperactivity’
Need of EAL support	0.46	Need of EAL support a predictor for increased ‘Hyperactivity’
Mother’s qualifications	0.53	Linear: Higher qualifications reduced ‘Hyperactivity’
Father’s qualifications	0.30	High qualifications reduced ‘Hyperactivity’
FSM	0.21	FSM a predictor of increased ‘Hyperactivity’
Family income	0.24	Middle income band a predictor of reduced ‘Hyperactivity’
Change in Marital status	0.24	Single mother who married or started living with a partner = predictor of increased ‘Hyperactivity’
Early years HLE	0.23	High Early years HLE scores = increased ‘Hyperactivity’ behaviour

‘Anti-social’ behaviour

Contrary to other social/behavioural outcomes, significant predictors for ‘Anti-social’ behaviour were not as strong. Gender had the strongest effect on ‘Anti-social’ behaviour, but early behavioural problems (as reported by parents at the start of the study), mother’s qualification level, eligibility for FSM, family SES and mother’s change in marital status also had a significant but small effect on children’s outcomes in ‘Anti-social’ behaviour (Table 3.9). Ethnicity was also associated with this outcome, but, again, the interpretation should be treated with caution due to the small size of some groups. In summary, girls, children with no early behavioural problems (as reported by parents at the start of the study), and children coming from families with higher mother’s qualification levels, higher family socio-economic status (SES) and not eligible for free school meals (FSM), have lower ‘Anti-social’ behaviour levels in Year 6 than others. Similar to results for the ‘Hyperactivity’ outcome, children whose mothers changed their marital status from being single to either being married or living with a partner had higher ‘Anti-social’ behaviour levels in Year 6.

Table 3.9: ‘Anti-social’ behaviour – factors with significant Net effect at the end of Year 6

Factor	Effect size	Description
Gender	0.38	Boys higher than girls
Ethnicity	0.27	Some minority groups lower e.g. Indian, others higher e.g. Black Caribbean than White UK
Early Behavioural problems	0.24	1 Early behavioural problem a predictor for increased ‘Anti-social’ behaviour
Mother’s Qualifications	0.27	Linear: Decreasing ‘Anti-social’ behaviour with increasing qualifications
Family SES	0.28	Skilled non-manual, Unskilled manual, and Unemployed = increased ‘Anti-social’ behaviour
FSM	0.27	Eligibility for FSM is a predictor of ‘Anti-social’ behaviour
Change in Marital status	0.25	Single mother who married or started living with a partner = predictor of increased ‘Anti-social’ behaviour

3.6 Reduction in school and child level variance for social/behavioural outcomes after including child, family and HLE characteristics

The contextualised multilevel models tested the net impact of different child, parent and HLE measures taken together and provided the best set of background predictors of children’s social/behavioural outcomes. In addition to reporting individual predictor’s net effects on each outcome, we can look at the overall impact of child, parent and HLE characteristics taken together (see Table A.4.2 in Appendix 4).

The proportion of variance at the *child level* accounted for by child, family and the HLE factors ranges from eight to twenty per cent, being higher for ‘Hyperactivity’ (20%), ‘Self-regulation’ (16%) and ‘Pro-social’ behaviour (14%) and the lowest for ‘Anti-social’ behaviour (8%). Whilst this represents a significant proportion, the majority of the variation in individual children’s behaviour at the end of Year 6 (age 11) is attributable to other factors.

Reductions in the *school level* variance reflect the importance of school composition and intake characteristics in accounting for differences in pupil outcomes between schools. When child and family background factors such as gender, ethnicity, eligibility for FSM, family income etc. are taken into account, differences between schools considerably decrease for ‘Hyperactivity’ (31%) and ‘Anti-social’ behaviour (22%), whereas there is a smaller decrease for ‘Self-regulation’ (13%) and ‘Pro-social’ behaviour (12%) indicating that for the social/behavioural outcomes, particularly ‘Hyperactivity’ and ‘Anti-social’ behaviour, a considerable proportion of the variation between schools is attributable to differences in school composition. While these proportions of variance are high, they are notably lower than the proportions reported for English (48%) and Mathematics (54%) in Year 6 where a large proportion of the school level variance was attributed to school intake composition (see Sammons et al., *forthcoming*).

Overall, background factors account for around a fifth (21%) of the total variance in 'Hyperactivity' in Year 6, with somewhat lower proportions for 'Self-regulation' (16%), 'Pro-social' behaviour (14%) and 'Anti-social' behaviour (9%).

Section 4: The impact of background characteristics on social/behavioural developmental progress from Year 2 to Year 6

In a previous section we explored the set of background characteristics that best predict children's social/behavioural *levels* at Year 6. In this section, we focus on whether the child, family and HLE characteristics, found to be significant in predicting social behaviour at the end of Year 6 were also significantly related to children's social/behavioural *developmental progress* from Year 2 to Year 6. Value added analyses (i.e., analyses in which prior developmental level is included as a predictor) were conducted for the four social/behavioural outcomes to explore changes in social/behavioural development from Year 2 to Year 6. We expanded the contextualised multilevel models to include prior social/behavioural developmental level, using the relevant social/behavioural outcomes at Year 2.

Using prior (Year 2) developmental level as a predictor in the contextualised models for Year 6 tends to render some background factors in these models non significant since some (or all) of their influence could be absorbed in the Year 2 outcome measures (to which background also contributes). Any effect left over after prior developmental level is taken into account would therefore indicate that a given factor not only predicts level of development at a given time point (developmental level) but also predicts a rate of change in a particular outcome over time (progress or development). Results from the value added analyses are presented in Table 4.1.

Improvement in 'Self-regulation'

After controlling for prior developmental level and other child-level background characteristics, ethnicity, early behavioural problems (as reported by parents at the start of the study) and Early HLE factors were no longer found to be statistically significant in the model. The value added analysis showed that girls, children with no early developmental problems (as reported by parents at the start of the study) and those who do not have a need for English as an additional language (EAL) support at Year 6 have a greater improvement in 'Self-regulation' from Year 2 to Year 6 than other children. Interestingly, all family background characteristics that were significant in the contextualised model reported earlier were also significant in the value added model. Children who come from families with higher parent's qualification levels, and those who come from families with higher earned income, and those not eligible for free school meals (FSM), show a greater improvement in 'Self-regulation' over time.

Improvement in 'Pro-social' behaviour

The value added analysis showed that girls and children who come from families with higher mother's qualification level and from families that have higher earned income show a greater improvement in 'Pro-social' behaviour from Year 2 to Year 6 than others. Ethnicity had a significant relationship with change in 'Pro-social' behaviour levels suggesting that children of Black Caribbean heritage had less improvement in 'Pro-social' behaviour than children of White UK heritage. Marital status was also a significant predictor in the value add analysis and showed a similar pattern of results suggesting that children of separated or divorced mothers also made less improvement in 'Pro-social' behaviour than others. Out of all significant factors from the contextualised model, only early behavioural problems (as reported by parents at the start of the study) and Early HLE had no significant relationship with improvement in 'Pro-social' behaviour.

Table 4.1: The impact of child, family and HLE characteristics on Social/Behavioural developmental progress at Year 6 controlling for Year 2 developmental level

'Self-regulation'	Effect is	Description
Gender	Significant	Girls showed greater improvement in 'Self-regulation' than boys (ES=0.20)
Ethnicity	NS	
Early Developmental problems	Significant	
Early Behavioural problems	NS	
Need of EAL support	Significant	
Mother's qualification level	Significant	Linear: greater improvement in 'Self-regulation' with increasing qualifications (ES=0.45)
Father's qualification level	Significant	High qualification = greater improvement in 'Self-regulation' (ES=0.27)
FSM	Significant	FSM a predictor of less improvement in 'Self-regulation' (ES=-0.17)
Family income	Significant	Linear: greater improvement in 'Self-regulation' with increasing salary (ES=0.22)
Early years HLE	NS	
'Pro-social' behaviour		Description
Gender	Significant	Girls showed greater improvement in 'Pro-social' behaviour than boys (ES=0.54)
Ethnicity	Significant	
Early Behavioural problems	NS	
Mother's qualification level	Significant	Linear: Greater improvement in 'Pro-social' behaviour with increasing qualification level (ES=0.25)
Family income	Significant	Middle and high income band = greater improvement in 'Pro-social' behaviour (ES=0.24)
Marital Status	Significant	Separated/Divorced mother a predictor of slower improvement in 'Pro-social' behaviour (ES=-0.17)
Early years HLE	NS	
'Hyperactivity'		Description
Gender	Significant	Girls larger reduction in 'Hyperactivity' than boys (ES=-0.57)
Ethnicity	Significant	
Early Behavioural problems	Significant	
Need of EAL support	Significant	
Mother's qualifications	Significant	
Father's qualifications	Significant	Linear: Higher qualifications larger reduction in 'Hyperactivity' (ES=-0.64)
FSM	NS	High qualifications larger reduction in 'Hyperactivity' (ES=-0.24)
Family income	Significant	Middle income band a predictor of larger reduction in 'Hyperactivity' (ES=-0.22)
Change in Marital status	NS	
Early years HLE	NS	
'Anti-social' behaviour		Description
Gender	Significant	Girls larger reduction in 'Anti-social' behaviour than boys (ES=-0.28)
Ethnicity	Significant	
Early Behavioural problems	NS	
Mother's Qualifications	NS	Professional non-manual = larger reduction in 'Anti-social' behaviour (ES=0.48)
Family SES	Significant	
FSM	Significant	
Change in Marital status	NS	
		FSM a predictor of less reduction in 'Anti-social' behaviour (ES=0.18)

Reduction in ‘Hyperactivity’

Of the significant factors from the contextualised model, eligibility for FSM, change in marital status and Early HLE no longer showed significant associations with reductions in ‘Hyperactivity’ from Year 2 to Year 6. The value added analysis indicated that girls, children with no early behavioural problems (as reported by parents at the start of the study) and children who come from families with higher mother’s and father’s qualification levels, and from families with higher earned income, have a greater reduction in ‘Hyperactivity’ than others. Ethnicity and need for English as an additional language (EAL) support also had a significant relationship with change in ‘Hyperactivity’ levels suggesting that children of Bangladeshi and Pakistani heritage had larger reduction in ‘Hyperactivity’ than children of White UK heritage, but for children with a need for EAL support in Year 6 there was less reduction in ‘Hyperactivity’ than others.

Reduction in ‘Anti-social’ behaviour

After controlling for prior developmental level and other background characteristics, the factors early behavioural problems (as reported by parents at the start of the study), mother’s qualification level and change in marital status were no longer statistically significant in the model. The value added analysis showed that girls and children who are not eligible for free school meals (FSM) show larger reductions in ‘Anti-social’ behaviour from Year 2 to Year 6 than others. Ethnicity was also a significant predictor in the value add model and the results suggest that children of Black Caribbean heritage had less reduction in ‘Anti-social’ behaviour than children of White UK heritage. Interestingly, family highest SES had a stronger effect on the change in ‘Anti-social’ behaviour between Year 2 and Year 6 than on the ‘Anti-social’ behaviour outcome (when prior developmental level is not included in the model). This factor also showed the strongest relationship of all with the change in ‘Anti-social’ behaviour and the results revealed that children from families of the professional non-manual socio-economic status (SES) group (i.e., the highest SES group) had a larger reduction in ‘Anti-social’ behaviour than children coming from families of other SES groups.

In summary, gender, parents’ qualification levels and family earned income appeared to be the strongest predictors of social/behavioural developmental progress from Year 2 to Year 6. In addition, family highest socio-economic status (SES) had the strongest effect in predicting reduction in ‘Anti-social’ behaviour over time. Differences in social/behavioural development among different ethnic groups and children still in need of EAL support at Year 6 need to be interpreted with caution since the group sizes are small.

4.1 Reduction in school and child level variance for social/behavioural outcomes after including prior developmental level

The value added models presented in this section include both the prior developmental levels from Year 2 and child, family and HLE background characteristics. In order to calculate the proportion of variance in social/behavioural outcomes accounted for by prior developmental level only, we conducted simple value added analyses in which only the prior developmental level of a specific outcome was included as a predictor. The results are presented in Table A.4.3 in Appendix 4.

The proportion of *child level* variance accounted for by prior developmental level in Year 2 varies for the four different aspects of social behaviour. The highest reduction in child level variance accounted for by prior developmental level is for ‘Hyperactivity’ (33%) and ‘Self-regulation’ (31%) indicating that a significant proportion of the variation in individual children’s outcomes at age 11 is attributable to their similar behaviour measured at age 7. A slightly lower reduction in child level variance is evident for ‘Anti-social’ (21%) and ‘Pro-social’ (17%) behaviour indicating that somewhat smaller variation in these aspects of social behaviour can be attributed to behaviour in these areas at the earlier time point. Comparing the proportion of child level variance explained by background characteristics, it is not surprising that a larger proportion of child level variance is accounted for by prior developmental level than by child, family and background characteristics, particularly for ‘Self-regulation’, ‘Hyperactivity’ and ‘Anti-social’ behaviour.

The proportion of *school level* variance accounted for by prior developmental level is somewhat higher for 'Anti-social' behaviour (27%), 'Pro-social' behaviour (24%) and 'Self-regulation' (23%). This suggests that a considerable proportion of the variation between schools on these three social/behavioural outcomes is explained by the pupil's earlier developmental level in Year 2. Thus, schools that had a high proportion of pupils with higher 'Self-regulation' and 'Pro-social' behaviour and reduced levels of 'Anti-social' behaviour at the end of Key Stage 1 are likely to have a high overall score for 'Self-regulation' and 'Pro-social' behaviour and low levels of 'Anti-social' behaviour at the end of Key Stage 2, and vice versa. The proportion of school level variance accounted for by prior developmental level for the 'Hyperactivity' outcome is much low (10%), suggesting that prior level of 'Hyperactivity' accounts for more of the variance at the child level than school level variation.

Overall, prior developmental levels account for almost a third of the total variance in 'Hyperactivity' and 'Self-regulation' in Year 6, with somewhat lower proportions for 'Pro-social' (18%) and 'Anti-social' (21%) behaviour.

Section 5: The impact of Pre-school and Primary school on children's social/behavioural outcomes in Year 6

One of the main goals of the EPPE 3-11 study is to identify any continuing effects of pre-school and also primary school on later children's outcomes. In this section, we explore various pre- and primary school characteristics that have an impact on social/behavioural outcomes in Year 6, after taking account of the impact of child, family and home learning environment (HLE) characteristics. In order to achieve this goal, we conducted a set of analyses expanding final contextualised models identified in Section 3, in which we control for important background characteristics, and included additional predictors of children's pre-school experiences, pre-school quality and effectiveness and primary school academic effectiveness as additional potential influencing factors on later social/behavioural development.

Measures of pre-school quality were collected using the ECERS-E and ECERS-R observational instruments (see Sylva et al., 1999; 2006). ECERS-R is a measure of quality related to the 'caring' aspects of the pre-school experience, whereas ECERS-E is a measure of quality related to the educational aspects of the pre-school. Effectiveness indicators for individual pre-school settings were calculated using value added multilevel models of EPPE 3-11 children's progress from age 3+ to entry to reception in primary school. Effectiveness in this context is measured in terms of pre- or primary school settings that promoted progress in positive social skills (e.g. 'Self-regulation'), or help to reduce negative aspects of social behaviour (e.g. 'Hyperactivity'). In addition, independent academic effectiveness indicators for primary schools were calculated using National assessment data sets for all primary schools in England linking Key Stage 1 (KS1) and Key Stage 2 (KS2) results for successive cohorts over three school years 2002-2004 (see Melhuish et al., 2006).

5.1 The effect of attending pre-school compared to none

Similar to findings for Year 5 (see Sammons et al., 2007a), at the end of Year 6 there are no longer statistically significant net effects on three social/behavioural outcomes for the most basic indicators of pre-school experience such as attending any pre-school centre versus none, differences in type of pre-school attended, duration in attending pre-school or age of starting pre-school. However, there still is a significant net effect of attending pre-school compared to none for 'Pro-social' behaviour ($ES=0.19$). Children who attended pre-school had higher 'Pro-social' behaviour levels at the end of Key Stage 2 than children who did not attend pre-school (i.e., 'home' children). This suggests some longer term benefits of attending a pre-school in terms of 'Pro-social' behaviour at age 11 years.

5.2 The impact of pre-school quality

Results from earlier phases of the study indicate a positive impact of higher quality pre-school provision on children's later cognitive and social/behavioural outcomes. As mentioned before, measures of pre-school quality were collected using the ECERS-E and ECERS-R observational instruments (see Sylva et al., 1999). ECERS-R is a measure of quality related to the 'caring' aspects of the pre-school experience, whereas ECERS-E is a measure of quality related to the educational aspects of the pre-school. Based on individual pre-school centres' quality scores, the sample was divided into groups of children whose pre-school experience could be classified as ranging from no quality (i.e. the 'Home' group, approximately 9% of the sample) through low (14%), medium (54%) and high quality (22%) (see Sylva et al., 2006).

The results in Year 6 indicate that the quality of the pre-school attended continues to have an impact on different aspects of social/behavioural development at the end of Year 6. Both aspects of the two pre-school measures of quality (ECERS-R and ECERS-E) had a statistically significant impact on all four social/behavioural outcomes, with ECERS-R having a slightly stronger impact on 'Pro-social' and 'Anti-social' behaviour than ECERS-E (see Figures 5.1, 5.2,

5.3 and 5.4). In terms of positive social/behavioural outcomes, children who attended medium and high quality pre-schools had higher levels of 'Self-regulation' in Year 6 than others (ES=0.24 for ECERS-R and ES=0.25 for ECERS-E). 'Home' children were rated by teachers as displaying significantly lower levels of 'Pro-social' behaviour relative to children who had attended any pre-school, although the difference is most marked for those who attended high quality (ES=0.28 for ECERS-R and ES=0.23 for ECERS-E). This is in accord with the finding on attending a pre-school compared to none (reported earlier in this section).

Figure 5.1: The impact of Pre-school quality (ECERS-R & ECERS-E) on 'Self-regulation' in Year 6

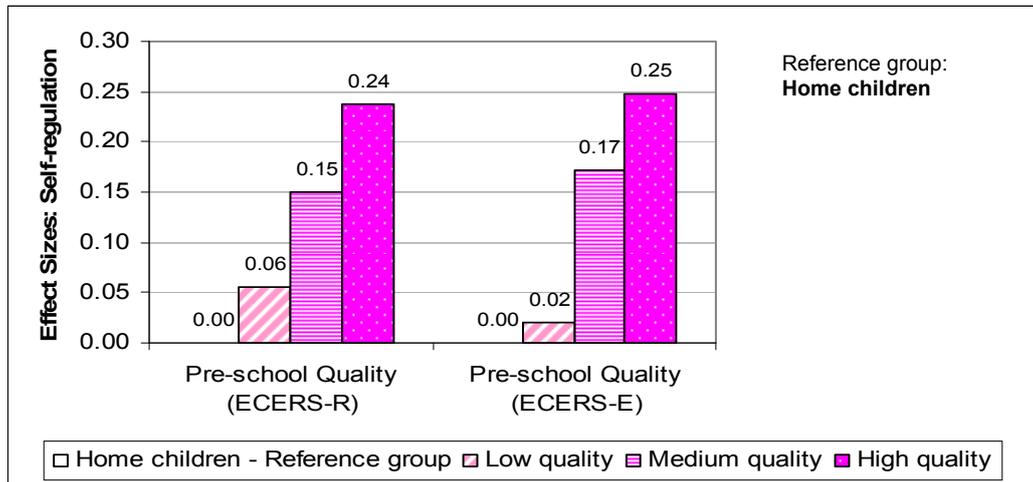
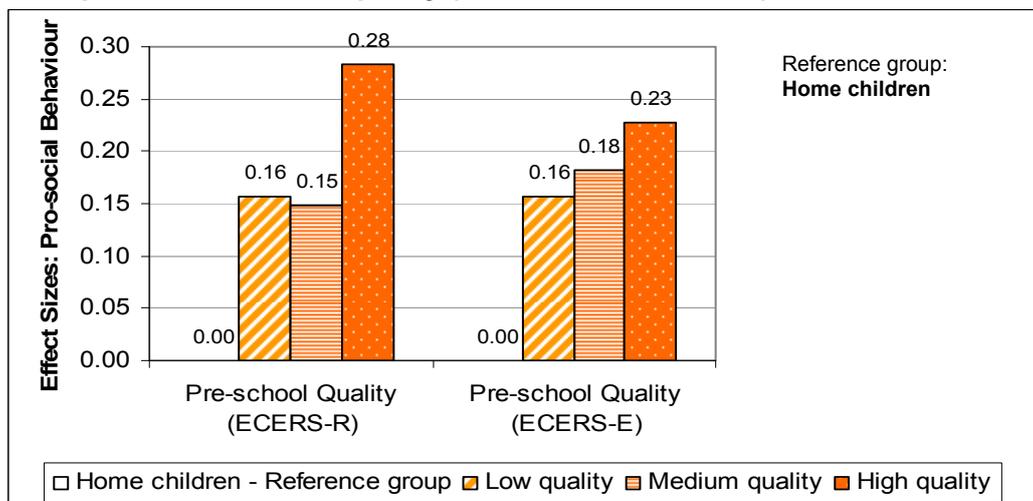


Figure 5.2: The impact of Pre-school quality (ECERS-R & ECERS-E) on 'Pro-social' behaviour in Year 6



In terms of negative social/behavioural outcomes, 'Home' children were rated by teachers as displaying significantly lower levels of 'Hyperactivity' in Year 6 relative to children who had attended low quality (ES=0.22 for both ECERS-R and ECERS-E) and medium quality pre-school (ES=0.17 for ECERS-R and ES=0.14 for ECERS-E). Children who had attended high quality pre-school had similar levels of 'Hyperactivity' as 'home' children and, therefore, they also had lower levels of 'Hyperactivity' than children who had attended low and medium quality pre-schools. This finding is in line with the findings for Year 5 (see Sammons et al., 2007a). The impact of pre-school quality on 'Anti-social' behaviour had a similar effect as for 'Self-regulation' and 'Pro-social' behaviour and suggests that children who attended high quality pre-schools had lower levels of 'Anti-social' behaviour in Year 6 than 'Home' children (ES=-0.23 for ECERS-R and ES=-0.22 for ECERS-E).

As these findings suggest, attending a high and even a medium quality pre-school has a lasting effect in promoting or sustaining better social/behavioural outcomes, in terms of increased 'Self-

regulation', higher 'Pro-social' behaviour and lower 'Anti-social' behaviour levels. In addition, attending a low quality pre-school seem to have long lasting negative effects on increased 'Hyperactivity' levels in Year 6.

Figure 5.3: The impact of Pre-school quality (ECERS-R & ECERS-E) on 'Hyperactivity' in Year 6

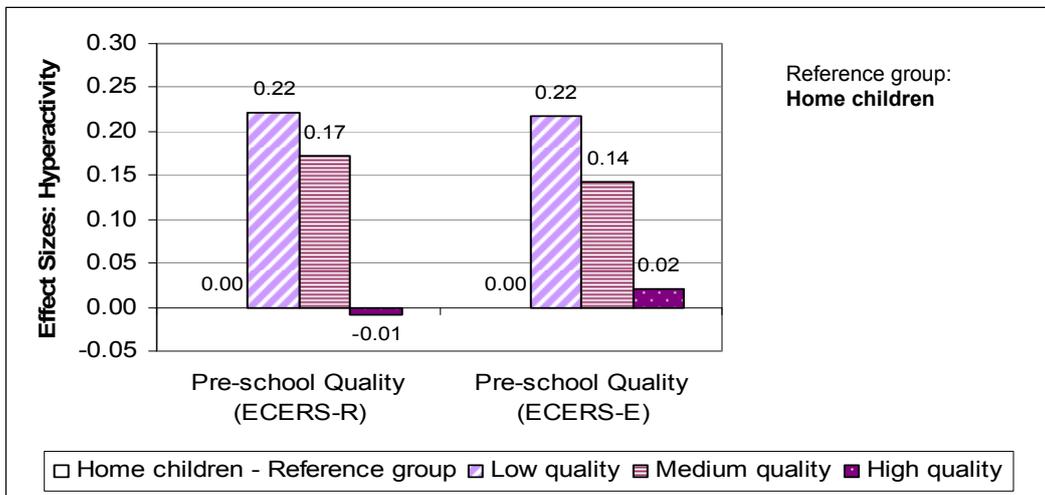
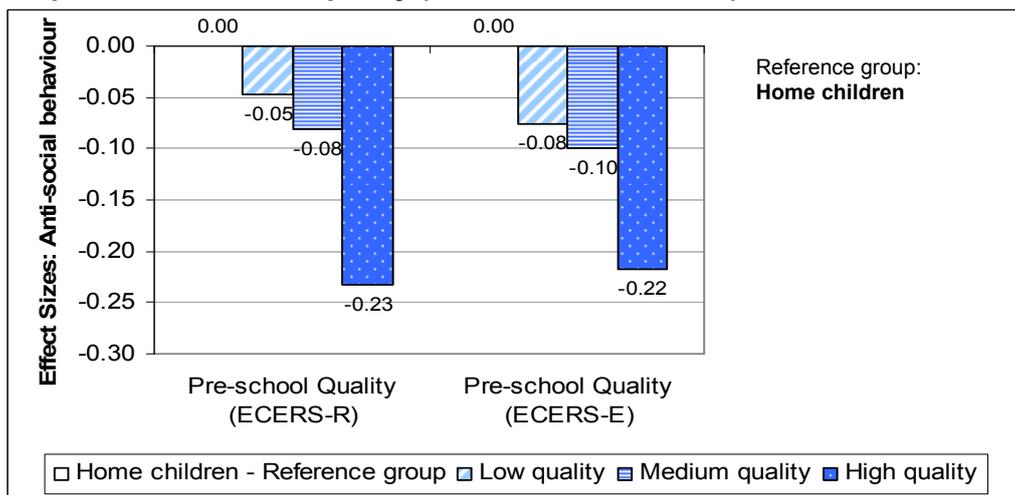


Figure 5.4: The impact of Pre-school quality (ECERS-R & ECERS-E) on 'Anti-social' behaviour in Year 6



In addition to exploring the impact of pre-school quality on later outcomes for all children in the EPPE 3-11 sample, we wanted to explore whether or not there is a differential effect of pre-school quality for certain groups of children (e.g., is there a different effect of pre-school quality for boys versus girls or children who are eligible for free school meals (FSM) in Year 6 versus children who are not). Differential effects of pre-school quality were tested for gender, FSM in Year 6, early behavioural problems (as reported by parents at the start of the study), and low versus high levels of mother's qualifications. We also looked at potential differential impact of pre-school quality for children who were identified for special educational needs (SEN) versus children who were never identified for SEN during primary school. The analyses were conducted by testing interaction effects between each of these variables and the pre-school quality measured by ECERS-E.

Controlling for significant background characteristics, differential effects were evident only for gender (boys vs. girls) and SEN (children identified as SEN vs. never identified as SEN). The significant differential effect for gender is in line with findings reported in the literature (Niles, et al., 2008). Our findings suggest that boys benefit more from attending a higher quality pre-school than girls in terms of increased levels of teacher rated 'Self-regulation' (ES=0.32 for boys versus ES=0.18 for girls) and 'Pro-social' behaviour (ES=0.45 for boys versus ES=0.02 for girls),

and lower levels of 'Hyperactivity' (ES=-0.28 for boys versus ES=-0.10 for girls) and 'Anti-social' behaviour (ES=-0.34 for boys versus ES=-0.11 for girls) in Year 6. It is important to note that overall girls have better scores on all four social/behavioural outcomes than boys; however, boys improve their scores significantly more if they previously attended a higher quality pre-school than girls do. In other words, girls tend to have similar levels of social/behavioural outcomes in Year 6 regardless of their earlier experience of pre-school quality, except for the 'Self-regulation' outcome where girls who had previously attended high quality pre-school tend to have higher 'Self-regulation' scores in Year 6 than girls who had attended low quality pre-school or no pre-school; but, again, boys gain more than girls do in terms of improved 'Self-regulation' scores if they had experienced higher quality).

Our findings of the significant differential effect of pre-school quality for SEN suggests that children who are identified as having a SEN during primary school gained more benefit from earlier attendance at a higher quality pre-school centre than children who were not later identified as having a SEN in terms of showing increased levels of 'Self-regulation' (ES=0.36 for SEN group versus ES=0.04 for non-SEN group) and 'Pro-social' behaviour (ES=0.23 for SEN group versus ES=0.17 for non-SEN group), and lower levels of 'Hyperactivity' (ES=-0.32 for SEN group versus ES=-0.08 for non-SEN group) and 'Anti-social' behaviour (ES=-0.39 for SEN group versus ES=-0.03 for non-SEN group) in Year 6. Note that overall children who were never identified as having a SEN have better scores on all four social/behavioural outcomes than children who were identified as having a SEN during primary school. However, children identified as having a SEN improve their scores significantly more if they were attending a higher quality pre-school than other children do (i.e., children never identified for SEN tend to have similar levels of social/behavioural outcomes in Year 6 regardless of pre-school quality). This is an important finding and suggests that medium and especially high level quality pre-school serve as a protective factor for children who are identified for SEN during pre-school and can benefit their all-round social/behavioural development.

We also tested whether or not there is a differential effect of attending pre-school for children with low versus high multiple disadvantage. The Multiple disadvantage index¹³ is a summary measure (see Appendix 5) based on various child, family, and HLE predictors, such as low birth weight or living in a family with low socio-economic status (SES), which are associated with an increased risk for lower attainment and poor social/behavioural outcomes. Since the multiple disadvantage index already contains information about various background characteristics, in this analysis we only controlled for gender, age and ethnicity of the child. Differential effects were evident for children with lower (up to two risk factors) versus higher (three or more risk factors) multiple disadvantage scores, but only in terms of 'Hyperactivity' and 'Anti-social' behaviour outcomes. The findings suggest that children who come from a high multiple disadvantage background benefit more from attending a high quality pre-school (versus none, low or medium quality) than children from low multiple disadvantage backgrounds. Again, it is important to note that overall children with low multiple disadvantage have better scores on 'Hyperactivity' and 'Anti-social' behaviour outcomes than children with high multiple disadvantage; however, children with high multiple disadvantage improve their scores by the end of Key Stage 2 significantly more if they previously attended a high quality pre-school than children with low risk do (for Hyperactivity, ES=-0.29 for high multiple disadvantage group versus ES=-0.13 for low disadvantage group; for Anti-social behaviour, ES=-0.34 for high multiple disadvantage group versus ES=-0.06 for low disadvantage group). These findings are also in line with other recent studies in the U.S., which suggest that children who come from a high family risk level benefit more from pre-school than children coming from low family risk level (Niles, et al., 2008), although such studies did not explore the interaction with quality of pre-school centre.

¹³ Note that the Multiple disadvantage index is a measure developed as part of the Early Years Transition and Special Educational Needs (EYTSSEN) Project and reflects a level of children's disadvantaged background (also it is a child-level measure). This measure is different from the Index of Multiple Deprivation (IMD) used earlier in the report for testing neighbourhood influences. IMD is a nationwide index combining weighted measures of levels of crime, barriers to housing, living environment, education and skills training, health deprivation and disability, employment and income for a specific neighbourhood.

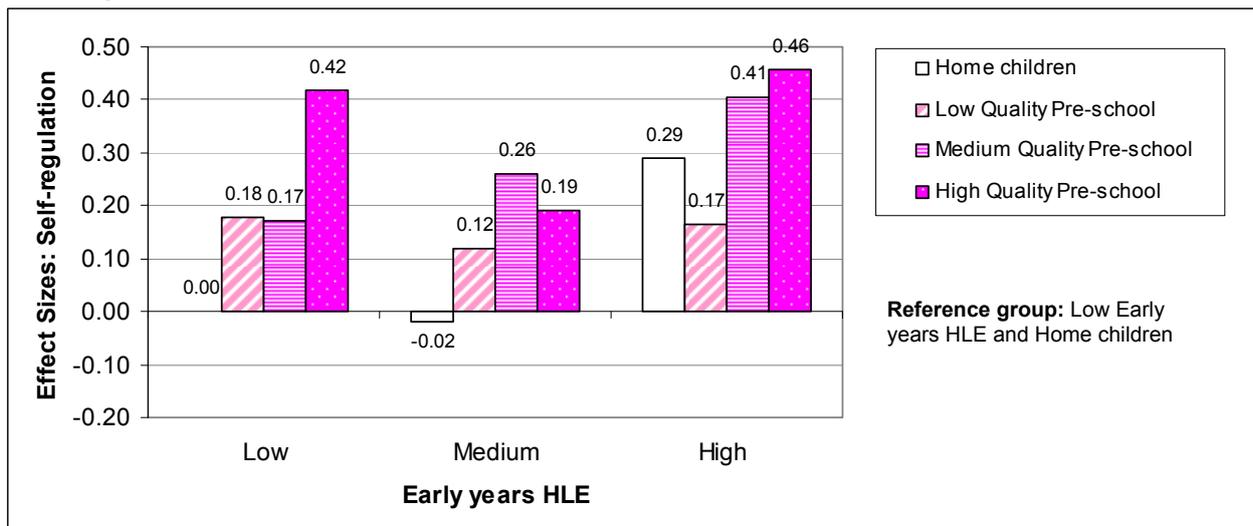
5.3 The combined impact of Pre-school quality and Early years HLE

In previous sections we have shown that the Early years home learning environment (HLE) has a strong and lasting positive effect on children’s later ‘Self-regulation’. We have also shown that attending high quality pre-school has a modest but lasting effect on children’s ‘Self-regulation’. Further analyses were conducted to explore the combined effect of the Early years HLE and pre-school quality (using the measure of ECERS-E) to further explore the interplay between these two predictors and the relative contribution each predictor makes to ‘Self-regulation’ (note that analyses were conducted for all four social/behavioural outcomes, however the findings were not statistically significant for the other three outcomes). For this analysis the Early years HLE index was regrouped into three categories representing low, medium and high¹⁴. All the relevant background predictors were included in this analysis. The reference group for this analysis was the ‘no quality (Home children) and low HLE’ group.

As can be seen in Figure 5.5, ‘Home’ children with high Early years HLE scores (ES=0.29) have a higher ‘Self-regulation’ level in year 6 relative to ‘Home’ children with low (reference group) and medium (ES=-0.02) HLE scores. On the other end, children with low Early years HLE who previously attended a high quality pre-school have significantly better outcomes in ‘Self-regulation’ in Year 6 (ES=0.42) relative to children with low Early years HLE but no pre-school experience (i.e., Home children). As expected, the greatest improvement in ‘Self-regulation’ comes from the combined effect of medium or high pre-school quality and high Early years HLE (ES=0.41 for medium quality and ES=0.46 for high quality).

As found in previous reports (see Sammons 2007a), there is a strong combined impact of Early years HLE and pre-school quality on later ‘Self-regulation’. Controlling for other background characteristics, a combination of high Early years HLE and past attendance at a medium or high quality pre-school has a strong association with higher ‘Self-regulation’ levels at the end of Key Stage 2. In addition, high Early years HLE seems to be a protective factor for children who do not attend pre-school helping them achieve higher levels of ‘Self-regulation’ in primary school. Similarly, attending high quality pre-school seems to protect against the disadvantage of a low Early years HLE and promotes children’s later ‘Self-regulation’.

Figure 5.5: The combined impact of Early years HLE and Pre-school quality (ECERS-E) on ‘Self-regulation’



¹⁴ There are theoretical reasons in favour of testing the Early years HLE measures because the EPPE 3-11 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 learning environment (HLE) during these formative years is of particular interest.

5.4 The impact of Pre-school effectiveness

During the pre-school phase of the EPPE 3-11 research, children’s cognitive progress was analysed from age 3 to rising 5 years (till the start of primary school). These analyses provided measures of pre-school academic effectiveness (see Sammons et al., 2002). Similarly, separate pre-school indicators of effectiveness were calculated for the different social/behavioural dimensions at pre-school. These included ‘Independence and Concentration’, ‘Peer-sociability’ and ‘Co-operation and Conformity’. For these indicators positive values represent an increase in that aspect of positive behaviour. A pre-school indicator for reduction in ‘Anti-social’ behaviour was also created but in this case positive values represent an increase in ‘Anti-social’ behaviour; for this indicator therefore, greater effectiveness is indicated by low or negative values. In these current analyses we used both pre-school academic effectiveness and pre-school effectiveness related to social behaviour as potential predictors for later social/behaviour outcomes.

The analyses on Year 6 data showed that significant continued effects on social behaviour are still found for indicators of effectiveness of the individual pre-school setting attended. Children who had attended a more effective pre-school setting still show significantly better social/behavioural development six years later. More specifically, pre-school academic effectiveness had a significant positive impact on children’s later ‘Self-regulation’ and ‘Pro-social’ behaviour (see Figures 5.6 and 5.7). The findings suggest that children who attended a more effective pre-school show higher levels of ‘Self-regulation’ (ES=0.29) and ‘Pro-social’ behaviour (ES=0.27) in Year 6.

Figure 5.6: The impact of Pre-school Effectiveness (Early number concepts) on ‘Self-regulation’ in Year 6

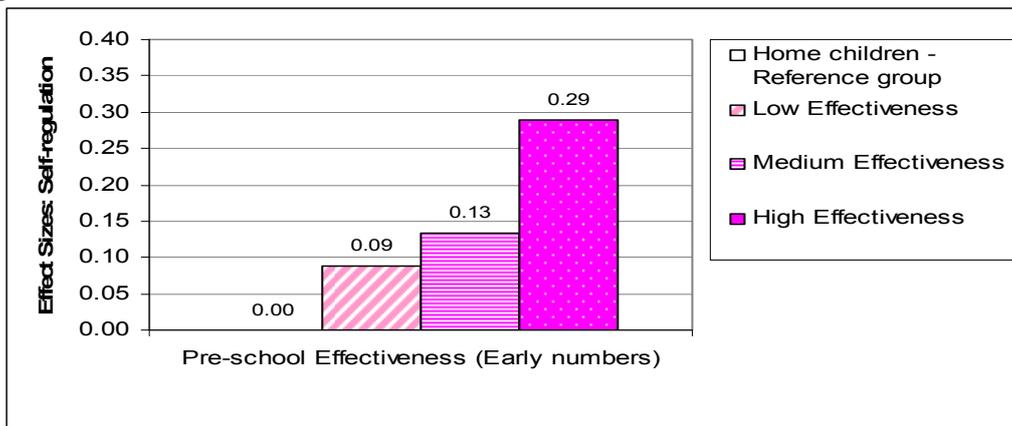
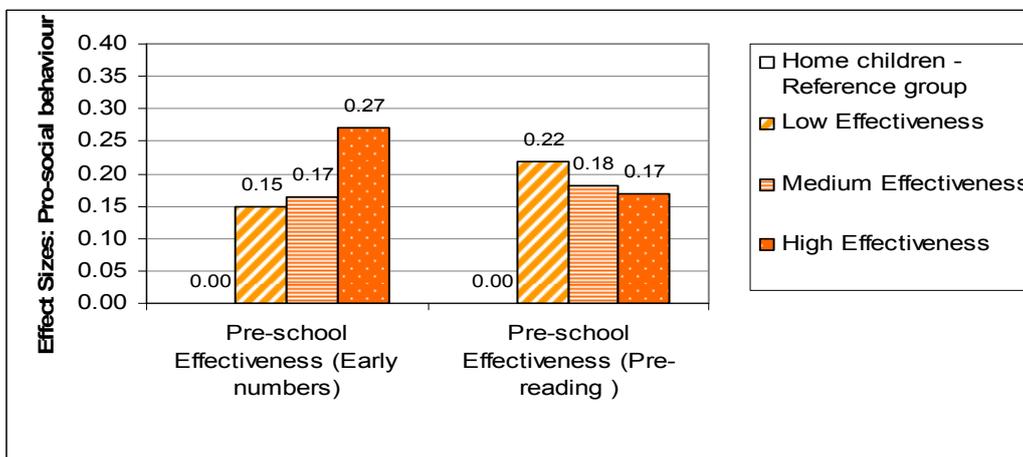


Figure 5.7: The impact of Pre-school Effectiveness (Early number concepts & Pre-reading) on ‘Pro-social’ behaviour in Year 6



In terms of social/behavioural indicators of pre-school effectiveness, all four indicators were found to be statistically significant predictors for better scores on later 'Self-regulation' and 'Pro-social' behaviour at age 11 (Figure 5.8 and Figure 5.9) although the effects for 'Pro-social' behaviour are somewhat higher. Overall, children who have attended a medium or high effectiveness pre-school show better 'Self-regulation' and more 'Pro-social' behaviour than the 'Home' group. More specifically, children who have attended medium and high effectiveness pre-schools were rated by their teachers as showing better 'Self-regulation' (ES=0.12 to ES=0.24) and more 'Pro-social' behaviour (ES=0.17 to ES=0.38) relative to the low effectiveness pre-schools. The effects are stronger for 'Pro-social' behaviour.

Figure 5.8: The impact of Pre-school Effectiveness (Social behaviour) on 'Self-regulation' in Year 6

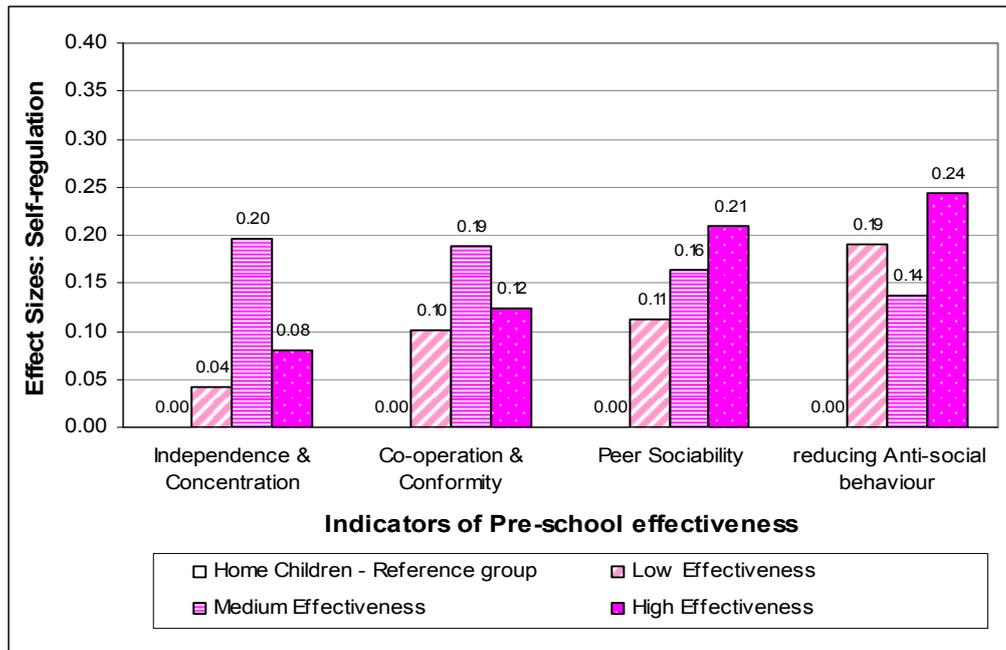
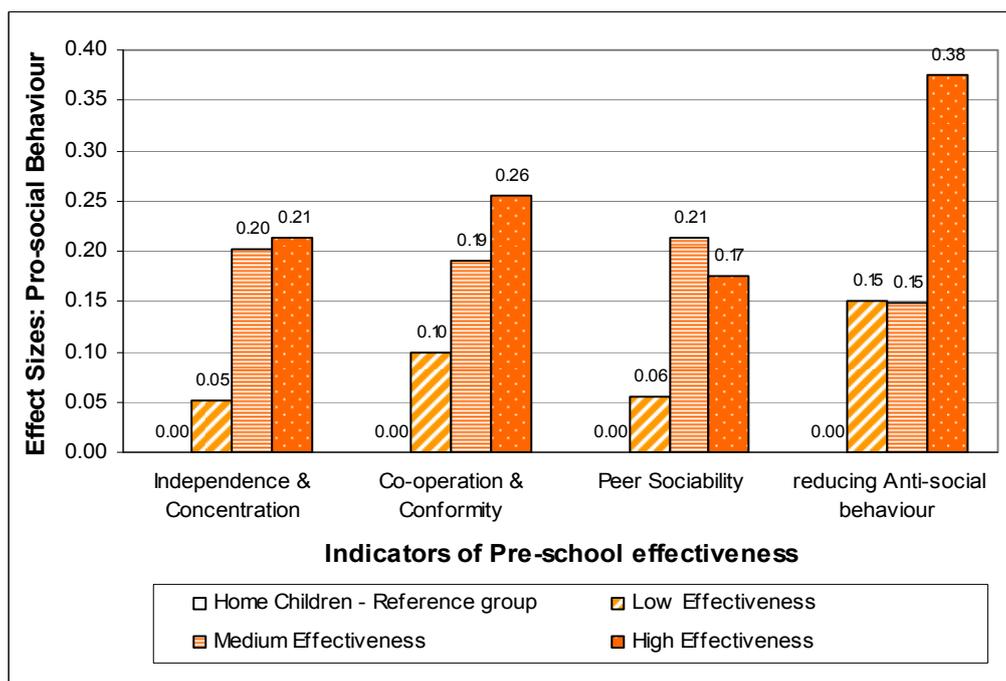


Figure 5.9: The impact of Pre-school Effectiveness (Social behaviour) on 'Pro-social' behaviour in Year 6



Particular social/behavioural indicators of pre-school effectiveness were found to be statistically significant predictors for lower scores on later ‘Hyperactivity’ and ‘Anti-social’ behaviour at age 11 (Figure 5.10 and Figure 5.11). Children who attended a low effectiveness pre-school in terms of ‘Independence and concentration’ and ‘Peer Sociability’ were found to have higher levels of ‘Hyperactivity’ in Year 6 than others. Similarly, children who attended a high effectiveness pre-school in terms of reducing ‘Anti-social’ behaviour were found to have lower levels of ‘Anti-social’ behaviour in Year 6 than others. Nonetheless ‘home’ children show good long term outcomes for ‘Hyperactivity’ in contrast to other three outcomes, and significantly better outcomes than those who attended low effective pre-school settings (see Figure 5.10).

Figure 5.10: The impact of Pre-school Effectiveness (‘Independence & Concentration’ and ‘Peer Sociability’) on ‘Hyperactivity’ in Year 6

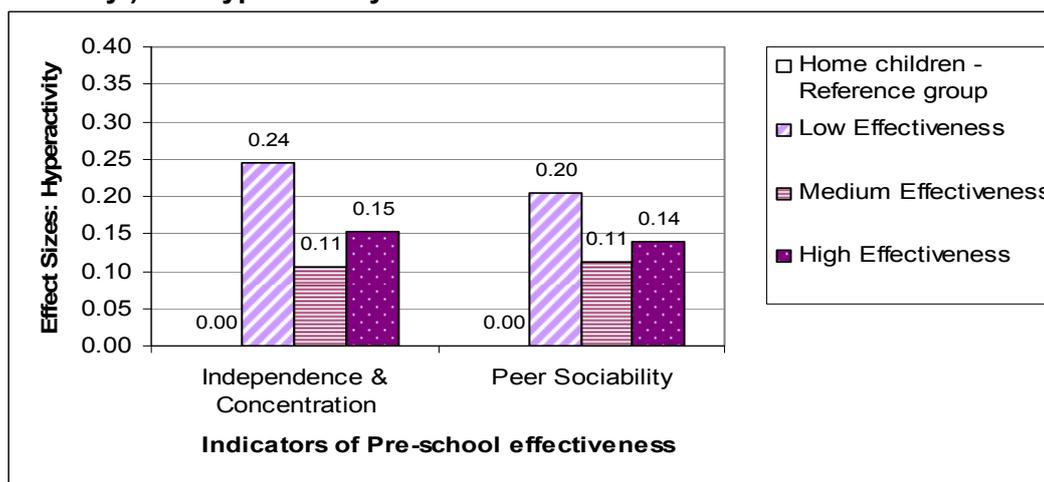
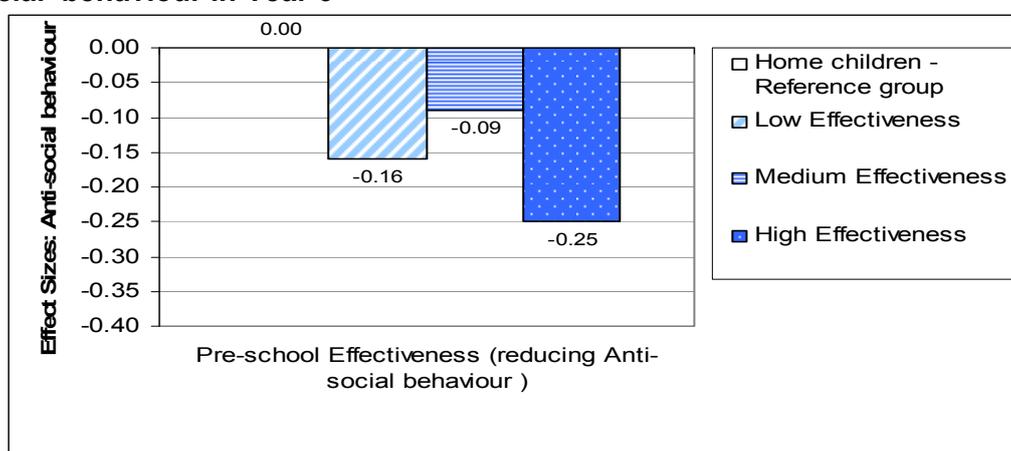


Figure 5.11: The impact of Pre-school Effectiveness (reducing ‘Anti-social’ behaviour) on ‘Anti-social’ behaviour in Year 6



5.5 The impact of Primary school academic effectiveness

In order to explore the net impact of primary school academic effectiveness on social/behavioural development at the end of Key Stage 2 we conducted multilevel analyses controlling for relevant child, family and HLE characteristics but without taking into account any characteristics of pre-school experience in the first instance. The value added effectiveness indicators for primary schools were calculated using National assessment data for all primary schools in England linking KS1 and KS2 results; separate indicators were calculated for the different core curriculum subjects English, Mathematics and Science (see Melhuish et al., 2006). These measures are thus independently derived and provide a measure of the academic success of the primary school in promoting its pupils’ academic progress over several years. Higher academic effectiveness of the primary school has already been shown to benefit children’s cognitive

outcomes at age 10 years (See Sammons et al., 2007b). It is also of interest to see whether primary school academic effectiveness has an impact (positive or negative) on social behaviour.

Consistent with the findings on social/behavioural outcomes in Year 5 (see Sammons et al., 2007a), the primary school academic effectiveness measures were not found to be significantly related to social/behavioural outcomes at the end of Year 6. The only statistically significant relationship appeared to be between primary school academic effectiveness in Science and children's 'Pro-social' behaviour in year 6. This suggested that children who attended a low academic effectiveness primary school (in terms of scores in Science) had better 'Pro-social' behaviour than children who attended medium ($ES=-0.20$) effectiveness school, although there were no significant differences between the low and high groups. Considering that these results do not show a clear trend in terms of different levels of primary school academic effectiveness and, no significant patterns were found for the English and Mathematics academic effectiveness indicators, they are not easily interpretable and, therefore, we are not able to make a clear final conclusion from this result.

Even though there was no evident impact of primary school academic effectiveness on Year 6 social/behavioural outcomes for all children in the EPPE 3-11 sample, we wanted to explore whether or not there is a differential effect of primary school academic effectiveness for certain groups of children (e.g., is there a different effect of primary school academic effectiveness for boys versus girls or children who are eligible for free school meals (FSM) in Year 6 versus children who are not). Differential effects of primary school academic effectiveness were tested for gender, FSM in Year 6, low versus high multiple disadvantage and low versus high levels of mother's qualification. We also looked at differential impact of primary school academic effectiveness for children who were identified with special educational needs (SEN) versus children who were never identified with SEN during primary school. The analyses were conducted by testing interaction effects between each of these variables and primary school academic effectiveness in English, Mathematics, or Science or the overall primary school academic effectiveness measure, which was calculated as an average of effectiveness in English, Mathematics and Science.

Controlling for significant background characteristics, differential effects were evident only for SEN (children identified as SEN vs. never identified as SEN) and mother's qualification level. Findings of differential effects of primary academic effectiveness for mother's qualification level suggest that children of mothers with low qualifications (none or vocational) benefit more from attending an overall high effectiveness primary school than children of mothers with medium (16 or 18 academic or other professional) qualification level and mothers with high (degree or higher) qualification level. The benefits were evident only in terms of low levels of 'Anti-social' behaviour in Year 6, which suggest that children of mothers with low qualifications had significantly lower levels of 'Anti-social' behaviour if they attended a high effectiveness primary school ($ES=-0.33$). In contrast, children of mothers with medium or high levels of qualification had similar levels of 'Anti-social' behaviour regardless of the primary school attended (effect sizes were between -0.01 and 0.06 for attending a high effectiveness primary school). This suggests that high effectiveness primary schools are particularly effective in reducing 'Anti-social' behaviour for children who have mothers with low qualification levels.

In addition, our findings of the significant differential effect of primary school academic effectiveness for SEN suggest that children who are identified with SEN during primary school benefit more from attending a higher effectiveness primary school than children who were not identified with SEN. The benefits were evident in terms of increased levels of 'Self-regulation' in Year 6 ($ES=0.32$ for SEN group versus $ES=0.02$ for non-SEN group) when children attended a high effectiveness primary school in Mathematics and lower levels of 'Anti-social' behaviour in Year 6 ($ES=-0.37$ for SEN group versus $ES=0.05$ for non-SEN group) when children attended an overall high effectiveness primary school. Note that overall children who were never identified for SEN have better scores on all four social/behavioural outcomes than children who were identified for SEN during primary school; however, children identified with SEN improve their scores

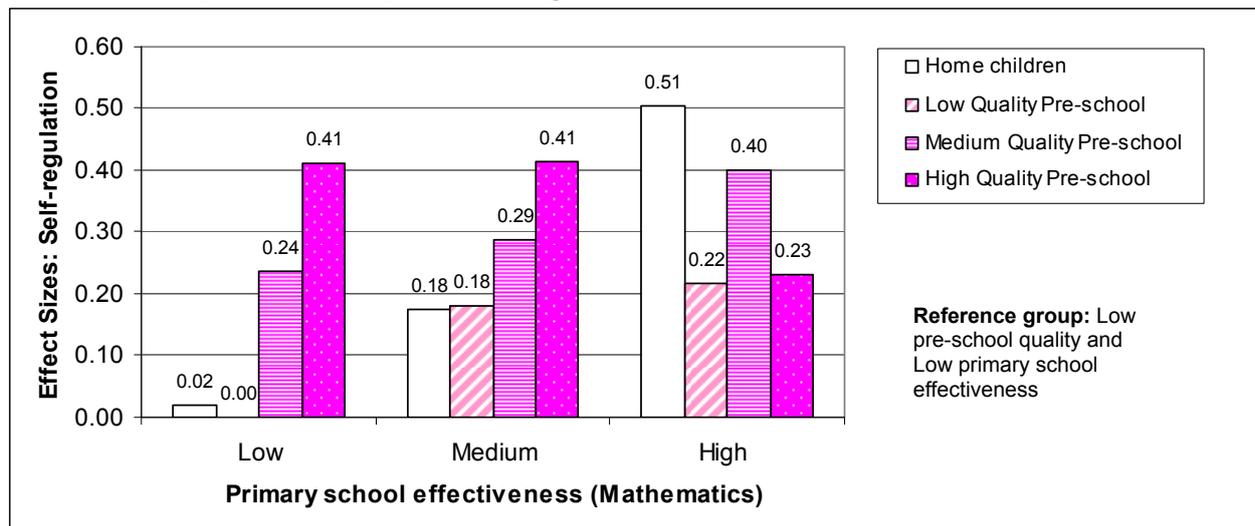
significantly more if they were attending a higher effectiveness primary school than other children do (i.e., children never identified with SEN tend to have similar levels of social/behavioural outcomes in Year 6 regardless of primary school effectiveness). This is an important finding and suggests that high level effectiveness primary school serve as a protective factor for children who are identified with SEN during primary school and can improve their levels of 'Self-regulation' and lower their levels of 'Anti-social' behaviour. Overall, our results support the view that the academic effectiveness of primary schools attended has an impact on certain groups of children in terms of better social/behavioural outcomes at the end of Key Stage 2.

5.6 The combined impact of Pre-school quality and Primary school academic effectiveness

Primary school academic effectiveness was not a statistically significant predictor of social/behavioural dimensions on its own. We sought to establish whether primary school academic effectiveness might be significant in combination with pre-school quality as was found in analyses of children's outcomes in Year 5 (Sammons et al., 2007a; 2007b) and in the analysis of cognitive outcomes in Year 6 (Sammons et al., *forthcoming*).

For these analyses, we combined measures of pre-school quality and indicators of primary school effectiveness to explore whether going to a higher quality pre-school had a protective function if a child went to a less academically effective primary school later on. Similar to the analyses for social/behaviour outcomes at age 10 years (Sammons et al., 2007a), we sought to establish whether children who did not go to pre-school or went to only a low quality pre-school appeared to have benefited more from the academic effectiveness of the primary school in terms of their social/behavioural development. We combined the various primary school academic effectiveness indicators with the ECERS-E measure of pre-school quality, which is also a measure of *academic* quality, and tested these measures in the full contextualised models controlling for all relevant background factors.

Figure 5.12: The combined impact of Pre-school quality (ECERS-E) and Primary school effectiveness (Mathematics) on 'Self-regulation'



Contrary to the findings from Year 5, in Year 6 the only significant interaction was between pre-school quality and primary school academic effectiveness in terms of Mathematics related to children's 'Self-regulation' (see Figure 5.12). The findings suggest that for children who attend low or even medium academically effective primary school in terms of Mathematics but who previously attended a high quality pre-school show significantly better 'Self-regulation' at the end of Key Stage 2. Similarly, attending a high academically effective primary school will benefit those children who either did not attend any pre-school or those who attended only a low quality pre-school in terms of boosting higher levels of 'Self-regulation' in Year 6. As expected, children

who either did not attend pre-school or went to low quality pre-school and afterwards to a low academically effective primary school had the lowest 'Self-regulation' levels at the end of Key Stage 2.

Taken together these findings suggest that pre- and primary school effects interact and may be additive and, therefore, the 'masking' of pre-school effects may be bi-directional. Thus, primary school academic influences may not only mask earlier pre-school effects but may also be masked by the positive or negative effects of the pre-schools that children had attended, such that high quality pre-schools may attenuate negative effects of primary schools and low quality pre-schools may reduce positive effects. It appears that 'Self-regulation' is the only social/behavioural outcome for which we find evidence of a clear and significant pattern of influences related to academic effectiveness of primary school in Mathematics. This is likely to reflect stronger links at child level between 'Self-regulation' and academic attainment.

5.7. The impact of pre-school and primary school on social/behavioural developmental progress

In addition to exploring the impact of pre-school and primary school on social/behavioural developmental *levels* in Year 6, we explored whether indicators of pre-school and primary school experiences were also significantly related to children's social/behavioural *developmental progress* from Year 2 to Year 6, controlling for background characteristics. Value added analyses (i.e., analyses in which prior developmental level is included as a predictor) were conducted for the four social/behavioural outcomes to explore changes in social/behavioural development from Year 2 to Year 6.

After controlling for prior developmental level and background characteristics, there was a significant net effect of attending pre-school compared to none for Pro-social behaviour (ES=0.22). In addition, the quality of the pre-school attended also had an impact on social/behavioural developmental progress. Both aspects of the two pre-school measures of quality (ECERS-R and ECERS-E) had a statistically significant impact on progress of almost all four social/behavioural dimensions, except for 'Self-regulation' for which only ECERS-E had a significant impact (see Table A.6.1 in Appendix 6). Children who attended high quality pre-schools had larger improvement in 'Self-regulation' than others (ES=0.23 for ECERS-E) and larger reduction in 'Anti-social' behaviour (ES=-0.22 for ECERS-R and ES=-0.20 for ECERS-E). 'Home' children had significantly less improvement in 'Pro-social' behaviour relative to children who had attended any pre-school, although the difference is most marked for those who attended high quality (ES=0.28 for ECERS-R and ES=0.27 for ECERS-E). These findings are in accord with the finding on social/behavioural developmental level (reported earlier in this section). For reduction in 'Hyperactivity' the biggest difference is between children who attended low quality pre-school and those who attended high quality pre-school; those who attended low quality pre-school had the least reduction in 'Hyperactivity'.

Indicators of effectiveness of the individual pre-school setting attended were also found to be related to social/behavioural developmental progress. Children who had attended a more effective pre-school setting showed significantly better progress in social/behavioural development during Key Stage 2. More specifically, high pre-school academic effectiveness had a significant positive impact on children's improvement in 'Self-regulation' (ES=0.24) and 'Pro-social' behaviour (ES from 0.19 to 0.37 for various indicators for pre-school effectiveness; see Table A.6.2 in Appendix 6). Similarly, children who attended a high effectiveness pre-school in terms of reducing 'Anti-social' behaviour were found to have larger reductions in 'Anti-social' behaviour in Year 6 than others. Even though, pre-school effectiveness was not significantly related to change in 'Hyperactivity', the influence of pre-school effectiveness on progress in 'Self-regulation', 'Pro-social' and 'Anti-social' behaviour are in accord with the findings on developmental levels of these outcomes.

Similarly to the findings on developmental levels, primary school academic effectiveness was not significantly associated with social/behavioural developmental progress.

5.8. Mobility during pre-school and primary school

Analyses exploring the characteristics of children who changed schools during Key Stage 1 and 2 and how this mobility is related to children’s cognitive and social/behavioural outcomes during Key Stage 2 are reported separately (Melhuish et al., 2008b). Here we summarise the key findings.

Mobility is defined here as a change of pre-school or primary school that does not result from a school closure, amalgamation, or transfer between phases of schooling. Of the total EPPE sample (but excluding children who did not attend pre-school - the ‘home’ group), more than a third of the sample (35%) changed pre-schools, seventeen percent of the sample changed schools during KS1 and about fifth of the sample (22.5%) changed schools during KS2 (Table 5.1).

Table 5.1: Mobility during pre-school and primary school

EPPE sample*	Pre-school				KS1				KS2			
	Non-mobile		Mobile		Non-mobile		Mobile		Non-mobile		Mobile	
	n	%	n	%	n	%	n	%	n	%	n	%
Total	1848	64.7	1009	35.3	2288	83.1	465	16.9	2054	77.5	596	22.5

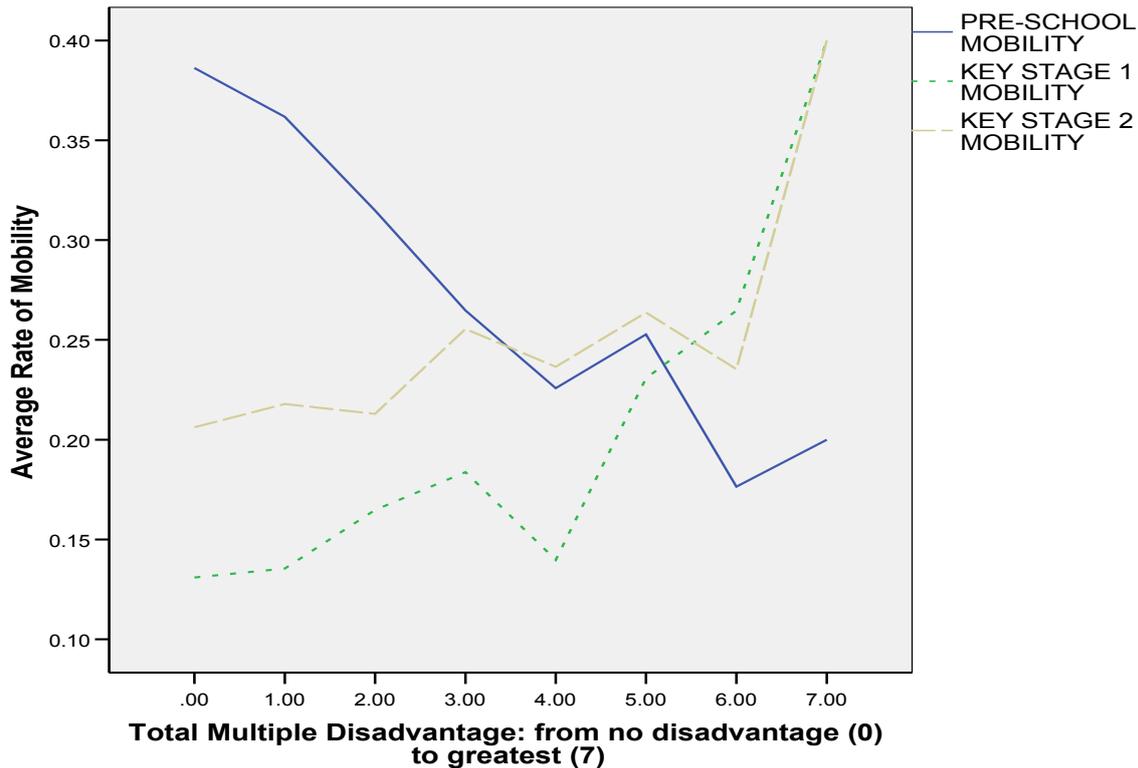
*excluding children who did not attend pre-school (‘home’ group)

Exploring the characteristics of mobile groups at different educational time points showed that there is a difference in level of social advantage, between families whose children moved between pre-school centres and those who moved in primary school. More advantaged families, defined in terms of mother’s highest qualification, were more likely to move during pre-school; and those eligible for free school meals (FSM) less likely to move during pre-school.

Mobility during Key Stage 1 (KS1 - 5-7 years old) of primary school had the reverse characteristic: those more socially disadvantaged, in terms of FSM and those with absent fathers, were more likely to move than those who were less disadvantaged (i.e., those who did not receive FSM or those whose father is present in the household). Mobility during Key Stage 2 (KS2 - 8-11 years old) was also typified by social disadvantage but not to the same degree as during KS1. These differences in family characteristics of mobile children in pre-school versus those mobile in primary school are illustrated in Figure 5.13. The pattern evident in Figure 5.13 shows that the more advantaged children had the highest rates of pre-school mobility and the lowest rates in KS1 and KS2.¹⁵ Those with the highest levels of disadvantage had the lowest rates of mobility in pre-school and the highest rates of mobility in KS1 and KS2.

¹⁵ The Multiple disadvantage index is a summary measure (see Appendix 5) based on various child, family, and HLE predictors, such as low birth weight or living in a family with low socio-economic status (SES), which are associated with an increased risk for lower attainment and poor social/behavioural outcomes.

Figure 5.13: Average rate of mobility for different levels of multiple disadvantage



Children who were mobile during pre-school were more likely to come from socially advantaged families and to attend a more academically effective primary school. By contrast, children who were mobile in KS1 were more likely to come from socially disadvantaged families and to have been attending a primary school with a significantly lower academic effectiveness before moving school. However, changing schools in KS2 is not related to primary school academic effectiveness, therefore, the KS2 mobility group do not move to go to better or less academically effective school.

Prior research has indicated that mobility is associated with lower levels of academic attainment (see for example, Machin, Telhaj & Wilson, 2006). Furthermore, Strand and Demie (2006) have found that although 7 to 11 year old pupil mobility is associated with poorer attainment, when other background factors (e.g. disadvantage) are taken into account this association is reduced, and it completely disappears when looking at progress, i.e. controlling for prior attainment. These findings suggest that it is social disadvantage rather than mobility that accounts for the lower academic attainment that has been associated with mobility as it co-varies with disadvantage rather than exerting an independent influence on academic attainment. The findings for the EPPE sample, in terms of mobility, are broadly consistent with previous research (Strand and Demie, 2006).

Analyses explored whether mobility might be associated with children’s social/behavioural outcomes at the end of KS2. Mobility during pre-school is not associated with social/behavioural outcomes. However, controlling for child, family and HLE characteristics and prior developmental level, KS2 mobility is associated with poorer social/behavioural development in Year 6: less progress in ‘Self-regulation’ (ES=-0.19) and ‘Pro-social’ behaviour (ES=-0.14) and less reduction in ‘Hyperactivity’ (ES=0.13) and ‘Anti-social’ behaviour (ES=0.17) in KS2 (Table 5.2). Although the effect sizes are small, the results still show that mobility during KS2 accounts for differences in children’s social/behavioural outcomes even after controlling for background characteristics such as disadvantage.

Table 5.2: The effect of primary school mobility on social/behavioural outcomes in Year 6
(Effect sizes are reported; comparison group in brackets)

	'Self-regulation'	'Pro-social' behaviour	'Hyperactivity'	'Anti-social' behaviour
KS2 mobility (compared to none)	-0.19	-0.14	0.13	0.17
KS1 & KS2 mobility (compared to none)	-0.28	-0.35	0.32	0.48

Further analyses also showed that if a child changed schools during both KS1 and KS2 (4% of the sample), they have poorer social/behavioural outcomes in Year 6, and the relationships with poor outcomes are even stronger than for those who have moved only during KS2. Children who moved in both KS1 and KS2 tend to make less progress in 'Self-regulation' (ES=-0.28) and 'Pro-social' behaviour (ES=-0.35) and have less reduction in 'Hyperactivity' (ES=0.32) and 'Anti-social' behaviour (ES=0.48) compared to children who do not change schools during KS1 or KS2. Note, however, that from these results it is not possible to conclude whether or not KS1 and/or KS2 mobility causes poorer social/behavioural outcomes; we can only show that mobility during primary school in KS2 is associated with poorer children's outcomes. Mobility might reflect unmeasured family characteristics that might mediate the association between mobility and social/behavioural outcomes. Possible unmeasured family characteristics that might be influential include parental personality such as being go-getting or achievement oriented or sub-cultural factors related to child achievement. Also movement might be job related, or due to family breakdown, or increase in family size. However, it is also possible that poor social/behavioural development might dispose parents to move their child to another school. For a detailed description on mobility during pre-school, KS1 and KS2 please refer to the separate report (Melhuish et al., 2008b).

Summary of Pre-school and Primary school influences

In this section we tested the net impact of different aspects of pre- and primary school experience while controlling for all other background measures simultaneously and thus provide rigorous and conservative estimates of statistical significance of any continuing pre-school effects as well as of primary school influence. We also looked at the relationships between changing schools during primary school and children's outcomes at the end of KS2.

The results show that good pre-school experience (in terms of high quality and high effectiveness) still makes a difference to children's longer term social/behavioural development even after 6 years full time in primary school education. The findings also suggested that boys and children who are identified as having SEN during primary school are more likely to benefit from high quality pre-school than girls and children who are never identified as having SEN during primary school. The benefits are related to higher 'Self-regulation' and 'Pro-social' behaviour and lower levels of 'Hyperactivity' and 'Anti-social' behaviour at the end of Key Stage 2. Similarly, children growing up in high multiple disadvantaged circumstances are also more likely to benefit from high quality pre-school than less disadvantaged children, and the benefits are related to reduced negative behaviour compared to children at high risk, who attend low quality pre-schools.

Overall, the results did not clearly illustrate that the academic effectiveness of the primary school matters for social/behavioural development at the end of Year 6, in contrast to clear results for children's cognitive attainment and progress in Year 6 (reported separately see Sammons et al., 2008). However, differential effects of attending an academically effective primary school were evident for children who were identified as having a SEN during primary school and children of mothers with low qualification level, suggesting that these children will particularly benefit, from attending a high academically effective primary school in terms of increasing their 'Self-regulation' and reducing their 'Anti-social' behaviour, at the end of Key Stage 2 in comparison to children who are never identified as having SEN or children with mothers of medium and high qualification level.

In addition, a high academically effective primary school seems to be especially important for those children who did not go to pre-school (the lowest scores are for the no pre-school group who went on to a low academically effective primary school) in terms of teacher rated 'Self-regulation', which again relates to similar findings on children's cognitive outcomes in primary school. Similarly, attending a high quality pre-school seems to act as a moderate to strong protective factor for children who go on to attend a less academically effective primary school but only in terms of 'Self-regulation'.

KS2 mobility and particularly if a child changed schools during both KS1 and KS2, is associated with poorer social/behavioural outcomes in Year 6: lower levels of 'Self-regulation' and 'Pro-social' behaviour and higher levels of 'Hyperactivity' and 'Anti-social' behaviour. However, these results do not show whether or not KS1 and/or KS2 mobility causes poorer social/behavioural outcomes; these results only show that mobility during primary school is associated with poorer children's outcomes.

In summary, these findings clearly suggest that attending a higher quality and higher effectiveness pre-school, continues to provide longer term benefits for all four measures of children's later social/behavioural outcomes at the end of Key Stage 2. There is also some indication that in combination with attending a higher academic effectiveness primary school later on, there are particular benefits for 'Self-regulation' at the end of Key Stage 2.

Summary and Conclusions

The Effective Pre-school and Primary Education Project 3-11 (EPPE 3-11) is a large-scale longitudinal study of the impact of pre-school and primary school on children's cognitive and social/behavioural development. The study has been following children from the start of pre-school (at age 3 years plus) through to the end of Key Stage 2 (KS2). The earlier EPPE 3-11 research pointed to important differences in young children's cognitive and social/behavioural outcomes related to child, family and Home Learning Environment (HLE) characteristics. It also identified significant pre-school effects. These were most marked at entry to primary school where it was shown that pre-school (particularly high quality and longer duration) gave children a better start to school (Sylva et al., 2004). However, benefits also remained evident during Key Stage 1 (KS1) in 'follow-ups' of child outcomes at ages 6, 7 and 10 years; although the pre-school influence was somewhat less strong. This present report has presented results of analyses on children's social/behavioural outcomes (i.e., 'Self-regulation', 'Pro-social' behaviour, 'Hyperactivity' and 'Anti-social' behaviour) and progress at the end of Key Stage 2 (i.e., at age 11 years). A separate report has described the results of analyses on children's English and Mathematics attainment at age 11 years (Sammons et al., 2008).

Background influences and the Home Learning Environment (HLE)

There were significant differences in social/behavioural development at age 11 years related to child background characteristics. Taken together such factors did not account for a large amount of the variance in pupils' scores (only 8% - 20%), however background influences were stronger predictors for 'Hyperactivity' and 'Self-regulation' than for 'Pro-social' and 'Anti-social' behaviour. A summary of the effects associated with all predictor variables for the four social/behavioural outcomes is presented in Table 6.1.

Of all the child factors explored in this study, gender and early behavioural problems (as reported by parents at the start of the study) had a significant relationship with all social/behavioural outcomes in Year 6. In addition, need for EAL support had a moderately strong effect on 'Self-regulation' and 'Hyperactivity' whereas early developmental problems (as reported by parents at the start of the study) had a strong effect on 'Self-regulation' only. Of all the family factors, mother's qualification level had the strongest effect on all children's social/behavioural outcomes in Year 6. Father's qualification level, family earned income, children's eligibility for free school meals (FSM), and marital status and change in marital status also had significant effects on children's outcomes. Family highest social-economic status (SES) was an important predictor of 'Anti-social' behaviour only.

The Early years home learning environment (HLE) was an important predictor of better child cognitive and social/behavioural outcomes at earlier time points (ages 3, 5, 6, 7 and 10). The current findings again draw attention to the importance of the quality of the Early years HLE for children's social behaviour at age 11. These results are in line with those already reported by EPPE 3-11 for academic attainment at this age, for which the Early years HLE has an even stronger effect (see Sammons et al., 2008). It is likely that parental interactions that contribute to a 'good' HLE promote children's overall development in the longer term. The implication of this for policy makers is that more attention should be given to ways to promote and support positive parenting. This could have significant benefits to future generations of children in terms of academic and social/behavioural outcomes.

In addition, we explored the way that Early years HLE interacts with pre-school quality in shaping social/behavioural development at age 11. As found in previous reports (see Sammons 2007a), there is a strong combined impact of Early years HLE and pre-school quality on later 'Self-regulation'. Controlling for other background characteristics, a combination of high Early years HLE and attending medium or high quality pre-school seems to have a strong association with higher 'Self-regulation' levels at the end of Key Stage 2. In addition, high Early years HLE seems to be a protective factor for children who do not attend pre-school helping them achieve higher

levels of 'Self-regulation' in primary school. Similarly, attending high quality pre-school seems to help protect against the disadvantage of a low Early years HLE and help children achieve higher levels of 'Self-regulation'.

Pre-school and Primary school experiences

The importance of pre-school and primary school experiences in shaping social/behavioural development at age 11 years has been highlighted in Section 5. We have shown that some pre-school influences, identified as important for child outcomes at earlier time points (ages 5, 6, 7 and 10) still remain evident at age 11 after six years in primary school. However, at this stage just having attended a pre-school is not sufficient to ensure better social/behavioural development in the longer term, except for 'Pro-social' behaviour. The analyses indicate that it is the quality and effectiveness of the pre-school attended that generally predicts better social/behavioural development. Poor quality pre-school, however, does not improve social/behavioural development at age 11 years and is even associated with increased 'Hyperactivity', whereas medium and especially high quality provides benefits for most outcomes. Children who had previously attended high quality pre-school show the strongest advantage and high quality settings are particularly beneficial for boys, children who are later identified as having a SEN in primary school and children growing up in highly disadvantaged circumstances. However, there are some indications that attending poor quality pre-school may adversely affect certain aspects of social/behavioural development, particularly 'Hyperactivity' in Year 6.

In addition, the effectiveness of the child's pre-school centre, in terms of promoting better social behaviour at entry to primary school, still shows a positive impact on later social/behavioural development at age 11 years for children who attended pre-school in comparison with the 'Home' group. It is particularly interesting that attending a pre-school identified as effective in helping to reduce 'Anti-social' behaviour at a younger age (between 3 and 5 years) still shows a benefit in terms of reduced 'Anti-social' behaviour at age 11.

The findings on both quality and effectiveness of pre-schools and their longer term benefits on social/behavioural development at age 11 complement and extend the EPPE 3-11 findings reported on cognitive outcomes in English and Mathematics (see Sammons et al., 2008). It appears therefore that high quality, effective pre-school offers benefits to all round development throughout Key Stage 2.

However, the analyses showed that the academic effectiveness of the primary school does not have a clear influence on social/behavioural development at the end of Year 6. This is in contrast to the findings for cognitive attainment and progress in Key Stage 2. Nonetheless, differential effects of attending an academically effective primary school were evident for children who were identified as having a SEN during primary school and children of mothers with a low qualification level, suggesting that these children will particularly benefit from attending a primary school that has a high academic effectiveness in terms of increasing their 'Self-regulation' and reducing their 'Anti-social' behaviour at the end of Key Stage 2, compared to children who were never identified as having a SEN, or children with mothers of medium and high qualification level.

In addition, a high academically effective primary school seems to be especially important for those children who did not go to pre-school (the lowest scores are for the no pre-school group who went on to a low academically effective primary school) in terms of promoting a higher 'Self-regulation', which again relates to similar findings on children's cognitive outcomes in primary school. Similarly, attending a high quality pre-school seems to act as a moderate to strong protective factor for children who go on to attend a less academically effective primary school but only for 'Self-regulation'. Overall, these findings clearly suggest that attending a higher quality and highly effective pre-school, especially in a combination with attending a higher effective primary school later on, will lead to positive social/behaviour outcomes at the end of Key Stage 2.

Table 6.1: Summary of background factors and pre- and primary school influences on social behaviour at Year 6

(Only the largest effect sizes are reported; for details see earlier tables – comparison group in brackets)

	'Self-regulation'	'Pro-social' behaviour	'Hyperactivity'	'Anti-social' behaviour
Child Factors				
Gender (boys)	0.30	0.71	-0.71	-0.38
Ethnicity (White UK)	0.37	-0.28	-0.55	-0.27
Early Developmental problems (none)	-0.47			
Early Behavioural problems (none)	-0.25	-0.24	0.31	0.24
Need of EAL support (none)	-0.65		0.46	
Family factors				
Free school meals (FSM) (non-FSM)	-0.23		0.21	0.27
Family earned income (none)	0.38	0.25	-0.24	
Mother's qualification level (none)	0.55	0.36	-0.53	-0.27
Father's Qualification level (none)	0.29		-0.30	
Family SES (professional non-manual)				0.28
Marital Status (married)		-0.18		
Change in Marital Status (couple)			0.24	0.25
Home Learning Environment				
Early years HLE (low)	0.42	0.22	-0.23	
Pre-school*				
Attending		0.19		
Pre-school quality*				
ECERS-E	0.25	0.23	0.22 (Low quality)**	-0.22
ECERS-R	0.24	0.28	0.22 (Low quality)**	-0.23
Pre-school effectiveness*				
Early number concepts	0.29	0.27		
Pre-reading		0.22		
'Co-operation and Conformity'	0.20	0.21		
'Independence & Concentration'	0.19	0.26	0.24 (Low effectiveness)**	
'Peer Sociability'	0.21	0.21	0.20 (Low effectiveness)**	
'Anti-social' behaviour	0.24	0.38		-0.25
Primary school effectiveness***				
Mathematics				
English				
Science		-0.20 (Medium quality)		

*The reference group for all pre-school effectiveness comparisons is the 'Home' group. The effect sizes represent differences between the 'home' group and the 'high quality/effectiveness' group unless stated otherwise.

**The effect sizes represent differences between the 'home' group and the 'low quality/effectiveness' group.

*** The reference group for Primary school effectiveness comparison is 'low effectiveness'

The findings on mobility showed that KS2 mobility, and particularly if a child changed schools during both KS1 and KS2, is associated with poorer social/behavioural outcomes in Year 6: lower levels of 'Self-regulation' and 'Pro-social' behaviour and higher levels of 'Hyperactivity' and 'Anti-social' behaviour. However, these results do not show whether or not KS1 and/or KS2 mobility causes poorer social/behavioural outcomes; these results only show that mobility during primary school is associated with poorer children's outcomes. Mobility might reflect unmeasured family characteristics that might mediate the association between mobility and social/behavioural outcomes. Possible unmeasured family characteristics that might be influential include parental personality such as being go-getting or achievement oriented or sub-cultural factors related to child achievement. Also movement might be job related, or due to family breakdown, or increase in family size. However, it is also possible that poor social/behavioural development might dispose parents to move their child to another school.

Implications

The research presented here demonstrates the extent to which individual child, family and home learning environment (HLE) background factors continue to predict children's social/behavioural development in Key Stage 2. This is relevant to the debate on equity in education, and to policies that seek to raise standards, reduce the equity gap and promote inclusion. The research indicates that much of the apparent raw difference in social/behavioural outcomes associated with certain characteristics, for example, ethnicity, is attributable to the impact of other socio-economic and demographic factors (e.g. income, language, family SES, parents' qualification levels and HLE). Such findings are important for policy and practical strategies that may help to enhance outcomes for disadvantaged or vulnerable groups. Earlier EPPE 3-11 results have contributed to the evidence base for the Government's Equalities Review.¹⁶

In line with findings for cognitive outcomes at age 11 (reported separately in Sammons et al., 2008) the present findings further support the conclusion that good (high quality and effective) pre-school experience still matters. There is new evidence of continuing pre-school effects in terms of better social/behavioural development at age 11. Taken together the results indicate that attending any pre-school has long term benefits only for 'Pro-social' behaviour. However, it is more important to attend a better quality pre-school than just to attend any kind of pre-school for all outcomes. Low quality pre-school is associated with poorer social/behavioural development in some areas. Thus, quality and effectiveness of pre-school are found to be especially relevant for lasting benefits. Therefore, improving the access to high quality and more effective pre-school experiences is likely to benefit children in the longer term by improving social adjustment at entry to primary school and promoting cognitive development. These benefits continue to remain evident throughout Key Stage 2 and thus have an important role to play in addressing the Enjoyment and Excellence and Every Child Matters' goals through contributing to both raising standards and the social inclusion agendas.

Primary school academic effectiveness (calculated independently by value added analyses using National assessment data sets matched between Key Stage 1 and 2 over three years) did not have a significant influence on social/behavioural outcomes. However, in combination with pre-school quality it did have a significant influence on 'Self-regulation' and for certain groups of children on 'Self-regulation' and 'Anti-social' behaviour (those identified as having some form of SEN and those whose mothers have a low qualification level). The present research provides new evidence concerning the combined effects of pre-school and primary school in shaping children's later social/behavioural outcomes at the end of Key Stage 2. Raising the effectiveness and quality of both pre-school and primary school will help to improve children's all round development.

It is important to note that no one factor is the key to enhancing children's social/behavioural and other educational outcomes in the longer term up to the end of Key Stage 2. What matters is the

¹⁶ <http://www.theequalitiesreview.org.uk>

combination of experiences over time. The child who has a better Early years home learning environment (HLE), goes to a high quality, effective pre-school setting, and who then goes on to attend a more academically effective primary school, appears to have a combination of 'protective' and enhancing experiences that tend to reduce the risk of low attainment and also similarly tend to benefit social/behavioural development. High quality and more effective pre-schools seem to support better outcomes in longer term cognitive and social/behavioural domains. Likewise, we also find that a higher quality Early years home learning environment (HLE) benefits both cognitive and social/behavioural development throughout pre-school and primary school. The implication of these findings is that policy should promote strategies to support improvements in Early years home learning environment (HLE), especially for vulnerable groups, and also work to improve the quality and effectiveness of pre-school provision. Such pre-schools are well placed to identify children who may need extra support if they do not experience a high quality home learning environment (HLE) and could be guided to work with parents to improve their home learning environment (HLE).

As with the conclusions related to cognitive outcomes, the findings on social/behavioural outcomes again suggest that, in order to help reduce the differences in social/behavioural outcomes for different disadvantaged groups, actions to improve their home learning environment (HLE), the quality and effectiveness of pre-school and primary school experiences will need to be tackled collectively, since, as mentioned above, the accumulation and combination of positive experiences over time leads to sustainable improvement of children's social/behavioural outcomes. In addition, it is likely that specially targeted interventions for children who are identified as well behind their peers in cognitive or social/behavioural profiles at the start of primary school will also be necessary to prevent a widening of the gap during KS1 and KS2 and hopefully improve individual pupil's trajectories (see for example, Hurry and Sylva., 2007; Sylva et al., 2008). This has implications for baseline assessment and SEN identification and the development of well founded, evidence based interventions.

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Appendix 2: Details of Social/Behavioural measures

An extended version of the Strengths and Difficulties Questionnaire (Goodman, 1997) was used to measure different features of children's social/behavioural development in Year 1, 2, 5 and 6. This social/behavioural child profile was completed by the class teacher who knew the child well. Principal component analysis and confirmatory factor analysis were used to identify the main underlying dimensions of social behaviour in Years 1, 2 and 5 (see for example, Sammons et al., 2007b). With Year 6 data we tested to see if the social/behavioural factors were similar to the results from previous years. Principal components analysis yielded 6 different principal components that were almost identical to factors from earlier years. Confirmatory factors analysis also yielded the best results with this 6-factor solution (RMSEA=0.07, CFI=0.96). Both analyses replicated the Year 5 findings in defining the main four aspects of social behaviour: 'Self-regulation', 'Pro-social' behaviour, 'Hyperactivity' and 'Anti-social' behaviour. In addition, two other factors, Emotional symptoms and Peer problems, were identical to two Goodman scales. However, for the purpose of EPPE analyses we only focused on analysing the first four factors in this report. The specific questionnaire items found to be associated with each of the four social/behavioural dimensions across Year 1, 2, 5 and 6 are presented in Table A.2.1. Please note that some items were not measured in Year 1 and 2 since they were not developmentally appropriate. Reliability coefficients are also presented for each scale within each year of testing and the results indicate very good reliability for each scale, particularly for the first four scales used in this report. The individual scores on each scale were calculated as a mean of all corresponding items. Children for whom data were missing on 40% or more items within each scale were excluded from the analysis.

Table A.2.1. Six social/behavioural scales measured across Years 1, 2, 5 and 6 with corresponding items

(Goodman items are in bold)

	Year 6	Year 5	Year 2	Year 1
'Hyperactivity' scale (12 items)	$\alpha = 0.87$	$\alpha = 0.87$	$\alpha = 0.81$	$\alpha = 0.89$
2: restless, overactive, cannot stay still for long				
10: constantly fidgeting or squirming				
15: easily distracted, concentration wanders				
21: thinks things out before acting (RC)				
25: sees tasks through to the end, good attention span (RC)				
27: quickly loses interest in what she/he is doing				N / A
36: gets over excited			N / A	N / A
39: is easily frustrated			N / A	N / A
45: is impulsive, acts without thinking			N / A	N / A
50: can behave appropriately during less structured lessons (RC)				
54: fails to pay attention				N / A
56: makes careless mistakes				N / A
'Pro-social' behaviour scale (8 items)	$\alpha = 0.87$	$\alpha = 0.86$	$\alpha = 0.90$	$\alpha = 0.90$
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: apologises spontaneously				
51: offers to help others having difficulties with a task				
52: is sympathetic to others if they are upset				

'Self-regulation' scale (9 items)	$\alpha = 0.87$	$\alpha = 0.85$	$\alpha = 0.89$	$\alpha = 0.89$
32: likes to work things out for self; seeks help rarely 35: does not need much help with tasks 38: chooses activities on their own 41: persists in the face of difficult tasks 44: can move on to a new activity after finishing a task 46: is open and direct about what she/he wants 47: is confident with others 53: shows leadership in group work 55: can take responsibility for a task			N / A	N / A N / A
'Anti-social' behaviour scale (6 items)	$\alpha = 0.75$	$\alpha = 0.70$	$\alpha = 0.73$	$\alpha = 0.65$
12: often fights with other children or bullies him 18: often lies or cheats 22: steals from home, school or elsewhere 26: vandalises property or destroys things 28: shows inappropriate sexual behaviour toward others 30: has been in trouble with the law			N / A N / A	N / A N / A N / A
Emotional symptoms scale (5 items)	$\alpha = 0.76$	$\alpha = 0.75$	$\alpha = 0.76$	$\alpha = 0.76$
3: often complains of headaches, stomach-aches and 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				
Peer problems scale (5 items)	$\alpha = 0.70$	$\alpha = 0.70$	$\alpha = 0.67$	$\alpha = 0.63$
6: rather solitary, tends to play alone 11: has at least one good friend (RC) 14: generally liked by other children (RC) 19: picked on or bullied by other children 23: gets on better with adults than with other children				

RC – reverse code

Appendix 3: Results of final contextualised models

Table A.3.1: Results of final contextualized model for 'Self-regulation' in Year 6

'Self-regulation'	Estimate	SE	Effect Size
Fixed Effects			
Intercept	2.039*	0.042	
Age	0.010*	0.002	0.17
Gender (compared to boys)	0.122*	0.017	0.30
Ethnic groups (compared to White UK Heritage)			
White European	-0.072	0.048	-0.18
Black Caribbean	0.045	0.046	0.11
Black African	0.003	0.062	0.01
Other Ethnic Minority	0.032	0.058	0.08
Indian	0.008	0.064	0.02
Pakistani	0.118*	0.049	0.29
Bangladeshi	0.152~	0.083	0.37
Mixed Heritage	-0.060	0.037	-0.15
Early Developmental Problems (compared to none)			
1 Developmental Problem	-0.104*	0.027	-0.25
2+ Developmental Problems	-0.192*	0.079	-0.47
Missing data	0.001	0.163	0.00
Early Behavioural Problems (compared to none)			
1 Behavioural Problem	-0.100*	0.029	-0.25
2+ Behavioural Problems	-0.080	0.060	-0.20
Need of EAL support in Year 6 (compared to none)			
Missing data	-0.093*	0.037	-0.23
EAL support needed	-0.266*	0.058	-0.65
FSM in Year 6 (compared to none)			
Eligible for FSM	-0.095*	0.026	-0.23
Family Salary (compared to 'no salary')			
Missing data	0.020	0.028	0.05
2,500 – 17,499	0.055~	0.029	0.13
17,500 – 29,499	0.112*	0.032	0.27
30,000 – 37,499	0.133*	0.036	0.33
37,500 – 67,499	0.156*	0.033	0.38
67,500 – 132,00 +	0.118*	0.047	0.29
Mother's qualifications (compared to none)			
Missing data	0.047	0.075	0.12
Vocational	0.035	0.032	0.09
Academic age 16	0.101*	0.026	0.25
Academic age 18	0.157*	0.039	0.38
Degree or equivalent	0.186*	0.040	0.45
Higher Degree	0.227*	0.058	0.55
Other professional / Miscellaneous	0.128~	0.075	0.31
Father's qualifications (compared to none)			
Vocational	0.056	0.035	0.14
Academic age 16	0.044	0.029	0.11
Academic age 18	0.056	0.040	0.14
Degree or equivalent	0.119*	0.038	0.29
Higher degree	0.090~	0.055	0.22
Other professional / Miscellaneous	0.025	0.086	0.06
No father information	0.027	0.028	0.07
Missing data	0.005	0.148	0.01
Early Years HLE (compared to 0 – 13)			
Missing data	0.023	0.064	0.06
14 – 19	0.057	0.033	0.14
20 – 24	0.039	0.034	0.10
25 – 32	0.092*	0.034	0.22
33 – 45	0.173*	0.041	0.42
Random Effects			
School variance	0.024	0.004	
Residual variance	0.167	0.005	

* p< 0.05; ~ p< 0.10

Table A.3.2: Results of final contextualized model for ‘Pro-social’ behaviour in Year 6

‘Pro-social’ Behaviour	Estimate	SE	Effect size
Fixed Effects			
Intercept	2.191*	0.038	
Age	0.003	0.002	0.05
Gender (compared to boys)	0.286*	0.017	0.71
Ethnic groups (compared to White UK Heritage)			
White European	-0.073	0.048	-0.18
Black Caribbean	-0.106*	0.046	-0.26
Black African	-0.085	0.062	-0.21
Other Ethnic Minority	-0.112~	0.058	-0.28
Indian	0.020	0.064	0.05
Pakistani	0.029	0.049	0.07
Bangladeshi	0.025	0.082	0.06
Mixed Heritage	-0.068~	0.037	-0.17
Early Behavioural Problems (compared to none)			
1 Behavioural Problem	-0.096*	0.029	-0.24
2+ Behavioural Problems	-0.048	0.059	-0.12
Missing data	0.020	0.110	0.05
Family Salary (compared to ‘no salary’)			
Missing data	0.004	0.028	0.01
2,500 – 17,499	0.040	0.028	0.10
17,500 – 29,499	0.100*	0.031	0.25
30,000 – 37,499	0.092*	0.035	0.23
37,500 – 67,499	0.089*	0.032	0.22
67,500 – 132,00 +	0.069	0.046	0.17
Mother’s qualifications (compared to none)			
Missing data	-0.014	0.073	-0.04
Vocational	0.030	0.030	0.07
Academic age 16	0.089*	0.025	0.22
Academic age 18	0.109*	0.038	0.27
Degree or equivalent	0.145*	0.035	0.36
Higher Degree	0.126*	0.050	0.31
Other professional / Miscellaneous	0.113	0.072	0.28
Marital status (compared to Married)			
Missing data	-0.118	0.099	-0.29
Single – Never Married	-0.036	0.023	-0.09
Separated / Divorced	-0.074*	0.030	-0.18
Widow	-0.037	0.100	-0.09
Early Years HLE (compared to 0 – 13)			
Missing data	0.024	0.064	0.06
14 – 19	0.060~	0.033	0.15
20 – 24	0.046	0.034	0.11
25 – 32	0.068*	0.033	0.17
33 – 45	0.087*	0.040	0.22
Random Effects			
School variance	0.034	0.005	
Residual variance	0.161	0.005	

* p< 0.05; ~ p< 0.10

Table A.3.3: Results of final contextualized model for ‘Hyperactivity’ in Year 6

‘Hyperactivity’	Estimate	SE	Effect Size
Fixed Effects			
Intercept	1.861*	0.039	
Age	-0.005*	0.002	-0.10
Gender (compared to boys)	-0.262*	0.015	-0.71
Ethnic groups (compared to White UK Heritage)			
White European	0.018	0.043	0.05
Black Caribbean	0.009	0.041	0.02
Black African	0.005	0.055	0.01
Other Ethnic Minority	0.050	0.052	0.13
Indian	-0.128*	0.056	-0.34
Pakistani	-0.168*	0.042	-0.45
Bangladeshi	-0.203*	0.074	-0.55
Mixed Heritage	0.060~	0.033	0.16
Early Behavioural Problems (compared to none)			
1 Behavioural Problem	0.114*	0.026	0.31
2+ Behavioural Problems	0.114*	0.053	0.31
Missing data	-0.270	0.147	-0.73
Need of EAL support in Year 6 (compared to none)			
Missing data	0.120*	0.033	0.32
EAL support needed	0.171*	0.052	0.46
FSM in Year 6 (compared to none)			
Eligible for FSM	0.076*	0.023	0.21
Family Salary (compared to ‘no salary’)			
Missing data	-0.006	0.043	-0.02
2,500 – 17,499	-0.002	0.026	0.00
17,500 – 29,499	-0.089*	0.030	-0.24
30,000 – 37,499	-0.030	0.034	-0.08
37,500 – 67,499	-0.048	0.031	-0.13
67,500 – 132,00 +	-0.007	0.042	-0.02
Mother’s qualifications (compared to none)			
Missing data	0.055	0.067	0.15
Vocational	-0.042	0.028	-0.11
Academic age 16	-0.101*	0.023	-0.27
Academic age 18	-0.122*	0.035	-0.33
Degree or equivalent	-0.153*	0.035	-0.41
Higher Degree	-0.166*	0.052	-0.45
Other professional / Miscellaneous	-0.198*	0.067	-0.53
Father’s qualifications (compared to none)			
Vocational	-0.028	0.031	-0.08
Academic age 16	-0.031	0.026	-0.08
Academic age 18	-0.014	0.036	-0.04
Degree or equivalent	-0.111*	0.034	-0.30
Higher degree	-0.077	0.049	-0.21
Other professional / Miscellaneous	0.016	0.077	0.04
No father info	0.004	0.029	0.01
Missing data	0.211	0.132	0.57
Change in marital status from Preschool to KS1 (compared to Couple – Couple)			
Missing data	0.055	0.042	0.15
Single – Single	0.040	0.031	0.11
Single – Couple	0.088*	0.044	0.24
Couple – Single	0.027	0.025	0.07
Early Years HLE (compared to 0 – 13)			
Missing data	0.000	0.057	0.00
14 – 19	-0.040	0.030	-0.11
20 – 24	-0.039	0.030	-0.11
25 – 32	-0.076*	0.030	-0.20
33 – 45	-0.086*	0.036	-0.23
Random Effects			
School variance	0.013	0.003	
Residual variance	0.138	0.004	

* p< 0.05; ~ p< 0.10

Table A.3.4: Results of final contextualized model for 'Anti-social' behaviour in Year 6

'Anti-social' behaviour	Estimate	SE	Effect size
Fixed Effects			
Intercept	1.127*	0.022	
Age	-0.001	0.001	-0.02
Gender (compared to boys)	-0.091*	0.010	-0.38
Ethnic groups (compared to White UK Heritage)			
White European	-0.022	0.027	-0.09
Black Caribbean	0.053*	0.025	0.22
Black African	-0.003	0.034	-0.01
Other Ethnic Minority	0.031	0.032	0.13
Indian	-0.063~	0.034	-0.27
Pakistani	-0.027	0.025	-0.12
Bangladeshi	-0.065	0.046	-0.27
Mixed Heritage	0.020	0.021	0.08
Early Behavioural Problems (compared to none)			
1 Behavioural Problem	0.057*	0.016	0.24
2+ Behavioural Problems	0.025	0.034	0.11
Missing data	-0.014	0.056	-0.06
FSM in Year 6 (compared to none)			
Eligible for FSM	0.065*	0.015	0.27
Mother's qualifications (compared to none)			
Missing data	0.045	0.042	0.19
Vocational	-0.011	0.017	-0.04
Academic age 16	-0.047*	0.014	-0.20
Academic age 18	-0.055*	0.022	-0.23
Degree or equivalent	-0.063*	0.021	-0.27
Higher Degree	-0.050~	0.029	-0.21
Other professional / Miscellaneous	-0.046	0.041	-0.19
Family SES (compared to professional non-manual)			
Other professional non-manual	0.021	0.018	0.09
Skilled non-manual	0.054*	0.020	0.23
Skilled manual	0.031	0.020	0.13
Semi-skilled manual	0.039	0.025	0.16
Unskilled manual	0.066~	0.040	0.28
Unemployed / Never worked	0.047*	0.023	0.20
Missing data	-0.051	0.057	-0.21
Change in marital status from Preschool to KS1 (compared to Couple – Couple)			
Missing data	0.050*	0.014	0.21
Single – Single	0.029~	0.016	0.12
Single – Couple	0.059*	0.026	0.25
Couple – Single	0.007	0.016	0.03
Random Effects			
School variance	0.003	0.001	
Residual variance	0.057	0.002	

* p< 0.05; ~ p< 0.10

Appendix 4: Results of the overall impact of background characteristics and prior developmental level on social/behavioural outcomes

Following tables present the details of child and school level variances and intra-school correlations of social/behavioural models tested in this report.

Table A.4.1: Null model showing primary school and child level variance of Year 6 Social/behavioural outcomes

	'Self-regulation'	'Pro-social' behaviour	'Hyperactivity'	'Anti-social' behaviour
School level variance estimate (standard error ¹⁷)	0.028 (0.005)	0.039 (0.006)	0.018 (0.004)	0.004 (0.001)
Child level variance estimate (standard error)	0.199 (0.006)	0.188 (0.006)	0.171 (0.006)	0.061 (0.002)
Intra-school correlation	0.12	0.17	0.10	0.06
Number of children	2661	2663	2664	2661
Number of schools	1032	1034	1034	1033

Table A.4.2: Contextualised models of social/behavioural measures at Year 6 showing primary school and child level variance

	'Self-regulation'	'Pro-social' behaviour	'Hyperactivity'	'Anti-social' behaviour
School level variance estimate (standard error)	0.024 (0.004)	0.034 (0.005)	0.013 (0.003)	0.003 (0.001)
Child level variance estimate (standard error)	0.167 (0.005)	0.161 (0.005)	0.138 (0.004)	0.057 (0.002)
Intra-school correlation	0.13	0.17	0.08	0.05
% Reduction in school level variance	13	12	31	22
% Reduction in child level variance	16	14	20	8
% Reduction total variance	16	14	21	9

¹⁷ The standard error provides a measure of the confidence limits associated with each estimate and is used to establish the statistical significance of the results.

Table A.4.3: Value add models of social/behavioural measures at Year 6 showing primary school and child level variance

	'Self-regulation'	'Pro-social' behaviour	'Hyperactivity'	'Anti-social' behaviour
School level variance estimate (standard error)	0.021 (0.004)	0.030 (0.005)	0.017 (0.003)	0.003 (0.001)
Child level variance estimate (standard error)	0.137 (0.005)	0.157 (0.006)	0.114 (0.004)	0.049 (0.002)
Intra-school correlation	0.13	0.16	0.13	0.05
% Reduction in school level variance	23	24	10	27
% Reduction in child level variance	31	17	33	21
% Reduction total variance	30	18	31	21

Appendix 5: Comparing the influence of background characteristics on social/behavioural outcomes in Year 6 from Year 2

In order to compare the net effects of child and family characteristics as well as the net effects of the Early years Home Learning Environment (HLE) on social/behavioural developmental level in Year 2 compared to the net effects in Year 6, we calculated multilevel models using the same factors used in the contextualised models for Year 6 and tested them as potential predictors of Year 2 social/behavioural outcomes so that direct comparisons at the two time points could be made. The change of net impact of different influencing factors reveals whether certain groups of children that showed increased levels of negative social behaviour at the end of Year 2 have sustained this behaviour or have worsened by the end of Year 6. It also explores whether certain groups of children have further improved or fallen behind compared to the average in terms of their social/behavioural development during Key Stage 2.

Comparisons were made on the basis of the effect sizes of the individual predictors in each set of models. In the following description of the results, differences in effect sizes between Year 2 and Year 6 (Δ ES) are presented to indicate the extent of change in the impact of different background factors on social/behavioural development rather than using absolute effect sizes. The changes in effect sizes are presented without an algebraic sign, but the direction of change is explained in the text. Table A.5.1 summarizes the extent of change in effects.

Child Measures

Boys are falling further behind when compared to girls on almost all aspects of social/behavioural development. Differences between the genders have increased over the years with boys showing higher levels of 'Hyperactivity' (Δ ES=0.25) and 'Anti-social' behaviour (Δ ES=0.08) and lower levels of 'Pro-social' behaviour (Δ ES=0.15) by Year 6. However, the difference between boys and girls did not increase for 'Self-regulation' (Δ ES=0.01).

The effect of needing EAL support has slightly increased for 'Hyperactivity' (Δ ES=0.04) with children who need EAL support showing more hyperactive behaviour by Year 6. In contrast, the impact of needing EAL support has become slightly weaker for 'Self-regulation' (Δ ES=0.05) by Year 6. In addition, the effect of early developmental and behavioural problems has slightly increased for 'Self-regulation' and 'Hyperactivity' (Δ ES< 0.08), whereas the impact of behavioural problems decreased for 'Pro-social' and 'Anti-social' behaviour (Δ ES< 0.13).

The impact of ethnicity has become stronger for all social/behavioural outcomes by Year 6 (see the table for details). However, considering that sample sizes for ethnic groups are small, these findings should be interpreted with caution.

Family Measures

The findings indicate that high qualification level (degree or higher) of the mother is a stronger predictor of all children's social/behavioural outcomes at Year 6 than at Year 2 (Δ ES< 0.22). The overall impact of father's qualification on 'Self-regulation' is somewhat higher in Year 6 compared to Year 2 (Δ ES< 0.04). On contrary, the impact of father's qualification on 'Hyperactivity' is weaker in Year 6 compared to Year 2 (Δ ES< 0.14). Interestingly, the overall effect of family socio-economic status on 'Anti-social' behaviour is reverses in Year 6 compared to the effect in Year 2 (Δ ES< 0.60), indicating that children who come from professional non-manual families have less 'Anti-social' behaviour in Year 6 than other children, whereas in Year 2 they had higher levels of 'Anti-social' behaviour than children coming from semi-skilled or unskilled and unemployed families.

The impact of family earned income has increased in strength for 'Self-regulation' (Δ ES< 0.16), 'Pro-social' behaviour (Δ ES< 0.14) and 'Hyperactivity' (Δ ES< 0.20), indicating larger disparity in social behaviour in Year 6 between children who come from families with higher income and

children who come from families with very low or no income. Similarly, looking at eligibility for free school meals (FSM), the findings illustrate that the impact is stronger in Year 6 for 'Self-regulation' ($\Delta ES=0.11$), but it is somewhat weaker for 'Hyperactivity' ($\Delta ES=0.04$) and 'Anti-social' behaviour ($\Delta ES=0.04$).

Table A.5.1: The impact of child, family and HLE characteristics on Social/behavioural development at Year 6 compared to Year 2

'Self-regulation'	Effect is now	Description
Gender	Same	Girls still show higher 'Self-regulation' than boys
Ethnicity	Slightly stronger	Slightly stronger effect for Bangladeshi and Pakistani groups showing higher 'Self-regulation' than White UK at Year 6
Early Developmental problems	Slightly stronger	Early developmental problems a slightly stronger predictor for lower 'Self-regulation' at Year 6
Early Behavioural problems	Slightly stronger	Early behavioural problems a slightly stronger predictor for lower 'Self-regulation' at Year 6
Need of EAL support	Slightly weaker	Need of EAL support a slightly weaker predictor for lower 'Self-regulation' at Year 6
Mother's qualifications	Stronger	Children of less educated mothers have fallen further behind on 'Self-regulation'
Father's qualifications	Slightly stronger	High father qualification stronger predictor of higher 'Self-regulation' at Year 6
FSM	Stronger	Gap between children eligible for FSM and not eligible for FSM has increased
Family income	Stronger	Children from low income families have fallen further behind on 'Self-regulation'
Early years HLE	Slightly weaker	Early Years HLE a slightly weaker predictor of high 'Self-regulation' at Year 6
'Pro-social' behaviour		Description
Gender	Stronger	Gap between boys and girls increased
Ethnicity	Stronger	Some minority groups scored lower on 'Pro-social' behaviour in Year 6
Early Behavioural problems	Slightly weaker	Early behavioural problems a slightly weaker predictor of lower 'Pro-social' behaviour at Year 6
Mother's Qualifications	Stronger	Children of less educated mothers have fallen further behind on 'Pro-social' behaviour
Family income	Stronger	Children from low income families have fallen further behind on 'Pro-social' behaviour
Marital Status	Mixed pattern	Slightly weaker effect for children of single mothers but stronger effect for children of separated/ divorced mother: both predicting lower 'Pro-social' behaviour
Early years HLE	Mixed pattern	For high HLE effect is slightly weaker whereas for lower HLE is slightly stronger
'Hyperactivity'		Description
Gender	Stronger	Boys showed an increase in 'Hyperactivity' at Year 6
Ethnicity	Stronger	Stronger effect for Indian, Bangladeshi and Pakistani groups showing lower 'Hyperactivity' than White UK at Year 6
Early Behavioural problems	Mixed pattern	1 Early behavioural problem slightly weaker predictor, but 2+ early behavioural problems a stronger predictor for higher 'Hyperactivity'
Need of EAL support	Slightly stronger	Need of EAL support slightly stronger predictor for higher 'Hyperactivity' at Year 6
Mother's qualifications	Stronger	Children of less educated mothers showed increasingly higher 'Hyperactivity' levels at Year 6
Father's qualifications	Weaker	Father's qualifications weaker predictor for 'Hyperactivity' at Year 6
FSM	Slightly weaker	Children eligible for FSM still show higher 'Hyperactivity' levels, but the effect is slightly weaker
Family income	Stronger	Children from middle income families have lower 'Hyperactivity' scores at Year 6

Change in Marital status	Weaker	Change in marital status a weaker predictor for increased 'Hyperactivity' at Year 6
Early years HLE	Weaker	Early Years HLE a weaker predictor of low 'Hyperactivity' at Year 6
'Anti-social' behaviour		Description
Gender	Stronger	Gap between boys and girls increased: Boys showed an increase in 'Anti-social' behaviour at Year 6
Ethnicity	Stronger	Some minority groups scored higher on 'Anti-social' behaviour in Year 6
Early Behavioural problems	Weaker	Early behavioural problems a weaker predictor of higher 'Anti-social' behaviour at Year 6
Mother's Qualifications	Slightly stronger	Children of less educated mothers showed increasingly higher 'Anti-social' behaviour levels at Year 6
Family SES	Reversed	Professional non-manual predictor for less 'Anti-social' behaviour at Year 6
FSM	Slightly weaker	Children eligible for FSM still show higher 'Anti-social' behaviour, but the effect is slightly weaker
Change in Marital status	Mixed pattern	Slightly weaker effect for children with mothers who stayed single, but stronger effect for children of mothers who married in predicting high 'Anti-social' behaviour

The impact of marital status on 'Pro-social' behaviour in Year 6 has slightly decreased for children of single mothers ($\Delta ES=0.06$) but it has increased for children of separated/divorced mothers ($\Delta ES=0.13$). Similarly, the impact of change in marital status on 'Anti-social' behaviour in Year 6 has slightly decreased for children of mothers who stayed single ($\Delta ES=0.06$), but it has increased for children of mother who change their marital status from being single to being married ($\Delta ES=0.18$). On contrary, the impact on 'Hyperactivity' in Year 6 has decreased for children of both mother who married ($\Delta ES=0.17$) and for those who got divorced ($\Delta ES=0.14$).

Early Years Home Learning Environment (HLE)

The quality of the Early years HLE was found to be an important predictor for almost all social/behavioural outcomes in Year 6 but compared to Year 2 its impact has somewhat decreased for 'Self-regulation' ($\Delta ES<0.11$), 'Hyperactivity' ($\Delta ES<0.16$) and 'Pro-social' behaviour but only for high levels of HLE ($\Delta ES<0.05$) whereas for lower levels of HLE the impact on 'Pro-social' behaviour has slightly increased ($\Delta ES<0.07$). As an overall predictor, Early years HLE has reduced its impact relative to other factors such as mother's qualifications. It is the high levels of Early years HLE that shows the strongest and most stable long term influence.

Appendix 6: Results of the impact of pre-school on social/behavioural developmental progress

Table A.6.1: The impact of Pre-school quality on Social/Behavioural developmental progress

'Self-regulation'		Effect size
ECERS-E	Home children – reference group	0.00
	Low quality	0.02
	Medium quality	0.12
	High quality	0.23
'Pro-social' behaviour		Effect size
ECERS-R	Home children – reference group	0.00
	Low quality	0.17
	Medium quality	0.20
	High quality	0.28
ECERS-E	Home children – reference group	0.00
	Low quality	0.18
	Medium quality	0.21
	High quality	0.27
'Hyperactivity'		Effect size
ECERS-R	Home children – reference group	0.00
	Low quality	0.15
	Medium quality	0.11
	High quality	-0.08
ECERS-E	Home children – reference group	0.00
	Low quality	0.15
	Medium quality	0.08
	High quality	-0.02
'Anti-social' behaviour		Effect size
ECERS-R	Home children – reference group	0.00
	Low quality	-0.15
	Medium quality	-0.14
	High quality	-0.22
ECERS-E	Home children – reference group	0.00
	Low quality	-0.18
	Medium quality	-0.14
	High quality	-0.20

Table A.6.2: The impact of Pre-school effectiveness on Social/Behavioural developmental progress

'Self-regulation'		Effect size
Early numbers	Home children – reference group	0.00
	Low effectiveness	0.03
	Medium effectiveness	0.10
	High effectiveness	0.24
'Pro-social' behaviour		Effect size
Early numbers	Home children – reference group	0.00
	Low effectiveness	0.13
	Medium effectiveness	0.21
	High effectiveness	0.30
Pre-reading	Home children – reference group	0.00
	Low effectiveness	0.24
	Medium effectiveness	0.22
	High effectiveness	0.20
Independence and Concentration	Home children – reference group	0.00
	Low effectiveness	0.10
	Medium effectiveness	0.23
	High effectiveness	0.26
Co-operation and Conformity	Home children – reference group	0.00
	Low effectiveness	0.11
	Medium effectiveness	0.23
	High effectiveness	0.28
Peer Sociability	Home children – reference group	0.00
	Low effectiveness	0.06
	Medium effectiveness	0.25
	High effectiveness	0.19
Reducing Anti-social behaviour	Home children – reference group	0.00
	Low effectiveness	0.19
	Medium effectiveness	0.19
	High effectiveness	0.37
'Anti-social' behaviour		Effect size
Reducing Anti-social behaviour	Home children – reference group	0.00
	Low effectiveness	-0.25
	Medium effectiveness	-0.14
	High effectiveness	-0.22

Appendix 7: Details of Selected Measures used in EPPE 3-11

A.7.1: The Multiple Disadvantage Index

The Multiple Disadvantage Index was developed as part of the Early Years Transition & Special Educational Needs (EYTSEN) Project which focuses 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 Early years Home Learning Environment (HLE). All the variables were chosen because they related to low baseline attainment when looked at in isolation. Where indicators were closely related, such as first language and ethnic groups, only the most significant was included.

Child variables

- First language: English as an additional language (EAL)
- Large family: 3 or more siblings
- Pre-maturity / low birth weight

Parent variables

- Mother's highest qualification level: no qualifications
- Social class of father's occupation: Semi-skilled, unskilled, never worked, absent father
- Father not employed
- Young Mother (Age 13-17 at birth of EPPE child)
- Lone parent
- Mother not working / unemployed
- Low Early years Home Learning Environment (HLE)

The EPPE Project - Children's activities at home

Does X have?

A regular bedtime

Rules about watching TV/videos

How often does X watch TV/videos in a typical weekday?

How many days in a typical week has X?

Played with friends at home

Does X have friends home to play?

Played with friends elsewhere

Does s/he go anywhere else to play?

Gone shopping with you

Gone on visits to friends or relatives

Sat down and eaten a meal with the whole family together

Does anyone at home ever read to X? If yes, how often?

Does anyone at home ever take X to the library? How often?

Does X ever play with letters or numbers? How often?

Does X ever paint and draw at home? How often?

Have you ever tried to teach X? ABC/ The Alphabet/ letters?

Numbers? How often?

Any songs/poems? How often?

Can you tell me which?

Any nursery rhymes? How often?

Can you tell me which?

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A.7.2: The Key Stage 1 Home Learning Environment (HLE)

HLE Factors and the items loading on these factor:

- **Home Computing**
 - The Child plays on computer by themselves.
 - Respondent plays computer games with the child.
 - Respondent uses computer with the child in educational ways.

- **Parent-Child Enrichment outings/activity outside home.**
 - Respondent visits library with the child.
 - Respondent does sport/physical activity with the child.
 - Respondent goes on educational visits with the child.

- **Parent-child one-to-one interactions at home**
 - Respondent plays with the child using toys/games/puzzles.
 - Respondent reads to the child.
 - Respondent listens to the child read.

- **Expressive play**
 - The Child plays 'make believe' or pretend games.
 - The Child paints/draws/makes models.
 - The Child enjoys dance music and movement.

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.

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 progress.

Birth weight 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 and Carran, 1989).

Centre/School level variance The proportion of variance in a particular child outcome measure (i.e. Pre-reading scores at start of primary school) attributable to differences between individual centres/schools rather than differences between individual children.

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).

Contextualised models Cross-sectional multilevel models exploring children's cognitive attainment at entry to primary school, controlling for child, parent 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.

Correlation A correlation is a measure of statistical association that ranges from + 1 to -1.

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. Note that the number of months of pre-school attended before the child entered the EPPE study is not included in this duration measure. A separate 'duration' measure of amount of time in pre-school prior to entering the study was tested but was not found to be significant (note that this 'duration' measure is confounded with prior attainment). 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 et al., 1998) is based on child centred pedagogy and also assesses resources for indoor and outdoor play. The English rating scale (ECERS-E) (Sylva et al., 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) 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 Appendix 5 and Elliot & Sammons (2004).

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

Hierarchical nature of the data Data that clusters into pre-defined sub-groups or levels within a system (i.e. young children, pre-school centres, LAs).

Home learning environment (HLE) 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.

Intervention study A study in which researchers 'intervene' in the sample to control variables i.e. control by setting, the adult:child ratios in order to compare different specific ratios in different settings. EPPE is not an intervention study in that it investigates naturally occurring variation in pre-school settings.

Intra-centre/school correlation The intra-centre/school correlation measures the extent to which the scores of children in the same centre/school resemble each other as compared with those from children at different centres/schools. The intra-centre/school 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 centres/schools. This gives an indication of possible variation in pre-school centre/school effectiveness.

Multiple Disadvantage Based on three child variables, six parent variables, and one related to the home learning environment which were considered 'risk' indicators when looked at in isolation. A child's 'multiple disadvantage' was calculated by summing the number of indicators the child was at risk on.

Multilevel modelling A methodology that allows data to be examined simultaneously at different levels within a system (i.e. young children, pre-school centres, LAs), 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.

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 (i.e. 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 by:

- Five regions (six LAs) 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.

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 and 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% of cases fall within one standard deviation of the mean and 95% of cases fall within two standard deviations.

Total BAS score By combining 4 of the BAS sub-scales (2 verbal and 2 non-verbal) a General Cognitive Ability score or Total BAS score at entry to the study can be computed. This is a measure of overall cognitive ability.

Value added models Longitudinal multilevel models exploring children's cognitive progress over the pre-school period, controlling for prior attainment and significant child, parent 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).

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