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

Technical Paper 8b

Measuring the Impact of Pre-School on Children's Social/Behavioural Development over the Pre-School Period

A Longitudinal Study funded by the DfES

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Address for correspondence:

EPPE Project
Room 416
University of London
Institute of Education
20 Bedford Way
London WC1H 0AL

Tel: +44 (0)20 7612 6219
Fax: +44 (0)20 7612 6230
Email: p.sammons@ioe.ac.uk

Website http://www.ioe.ac.uk/projects/eppe

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Authors :

Pam Sammons
Kathy Sylva
Edward Melhuish
Iram Siraj-Blatchford
Brenda Taggart
Karen Elliot

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THE EPPE RESEARCH TEAM

Principal Investigators

Professor Kathy Sylva
Department of Educational Studies, University of Oxford

Professor Edward Melhuish
Institute for the Study of Children, Families and Social Issues, Birkbeck University of London

Professor Pam Sammons
Institute of Education, University of London

Professor Iram Siraj-Blatchford
Institute of Education, University of London

Research Co-ordinator

Brenda Taggart
Institute of Education, University of London

Senior Research Officer for Multilevel Analyses

Karen Elliot
Institute of Education, University of London

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20 Bedford Way, London WC1H OAL

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Background

The Effective Provision of Pre-school Education (EPPE) project explores the impact of pre-school centre provision on young children's cognitive progress and their social behavioural development. The EPPE study was commissioned and funded by the Department for Education and Employment (now the Department for Education and Skills). EPPE Technical Papers 8a and 8b report on the main findings of the first phase of the longitudinal research which tracked a large sample of young children over the pre-school period from age 3 years plus to the start of primary school, when children entered reception classes. An educational effectiveness design was adopted which explores the developmental progress children made during this period and analyses the contribution made by different pre-school centres to cognitive and social behavioural gains.

The study follows a large sample of young children for five years from pre-school entry at age 3 years plus up to age 7 years (the end of Key Stage 1 of primary education). It investigates the influence on children's cognitive and social behavioural outcomes of a wide variety of child, parent and family factors, including amount of care outside the family, and aspects of the home learning environment provided by parents. The research seeks to establish whether different types of pre-school settings differ in their impact and effectiveness. It also seeks to identify any variations between individual pre-school centres in their impact upon children's cognitive progress and social behavioural development. Measures of the quality of pre-school centres and details of variations in centre policy and practices have been collected from observations by researchers and from interviews with centre managers. The study has sought to establish whether such factors show a relationship with young children's progress and development. In total 141 pre-school centres drawn from five regions across England form the focus of the EPPE research. Centres were drawn from six types of provision: nursery classes, playgroups, local authority day care, private day nurseries, nursery schools and integrated centres (i.e. combined centres). The research drew approximately equal numbers of target centres of each of the main type of provisions, with the exception of integrated centres which are a relatively recent innovation and of which only a small number existed at the start of the research. The five regions were chosen to cover a range of socio-economic and geographical areas including rural, metropolitan, shire county, inner-city. The regions were selected to include ethnically diverse and socio-economically disadvantaged communities.

Detailed case studies of centres, chosen because they were in the more effective half of the spectrum in terms of children's outcomes, are reported separately (see EPPE Technical Paper 10, forthcoming). These provide rich information about processes operating in different centres and illuminate our understanding of the ways different aspects of policy and practice, including effective early childhood pedagogical strategies, can help promote young children's learning and development.

This report describes the results of analyses of young children's social behavioural development during their time in pre-school. Equivalent analyses of the cognitive progress of children in the study have been conducted and the results are reported separately in EPPE Technical Paper 8a. Developmental gains were measured from entry to the EPPE study until the start of primary school. Young children's social behavioural outcomes were assessed by their class teachers at entry to primary school. Four aspects of social behavioural development have been studied, namely 'Independence & Concentration', 'Co-operation & Conformity', 'Peer Sociability' and 'Anti-social / Worried'. A range of statistical methods has been used to analyse data for around 2,800 children, representing around 95 per cent of the total child sample at entry to the study. Multilevel modelling has been used to identify and explore pre-school centre effects. An additional sample of 'home' children (without pre-school centre experience) was recruited at primary school entry bringing the total to over 3100 in some analyses.

Methodology
EPPE uses statistical techniques (multilevel modelling) to measure the influence of different background factors on young children's social behavioural development at the start of primary school. Contextualised analyses are used to identify the unique (net) contribution of particular characteristics to variation in children's outcomes, in this instance their development in different social behavioural measures, while other influences are controlled. Thus, for example, the impact of family socio-economic status (SES), is established while taking into account the influence of mother's qualification levels, low income (indicated by eligibility for free school meals), ethnicity, birthweight, home learning environment etc. It is of policy interest to establish the nature and strength of such background influences, individually and in total, because they are relevant to issues of equity and social inclusion.

Multilevel modelling has been used to identify and explore pre-school centre effects and the 'value added' by different centres.[1] Value added multilevel models investigate children's developmental gains over their time in pre-school, by controlling for a child's age at assessment and prior social behavioural development at entry to pre-school, as well as a wide range background influences. These analyses are used to establish whether there is evidence of pre-school influences on young children's social behavioural developmental gains. In particular, the extent to which children's social behavioural developmental gains are associated with the pre-school centre attended can be calculated. The centre level variance provides an indication of the size of any effect related to pre-school attended. More effective centres (positive outliers in value added terms) can be identified where children made significantly greater developmental gains than predicted on the basis of prior social behavioural and intake characteristics. Centres where children made less developmental gains than predicted can be viewed as *less effective* (negative outliers in value added terms).

The multilevel value added analyses are also extended to establish the extent to which factors such as type of pre-school attended, number of sessions, quality characteristics ratios and staff qualifications show any statistical relationship with the effects of pre-school. It is thus possible to establish whether variations in quality and extent of time in pre-school have an impact on children's social behavioural developmental gains and, in particular, whether higher quality and more pre-school experience have a positive impact.

Findings concerning a sample of 'home children', who have had no pre-school centre experience before starting primary school, are reported for comparison with the pre-school sample. The contextualised multilevel analyses explore whether home children are at a disadvantage in terms of social behavioural development when they start primary school and the extent to which any development gap can be attributed to the absence of pre-school experience, rather than to differences in their background characteristics. These analyses provide important additional evidence concerning the overall impact of pre-school provision.

Main Findings and Implications for Policy
The main findings of the EPPE study provide a range of evidence relevant to current policy concerns with developing pre-school provision, promoting social inclusion and combating exclusion.

The impact of a child's background
Early findings from the EPPE research (EPPE Technical Paper 2 & 7) illustrated that there are important differences in young children's cognitive and social behavioural attainments related to specific child, parent and home environment characteristics at entry to the study (age 3 years plus). EPPE Technical Paper 8a confirmed the continued strength of such influences on cognitive outcomes measured at the start of primary education. It should be noted that in

[1] Social behavioural developmental gains were measured from entry to the EPPE study (age 3 years plus) until the start of primary school (usually at entry to reception classes at rising 5 years, though in some instances children are enrolled directly into year 1 classes and do not join a reception class).

general, children's cognitive attainments are more susceptible to child, family and home environment influences than social behaviour for this pre-school age group.

The results from the analyses of social behavioural outcomes emphasise the need to make adequate statistical control for differences in the characteristics of young children who attend different pre-school settings, in both prior social behavioural development and other relevant characteristics, in any studies of the influence of pre-school institutions. Such control for intake differences is important to ensure that valid comparisons can be made both at the level of individual centres and also by type of provision. It is also essential for studies seeking to compare children who do not attend a pre-school centre before they start school, because as a group they show differences in terms of a range of characteristics and, in particular, are more likely to experience multiple disadvantage.

Home learning environment

The research points to the importance of a range of factors, such as mother's educational level, socio-economic status (SES) etc, and the influence of aspects of the home learning environment, (i.e. activities that offer learning opportunities to the child), when investigating young children's social behavioural outcomes. The present analyses confirm that parental involvement in activities (such as reading to their child, teaching songs and nursery rhymes, playing with letters & numbers, visiting the library, painting & drawing, emphasising the alphabet, etc) are significant in accounting for differences in social behavioural development at the start of primary school. The effect sizes relating to the home learning environment (and in particular the home learning environment index[2]) are generally higher than for family measures such as mothers' qualification level. The home learning environment measures also influence young children's social behavioural developmental gains over the pre-school period. The analyses reported in EPPE Technical Paper 8a also reveal that aspects of the home learning environment are associated with significantly better cognitive and language outcomes at primary school entry.

These results suggest that policies targeted at working with parents in disadvantaged communities (such as *Sure Start*) might consider encouraging active parenting strategies that promote children's social behavioural development and their cognitive progress. Many pre-school settings already encourage parental participation, and some have developed programmes that feature parent education. The EPPE results suggest programmes that directly promote activities for parents and children to engage in together are likely to be most beneficial for young children (see EPPE Technical Paper 10 for further discussion of this issue). Health visitors may also be well placed to provide guidance for parents on ways to enrich young children's home learning environments and some primary schools run activities for parents. Such provision could also seek to promote the benefits of joint activities, which promote pre-school children's developmental learning at home.

Variations in centre effectiveness

The value added multilevel analyses show the individual pre-school centre attended by a child also has an impact on children's social behavioural developmental gains.[3] A number of statistically significant outlier centres were identified. These are centres where children showed significantly better (in the case of positive outliers) or, by contrast, significantly poorer social behavioural developmental gains than predicted (negative outliers), given their prior social behaviour and background. There were 52 (36.9%) centres identified as performing broadly as expected across all areas of social behavioural development, when intake differences are controlled. Just over one in 10 centres (12.8%) were found to be statistical outliers (performing significantly above or significantly below expectation at the 95% confidence levels for one or

[2] The home learning environment index provides a summary based on the individual measures reported above such as parents reading to their child. It is interesting to note that the home learning environment index is only moderately correlated (r=0.3) with family SES or mother's qualification levels.

[3] Significant centre level variance in children's social behavioural developmental gains remain even when account is taken of prior social behavioural development and other intake differences (in terms of child, family and home learning environment characteristics).

more social behavioural area). This is likely to be a conservative estimate of the extent of real differences in effectiveness between individual centres, since, with small numbers of children per centre an effect has to be large to reach statistical significance.

Typically centres vary in their effects on different social behavioural outcomes. No centre performed significantly above or significantly below expectation for all social behavioural outcomes. However, pre-school centre effects are generally more highly correlated in social behavioural outcomes than cognitive outcomes. This suggests that pre-school settings show more internal variation in effectiveness in promoting children's cognitive outcomes than is the case for their social behavioural outcomes. Nonetheless, the most usual profiles across the four outcomes studied show that a number of centres could be distinguished with broadly positive effects, whereas others showed generally poorer effects on social behavioural developmental gains.

It is important to note that more than a fifth of children (23%) had left their target centre before starting primary school and moved to other provision. There was no evidence that mobile children, who moved pre-school centre during the study, showed poorer social behavioural outcomes when they started school. The proportion of mobile children varied significantly for different types of provision, however, being very uncommon for those in nursery classes or nursery schools. By contrast the majority of playgroup children (52%) had moved centre, often to a different form of provision. The much higher incidence of movement from playgroups has implications for the analysis of the effects of this type of provision, and the effects of individual playgroup centres. The high degree of mobility means that it is very difficult to measure the impact of playgroups on children's social behavioural developmental gains (either at the level of individual centres or as a type of provision) accurately.

The impact of pre-school – type, quantity and quality

Elsewhere it has been shown that pre-school centre experience has an important influence on young children's cognitive development (see EPPE Technical Paper 8a). The findings for social behavioural development also support this interpretation.

Quality of pre-school provision is regarded as a vital feature of early years education and care. The EPPE study explored variation in the quality of individual centres using the Early Childhood Environment Rating Scale (total ECERS-E and ECERS-R scales). Trained researchers conducted detailed observations of centres to assess quality.

Higher quality scores as assessed by the ECERS-R scale were positively related to better child outcomes for one of the social behavioural measures ('Co-operation & Conformity'). The results of analyses of the ECERS-R subscales also suggest that specific subscales of quality measured by this instrument (social interaction, and language and reasoning) are associated with better social behavioural developmental outcomes at primary school entry. In addition, another observational instrument, which provides measures of adult child interaction (Caregiver Interaction Scale, Arnett, 1989), is related to all three of the social behavioural outcomes except 'Anti-social / Worried' behaviour. In particular, where staff child interactions were rated as more 'Positive' better child social behavioural outcomes are found.

Types of provision effects were identified for several social behavioural outcomes, in line with findings for cognitive outcomes. These results suggest that, as a group, children who attended LA day care and private day nurseries show poorer behavioural outcomes than those who attended other forms of provision (note that proportionately more of the children in LA day nurseries and private day nurseries started at their pre-school target centre before 3 years of age). Moreover children who attended integrated provision or nursery classes tended to make greater gains in social behavioural development during the pre-school period. Nonetheless, there was significant variation in effectiveness on social behavioural gains within each type of provision; thus differences between individual pre-school centres and differences between types of provision are both important.

The EPPE research indicates that pre-school centre experience can play an important part in promoting young children's social behavioural development, and that higher quality provision in particular, is beneficial in promoting better social behavioural outcomes by the start of primary school. There is evidence that some types of provision are associated with better social behavioural development and that higher staff qualifications (proportion of staff hours at qualified teacher status) have a positive influence on young children's social behavioural outcomes. Elsewhere, it has been demonstrated that there is a significant link between pre-school centre quality ratings and centre manager qualification levels (EPPE Technical Paper 5), and variations between type of provision and quality (EPPE Technical Paper 6), thus improving staff training and qualification levels may be strategies which can help raise the quality of provision.

When looking at social behaviour outcomes at start of school (i.e. contextualised models), it is found that children who spent longer in pre-school (measured from start date at target pre-school centre to date started primary school) were rated by class teachers as showing more 'Anti-social / Worried' behaviour at primary school entry. In other words, a longer time (in years and months) spent in pre-school, is associated with slightly more 'Anti-social / Worried' behaviour, although it should be noted that only a small proportion of children in total show difficulties for this behavioural outcome. This effect is primarily related to LA day care nurseries and private day nurseries where a substantial proportion start under 2 years of age and some under one year. However, when a measure of pre-school centre quality was added to the model (i.e. ECERS-R), the impact of duration was reduced (although still remained significant). This suggests that higher quality in pre-school centres tends to reduce, but not eliminate, the negative effect of a longer time spent in pre-school centres on 'Anti-social / Worried' behaviour. It is important to note the significant positive link of duration of pre-school with young children's cognitive progress over the pre-school period (see EPPE Technical Paper 8a).

Referring to social behavioural development gains over the pre-school period (by controlling for social behavioural development at age 3 and other significant background characteristics), analyses showed that the indicator of 'duration' of pre-school was not statistically significant in accounting for social behavioural developmental gains over the pre-school period in any of the four outcomes.

Ratios & staff qualifications

Adult child ratios can be measured in several ways. Statutory minimum levels vary by type of provision. However many settings operate with more generous ratios than those statutorily required. Observed ratios (with and without volunteers) were used to provide indicators of staffing levels normally experienced by children aged 3-5 years in individual centres. Statutory, reported (by centre managers) and observed ratios were all tested for links with children's social behavioural gains. The results show no significant relationships between ratios and young children's social behavioural developmental gains over the pre-school period. More generous adult/child ratios showed a significant link with one aspect of children's cognitive progress, early numbers concepts. Elsewhere it has been demonstrated that quality, qualifications and type of provision are themselves associated (EPPE Technical Papers 5 & 6). Ratios tended to be poorer (i.e. higher ratios with more children per adult) in some forms of provision which had more highly qualified staff and higher observed ratings for quality (measured by ECERS-E), although the correlation is fairly low (r=0.21). The exception, are integrated centres which have higher quality scores but low ratios.

As noted earlier, Centre managers' qualification levels and the proportion of staff hours at different qualification levels also show significant variation between individual centres and by type of provision (EPPE Technical Paper 5). Centre managers' qualifications are significantly associated with the observed quality profiles of centres (EPPE Technical Paper 6). Centres where managers reported they had Level 5 qualifications (trained teachers) exhibited higher quality. Findings from the associated Researching Effective Pedagogy in the Early Years study

(see Siraj-Blatchford et al, 2002a) also indicate that the observed behaviour of other staff is positively influenced by the presence of a member of staff with Level 5 qualifications.

The value added multilevel analyses found a significant positive relationship between the percentage of Level 5 staff hours and young children's social behavioural developmental gains in 'Co-operation & Conformity'. In addition, children who attended centres where proportionately more staff time were at level 5 showed reductions in 'Anti-social / Worried' behaviour. Given the complex inter-relationships between ratios, staff qualifications, quality and type of provision, plus the extent of variation between individual centres of the same type, these influences on children's social behavioural outcomes may be confounded. It may be more relevant for policy makers and practitioners to consider the impacts of *packages* of provision, rather than to try to separate the impact of particular features in isolation.

Children who do not experience pre-school

Data were collected for a group of 'home' children with no or minimal pre-school centre experience. Comparison of the home sample with the main EPPE sample of children who experienced pre-school showed that both the characteristics and the social behavioural development of home children vary significantly. It is not possible to conclude with certainty that differences in social behaviour found for the home group are directly a consequence of their lack of pre-school experience, due to the home children's very different social backgrounds. Contextualised multilevel analyses of their class teachers' social behavioural assessments exploring the impact of child, parent and home environment factors illustrate that, even when these important influences are controlled, home children's social behaviour is rated as significantly poorer in terms of three areas of development - 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' - than those of children who attended any of the six types of pre-school provision studied. This result suggests that pre-schooling has a positive impact on these aspects of social behavioural development, in particular 'Peer Sociability'. Hence children without pre-school centre experience may be at a disadvantage in terms of 'Peer Sociability', 'Independence & Concentration' and 'Co-operation & Conformity' when they start primary school, as these behaviours are likely to be important for successful adjustment to primary school. In addition, 'Independence & Concentration' is modestly associated with cognitive attainment at entry to school and hence would be expected to promote classroom learning. Home children do not show any significant differences in terms of 'Anti-social / Worried' behaviour than the pre-school sample.

In combination with the findings for cognitive progress reported in Technical Paper 8a, the results summarised here indicate that pre-school centre experience can help to combat social exclusion and promote inclusion by offering disadvantaged young children, in particular, a better start at school, through promoting positive social behavioural as well as cognitive development. Further analyses will explore the subsequent progress and development of these children over Key Stage 1. Such analyses will help to establish whether the positive impact of pre-school on young children's cognitive and social behavioural development remains significant as children progress through their first years at primary school.

Introduction

The Effective Provision of Pre-School Education (EPPE) study is a large scale longitudinal study funded by the Department for Education & Skills. It was begun in 1996 with the aim of investigating which kinds of Early Childhood provision were most 'effective' in promoting young children's development during their time attending a pre-school setting, and to explore whether any pre-school effects continue to influence children after they start primary school up until the end of Key Stage 1 (age 7 plus years). The EPPE research is the first study of pre-schools in Europe to use an educational effectiveness design based on sampling children in a range of pre-school settings and uses statistical approaches (multilevel modelling) that enable the identification of individual centre effects. Beginning around the age of 3 years (at entry to a target pre-school in the sample or at their third birthday for children who had already entered provision at a younger age), children were assessed at each major change of provision and then at entry to primary school. In this way it has been possible to explore variations between centres in the 'value added' in terms of impact on children's cognitive progress and social behavioural development.

The study follows children for five years from pre-school up to the end of Key Stage 1 (the first phase of primary education). It explores the impact of a wide variety of child, parent and family factors, including amount of care outside the family, and aspects of the home learning environment provided by parents. The research explores whether different types of pre-school settings differ in their impact and effectiveness, as well as identifying variations between individual pre-school centres in children's cognitive progress and social behavioural development. Measures of the quality of pre-school centres and details of variations in centre policy and practices have been collected from observations by trained researchers and from interviews with centre managers. The study has sought to establish whether such factors have an impact on young children's progress and development. In total 141 pre-school centres drawn from five regions across England form the focus of the EPPE research. Centres were drawn from six types of provision - nursery classes, playgroups, local authority day nurseries, private day nurseries, nursery schools and integrated centres (i.e. combined centres which fully integrate education and care).

The EPPE study uses a mixed methods approach, including detailed statistical analyses of effectiveness and in-depth case studies of individual centres. Full details of the EPPE study have been provided in a series of Technical Papers. The present paper is based on statistical analyses for a sample of over 3100 children. A wide range of information has been drawn on, including assessments of individual children at entry to pre-school (age 3 years plus) and followed up again at entry to school (typically age rising 5 years) based on child care workers' and, later, class teachers' assessments of social behavioural development at these two time points. Detailed information about children's health, and care histories, family characteristics and home learning environments was collected from parental interviews. Researchers conducted detailed observations in each centre to provide information about the quality of provision, and centre managers were interviewed to provide details about a range of centre policies and practices.

The EPPE project draws on rich information about pre-school children's personal and family characteristics and details of the home learning environment collected from parental interviews. The analyses of young children's social behaviour, as assessed by pre-school workers at entry to the study (age 3 plus years) revealed important relationships between both cognitive attainments, social behaviour and measures of these characteristics (see Technical Papers 2 , 4 and 7 for details).

Aims

The aims of the multilevel analyses in this report are:

- To model young children's social development across the pre-school period until entry to primary school.[4]
- To explore the impact of a range of child, parent and home characteristics on pre-school children's social behavioural development over their time in pre-school and at entry to school.
- To explore the impact of pre-school, including any variations in children's social behavioural outcomes at the start of school for those who attended different types of pre-school (and those who received no pre-school provision).
- To establish whether there is significant variation between individual pre-school centres in their effects on different social behavioural outcomes.
- To explore the impact of pre-school characteristics, including quality and staff qualifications.

Research questions addressed in this report

1. *What is the variation in children's school entry social behavioural assessments for different groups of children?* (e.g. girls compared with boys, those from different ethnic or language backgrounds, those whose parents have different levels of educational qualifications, or from different socio-economic groups). Of particular interest will be the question of whether the variation between different groups of children has increased or decreased over the pre-school period

2. *What is the impact of amount and duration of pre-school experience?* Children's pre-school 'careers' are very varied. Does more pre-school experience result in better social behavioural outcomes at school entry when account is taken of the impact of other factors? Are different groups of children equally affected, or is more experience particularly beneficial for disadvantaged groups? These results should help to inform policy makers about the relative benefits which may be expected to arise from policies that increase pre-school provision.

3. *What is the extent of child mobility (in terms of change of pre-school centre) evident for children in the pre-school period?* In particular does a change of pre-school centre before starting primary school show a significant association with young children's social behavioural development?[5]

4. *Do individual pre-schools vary in their effectiveness in promoting young children's social behavioural development?* As there are differences between individual centres in the characteristics of the children they serve, it is essential to take account of such differences in any comparisons of child outcomes measured at the start of primary school. It is also of particular interest to establish whether centres vary in their effectiveness in different domains. Are the same centres that promote better child outcomes in one area, say Independence and concentration, also more effective in promoting other social behavioural outcomes, e.g. Peer sociability?

5. *Does type of pre-school experience matter?* Taking account of children's differences at entry to pre-school, and the amount of provision experienced, do children attending certain types of pre-school (playgroup, nursery class, private day nursery, local authority day nursery, nursery school or integrated centre) differ in their social behavioural development by the time they

[4] This is primarily entry to reception class. However one LEA in the sample has a policy of sometimes allowing children to enter directly into year 1.

[5] A future Technical paper will focus in detail on the issue of child mobility during the pre-school period and in particular on those children who experience highly mobile pre-school careers. It will explore whether discontinuity/fragmentation of experience (frequent changes of pre-school centre) has an adverse impact on children's cognitive and social behavioural development as measured at primary school entry and at the end of year 1.

enter school? If type of pre-school does matter, do some groups do better (e.g. disadvantaged groups or boys show better social behavioural outcomes) if they experience certain types of provision?

6. *Does quality of pre-school setting have a significant impact on young children's social behaviour development?* A range of observational measures of environmental quality and staff child interactions were collected for the EPPE research. Analyses explore whether these show a statistically significant association with better child outcomes at the start of primary school.

7. *How do children entering primary school without any pre-school experience differ from their peers who have attended centres in the main EPPE pre-school sample?* The analysis will compare the personal and background characteristics of 'home' children (those without pre-school centre experience) with those of the pre-school centre sample to establish whether 'home' children are drawn from specific groups. It will also compare the school entry social behavioural assessments of such children to establish whether they are significantly different from those of children who have attended a pre-school centre.

Methods

The analyses employ a range of statistical techniques from descriptive and correlation analysis of the reception assessments to multilevel (hierarchical) regression methods to examine children's social behavioural development over the pre-school period (see Goldstein, 1995). Principal components analysis is used to examine underlying dimensions in young children's social behaviour and to identify groups of items that distinguish different aspects of social behaviour (see EPPE Technical Papers 2 & 7 for details). The multilevel analyses are central to the study of changes in young children's development over time and impact of pre-school. These analyses allow the variation in children's outcomes measured at entry to primary school to be separated into that which reflects variation between children, and that which reflects variations between different pre-school centres.

Multilevel models provide more accurate assessments of the impact of different child or centre level characteristics, and enable the calculation of value added estimates (residuals) of individual centre level effects on each of the four areas of social behaviour measured in the EPPE study. These residuals measure the difference between the expected and actual results, after controlling for differences in characteristics such as prior social behaviour (most important) and child parent and home environment characteristics like age, gender, SES, and home environment. An important feature of the value added analysis is the calculation of the confidence limits associated with each centre level residual estimate. These allow us to establish whether variations between individual centres are statistically significant and to identify outlier centres (those which show strong positive or negative effects on young children's social behavioural development).

Background information about child, parent and family characteristics, was obtained through parent interviews. Parent interviews were conducted soon after children were recruited to the study. It should be noted that most interviews were with children's mothers and usually took place at the child's pre-school centre, although for some working parents telephone interviews were found to be more convenient. All parents had agreed to their child taking part in the EPPE study and given written consent. The parent interviews were designed to obtain information about a child's health and care history, details of family structure and parent's own educational and occupational backgrounds as well as some indications of parent-child activities and routines. Parents were assured of confidentiality and anonymity in presenting results. An excellent response rate (97%) to the interview was achieved, although in some instances particular questions had a slightly lower rate of response (e.g. related to occupations). In most cases the parent interviews were conducted within 10 weeks of recruiting a child to the study, though for a small number of children in 'hard to reach' groups a longer time gap sometimes occurred.

This report describes the results of analyses of young children's social behavioural development during their time in pre-school. Equivalent analyses of the cognitive progress of children in the study have been conducted. The results are reported separately in EPPE Technical Paper 8a. Social behavioural development gains have been measured from entry to the EPPE study (age 3 years plus) until the start of primary school (usually measured at entry to reception classes at rising 5 years, though in some regions children can be enrolled directly into Year 1 classes and did not join a reception class).

An additional group of over 300 'home' children recruited at entry to primary school brings the total sample to over 3100 children for some analyses.

Structure of Main Report and Analyses

This report is divided into six sections. The first provides some descriptive statistics concerning the characteristics of the EPPE sample and investigates whether particular groups of pupils show differences in social behavioural development at entry to primary school.

The second section addresses the question of the extent to which different child, parent and home environment background characteristics account for variation in social behavioural development in the four outcomes at school entry. This section uses multilevel modelling techniques so that the net influence of different background factors on children's development at different ages can be ascertained. Contextualised analyses are used to identify the unique (net) contribution of particular characteristics to variation in children's outcomes, in this instance their development in different social behavioural outcomes, while other influences are controlled. Thus, for example, the impact of family SES, is established while taking into account the influence of mother's qualification levels, low income (measured by eligibility for free school meals), ethnicity, birthweight, home learning environment, etc. It is of policy interest to establish the nature and strength of such background influences individually and in total, because they are relevant to issues of equity and social inclusion.

The third section describes the results of value added multilevel models which investigate child social behavioural development gains over their time in pre-school (by controlling for a child's age at assessment and prior social behavioural development at entry to the study). These analyses enable the EPPE research to establish whether there is evidence that pre-school influences young children's social behavioural developmental gains. In particular, the extent to which children's social behavioural developmental gains are statistically associated with the individual pre-centre they attended can be calculated. The centre level variance provides an indication of the size of any effect related to pre-school attended. The calculation of centre level residuals can be interpreted as value added indicators of centre effectiveness. Centres where children made significantly greater social behavioural developmental gains than predicted on the basis of prior social behavioural development and intake characteristics can be viewed as *more effective* (significant positive outliers in value added terms), while centres where children made less developmental gains than predicted can be viewed as *less effective* (significant negative outliers in value added terms).

In the fourth section the multilevel analyses are extended to establish the extent to which factors such as type of pre-school attended, number of sessions, quality characteristics, ratios and staff qualifications show any statistically significant relationship with social behavioural gains. Do variations in quality and extent of time in pre-school have an impact on social behavioural developmental gains and, in particular, does higher quality and more pre-school experience have a positive impact?

The fifth section presents findings concerning a sample of 'home children' who have had no or only very limited pre-school experience before starting primary school, in comparison with the pre-school sample. The inclusion of a sample of 'home children' enables the study to provide further information about the impact of pre-school provision as a whole (rather than just examining variations amongst children who attended different settings and types of provision). The analyses explore whether home children are at a lower social behavioural development level

when they start primary school taking into account the background characteristics of home children, compared with the main EPPE sample.

The last section of the paper summarises the results drawing together the main findings and conclusions.

Section 1: Characteristics of the Sample and Social Behavioural Development at Entry to Primary School

The sample recruited for the EPPE study is described in detail in EPPE Technical Paper 1. In summary, six English Local Authorities (LAs) in five regions participated in the research with children recruited from six main types of provision (nursery classes, playgroups, private day nurseries, LA day care nurseries, nursery schools and integrated centres). In order to enable comparison of centre and type of provision effects the project was designed to recruit 500 children, 20 in each of 20-25 centres, from the six types of provision; thus giving a total sample of 3000 children and 140 centres. In some LAs certain forms of provision are less common and others more typical. Within each LA, centres of each type were selected by stratified random sampling and, due to the small size of some centres in the project (e.g. rural playgroups), more of these centres were recruited than originally proposed, bringing the sample total to 141 centres and over 3000 children.[6]

The sample with matched data (in other words, data at both assessment time points i.e. entry to the EPPE study and entry to primary school) is 2857 children from 141 centres. Table 1.1 reports the number of centres and EPPE children, the mean number and spread (i.e. standard deviation and range) of EPPE children per centre for each type of provision (Chart A.1 in Appendix A shows in graph format the number of EPPE children in the pre-school centres). Note that the total EPPE sample is more than 3100 when the 'home' children are included.

Table 1.1 Descriptive Statistics of the EPPE Sample by Type of Provision

	Centres	Children			
	n	n	mean	sd	range
Nursery class	**25**	**588**	**23.52**	**3.14**	**13-28**
Playgroup	**34**	**609**	**17.91**	**4.65**	**10-28**
Private day nursery	**31**	**516**	**16.65**	**5.14**	**6-27**
LA day care	**24**	**433**	**18.04**	**5.01**	**10-28**
Nursery school	**20**	**519**	**25.95**	**2.37**	**19-30**
Integrated centre	**7**	**192**	**27.43**	**3.55**	**25-35**
All	**141**	**2857**	**20.26**	**5.66**	**6-35**

Table 1.2 shows the number and percentage of mobile children (i.e. those who had made a change of centre during the course of the EPPE study) by pre-school type. It can be seen that just under a quarter of the sample (23.0%) had moved from the target pre-school centre from which they were recruited at entry to the study during the pre-school period. However, far more children were identified as mobile for certain forms of provision. Children attending nursery classes, nursery schools and integrated centres were least likely to have changed centre, while the majority of those in playgroups (52%) had moved centre. Children who left their target pre-school were tracked in their new settings and re-assessed there. They were also followed up into primary school to maintain sample size and so that the impact of mobility could be analysed for this young age group. A further paper will focus in greater detail on the nature and extent of mobility amongst the EPPE sample and its impact.

[6] Only a small number of integrated centres were recruited because nationally there were few examples of this relatively recent form of pre-school provision in existence at the start of the project.

Table 1.2 Number & Percentage of Children Changing Pre-school Centre Before Primary School Entry by Type of Provision

	n of children	% of children	n of centres
Nursery class	**16**	**2.4**	**25**
Playgroup	**340**	**51.7**	**34**
Private day nursery	**157**	**23.9**	**31**
LA day care	**121**	**18.4**	**24**
Nursery school	**11**	**1.7**	**20**
Integrated centre	**13**	**2.0**	**7**
All	**658**	**23.0**	**141**

Social Behavioural Factors at Primary School Entry

During the first few weeks after entry to primary school, the child's class teacher was asked to complete the Child Social Behaviour Questionnaire (CSBQ).[7] The CSBQ provides a measure of current social behavioural development at exit from pre-school and a baseline measure for entry to primary school. Social behavioural factors were obtained from a principal components analysis of the child social behavioural items in the CSBQ at entry to primary school. The analysis identified a number of underlying dimensions (factors) which reflect patterns of associations amongst the questionnaire items. The four main factors are detailed below with the items relating to each factor given in Appendix 1:

- Primary School Entry Social Behavioural Factor 1: Independence & Concentration
  Example items: *Item 45 – 'sees tasks through to the end, good attention span';*
  Item 14 – 'easily distracted, concentration wanders' (note that this item was reversed in the analysis)
  This factor measures the child's ability to play or work independently showing a certain level of concentration.

- Primary School Entry Social Behavioural Factor 2: Co-operation & Conformity
  Example items: *Item 13 – 'co-operates with your request's;*
  Item 21 – ' follows school rules'
  This factor measures the child's co-operative behaviour and conformity to requests or rules.

- Primary School Entry Social Behavioural Factor 3: Peer Sociability
  Example items: *Item 18 – 'will join a group of children playing';*
  Item 20 – 'In social activities, tends to just watch others' (note that this item was reversed in the analysis)
  This factor measures the child's ability to play or work well with peers and in groups.

- Primary School Entry Social Behavioural Factor 4: Anti-social / Worried
  Example items: *Item 29 –'teases other children, calls them names';*
  Item 37 – 'bullies other children'
  This factor measures the child's tendency to show behaviour that is disruptive to others or that is aggressive or destructive. Often, but not always, such behaviour occurs together with indications of worry or upset by the child.

The social behavioural outcomes examined in this technical paper are the main four factors as identified above that account for 52% of the variance in teachers' ratings of children on the instrument. A parallel study in Northern Ireland (EPPNI[8]) has also explored social behaviour development for a sample of children attending different forms of pre-school provision (see EPPNI Technical Paper 4). This study has similar results.

[7] An instrument developed by the EPPE team from the Adaptive Social Behaviour Inventory by Hogan et al. (1992). See Appendix A for further details.
[8] Effective Pre-School Provision Northern Ireland.

Details such as mean and spread of the data (i.e. standard deviation:sd) of the primary school entry social behavioural factors are shown in Table 1.3 whilst Charts A.2–A.5 in Appendix A show their respective distributions graphically. The distributions of the four social behavioural outcomes show a degree of skewness that is often associated with behavioural and attitude rating scales. The skewness is most marked for the factor Anti-social/worried, with most children being very favourably rated on this dimension. Note that a high score on 'Independence & Concentration', 'Co-operation & Conformity', and 'Peer Sociability' relates to more positive outcomes, whereas a high score on 'Anti-social / Worried' relates to greater anti-social / worried behaviour (children were rated on a 5 point scale with 1 signifying the behavioural description rarely / never occurred and 5 the description almost always occurred).

Table 1.3 The Distribution of Children's Scores on the Primary School Entry Child Social Behavioural Factors

	n	mean	sd	minimum value	maximum value
Independence & Concentration	**2562**	**3.54**	**0.83**	**1**	**5**
Co-operation & Conformity	**2570**	**3.92**	**0.68**	**1.33**	**5**
Peer Sociability	**2568**	**3.65**	**0.71**	**1**	**5**
Anti-social / Worried	**2567**	**1.74**	**0.66**	**1**	**4.57**

Table1.4 shows the correlations (a measure of statistical association which ranges from +1 to –1) between children's scores on the different social behavioural factors. The correlations vary considerably, although all are highly significant. The strongest statistical association is between children's scores on 'Independence & Concentration' and 'Co-operation & Conformity' whilst the weakest correlation is between 'Peer Sociability' and 'Anti-social / Worried'. Charts A.6 and A.7 in Appendix A show the degree of these associations graphically.

Table 1.4 Correlations Between Children's Scores on the Primary School Entry Child Social Behavioural Factors

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried
Independence & Concentration	**1.00****	**0.81****	**0.43****	**- 0.54****
Co-operation & Conformity		**1.00****	**0.38****	**- 0.69****
Peer Sociability			**1.00****	**- 0.10****

** Statistically significant at the 0.01 level

It is of interest to compare teachers' scores on the four social behavioural outcomes for various subsets of children to see if certain groups of children are assessed as showing significant differences in social behaviour at the start of primary school. It should be noted that the study relies on class teachers' assessment of individual children's behaviour; Class teachers are those with the most direct knowledge of young children's behaviour in school and they are in a position to judge a child's behaviour in relation to the typical behaviour of that age group. Also their perceptions and expectations of behaviour are likely to influence children's experiences and understanding of what is considered appropriate. This is an inevitable limitation inherent in instruments which rely on teacher perceptions and judgements. Nonetheless teachers remain essential sources of information about children's social behaviour in school. Table 1.5 provides some descriptive statistics for the EPPE sample.

Table 1.5: The Characteristics of the EPPE Sample at Primary School Entry

		n	%
Gender:	**male**	1489	52.1
	female	1368	47.9
Ethnicity*:	**White UK**	2127	74.5
	White European	118	4.1
	Black Caribbean	116	4.1
	Black African	64	2.2
	Black other	22	0.8
	Indian	55	1.9
	Pakistani	75	2.6
	Bangladeshi	25	0.9
	Chinese	5	0.2
	Other	62	2.2
	Mixed heritage	185	6.5
English as an additional language		249	8.7
Receiving free school meals		598	22.5
3 or more siblings		374	13.4
Mother has no formal qualification		501	18.1
Area:	**East Anglia**	559	19.6
	Shire County	594	20.8
	Inner London	656	23.0
	North-east	503	17.6
	West Midlands	545	19.1

total n=2857

Gender

Table 1.6 provides descriptive statistics comparing boys' and girls' social behavioural development at entry to primary school. Girls' scores, on average, are somewhat more positive for each factor. Nonetheless, the differences are small and there is considerable overlap in the ratings given to the two groups by their class teacher. The identification of gender differences in social behaviour at the start of primary school is in line with findings for the same children at a younger age (see EPPE Technical Paper 2, & 7).

Table 1.6 Distribution of Children's Scores on the Primary School Entry Social Behavioural Factors by Gender

	Boys			Girls		
	n	**mean**	**sd**	**n**	**mean**	**sd**
Independence & Concentration	**1341**	**3.37**	**0.84**	**1221**	**3.72**	**0.78**
Co-operation & Conformity	**1344**	**3.79**	**0.70**	**1226**	**4.06**	**0.64**
Peer Sociability	**1343**	**3.62**	**0.71**	**1225**	**3.68**	**0.72**
Anti-social / Worried	**1342**	**1.78**	**0.66**	**1225**	**1.70**	**0.66**

Child's First Language

The descriptive statistics for the four measures of social behaviour for children who speak English as an additional language compared with children for whom English is their mother tongue are shown in Table 1.7. The results show that the social behavioural development of

children for whom English is their mother tongue was rated more positively on all social behavioural factors (i.e. higher scores on 'Independence & Concentration', 'Co-operation & Conformity', and 'Peer Sociability' and lower scores on 'Anti-social / Worried').

Table 1.7 Distribution of Children's Scores on the primary School Entry Social Behavioural Factors by Child's First Language

	English as Mother Tongue			English as an Additional Language		
	n	mean	sd	n	mean	sd
Independence & Concentration	2382	3.56	0.83	180	3.33	0.85
Co-operation & Conformity	2390	3.93	0.68	180	3.73	0.68
Peer Sociability	2388	3.68	0.70	180	3.34	0.76
Anti-social / Worried	2387	1.74	0.66	180	1.78	0.63

Mother's qualification level

Table 1.8 summarises the social behavioural scores by mother's qualification level. Again a trend can be seen, with the behaviour of children whose mothers have no formal qualifications tending to be rated slightly more negatively, while those whose mothers have degrees or higher degrees tended to be rated slightly more positively. The results reveal differences in the social behaviour (as rated by class teachers) of children whose mothers are at the top and bottom of the qualification scale in each measure.

Table 1.8 Distribution of Children's Scores on the Primary School Entry Social Behavioural Factors by Mother's Qualification Level

	Mother No Qualifications			Mother Vocational Qualification			Mother Academic Qualification at 16		
	n	mean	sd	n	mean	sd	n	mean	sd
Independence & Concentration	446	3.26	0.85	387	3.51	0.78	948	3.56	0.83
Co-operation & Conformity	447	3.71	0.69	389	3.86	0.68	950	3.94	0.67
Peer Sociability	447	3.47	0.76	389	3.68	0.66	950	3.66	0.70
Anti-social / Worried	447	1.84	0.70	389	1.81	0.67	950	1.71	0.65

	Mother Academic Qualification at 18			Mother Degree			Mother Higher Degree		
	n	mean	sd	n	mean	sd	n	mean	sd
Independence & Concentration	226	3.47	0.80	341	3.84	0.76	116	3.84	0.80
Co-operation & Conformity	226	3.90	0.68	341	4.15	0.62	117	4.08	0.70
Peer Sociability	226	3.67	0.67	341	3.77	0.72	116	3.77	0.74
Anti-social / Worried	226	1.75	0.64	340	1.62	0.60	116	1.75	0.67

Qualification categories 'other professional' and 'miscellaneous' excluded due to the small number of mother's in these categories.

Similarly there are indications of weak associations between family SES (based on highest occupational level of either parent) and class teachers' behaviour ratings at the start of primary

school as can be seen in Table 1.9.

Table 1.9 Distribution of Children's Scores on the Primary School Entry Child Social Behavioural Factors by Family SES Level

	Professional non-manual			Intermediate non-manual		
	n	mean	sd	n	mean	sd
Independence & Concentration	250	3.79	0.77	684	3.67	0.82
Co-operation & Conformity	251	4.06	0.68	685	4.02	0.66
Peer Sociability	251	3.78	0.69	684	3.73	0.68
Anti-social / Worried	251	1.68	0.67	683	1.69	0.62

	Skilled non-manual			Skilled manual		
	n	mean	sd	n	mean	sd
Independence & Concentration	835	3.55	0.81	317	3.42	0.80
Co-operation & Conformity	837	3.92	0.68	319	3.86	0.67
Peer Sociability	836	3.68	0.69	319	3.59	0.74
Anti-social / Worried	836	1.77	0.66	319	1.73	0.64

	Semi-skilled manual			Unskilled manual			Never worked		
	n	mean	sd	n	mean	sd	n	mean	sd
Independence & Concentration	317	3.30	0.86	55	3.15	0.85	58	3.31	0.92
Co-operation & Conformity	319	3.75	0.69	55	3.59	0.73	58	3.67	0.80
Peer Sociability	319	3.45	0.78	55	3.52	0.77	58	3.44	0.66
Anti-social / Worried	319	1.77	0.66	55	1.82	0.73	58	1.94	.82

The analyses also indicate that there are weak but significant associations between social behavioural development at the start of primary school and children's cognitive attainments[9] at this age. In Table 1.10 the correlations between children's social behavioural scores and their cognitive attainments in different areas are reported with the associations strongest for 'Independence & Concentration' and cognitive attainments at the start of primary school. Once again this is in line with earlier findings at pre-school entry, which indicated associations between cognitive attainment and social behaviour development.

Table 1.10 Correlations between Children's scores on the Primary School Entry Child Social Behavioural Factors and Children's Cognitive Attainment at Entry to Primary School

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried
Pre-Reading	0.23**	0.14**	0.13**	-0.03
Early Number Concepts	0.24**	0.15**	0.14**	-0.08**
Language	0.22**	0.15**	0.15**	-0.05**
Non-verbal reasoning	0.18**	0.11**	0.11**	-0.03
Spatial awareness / reasoning	0.19**	0.12**	0.11**	-0.04

[9] For more details on the cognitive attainments at entry to primary school, see EPPE Technical Paper 8a.

** Statistically significant at the 0.01 level

As child, parent and home environment factors are associated, a method of separating out the net contributions of different background characteristics in accounting for variations between individual children in class teachers' ratings of different features of social behaviour is required. In Section 2 the results of multilevel analyses that explore this question are described. These statistical analyses allow the combined contribution of a range of factors to be assessed and the net (or unique) contribution of each to be identified.

Section 2: Children's Social Behavioural Development at Entry to Primary School: Results From Contextualised Multilevel Analyses

This section presents the results of a contextualised multilevel analysis (including all children in the EPPE sample with pre-school centre experience) establishing the pattern of relationships between child, family and home environment characteristics and children's social behavioural development at primary school entry[10]. The four social behavioural factors discussed in Section 1 are employed as outcomes in the contextualised multilevel model. Background details about children's earlier child care experiences, health, family and home learning environment were obtained from parental interviews conducted when children entered the EPPE study.

Are patterns of associations between social behavioural development with child, family and home environment factors similar at primary school entry to the pattern found when children were younger at pre-school entry age 3 years plus (see EPPE Technical Paper 7 for earlier findings)? It is important to theory and policy to establish, in particular, whether the power of such factors to account for the variation between children in their social behavioural development at school entry is weaker or stronger than at pre-school entry. The value added analyses of changes in child social behavioural development over the pre-school period, reported subsequently in Section 3, are used to investigate the impact of pre-school in more detail.

Multilevel models provide a method of exploring the extent of variation in children's social behavioural development which can be attributed to differences between individual children and group attributes such as the area in which they live or the institution they attend.[11] In the contextualised analysis reported here in Section 2, multilevel models allow an exploration of the variation in children's scores on the four measures of Child Social Behaviour in terms of centre level variation and the extent of differences related to particular individual (child, family and home environment) characteristics.

Table 2.1 shows the null models (i.e. with no explanatory variables included) for the four social behavioural outcomes. The intra-centre correlation measures the extent to which the scores of children in the same centre resemble each other in comparison with those from children at different centres. The intra-centre correlations indicate that approximately 4-6% of the variation in children's social behavioural scores is attributed to systematic differences between pre-school centres, while the majority (over 94%) reflects differences between individual children. These intra-centre correlations are smaller than the intra-centre correlations for the cognitive outcomes reported in EPPE Technical Paper 8a. They suggest that individual pre-school centres may not vary greatly in their impact on social behavioural outcomes at the start of primary school.

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

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-Social / Worried
Centre level variance: estimate (se)	**0.029 (0.008)**	**0.025 (0.006)**	**0.023 (0.006)**	**0.022 (0.005)**
Child level variance: estimate (se)	**0.660 (0.019)**	**0.443 (0.013)**	**0.484 (0.014)**	**0.411 (0.012)**
Intra-centre correlation	**0.044**	**0.056**	**0.045**	**0.054**
Number of children (number of centres)	**2562 (141)**	**2570 (141)**	**2568 (141)**	**2567 (141)**

The results from a contextualised analysis, where explanatory variables related to child, family and home environment characteristics are added to the multilevel model to control for the

[10] Children's social behavioural development at entry to primary school will also provide a baseline for later assessment of developmental gains across, for example, the reception year or Key Stage 1.

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

influence of background characteristics, are reported in Table 2.2. The intra-centre correlation represents the extent to which individual pre-school centres differ in their impact on social behavioural development in these contextualised models. If all centres were equally effective, the intra-centre correlation would be zero, but this would not mean that pre-schooling had no impact, rather that centres did not differ in their impact on young children's social behavioural development. The intra-centre correlation indicates that between 4-5% of the unexplained variance in pupils' social behavioural ratings at primary school entry may be attributed to pre-school centre attended, after control for the impact of all significant background characteristics. While the size of the intra-centre correlation seems small, this does not imply that the pre-school influence is unimportant. Gage (1984) has drawn attention to the educational importance of measures that account for very small proportions of total variance, and made comparisons with medical research where interventions that account for less than 1% of total variance have been shown to be of great importance in improving outcomes.

Table 2.2 Contextualised models (at entry to study and at entry to primary school) showing pre-school centre and child level variance

	Entry to Primary School				Entry to Pre-school Study (3+)	
	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-Social / Worried	Cooperation & Conformity	Peer Sociability
Centre level variance: estimate (se)	0.025 (0.007)	0.017 (0.005)	0.023 (0.006)	0.014 (0.004)	0.028 (0.004)	0.038 (0.006)
Child level variance: estimate (se)	0.554 (0.017)	0.393 (0.012)	0.451 (0.013)	0.388 (0.011)	0.135 (0.004)	0.178 (0.005)
Intra-centre correlation	0.043	0.041	0.049	0.035	0.172	0.176
% Reduction in centre level variance	10.71	29.17	4.17	36.36	12.50	8.57*
% Reduction in child level variance	16.57	11.88	7.20	5.83	12.90	9.64
% Reduction in total variance	16.33	12.77	7.06	7.37	12.83	6.90
Number of children (number of centres)	2370 (141)	2424 (141)	2499 (141)	2425 (141)	2561 (141)	2750 (141)

* Percentage increase in centre level variance

The impact of child, family and home environment factors on social behavioural development at the start of primary school can be compared with the impact of these factors on social behavioural development at pre-school entry. Table 2.2 also shows the equivalent contextualised analysis for the sample using 'Co-operation & Conformity' and 'Peer Sociability' factor scores at pre-school entry[12] as the dependent variables for the whole sample. Considering the reduction in total variance, it can be seen that child, family and home environment factors in combination accounted for a similar percentage of the total variance of children's 'Co-operation & Conformity' scores at entry to the study (age 3+) and at the start of primary school (age 5). Referring to the centre level variance, for 'Peer Sociability' the findings at entry to the study show an increase in centre level variance when child, family and home environment factors are accounted for whereas at entry to primary school there is a small decrease in the centre level variance. These findings do not suggest that there is any increase in the strength of background influences on these social behavioural outcomes between the ages of 3 and 5 years. It should also be noted that the items in the instrument developed for the younger age group use a three-point scale. At start of primary school the items in the extended CSBQ use a five-point scale, allowing class teachers to make finer distinctions in their judgements of individual child behaviour. It is likely

[12] See Section 3 of this report for further details on the social behavioural measures (and subsequent factors) at entry to the study.

that this difference in the measurement scales may affect the sensitivity with which centre differences can be identified. These limitations of the data would be noted in interpreting the results about the relative strength of background influences. It appears from these data that pre-school has a significant impact on social behavioural outcomes but does not alter existing relationships between child, parent and home learning environment characteristics and social behavioural outcomes.

It is interesting to note that background factors account for relatively more of the total variance in 'Independence & Concentration' than other social behavioural factors. Children's scores on the 'Independence & Concentration' factor also show a stronger correlation to cognitive attainment at school entry (as shown earlier in Table 1.10).

In EPPE Technical Paper 8a, equivalent contextualised analyses of the children's scores in 5 cognitive outcomes (Pre-Reading, Early Number Concepts, Language, Non-verbal reasoning, Spatial awareness / reasoning) and their relationship with the same set of child, parent and home learning environment characteristics are reported. It is notable that the relationships are far stronger for attainment in cognitive outcomes (language, pre-reading and early number concepts) than for social behavioural measures. Nonetheless, for certain behaviours most likely to be relevant for learning such as 'Independence & Concentration' background influences are of moderate importance (accounting for 16% of total variance in teachers' ratings for this outcome).

Given the identification of relationships between child, family and home environment characteristics and ratings of social behavioural outcomes at entry to the pre-school study (age 3 years plus[13]), the contextualised models investigate any continuing impact of these measures on young children's social behavioural development at entry to primary school. In this way the impact of, for example, number of siblings or birth weight can be established net of the influence of other factors. The contextualised models indicate that, for all 4 outcomes, a number of child, family and home environment characteristics show statistically significant relationships with social behavioural development at entry to primary school. Tables B.1 – B.4 in Appendix B summarises these results in a tabular format. The main findings in terms of statistically significant child, family, home environment and other characteristics are summarised here. In reporting differences it should be noted that the net impact of different factors is described and only differences that are statistically significant ($p<0.05$) are noted. The differences refer to findings made in comparisons of groups of children (e.g. girls compared with boys) and therefore refer to general trends that do not necessarily apply to all individuals within a group.

Child Measures

Age in months at primary school assessment was significant for all four outcomes. As might be expected, older children showed higher social behavioural development in terms of three aspects: 'Independence & Concentration'; 'Co-operation & Conformity'; and 'Peer Sociability'. Older children also tended to exhibit more anti-social / worried behaviour than younger children in terms of class teachers' assessments when they start primary school.

Gender differences in social behavioural development at primary school entry in favour of girls were identified for 'Independence & Concentration', 'Co-operation & Conformity' and 'Anti-social / Worried'. Children with low birth weight (i.e. below 2500 grams) had significantly lower 'Independence & Concentration' scores at primary school entry than children classified as normal / above normal birth weight. [14]

Children with siblings showed significantly higher factor scores[15] for 'Independence & Concentration' and 'Co-operation & Conformity' than singletons. In contrast, children from larger

[13] described in Technical Paper 7

[14] Babies born weighing 2500 grams (5lbs 8oz) or less are defined as below normal birth weight: fetal 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 Caren, 1989).

[15] Factor scores for each child were calculated by averaging the ratings given by the teacher for the items that form each factor.

families (with 3 or more siblings) had lower 'Peer Sociability' scores than singletons. For the 'Anti-social / Worried' outcome, the analyses reveal that teachers rated singletons as showing significantly more anti-social / worried behaviour compared with children who had siblings.

Children with English as an additional language (EAL) were rated less positively on two factors, 'Independence & Concentration' and 'Co-operation & Conformity' outcomes. For ethnicity, the relationships varied markedly as follows:

- Black African children showed significantly higher 'Co-operation & Conformity' scores in comparison with the White UK group.

- Children from the Pakistani and Bangladeshi ethnic groups had lower scores for 'Peer Sociability' than the White UK ethnic group

- The Pakistani group recorded significantly lower 'Anti-social /Worried' scores compared to the White UK group (where lower anti-social / worried scores indicate less anti-social / worried behaviour) .

Family Measures

The results indicate that the free school meals (FSM) measure of socio-economic disadvantage[16] (despite its acknowledged limitations for this young age group where home dinners are more common) showed a negative relationship with the 'Independence & Concentration' and 'Co-operation & Conformity' measures at entry to school. In other words children entitled to free school meals tend to have on average lower scores for the 'Independence & Concentration' and 'Co-operation & Conformity' factor scores. The relationship was significant and positive for 'Anti-social / Worried' suggesting that, in general, children entitled to FSM tend to be slightly more likely to exhibit more anti-social / worried behaviour in their class teachers' assessments.

Mother's education[17] as measured by degree level academic qualifications was consistently found to show a positive and significant relationship with 'Independence & Concentration', 'Co-operation & Conformity' and 'Anti-social / Worried' (see Appendix B for significant results for various other qualification groups). Fathers' education is also significant for the 'Independence & Concentration' and 'Co-operation & Conformity' outcomes with children whose fathers have a higher degree being rated more highly in terms of factor scores at entry to primary school than children whose fathers have no qualifications. Fathers' employment status is only significant for one outcome ('Peer Sociability'), with the category of 'not working' showing a negative significant impact compared with the category full-time employment.

In terms of parents' highest social class of occupation, compared to professional non-manual occupations (Class I), all other categories are associated with lower levels of social behavioural development for 'Peer Sociability'. Significant differences are noted between children with a parent in a professional (Class I) occupation and children from families where the highest status occupation is semi-skilled manual.

Home Environment Measures[18]

The results indicate that the frequency with which parents said they teach their child the alphabet compared with the never category shows a positive relationship with two aspects of social behavioural development, namely 'Independence & Concentration' and 'Co-operation & Conformity' outcomes. The frequency with which parents reported that they taught their child songs or nursery rhymes also showed a significant impact on a child's social behavioural development in all four outcomes at school entry controlling for other factors. The parent's reported emphasis on teaching letters/numbers is important for 'Independence & Concentration' with children whose parents reported that their children played with letters and numbers more

[16] Note that, unlike the other family measures collected at entry to the study, the FSM measure is collected at entry to primary school.
[17] This information was collected in the parental interview at entry to the study.
[18] This information was also collected in the parental interview at entry to pre-school.

frequently showing higher social behavioural development in this outcome. Furthermore, the frequency with which the child is reported to paint or draw at home showed a significant positive relationship (compared with never/infrequent category) with 'Independence & Concentration' and a significant negative association with class teachers' assessments of level of 'Anti-social / Worried' behaviour.

The frequency with which parents reported reading to the child is associated with higher factor scores for the 'Co-operation & Conformity' outcome. In addition, the frequency of library visits shows a positive association with 'Independence & Concentration' and 'Co-operation & Conformity' and a negative relationship with 'Anti-social / Worried' (in other words children who visit the library tend to show less anti/social worried behaviour, taking account of other factors).

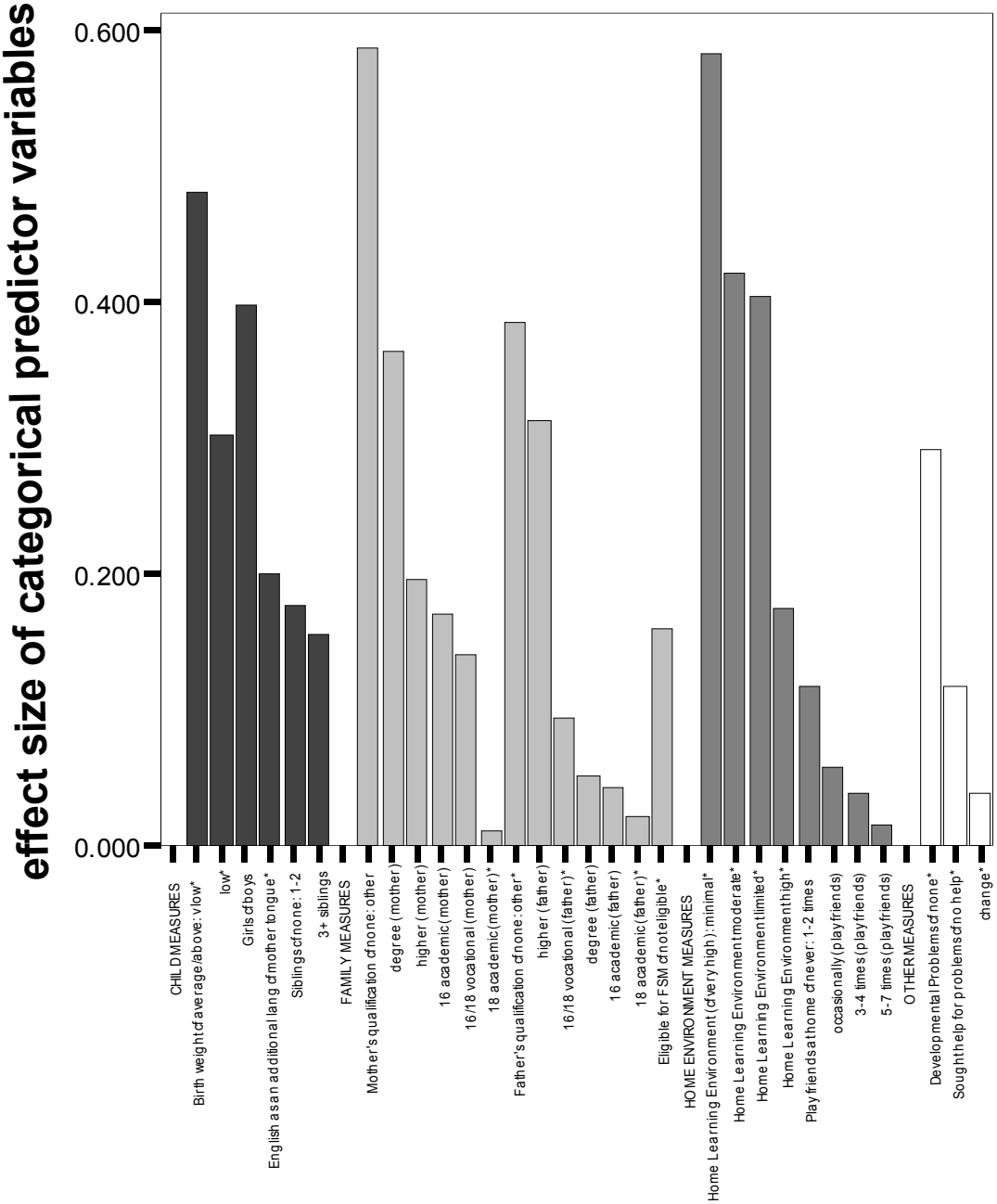
Further analyses have been conducted using the home learning environment index which provides a summary based on the individual measures reported above. For further details of the relationship between this measure and children's social behavioural development at entry to the study, age 3 plus years, see EPPE Technical Paper 7. Children's scores on this measure were divided into five groups; very high, high, moderate, limited and minimal.[19] The individual home environment measures (such as frequency with which parents reported reading to the child) were removed from the 'Independence & Concentration'[20] contextualised model detailed in Appendix B and replaced with measures relating to this home learning environment index. Effect sizes[21] were calculated to compare the strength of different groups of measures and are shown in Chart 2.1. It can be seen that the effect size for the home learning environment index (very high group compared with minimal) is large at 0.58. This is higher than that for family measures such as mother's qualification level and low income indicated by eligibility for FSM (except for the very small group whose mothers had other forms of qualifications which had a similar effect size of 0.59).

Referring back to the contextualised models shown in Appendix B, children whose parents reported that their child often plays with friends at home showed higher scores for both the 'Independence & Concentration' and the 'Peer Sociability' factors than those whose parents indicated their child never played with friends at home. Children whose parents reported that their children did not have a regular bedtime showed significantly lower factor scores for the 'Anti-social / Worried' outcome compared to children with a regular bedtime i.e. were rated as rarely / never or not often exhibiting anti-social / worried behaviour. This indicates that having a regular bedtime, an indicator of a more structured approach, appears to be associated with higher scores in terms of anti-social worried behaviour at primary school entry (i.e. rated as sometimes, usually or almost always exhibiting anti-social / worried behaviour).

[19] The number of children in these groups are as follows: very high n=335 (11.7%), high n=898 (31.4%), moderate n=667 (23.3%), limited n=591 (20.7%), minimal n=257 (9.0%).
[20] 'Independence & Concentration' was chosen to illustrate effect sizes as background factors account for relatively more of the total variance in this outcome than other social behavioural factors.
[21] See Appendix B for further details relating to the calculation of and issues associated with effect sizes.

Chart 2.1 Effect sizes for child, parent, home environment (in terms of the home environment index) and other measures as predictors of 'Independence & Concentration' at primary school entry
* denotes a negative effect

Note that the effect sizes shown do not take into account the size of groups. Some large effects (e.g. for mother's and father's qualification other professional) apply to very small numbers of children and not all are statistically significant.



Other Measures

In terms of amount of pre-school experience, children who spent longer in pre-school (measured from start date of target pre-school centre to date started primary school) tended to show higher factor scores for the 'Anti-social / Worried' outcome. In other words, a longer time (in years and months) spent in the target pre-school, is associated with slightly more anti-social / worried behaviour in class teachers' ratings. However, when a measure of quality was tested in the model (i.e. ECERS-R)[22], the impact of duration was reduced (although still remained significant). This suggests that higher quality pre-school centres (as measured by ECERS-R) tend to reduce the negative effect of time spent in pre-school on anti-social / worried behaviour.

By contrast, there was no evidence that a longer duration of time in the target pre-school centre had a negative impact on any of the other three areas of social behavioural development. Indeed, as reported in Section 5 of this paper (see Table 5.5 and Chart 5.1) in comparison with 'home' children, those who had spent longer in the pre-school show the best outcomes for 'Peer Sociability'. In addition, note that only the children who had greater than three years pre-school centre experience had significantly poorer outcomes for 'Anti-Social / Worried' behaviour and that this impact was relatively modest in terms of effect size. It should also be noted that the analyses of cognitive attainment at both age 3 years plus and at entry to primary school point to a significant positive impact of an early start.

Additionally, the number of non-parental carers a child experienced before entering the study (e.g. relatives usually grandmothers, childminders) was also tested in the contextualised models, with children who had only parental carers compared to children with 1, 2, 3 and 4+ non-parental carers.[23] The number of non-parent carers a child had showed a statistically significant positive relationship for 'Anti-social / Worried' (children with non-parent carers attaining higher scores for anti-social / worried behaviour than children with only parental carers).

Additional analyses were conducted to explore the relationship between social behavioural development and other variables related to amount of childcare before entering the study. Three variables in particular were tested in the models:

- Group care before entry to the study (age 3 years plus) either in target centre or other group care. Those children who had no or less than 1000 hours of group care were compared in the multilevel analyses to children who had experienced group care for 1001-2000 hours and more than 2000 hours.[24]

- Relative care before entry to the study (usually grandmothers). Children with no relative care are compared to those children with up to 1000 hours and more than 1000 hours of relative care.[25]

- Individual care before entry to the study (usually childminders). Children with no individual care are compared to groups of children with varying numbers of hours of individual care. [26]

[22] This measure of quality applies to the pre-school centre environment that the child experienced during the EPPE study.

[23] The number of children in each group are as follows: only parental carers n=997 (35.7%), one non-parental carer n=996 (35.6%), two non-parental carers n=526 (18.8%), three non-parental carers n=181 (6.5) and four or more non-parental carers n=94 (3.4%).

[24] The number of children in each of these groups relating to the number of hours of group care that a child experienced are as follows: no or less than 1000 hours of group care n=2188 (78.7%), 1001-2000 hours of group care n=266 (9.6%) and more than 2000 hours of group care n=327 (11.8%).

[25] The number of children in each of the relative care groups are as follows: no relative care n=2086 (73.0%), up to 1000 hours of relative care n=366 (12.8%) and more than 1000 hours of relative care n=404 (14.1%).

[26] The number of children in each of the individual care groups are as follows: no individual care n=2146 (75.1%), up to 1000 hours of individual care n=350 (12.3%), 1001-2000 hours n=135 (4.7%), 2001-3000 hours n=86 (3.0)% and more than 3000 hours of individual care n=139 (4.9%).

It is important to note that these variables are correlated with other measures, for example, the variable measuring group care before entry to the study (either in target centre or other group care) is correlated to the duration variable, which measures time in the target pre-school centre from start date. Likewise, the variables associated with the number of non-parental carers are correlated to the number of hours of relative and individual care variables. Thus, when testing these additional childcare variables, duration and number of non-parental carers are removed from the contextualised models.

The findings indicated that the amount of childcare before entering the study had a statistically significant impact on the incidence of anti-social / worried behaviour at start of primary school.

- Children with higher levels (i.e. greater than 1000 hours) of relative care (usually grandmothers) showed statistically significantly less anti-social / worried behaviour.

- Children with very high levels (i.e. greater than 3000 hours) of individual care (usually childminders), by contrast, showed statistically significantly more anti-social / worried behaviour.

- Furthermore, children who had experienced moderate to high levels (i.e. greater than 2000 hours) of group care before entry to the study (either in target centre or other group care) showed statistically significantly higher levels of anti-social / worried behaviour.

It should be noted that this effect is in line with that noted for social behaviour at entry to the pre-school study (3 years plus) and is mainly associated with children attending two types of provision where a young age at entry is more common (LA day care nurseries and private day nurseries where a substantial proportion start under 2 years of age and some under one year, see further discussion in EPPE Technical Paper 7). Chart 2.2 displays effect sizes for the 'Anti-social / Worried' outcome for a contextualised model at primary school entry including the group care, relative care and individual care variables alongside child, family and home environment measures.

In relation to the other social behavioural outcomes, children who experienced greater than 2000 hours of group care before entry to the study showed statistically significantly higher levels of peer sociability. While children with greater than 1000 hours of relative care showed more 'Independence & Concentration' and 'Co-operation & Conformity' (these results verged on the statistically significant).

Taken together, these results indicate that, in contrast to cognitive development and to other areas of social behavioural development, high levels of non-parental care (other than relatives) at a young age seem to be associated with an increased 'risk' for some children of developing anti-social / worried behavioural problems, although experience of a pre-school centre for a longer period of time shows significant benefits for cognitive development and in particular 'Peer Sociability' (see EPPE Technical Paper 8a and Section 5 of this report). These findings are in line with previous research by the NICHD childcare project on the links between quantity of childcare and anti-social behaviour (NICHD, 2002).

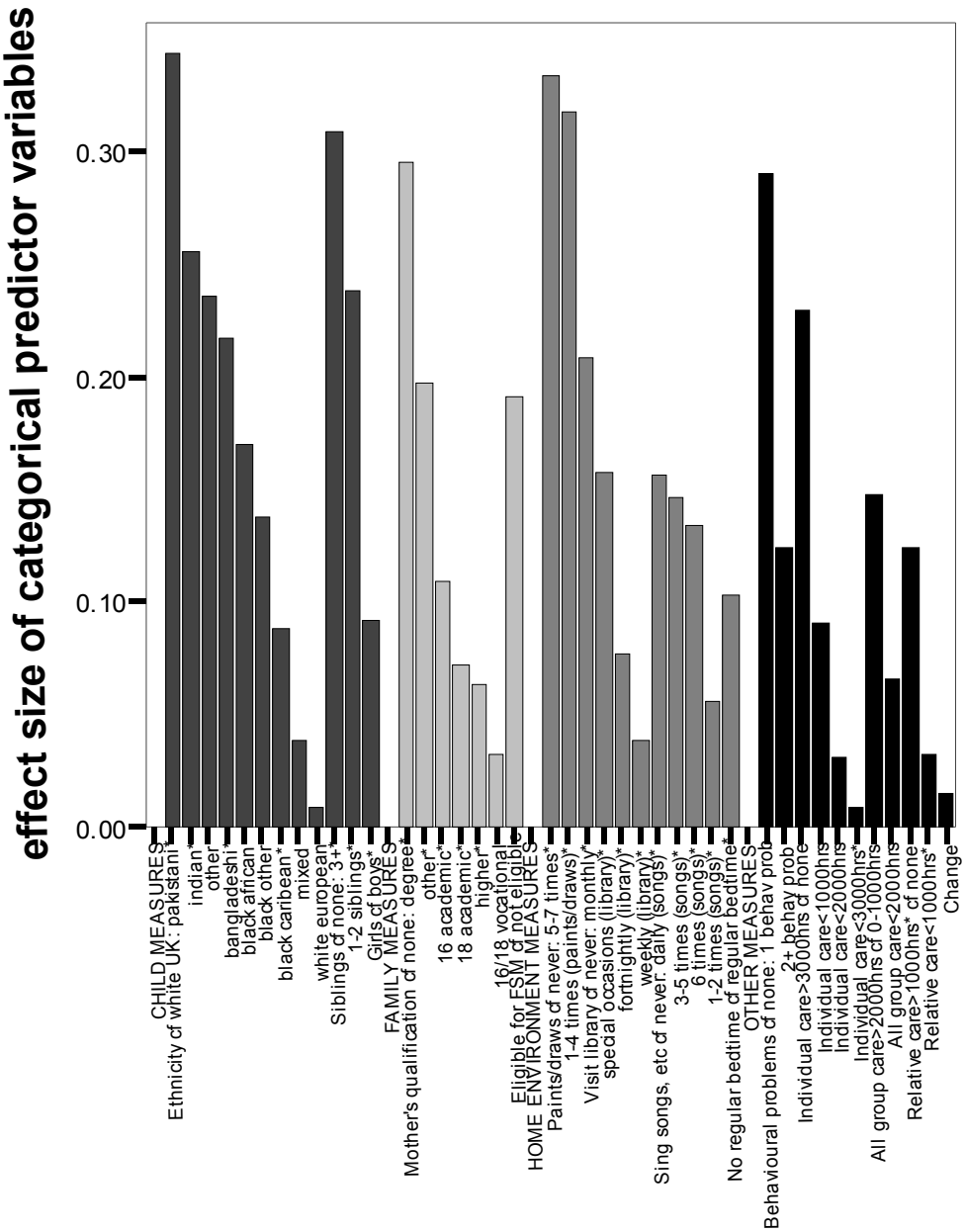
Parents were asked in the interviews at the start of the study whether their child had any developmental or behavioural problems and if so, whether they had sought any help in relation to these problems. Referring back to the contextualised models shown in Appendix B, as a group, children whose parents reported no developmental problems with their children showed higher 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' scores than children whose parents reported a developmental problem. In terms of behavioural problems in particular, children reported to have no problems in their parent's view showed higher scores on the 'Co-operation & Conformity' and 'Peer Sociability' and lower scores on the 'Anti-social / Worried', compared with children whose parents thought they showed earlier behavioural problems. The children of parents that sought help for any behavioural/developmental problems tended to show lower scores for 'Independence & Concentration'.

The fully contextualised model tests the *net* impact of different measures while controlling for all other measures simultaneously. It thus provides more rigorous and conservative estimates of statistical significance for the impact of specific background characteristics. It does not imply that measures have no relevance if they are not statistical predictors after control for other, related measures. For example, parents' occupational status is related to mother's educational qualification level. Likewise, the various measures of home environment are inter-related. The contextualised model shows which set of child, parent or home environment measures, taken together, provides the best predictors of different aspects of children's social behavioural development and which individual measures show a *specific* impact over and above other influences.

Chart 2.2 Effect sizes for child, parent, home environment and other measures (in particular amount of childcare before entering the study) as predictors of anti-social/worried behaviour at primary school entry

* denotes a negative effect

Note that the effect sizes shown do not take into account the size of groups. Some large effects (e.g. for ethnicity, or mother's qualification other professional) apply to very small numbers of children and not all are statistically significant.



Section 3: Children's Social Behavioural Development Over the Pre-school Period: Results from the Value Added Multilevel Analyses

In order to investigate the impact of individual pre-school centres on young children's social behavioural developmental gains during the pre-school period covered in the EPPE study, it is necessary to have baseline data about children's prior social behavioural development so that subsequent change can be measured. Only in this way will it be possible to establish whether children attending specific centres show greater developmental gains by entry to school. Additionally, it is also necessary to make proper control for differences in the characteristics of the children they serve because only when differences in the intake characteristics of children attending different centres are taken into account can valid comparisons be drawn.

This section presents the results of value added analyses of children's social behavioural developmental gains over the pre-school period for each of the four social behaviour factors described previously. These analyses include all children in the EPPE sample with pre-school centre experience. The value added models examined are (i) *simple value added models* controlling for children's prior social behavioural development only, and (ii) *complex value added models* controlling for children's prior social behavioural development and, in addition, any significant child, family and home environment characteristics. Comparisons between simple and complex value added models allow the impact of background factors on social behavioural developmental gains, over and above the impact of prior social behavioural development, to be ascertained. By comparing these results with models in Section 2 it is also possible to explore the extent to which such factors influence changes in social behavioural development over the pre-school period.

Research in the school effectiveness field (Goldstein et al, 1992; Mortimore et al, 1994; DFE, 1995; Strand, 2002; Tymms, 1997) shows that, for cognitive progress, prior attainment is the best predictor of future attainment. Although there is a smaller research base examining social behavioural development, the evidence also suggests that prior social behavioural development can be a significant predictor of future social behavioural development for young children in primary school (Tizard et al, 1988; Mortimore et al, 1988).

The instrument chosen at entry to the EPPE study (age 3 plus) to provide a baseline for the value added analysis was the Adaptive Social Behavior Inventory (ASBI)[27]. The ASBI was completed by a pre-school worker who was familiar with the child and provides measures of social behavioural development at entry to the target centre (age 3 years plus). The social behavioural factors at entry to pre-school (detailed below) are obtained from a principal components analysis of the ASBI child social behavioural items, which identified a number of underlying dimensions, reflecting patterns of associations amongst the questionnaire items. Appendix C details the ASBI items that form the 5 factors which, in total, account for 56% of the variance.

- Entry to study Social Behavioural Factor 1: Co-operation & Conformity
  Example items: *Item 3 –'is obedient and compliant';*
  Item 8 – 'waits his/her turn in games or other activities'

- Entry to study Social Behavioural Factor 2: Peer sociability
  Example items: *Item 13 –' will join a group of children playing';*
  Item 19 –'plays games and talks with other children'

- Entry to study Social Behavioural Factor 3: Confidence
  Example items: Item 22 –'is confident with other people';

[27] The ASBI was developed by Hogan et al, (1992) as a general measure of the social and behavioural development of pre-school children. It was developed because there was not a measure then available that produced measures of social competence, pro-social and anti-social behaviours for pre-school children. See Appendix C for further details.

Item 9 – 'is open and direct about what he/she wants'

- Entry to study Social Behavioural Factor 4: Anti-social
  Example items: *Item 21 – ' teases other children, calls them names';*
  Item 26 – 'bullies other children'

- Entry to Pre-school Social Behavioural Factor 5: Worried / upset
  Example items: Item 6 – 'gets upset if you don't pay enough attention';
  Item 25 –'accepts changes without fighting against them or becoming upset' (note that this item is reversed in the analysis).

Table 3.1 reports the correlations between the first four prior social behaviour factors at entry to the study and the social behavioural factors measured by class teachers' assessments at entry to primary school. Although the correlations between the factors at the different time points are low, they are generally statistically significant. It is important to note that the lower correlations (in comparison with those for cognitive outcomes over the same time period) are likely to reflect a number of influences, including real changes in child behaviour at different ages, measurement error in terms of teachers and care workers' assessments, and differences in the instruments (in terms of number of points on the rating scales used). Given this the extent of change should be interpreted with caution. Further details of the social behavioural measures used at the start of school are in Appendix A and at the start of the study in Appendix C.

Table 3.1 Correlations Between Children's Scores on Four Social Behavioural Factors at Entry to Study and at Entry to Primary School

	Independence & Concentration at age 5	Co-operation & Conformity at age 5	Peer Sociability at age 5	Anti-Social / Worried at age 5
Co-operation & Conformity at age 3	**0.19****	**0.16****	**0.10****	**-0.12****
Peer Sociability at age 3	**0.12****	**0.09****	**0.16****	**0.02**
Confidence at age 3	**0.08****	**0.04***	**0.13****	**0.04***
Anti-Social at age 3	**-0.08****	**-0.09****	**0.01**	**0.15****

** Statistically significant at the 0.01 level * Statistically significant at the 0.05 level

Children are assessed at pre-school entry (and because there are variations in centre policies and uptake the age of assessment varies). The value added models control for age of entry to pre-school and age at entry to school. The age at assessment measures also control to some extent for amount of pre-school experience.

Simple value added models

The multilevel analyses of children's social behavioural development gains over the pre-school period use the four CBSQ factor scores at primary school entry as outcome measures and prior social behavioural development at pre-school entry. The results indicate the existence of significant centre level variance after controlling for age, and prior social behavioural factors at pre-school entry. Table 3.2 shows the results of the simple value added model of child social behavioural development gains for the four social behavioural outcomes, reporting the intra-centre correlation and the extent of variance at the pre-school centre level and at the child level.

The intra-centre correlation provides an indication of the extent to which unexplained variance in children's social behavioural development gains may be attributed to differences between the different pre-school settings. This gives an indication of possible variation in pre-school effectiveness (between the 141 individual pre-school centres in the EPPE sample). The results

show that the size of the intra-centre correlation varies only slightly between the four social behavioural outcomes for the simple value added models. The smallest intra-centre correlation is for 'Anti-social / Worried', indicating that pre-schools seem to vary slightly less in their impact on this outcome over the pre-school period compared with their impact on the other three social behavioural outcomes.

The intra-centre correlations for the simple value added models are generally larger (with the exception being 'Anti-social / Worried') than those reported for the null models (i.e. with no explanatory variables included – see Table 2.1 in Section 2). In other words, when prior social behavioural development is accounted for in the simple value added multilevel models, greater differences in children's social behavioural developmental gains between pre-school centres are evident. The increase is greatest for the factor 'Independence & Concentration' where centre level variance rose by over 20%. This result indicates that it is important to take account of children's prior social behavioural development in any studies of the impact of pre-school, in the same way as studies of differences between individual centres in their effects on cognitive progress control for children's prior attainment. The extent of any centre level differences may not be accurately identified without the inclusion of baseline measures of prior behaviour.

Considering centre level variance in Table 3.2, it can be seen that for two outcome factors ('Independence & Concentration' and 'Peer Sociability') controlling for age and significant prior social behavioural factors at pre-school entry do not explain differences between centres and, in fact, the differences between centres increase slightly. In contrast, for 'Co-operation & Conformity' and 'Anti-social / Worried', the addition of significant prior social behavioural factors reduces the centre-level variance, accounting for 8% and 14% of the centre level variance respectively. These results suggest that different pre-school settings do vary in their impact on young children's social behavioural development. The findings on social behaviour are in line with those reported for the analysis of cognitive progress (see Section 3, EPPE Technical Paper 8a).

Table 3.2 Simple value added model[28] showing pre-school centre and child level variance

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried
Centre level variance: estimate (se)	0.035 (0.008)	0.023 (0.005)	0.025 (0.006)	0.019 (0.005)
Child level variance: estimate (se)	0.551 (0.016)	0.366 (0.011)	0.413 (0.012)	0.346 (0.010)
Intra-centre correlation	0.060	0.059	0.057	0.052
% Reduction in centre level variance	-20.69 (i.e. an increase of 20.69)	8.00	-8.70(i.e. an increase of 20.69)	13.64
% Reduction in child level variance	16.77	17.38	14.67	15.61
% Reduction in total variance	15.20	16.88	13.61	15.51
Number of children (number of centres)	2546 (141)	2549 (141)	2553 (141)	2548 (141)

The best fit in the simple value added models is achieved by inclusion of the prior social behavioural measures described in Table 3.3. Only significant effects have been reported with *positive* denoting a positive significant effect, whilst *negative* shows a negative significant effect.

[28] Controlling for age at both entry to pre-school and entry to school social behavioural assessment and significant social behavioural factors at pre-school entry

Table 3.3 Impact of Prior Social Behavioural Factors on Developmental Gains over the Pre-school Period in Four Social Behavioural Outcomes (Simple Value Added Models)[29]

	Independence & Concentration at age 5	Co-operation & Conformity at age 5	Peer Sociability at age 5	Anti-Social / Worried at age 5
Co-operation & Conformity at age 3	**positive**	**positive**		**negative** (i.e. associated with reductions in anti-social / worried behaviour)
Peer Sociability at age 3			**positive**	
Confidence at age 3		**negative**	**positive**	**positive** (i.e. associated with increases in anti-social / worried behaviour)
Anti-Social at age 3		**negative**		**positive** (i.e. associated with increases in anti-social / worried behaviour)

Independence & Concentration

- Prior social behavioural development in 'Co-operation & Conformity' is the only prior social behavioural factor to show a significant relationship with children's scores on this outcome at start of primary school. The relationship is positive suggesting that the higher a child's rating at age 3 plus on items from the 'Co-operation & Conformity' dimension of the ASBI, the higher a child's subsequent rating at entry to school on the 'Independence & Concentration' factor.

Co-operation & Conformity

- As one might expect, prior social behavioural development in the factor 'Co-operation & Conformity' at age 3 plus years shows a highly significant positive relationship with later 'Co-operation & Conformity' development.

- Prior 'Anti-Social' behaviour shows a significant negative relationship with this outcome i.e. the less anti-social behaviour a child exhibits at entry to the pre-school study, the higher a child is rated as co-operative and conforming at entry to primary school.

- Prior social behavioural development in 'Confidence' shows a significant negative relationship with later 'Co-operation & Conformity'. This suggests that the less confident a child is at entry to pre-school, the higher a child is rated as co-operative and conforming at entry to school.

Peer Sociability

- Prior social behavioural development in 'Peer Sociability'[30] is unsurprisingly related to later ratings of 'Peer Sociability', showing a highly significant positive relationship

[29] Controlling for age at both entry to pre-school and entry to school social behavioural assessment and significant social behavioural factors at pre-school entry.

[30] Note that the addition of a quadratic term for the prior social behavioural 'Peer Sociability' outcome has also been included in the model to improve the fit.

- Prior social behavioural development in 'Confidence' also shows a significant positive relationship with later 'Peer Sociability'

Anti-social / Worried (Anti-social, Worried or Upset)

- Prior 'Anti-social' behaviour[31] is related to later 'Anti-social / Worried' behaviour, showing a significant positive relationship i.e. if a child is seen by pre-school workers as exhibiting anti-social behaviour at entry to the pre-school study, they are also more likely to be rated as more anti-social / worried by their class teacher at entry to primary school.

- Prior social behavioural development in 'Co-operation & Conformity' shows a significant negative relationship with later 'Anti-social / Worried' behaviour. This suggests that the higher a child is rated as co-operative and conforming at entry to pre-school, the less likely they are to show anti-social / worried behaviour at entry to school. These findings and the results above for the outcome 'Co-operation & Conformity' suggest a significant inverse relationship between the items relating to the 'Co-operation & Conformity' and 'Anti-Social/Worried' behaviour dimensions of the ASBI at entry to pre-school and the CSBQ at entry to primary school.

- Prior social behavioural development in 'Confidence' also shows a significant positive relationship with 'Anti-social / Worried'. This suggests that the more confident a child is rated at entry to the pre-school study, the more likely they are to be rated as 'Anti-Social / Worried' at entry to school.

Complex value added model

Significant relationships between child, family and home environment characteristics and children's attainment in the social behavioural outcomes have been identified at entry to pre-school age 3 years plus[32] and also at primary school entry[33], although these relationships are notably weaker than those found in the analyses of cognitive attainment (see EPPE Technical Paper 8a). Subsequently, further multilevel analyses have been conducted to investigate the continuing impact of such measures on young children's social behavioural developmental gains over the pre-school period, while taking account of the links with prior social behavioural development reported above. The results show that a number of statistically significant relationships with children's social behavioural development gains over the pre-school period remain evident, and such measures account for additional variance at both the centre and child level. The complex value added model is shown in Table 3.4. It demonstrates that to explore the impact of pre-school settings (pre-school centres) on children's social behavioural development gains over the pre-school period, it is necessary to have good data about child, parent and home environment characteristics and to control for these intake characteristics as well as measures of children's prior social behavioural development in assessing the impact of pre-school.

As reported previously for the contextualised models (see Section 2) and the simple value added models, the size of the intra-centre correlation only varies to a small extent between social behavioural outcomes. The results show that approximately 5 per cent of the variance in social behavioural development gains not accounted for by prior development and child, parent and home characteristics is attributable to pre-school centre differences. The inclusion of factors related to children's background shows the strongest impact on social behavioural developmental gains for the 'Independence & Concentration' outcome. In the simple value added model (accounting only for prior social behavioural development and age at both testing points), the intra-centre correlation for the 'Independence & Concentration' outcome is 6 per cent whilst in the complex value added model, the equivalent percentage is 5 per cent. This indicates

[31] Note that the addition of a quadratic term for the prior 'Anti-Social' behaviour outcome has also been included in the model to improve the fit.
[32] described in EPPE Technical Paper 7
[33] described in Section 2 of this paper

that when only prior social behavioural development is taken into account, 6 per cent of the unexplained variance is attributable to pre-school centre differences in 'Independence & Concentration' developmental gains during the pre-school period, whereas when child, family and home characteristics are controlled for in addition to prior social behaviour, only 5 per cent of the unexplained variance is attributable to pre-school centre differences. These are broadly in line with results for cognitive progress over the pre-school period reported in EPPE Technical Paper 8a.

Table 3.4 Complex value added model[34] showing pre-school centre and child level variance

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried
Centre level variance: estimate (se)	0.026 (0.007)	0.020 (0.005)	0.024 (0.006)	0.016 (0.004)
Child level variance: estimate (se)	0.496 (0.015)	0.339 (0.010)	0.400 (0.012)	0.334 (0.010)
Intra-centre correlation	0.050	0.056	0.057	0.046
% Reduction in centre level variance	7.14	20.00	0	23.81
% Reduction in child level variance	25.19	23.99	17.53	18.73
% Reduction in total variance	24.46	23.78	16.70	18.98
Number of children (number of centres)	2428 (141)	2423 (141)	2497 (141)	2421 (140)

In comparing the simple value added model (Table 3.2) and the complex value added model (Table 3.4) it can be seen that there is a substantial reduction in the centre level variance for all 4 social behavioural factors. This reduction reflects the increased variance accounted for by the child, family and home environment characteristics of the sample. The increase in the total variance accounted for in the simple and complex value added models indicates that the importance of background measures varies for different behavioural factors. A comparison of the reduction in total variance reported in Tables 3.2 and 3.4 shows that compared to the simple value added model, the complex value added model accounts for an additional 9.3 per cent and 6.9 per cent of the total variance for the 'Independence & Concentration' factor and the 'Co-operation & Conformity' factors respectively.

In summary, when exploring the impact of pre-school centres on children's social behavioural developmental gains, in addition to baseline measures of children's prior social behavioural development, it is helpful to include information about the child, parent and home environment. This allows proper control for differences between centres in the characteristics of the children they serve. Only when differences in intake are measured can valid comparisons be drawn. For developmental gains in all four social behavioural outcomes (after controlling for prior social behavioural development at entry to the EPPE study), a number of child, parent and home environment characteristics continue to show statistically significant relationships over the pre-school period. Table C.5 in Appendix C summarises these results in a tabular format and Tables C.1-C.4 show multilevel estimates and their associated standard errors for each outcome. These tables highlight all groups of variables tested and their respective significance. In addition, Charts D.1-D.4 in Appendix D display graphically effect sizes for the outcomes 'Independence & Concentration' and 'Co-operation & Conformity'[35]. The main findings in terms

[34] Controlling for age at baseline and outcome assessment, social behavioural development at pre-school entry and child, parent and home environment characteristics

[35] Note that effect sizes have been calculated for the all measures included in the complex value added

of intake characteristics for social behavioural developmental gains in each outcome are summarised below. In reporting differences it should be noted that the net impact of different factors is described and only differences that are statistically significant ($p<0.05$) are noted. The differences refer to findings made in comparisons of groups of children (e.g. girls compared with boys) and therefore refer to general trends that do not necessarily apply to all individuals within a group.

Independence & Concentration Developmental Gains (taking account of prior social behavioural development)

Child measures:

- Girls made greater developmental gains in 'Independence & Concentration' than boys.
- Older children made greater developmental gains in 'Independence & Concentration'.
- Children from families with 1 or 2 siblings made greater developmental gains in 'Independence & Concentration' than singletons.
- Children with below normal birth weight made less developmental gains in 'Independence & Concentration' than children classified as normal / above normal birth weight.

Family Measures:

- Compared with children whose mothers have no qualifications, children whose mothers have qualification levels 16 year academic, degree or other qualifications made greater developmental gains in 'Independence & Concentration', with those whose mothers have other qualifications recording the most positive impact.
- Compared with children whose fathers have no qualifications, children whose fathers have higher degrees made greater developmental gains in 'Independence & Concentration'.

Home Environment Measures:

- Children whose parents report taking their children to the library made greater developmental gains in 'Independence & Concentration' than children who never visit the library, with those whose parents who take them fortnightly or monthly recording a significant positive impact.
- Children whose parents reported that they paint and draw at home made greater developmental gains in 'Independence & Concentration' than children whose parents said that they never paint or draw at home.
- Children whose parents reported that their children played with letters and numbers daily made greater developmental gains in 'Independence & Concentration' than children who never played with letters and numbers at home.
- Children whose parents reported encouraging their children to learn songs, poems and nursery rhymes (with a frequency of 3 or more times a week) made greater developmental gains in 'Independence & Concentration' than children whose parents never reported this activity.

Developmental / Behavioural measures:

- Children whose parents reported their child had no developmental problems made greater gains in 'Independence & Concentration' than children whose parents reported any developmental problems.
- Children whose parents reported that no help was sought for any health, behavioural or developmental problems made greater developmental gains in 'Independence & Concentration' than children whose parents had sought help. This may reflect parents seeking help for more severe problems or greater parental concern.

There are no statistically significant differences related to change of pre-school centre during the EPPE study period in terms of children's developmental gains over the pre-school period when 'Independence & Concentration' at school entry is studied, after controlling for social behavioural development. Interestingly, no compositional effects (such as percent of children in a centre whose mother has a degree or above) were found to be statistically significant in the

models discussed in this section with also the inclusion of a measure of quality (see Section 4 for more details).

development of children's 'Independence & Concentration'. This compositional factor had been found to be important in predicting children's cognitive progress over pre-school (see EPPE Technical Paper 8a).
For details of estimates and effect sizes for 'Independence & Concentration' see Table C.1 in Appendix C and Charts D.1-D.2 Appendix D.

Co-operation & Conformity Developmental Gains (taking account of prior social behavioural development)
Child measures:
- Girls made greater developmental gains in 'Co-operation & Conformity' than boys.
- Older children made greater developmental gains in 'Co-operation & Conformity'.
- Children from families with 1 or 2 siblings made greater developmental gains in 'Co-operation & Conformity' than singletons.
- Children from the Black African ethnic group made more developmental gains in 'Co-operation & Conformity' than the White UK ethnic group.

Family measures:
- Children whose mothers have academic qualifications made greater developmental gains in 'Co-operation & Conformity' than children whose mothers have no qualifications, with those whose mothers have degrees recording a significant positive impact.
- Compared with children whose fathers have no qualifications, children whose fathers have higher degrees made greater developmental gains in 'Co-operation & Conformity'.
- Children not eligible for FSM made more developmental gains in 'Co-operation & Conformity' than children eligible for FSM.

Home Environment measures:
- Children whose parents reported frequently encouraging their children to learn songs, poems and nursery rhymes made more developmental gains in 'Co-operation & Conformity' than children who were never encouraged to learn songs, poems and nursery rhymes.
- Children whose parents read to them daily made more developmental gains in 'Co-operation & Conformity' than children whose parents read to them less frequently.
- Children whose parents reported that their children had a regular bedtime made less developmental gains in 'Co-operation & Conformity' than children without a regular bedtime. Findings at entry to pre-school indicated that regular bedtime had a positive effect. Hence the greater improvement where children do not have a regular bedtime may reflect their greater potential for improvement given their lower baseline scores. Alternatively, it may suggest that at older age this greater level of structure can be less advantageous.

Developmental / Behavioural measures:
- Children whose parents reported no behavioural problems with their children made more gains in 'Co-operation & Conformity' than children whose parents reported one behavioural problem.

There was no evidence that children who changed pre-school centre during the EPPE study period made less developmental gains in terms of 'Co-operation & Conformity' over the pre-school period. No compositional effects were found to be statistically significant in the development of 'Co-operation & Conformity'.

For details of estimates and effect sizes for 'Co-operation & Conformity' see Table C.2 in Appendix C and Charts D.3-D-4 in Appendix D.

Peer Sociability Developmental Gains (taking account of prior social behavioural development)
Child measures:
- Children who are older at time of school entry made greater developmental gains in 'Peer Sociability'.

- Children from the Bangladeshi ethnic group made less developmental gains in 'Peer Sociability' than the White UK ethnic group.

Family measures:
- Children from families where the highest social class of occupation is professional non-manual made greater developmental gains in 'Peer Sociability' than children from other families, with those families where the highest social class of occupation is semi-skilled manual recording a significant negative impact.
- Compared to children whose fathers work full time, children whose fathers are not working made less developmental gains in 'Peer Sociability'

Home Environment measures:
- Children whose parents report encouraging their children to learn songs, poems or nursery rhymes made greater developmental gains in 'Peer Sociability', with those children whose parents report this frequently (6 or more times a week) recording a significant positive impact.
- Children whose parents reported that their children never played with friends at home made less developmental gains in 'Peer Sociability' than children who play with friends at home, with those children who play with friends at home once or twice a week (rather then more often) recording a significant positive impact.

Developmental / Behavioural measures:
- Children whose parents reported no behavioural problems with their children made greater developmental gains in 'Peer Sociability' than children whose parents reported one behavioural problem, as might be expected.

Composition of intake measures:
- Interestingly, in contrast to cognitive outcomes, children attending pre-school settings where there is a higher proportion of mothers with degrees, higher degrees or other qualifications made less developmental gains in 'Peer Sociability'.

There were no significant gender differences in developmental gains for 'Peer Sociability' in the value added analysis. Likewise birth weight and English as an additional language showed no significant association with development in 'Peer Sociability'. There was no evidence that children who changed pre-school centre during the EPPE study period made less developmental gains in terms Peer Sociability' over the pre-school period.

For details of estimates for 'Peer Sociability' see Table C.3 in Appendix C.

Changes in Anti-social / Worried Behaviour (taking account of prior social behavioural development)

Child measures:
- Children who are older at primary school entry displayed a greater increase in their 'Anti-social / Worried' behaviour over the pre-school period.
- Compared with the White UK ethnic group, children from the Pakistani ethnic group showed a greater decrease 'Anti-social / Worried' behaviour over the pre-school period.
- As a group, children with siblings (both the group 1-2 siblings & the 3+ siblings groups) showed a greater decrease in 'Anti-social / Worried' behaviour compared with singletons over the pre-school period.

Family measures:
- Compared with children whose mothers have no qualifications, children whose mothers have academic qualifications showed a greater decrease in 'Anti-social / Worried' behaviour over the pre-school period, and children whose mothers have degrees recorded a significant reduction.
- Compared with children whose fathers have no qualifications, children whose fathers highest level of qualification is 16 academic showed a greater decrease in 'Anti-social / Worried' behaviour over the pre-school period.

- Children not eligible for FSM showed a greater decrease in 'Anti-social / Worried' behaviour compared with children eligible for FSM over the pre-school period.
- Compared to children whose fathers work full time, children whose fathers are classified in the 'other' category[36] showed a greater decrease in 'Anti-social / Worried' behaviour.

Home Environment measures:
- Children whose parents report encouraging their children to paint and draw at home (compared to those children that never paint or draw at home) showed a greater decrease in 'Anti-social / Worried' behaviour over the pre-school period.
- Children whose parents report taking them to the library showed a greater decrease in 'Anti-social / Worried' behaviour over the pre-school period compared with children who never visit the library. Those children who visit the library every month recorded significant reduction.
- Children whose parents reported that their children did not have a regular bedtime showed a greater decrease in 'Anti-social / Worried' behaviour over the pre-school period compared to children with a regular bedtime. This is in line with findings for the outcome 'Co-operation & Conformity'.

Developmental / behavioural measures:
- Children whose parents reported no behavioural problems with their children up to the start of the study showed a greater decrease in 'Anti-social / Worried' behaviour over the pre-school period compared to children whose parents reported one behavioural problem.

Other measures:
- Children who had been cared for by one or more non-parental carers before entry to the study (e.g. relatives usually grandmothers, childminders) displayed a greater increase in their 'Anti-social / Worried' behaviour over the pre-school period compared with children who had not had any non-parental carers, with those children with 3 non-parental carers recording a significantly greater increase. However, in contrast, further analyses show that children who had been cared for by relatives (e.g. grandmother) more often showed a greater decrease in 'Anti-social / Worried' behaviour over the pre-school period.

Gender, birth weight and English as an additional language are not significantly associated with developmental change in 'Anti-social / Worried' behaviour over the pre-school period. There was no evidence that children who moved pre-school centre during the EPPE study period displayed an increase in their 'Anti-social / Worried' behaviour.

For details of estimates for 'Anti-social / Worried' see Table C.4 in Appendix C.

[36] The 'other' category in terms of father's working status comprises primarily fathers who work part-time but also a small number of fathers who work part time and are self-employed.

Differences Between Individual Pre-School Centres in their Effects on Child Social / Behavioural Outcomes

Using an 'educational effectiveness' design based on multilevel modelling, the progress of EPPE children has been tracked to estimate the impact of individual centres on children's social behavioural development over the pre-school period. As seen earlier in this report, social background was taken into account, along with the 'home learning environment' provided by parents.

Centres that are more or less effective in promoting children's social behavioural gains (i.e. outliers) have been identified by categorising the value added residuals for the four outcome measures. Pre-school centre effects significantly above/below expectation at the 95 per cent confidence limit are identified by calculating confidence intervals for each value added residual (value added residual +/- 1.96 standard error). If the confidence intervals for a value added residual do not overlap zero[37], the value added residual is significantly different either above or below expectation and the centre is identified as an outlier.

In studies of institutional effects particularly where the numbers of children in individual institutions are small, it is common for the majority of residual estimates to have 95% confidence intervals that overlap zero, suggesting centre effects on children's social behavioural developmental gains are not significantly different from zero (or, in other words, children make developmental gains in line with that predicted by prior behaviour and other characteristics). It is also possible to classify centre effects either above or below expectation by calculating less stringent confidence intervals at the 68 per cent significance level for the value added residuals (value added residual +/- 1 standard error). Table 3.5 summaries centre effects for the 141 pre-school settings (pre-school centres). The results show that there is greater variation in pre-school effects for children's developmental gains in 'Co-operation & Conformity' than for gains in other factors. For example, 9 centres (6.3%) of the 141 included in the analysis of 'Co-operation & Conformity' developmental gains were identified as significant outliers at the 95% significance level. For the other social behavioural outcomes ('Independence & Concentration', 'Peer Sociability' and 'Anti-Social / Worried'), there are fewer significant outliers (approx 4-5%). It is possible that this finding reflects differences among pre-school centres in their aims and the emphasis given to promoting particular aspects of social behavioural development. It may also reflect greater difficulties in measuring social behavioural change in young children in comparison with assessments of cognitive attainment that tend to show higher reliability.

Table 3.5 Summary of pre-school centre effects showing the number of pre-school centres in each category

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried[38]
Above expectation (95% significance)	**4 (2.8%)**	**5 (3.5%)**	**4 (2.8%)**	**1 (0.7%)**
Above expectation (68% significance)	**15 (10.6%)**	**17 (12.1%)**	**18 (12.8%)**	**22 (15.6%)**
As expected	**100 (70.9%)**	**97 (68.8%)**	**101 (71.6%)**	**101 (71.6%)**
Below expectation (68% significance)	**19 (13.5%)**	**18 (12.8%)**	**15 (10.7%)**	**12 (8.5%)**
Below expectation (95%significance)	**3 (2.1%)**	**4 (2.8%)**	**3 (2.1%)**	**5 (3.5%)**

percentages given in brackets

[37] Note that the average effect predicted for the whole sample based on child, parent and home environment characteristics and prior attainment is designed to be zero.

[38] Note that for the 'Anti-social / Worried' outcome an effect significantly above expectation indicates a reduction in anti-social / worried behaviour. Likewise, an effect significantly below expectation indicates an increase in anti-social / worried behaviour.

The number of children per centre is a crucial factor that affects the identification of statistically significant outliers. Where the number of children is small, the confidence limits for value added residual estimates of individual centre effects are wider. Therefore, as some pre-school centres have small numbers of children in the study, the number of centres identified as outliers is likely to be a conservative estimate of the extent of any 'real' differences. Moreover, as the number of children per centre (see Table 1.1 for mean number) is largest for nursery schools, integrated centres and nursery classes, the chances of identifying statistically significant differences are likely to be somewhat higher for these types of provision.–

In terms of correlations between value added residuals across all centres, the results in Table 3.6 show there is generally a moderately high, statistically significant, association between residual estimates of centre effects on social behavioural developmental gains over the pre-school period. As expected, the correlations between the fourth factor 'Anti-Social / Worried' and the other factors are negative (statistically significant). The strongest correlation is between 'Independence & Concentration' and 'Co-operation & Conformity'. The similarity of centre effects on different aspects of social behavioural development is somewhat stronger than those found for the different aspects of cognitive progress over the pre-school period.

Tables 3.7 – 3.9 show pictorially the relationship between the 141 pre-school centres' value added residuals for different combinations of outcomes. For example, the cross tabulation of pre-school centre effects for the 'Independence & Concentration' and 'Co-operation & Conformity' outcomes (Table 3.7) reveals that 74 per cent of the pre-school centres in the EPPE sample have the same 'effectiveness' category for the two outcomes. In the other centres, different levels of effectiveness for the two outcomes are found. This demonstrates that internal variations in EPPE pre-school centres' effectiveness across the four social behavioural outcomes do exist although to a lesser degree than for the cognitive outcomes reported in EPPE Technical Paper 8a.

Table 3.6 Correlations between pre-school centre effects across four social behavioural outcomes

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried
Independence & Concentration	**1.00****	**0.76****	**0.61****	**-0.50****
Co-operation & Conformity		**1.00****	**0.54****	**-0.65****
Peer Sociability			**1.00****	**-0.20***

** Statistically significant at the 0.01 level * Statistically significant at the 0.05 level

Table 3.7 Cross tabulation of pre-school centre effects for the outcomes 'Independence & Concentration' and 'Co-operation & Conformity'

'Co-operation & Conformity' / Independence & Concentration	Above expectation (95% significance)	Above expectation (68% significance)	As expected	Below expectation (68% significance)	Below expectation (95% significance)
Above expectation (95% significance)	3 (2.1%)		1 (0.7%)		
Above expectation (68% significance)	1 (0.7%)	11 (7.7%)	3 (2.1%)		
As expected	1 (0.7%)	6 (4.2%)	81 (57.4%)	12 (8.5%)	
Below expectation (68% significance)			12 (8.5%)	6 (4.2%)	1 (0.7%)
Below expectation (95%significance)					3 (2.1%)

Percentages given in brackets

Table 3.8 Cross tabulation of pre-school centre effects for the outcomes 'Independence & Concentration' and 'Peer Sociability'

Peer Sociability / Independence & Concentration	Above expectation (95% significance)	Above expectation (68% significance)	As expected	Below expectation (68% significance)	Below expectation (95% significance)
Above expectation (95% significance)	1 (0.7%)	2 (1.4%)	1 (0.7%)		
Above expectation (68% significance)	2 (1.4%)	4 (2.8%)	9 (6.3%)		
As expected	1 (0.7%)	12 (8.5%)	78 (55.3%)	9 (6.4%)	
Below expectation (68% significance)			13 (9.3%)	3 (2.1%)	3 (2.1%)
Below expectation (95%significance)				3 (2.1%)	

Percentages given in brackets

Table 3.9 Cross tabulation of pre-school centre effects for the outcomes 'Peer Sociability' and 'Anti-social / Worried'[39]

Anti-social / Worried / Peer Sociability	Above expectation (95% significance)	Above expectation (68% significance)	As expected	Below expectation (68% significance)	Below expectation (95% significance)
Above expectation (95% significance)		1 (0.7%)	3 (2.1%)		
Above expectation (68% significance)	1 (0.7%)	3 (2.1%)	14 (10.0%)		
As expected		14 (9.9%)	74 (52.5%)	10 (7.1%)	3 (2.1%)
Below expectation (68% significance)		3 (2.1%)	8 (5.7%)	2 (1.4%)	2 (1.4%)
Below expectation (95%significance)		1 (0.7%)	2 (1.4%)		

Percentages given in brackets

Internal variations in pre-school centres' effectiveness across the four social behavioural outcomes can also be examined by an exploration of the profiles of the pre-school centres in

[39] Note that for the 'Anti-social / Worried' outcome an effect significantly above expectation indicates a reduction in anti-social / worried behaviour. Likewise, an effect significantly below expectation indicates an increase in anti-social / worried behaviour.

terms of the value added residual categories. For the 141 pre-school settings, 52 centres (36.9%) were identified as performing broadly as expected (compared to other pre-school centres in the EPPE sample) across all four areas of child social behavioural development assessed, when intake differences are controlled. In other words, there is little evidence of internal variations in these centres effectiveness.

The remaining 89 centres (63.1%) are performing significantly above or significantly below expectation (at either the 68 or 95% confidence levels) in one or more of the outcome measures. Of these 89 centres, 18 (representing 12.8% of the total number of centres) are performing significantly either above or below expectation at the more stringent 95 per cent level for one or more of the outcome measures. Table 3.11 shows that over half of these 18 pre-schools are performing statistically significantly above or below expectation for only one social behavioural outcome. None of the centres are performing either above or below expectation at the 95 per cent significance level for all social behavioural outcomes. In general, the pre-school centres show either a broadly positive or negative centre profile. For example, as shown in Table 3.12, the pre-school centre denoted by **X** has a broadly positive profile with children performing above expectation for three out of the five outcomes. By contrast, three of the value added residuals are below expectation for pre-school centre **Y**.

Table 3.11 shows the number of pre-school centres with effects either above or below expectation at the 95% significance level for 1-5 outcomes

	1 outcome	2 outcomes	3 outcomes	4 outcomes
Above expectation (95% significance)	**4**	**2**	**2**	**0**
Below expectation (95% significance)	**6**	**3**	**1**	**0**

Table 3.12 Example of pre-school centre profiles

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried[40]
Above expectation (95% significance)		**X**	**X**	
Above expectation (68% significance)	**X**			
As expected		**Y**		**X**
Below expectation (68% significance)	**Y**			**Y**
Below expectation (95% significance)			**Y**	

X denotes a broadly positive value added residual category centre profile
Y denotes a generally negative value added residual category centre profile

However, a small number (5 centres) have been identified with a mixed profile of value added residuals across the four outcome measures (i.e. are performing above expectation in at least one outcome and below expectation in at least one outcome). Table 3.13 illustrates two examples of pre-school centres in the EPPE sample with a mixed profile of social behavioural value added residuals. As a group, children in Centre **A** made significant gains in one social behavioural outcome; however, by contrast, the same children made poorer gains in another outcome (compared to EPPE children in other pre-school centres in the sample). The pre-school centre represented by **B** is another example of a centre with a mixed centre effect profile with children performing below expectation in two outcomes and above expectation in one

[40] Note that for the 'Anti-social / Worried' outcome an effect significantly above expectation indicates a reduction in anti-social / worried behaviour. Likewise, an effect significantly below expectation indicates an increase in anti-social / worried behaviour.

outcome (the children performed as expected in the other one outcome). It is important to note that no centres performed significantly above expectation at the 95 per cent level in one outcome AND significantly below expectation also at the 95 per cent level in another outcome.

Table 3.13 Examples of two 'mixed' centre profiles

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried[41]
Above expectation (95% significance)				
Above expectation (68% significance)			**A**	**B**
As expected	**A**	**B**		**A**
Below expectation (68% significance)	**B**	**A**		
Below expectation (95% significance)			**B**	

A and **B** denote mixed value added residual category centre profiles

In EPPE Technical Paper 8a, pre-school centre profiles are examined in a similar way using the results of the multilevel value added analysis of cognitive outcomes. Further exploration of centre profiles examining value added residuals from both the cognitive and social behavioural outcomes is also planned. For example, it will be of interest to see whether centres with a broadly positive profile for cognitive outcomes also have a positive profile for social behavioural outcomes. Using the pre-school centre profiles from both cognitive and social behavioural value added analyses, a sample of pre-school settings ranging from average to very effective was selected for detailed case study analysis (see EPPE Technical Paper 10).

It can be concluded that individual pre-school settings (pre-school centres) in the EPPE sample differ in their impact on young children's social behavioural developmental gains. However, within one individual pre-school centre, internal variation between the different social behavioural outcomes may exist. In other words, some centres may have a particular strength and others an area of apparent weakness.

[41] Note that for the 'Anti-social / Worried' outcome an effect significantly above expectation indicates a reduction in anti-social / worried behaviour. Likewise, an effect significantly below expectation indicates an increase in anti-social / worried behaviour.

Section 4: Accounting for Pre-school Centre Effects on Children's Social Behavioural Development

An important aim of the EPPE research is to establish whether particular features of pre-school settings are related to children's progress or social behavioural development. In this paper, the focus is on social behavioural outcomes. Observational data on the quality of pre-school centres environments was obtained using the Early Childhood Environment Rating Scale and the English Extension (ECERS-R and ECERS-E) and the Caregiver Interaction Scale instruments (for further details see EPPE Technical Paper 6a). In addition, type of pre-school setting is an important feature given diversity in pre-school provision in England. The EPPE study therefore also has the further aim of examining whether there are systematic variations in centre effectiveness for the six types of provision included in the sample of 141 centres. Given the links between quality and type of provision identified elsewhere (see EPPE Technical Papers 5 and 6), the relationships between staff qualification levels and effectiveness is also explored.

For each of the four social behavioural outcomes collected at primary school entry, the possible influence of a number of process measures related to pre-school experience were tested. Process measures were included in the complex value added models to explore any statistically significant relationship with child social behavioural outcomes. It should be noted that the models adopted control for age, change of centre, significant prior social behavioural factors and all child, parent and home learning environment measures found to be significant predictors in the complex value added models described in Section 3 of this report. These analyses include all children in the EPPE sample with pre-school centre experience.

Pre-School Type
The five regions in EPPE were strategically chosen to represent urban, suburban, and rural areas and also to include neighbourhoods with social and ethnic diversity. All local authorities in the EPPE sample were divided into five sampling areas, usually geographic divisions that already existed. Official lists of playgroups, nursery classes, nursery schools, private day nurseries, social services/voluntary day nurseries, and nursery schools combining care and education were obtained with the help of the local early years co-ordinators in every authority. Within each sampling area, one of each type of provision was randomly selected, yielding approximately 25 centres of various types in each region. Some over and under-sampling occurred in each category of provision because not all authorities had sufficient numbers of local authority day nurseries.

Summary of the different types of provision
For the main analysis pre-schools were divided into six types.

1. Local Education Authority nursery classes (n=25)
   These are part of primary schools, have an adult:child ratio of 1:13, (one in every two adults is normally a 4 year graduate qualified teacher and the other adult usually has had 2 years child care training) and usually offer only half-day sessions in term time, 5 days/week.

2. Voluntary playgroups and/or pre-schools (n=34)
   These have an adult:child ratio of 1:8, (training of adults is variable from none to graduate level. The most common type of training is based on short Pre-school Learning Alliance courses). All offer sessional provision in term time. Many children attend fewer then 5 sessions/week. Playgroups usually have fewer resources (facilities, materials and sole use of space) than other types of centres.

3. Private day nurseries (n=31)
   These have an adult:child ratio of 1:8, (normally the adults have a two year child care training, but some have less training). All offer full day care for payment.

4. Local authority (day care) centres (n=24)
   These came from the social services day care tradition, although in recent years many have come under the authority of the LEA. Thirteen in this group combined care and education with one teacher per centre or a peripatetic teacher shared with other centres. 11 centres have not officially incorporated education into care. The ratio is 1:8, (normally the adults have two years child care training. The combined centres have a small input from a teacher), and all offer full day care.

5. Nursery schools (n=20)
   These are 'traditional' nursery schools under the LEA with adult:child ratios of 1:13, (the headteacher would be a 4 year graduate qualified teacher with an early years background, other staff would have similar training to nursery classes employees, usually a trained teacher and classroom assistant in each class), usually offering half-day provision. One in this group was an 'Early Excellence Centre'.

6. Integrated centres (also known as combined centres). In the sample these are former nursery schools combining education and care (n=7)
   These are similar to nursery schools but have developed their provision of extended care to include full day care and parent involvement. They would have statutory adult:child ratio of 1:13, although many negotiated more generous ratios reflecting their additional care provision (staffing would be the same as nursery schools for the over 3s). Even though these centres were chosen as a stratified random sample four in this group were 'Early Excellence Centres'.

Multilevel analyses were used to test the impact of pre-school type on children's developmental gains in four aspects of social behaviour over the pre-school period. The full range of type of pre-school comparisons[42] for the four social behavioural outcomes is shown in Table 4.1. Only significant effects between types of pre-school provision are reported. For example, in terms of developmental gains in 'Co-operation & Conformity' during the pre-school period, the analyses shows that there is a statistically negative effect associated with children who attended playgroups, private day nurseries and local day authority nurseries compared to children who attended nursery classes. These effects are after controlling for a wide range of child, parent, family, home environment and other pre-school characteristics. Note that a high score on 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' relates to more positive developmental gains whereas higher scores on 'Anti-social / Worried' relate to worsening anti-social / worried behaviour over the pre-school period.

The social behavioural measure 'Independence & Concentration' shows no statistically significant differences according to type of provision. It should be noted that there are major difficulties in identifying any clear effects for playgroups because there is a confounding of change and type of pre-school provision.[43]

[42] For the variable 'types of provision', the analysis has been repeated using each type of provision as the comparison group. In this way it is possible to establish with greater certainty the extent to which progress varies for children attending different types of provision.

[43] See Table 1.2 in Section 1 illustrating number and percentage of children changing pre-school centre before school entry by type of provision.

Table 4.1 Impact of type of provision on children's social behavioural development gains (using the complex value added models)

	Co-operation & Conformity	Peer Sociability	Anti-Social / Worried
Compared to Integrated Centres			
Nursery classes			
Playgroups	**negative**		
Private day nurseries	**negative**		
LA day care	**negative**		
Nursery schools			
Compared to Nursery Classes			
Playgroups	**negative**	**negative**	
Private day nurseries	**negative**		**positive (worse)**
LA day care	**negative**	**negative**	**positive (worse)**
Nursery schools			
Integrated centres			
Compared to Playgroups			
Nursery classes	**positive**	**positive**	
Private day nurseries			
LA day care			
Nursery schools			
Integrated centres	**positive**		
Compared to Private Day Nurseries			
Nursery classes	**positive**		**negative (better)**
Playgroups			
LA day care			
Nursery schools			**negative (better)**
Integrated centres	**positive**		
Compared to LA Day Care			
Nursery classes	**positive**	**positive**	**negative (better)**
Playgroups			
Private day nurseries			
Nursery schools			
Integrated centres	**positive**		**negative (better)**
Compared to Nursery Schools			
Nursery classes			
Playgroups			
Private day nurseries			**positive (worse)**
LA day care			**positive (worse)**
Integrated centres			

Types of provision effects were identified for several social behavioural outcomes, in line with findings for cognitive outcomes. The results suggest differences on the factor 'Co-operation & Conformity' where children in nursery classes and integrated centres (i.e. combined centres)

made more developmental gains. The difference is statistically significant when nursery classes and integrated centres are compared to playgroups, private day nurseries and local authority day nurseries. It appears that nursery classes show a positive impact for 'Peer Sociability' compared with playgroups and local authority day nurseries.

There are indications that poorer outcomes in terms of the factor 'Anti-social / Worried' behaviour (i.e. a worsening of anti-social / worried behaviour) are associated with both private and LA day care nurseries. These differences are statistically significant in comparison with nursery classes and nursery schools. The two groups of children (private day nursery and LA Day Care) differ from the rest of the sample in that proportionately more of them started at their pre-school target centre before 3 years of age and this was associated with increased incidence of anti-social / worried behaviour at age 3 (see EPPE Technical Paper 7). (It is also important to note that children attending nursery classes, nursery schools and integrated centres may previously have had daycare experience from an early age in other centres and other types of provision.) It should be noted that age at start of target pre-school is not found to be significant in accounting for change in any measure of social behavioural development over the pre-school period and therefore this measure is not controlled for in the complex value added models (for descriptive statistics on the age at start of target pre-school variable, see Table 4.2).

Table 4.2 Age at start of target pre-school to according to pre-school type

	n of children	mean	sd	min	max	n of centres
Nursery class	**588**	**43.9**	**4.0**	**28.1**	**52.0**	**25**
Playgroup	**609**	**34.0**	**3.8**	**21.4**	**50.5**	**34**
Private day nursery	**516**	**25.5**	**12.1**	**1.2**	**51.3**	**31**
LA day care	**433**	**26.2**	**11.9**	**1.0**	**50.1**	**24**
Nursery school	**519**	**43.5**	**4.1**	**35.2**	**52.3**	**20**
Integrated centre	**192**	**34.0**	**10.0**	**3.3**	**49.8**	**7**
All	**2857**	**35.0**	**11.0**	**1.0**	**52.3**	**141**

There is also a degree of variation in the effectiveness of individual centres within most types of provision. In terms of the social behavioural outcomes, although the number of outlier centres are small, centres performing statistically above expectation were proportionately more likely to be drawn from nursery classes and integrated centres whereas proportionately more of the centres performing below expectation were playgroups.

In addition, the mean pre-school centre effects (i.e. value added residuals) by pre-school type can be examined (see Table 4.3). The results generally mirror the findings above.

Table 4.3 Mean pre-school centre effects by pre-school type

	Independence& Concentration	Co-operation & Conformity	Peer Sociability	Anti-Social / Worried
Nursery classes	**0.02**	**0.04**	**0.05**	**-0.01**
Playgroups	**-0.01**	**-0.01**	**-0.02**	**-0.01**
Private day nurseries	**-0.01**	**-0.02**	**0.00**	**0.02**
LA day care	**-0.01**	**-0.02**	**-0.02**	**0.03**
Nursery schools	**0.01**	**0.00**	**-0.01**	**-0.03**
Integrated centres	**0.04**	**0.08**	**-0.01**	**-0.02**

Note that the average predicted for the whole sample based on child, parent and home environment characteristics and prior attainment is designed to be zero.

Quality Characteristics (in terms of ECERS-R and ECERS-E)

Two rating scales were used in EPPE to assess the quality of pedagogy, curriculum and resources. The American Early Childhood Environment Rating Scale (ECERS-R) (Harms et al, 1998) is based on a child-centred pedagogy and also assesses resources for indoor and outdoor play[44]. The English rating scale ECERS-E (Sylva et al, 1999d) was intended as a supplement to the ECERS-R and was developed especially for the EPPE study to reflect the Desirable Learning Outcomes[45] and more importantly the Curriculum Guidance for the Foundation Stage which at the time was in trial stage. This scale focuses squarely on three curricular areas (Literacy, Numeracy, Science / Knowledge of the world) and on Diversity of provision for children of different abilities, gender and cultures. All ECERS observations were carried out in each of the 141 centres in the period May 1998 – June 1999. EPPE Technical Paper 6 and 6a give full details of the range in centres' characteristics as measured by these scales. It was found that there was substantial variation between centres of the same type (within-type variation) and also significant variation between types of provision in these measures of quality of pre-school provision. In general, the quality characteristics of playgroups and private day nurseries were found to be lower than those of other forms of provision in the two ECERS instruments. The highest average ECERS scores were found for integrated centres and nursery schools (see EPPE Technical Paper 6).

Table 4.4 reports a summary of results. Two overall measures of quality characteristics were tested in the multilevel analysis of centre effects, i.e. a centre's average total score on the ECERS-R and on the ECERS-E scale. Only significant effects are reported. For example, in terms of 'Co-operation & Conformity', the analyses shows that there is a statistically positive effect associated with the average total ECERS-R score after controlling for a wide range of child, parent, family, home environment and other pre-school characteristics. In addition, the impacts of individual ECERS-R and ECERS-E subscales[46] were analysed and the results are also summarised in Table 4.4. Note that a high score on 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' relates to more positive outcomes whereas higher scores on 'Anti-social / Worried' relate to worse anti-social / worried behaviour.

Table 4.4 Impact of quality of provision (as measured by ECERS-R and ECERS-E) on children's social behavioural developmental gains (using the complex value added models)

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-Social / Worried
ECERS-E average total	**positive#**	**positive#**		
ECERS-E subscale: literacy		**positive#**		
ECERS-E subscale: maths				
ECERS-E subscale: science/envir	**positive#**			
ECERS-E subscale: diversity	**positive#**	**positive#**		
ECERS-R average total		**positive**		
ECERS-R subscale: space & furnishings				**negative#(better)**
ECERS-R subscale: personal care routines				
ECERS-R subscale: language and reasoning		**positive**		

[44] ECERS-R subscales relate to Space and Furnishings, Personal Care Routines, Language and Reasoning, Activities (pre-school activities), Social Interaction, Programme Structure and Parents and Staffing (adults working together)

[45] Desirable Learning Outcomes have since been replaced by the Early Learning Goals

[46] See EPPE Technical Papers 6 and 6a for further details on ECERS-R and ECER-E subscales.

ECERS-R subscale: pre-school activities				
ECERS-R subscale: social interaction	**positive**	**positive**	**positive#**	
ECERS-R subscale: organisation & routine				
ECERS-R subscale: adults working together				

verging on statistical significance

To summarise, the results show that:

- There is no statistically significant relationship between children's developmental gains in three aspects of social behaviour - 'Independence & Concentration', 'Peer Sociability' and 'Anti-Social / Worried' - over the pre-school period and the pre-school centre's average total ECERS-R score.

- The pre-school centre's average total ECERS-R score shows a positive relationship in terms of children's developmental gains over the pre-school period for 'Co-operation & Conformity'.

- There is no statistically significant relationship between children's developmental gains in 'Peer Sociability' or increase in 'Anti-social / Worried' behaviour over the pre-school period and the pre-school centre's average total ECERS-E score (effects are weakly positive but non significant).

- The pre-school centre's average total ECERS-E score shows a positive relationship (verging on statistical significance) in terms of children's developmental gains over the pre-school period in 'Independence & Concentration' and 'Co-operation & Conformity'.

- The ECERS-R subscale 'Social Interaction'[47] shows a statistically significant positive relationship with centre effects on both 'Co-operation & Conformity' and 'Independence & Concentration', and verges on the significant for 'Peer Sociability'. Charts D.2 and D.4 show illustratively effect sizes for continuous predictor variables included in these complex value added models. For both 'Independence & Concentration' and 'Co-operation & Conformity', the effect size for the ECERS-R 'Social Interaction' subscale is not surprisingly smaller than the effect sizes associated with prior social behavioural development at age 3, but larger than the effect size for age at entry to the study assessment point. It should be noted that effect sizes for continuous measures might appear modest but generally apply to all children in the sample (in contrast to those for some categorical predictors that apply to very small sub-groups).

- The ECERS-R subscale 'Language & Reasoning' shows a statistically significant positive relationship with greater gains in 'Co-operation & Conformity'.

- The ECERS-R subscale 'Space & Furnishings' shows a favourable association (verging on statistical significance) with a reduction in 'Anti-social / Worried' behaviour. This suggests that where provision for the physical environment is better, a decrease in 'Anti Social / Worried' behaviour is shown. This subscale includes indoor space and space for gross motor play amongst other aspects.

- None of the ECERS-E subscales show a statistically significant relationship with children's social behavioural development, though several are positive and verge on significance (e.g.

[47] The ECERS-R 'Social Interaction' subscale includes a strong emphasis upon staff showing respect to children, listening to what they say, and responding sympathetically.

the 'Diversity' subscale[48] with both 'Independence & Concentration' and 'Co-operation & Conformity').

Quality is not a universal concept but depends on national curricula and cultural priorities. The 'outcomes' deemed important in children's development will relate in different ways to different measures of quality. In terms of social behavioural development over the pre-school period, ECERS-R findings for average total score and the individual subscales suggest that certain aspects of environmental quality, measures of 'social interaction' and 'language and reasoning' in particular, have a positive impact on children's social behavioural development, especially for 'Co-operation & Conformity'. In EPPE Technical Paper 8a, relationships with cognitive outcomes are reported. As might be anticipated, the ECERS-E measures given their focus on specific curricular areas show a stronger positive impact on cognitive progress.

Quality Characteristics (in terms of Caregiver Interaction Scale)

Additional measures of pre-school quality are provided by the Caregiver Interaction Scale (CIS) (Arnett, 1989). This scale of adult-child interaction is completed after sustained period of observation with the 26 items forming 4 subscales: 'Positive relationships', 'Permissiveness', 'Punitiveness' and 'Detachment'.

- Positive relationships is a subscale made up of 10 items indicating warmth and enthusiasm interaction with children by the caregiver.
- Punitiveness is a subscale made up of 8 items indicating harsh or over-controlling behaviour in interaction with children by the caregiver.
- Permissiveness is a subscale made up of 4 items indicating avoidance of discipline and control of children by the caregiver.
- Detachment is a subscale made up of 4 items indicating lack of involvement in interaction with children by the caregiver.

Comparing the ECERS-R / ECERS-E scales and the Caregiver Interaction Scale, there are significant associations between centres in terms of these two separate measures of quality. For example, the overall correlations between the Caregiver Interaction Scale 'Positive relationships' and the ECERS-R subscale 'Language reasoning' is 0.64, and with 'Social Interaction' 0.68 (for more details, see Table D.1 in Appendix D).

Table 4.5 reveals that the behaviour of staff in pre-school centres varies significantly in terms of 'Positive relationships', 'Permissive' and 'Detachment'. Integrated centres, followed by nursery classes and nursery schools score more highly in terms of the Caregivers Interaction Scale measure of 'Positive relationships'. Playgroups score least well on this scale, and show higher mean scores on the 'Detachment' and 'Permissiveness' scale (negative aspects of adult-child interactions) followed by LA day care nursery.

Table 4.5 Mean Arnett factors by pre-school type

	Nursery Classes	Playgroups	Private Day Nurseries	LA Day Care	Nursery Schools	Integrated centres
Positive	**3.50**	**2.94**	**3.20**	**3.25**	**3.45**	**3.67**
Permissive	**1.30**	**1.62**	**1.49**	**1.59**	**1.44**	**1.31**
Detachment	**1.26**	**1.66**	**1.53**	**1.47**	**1.24**	**1.08**

Note that 'Punitiveness' did not differ by pre-school type so is not included in the table

The multilevel analyses reveal that different areas measured by the Caregiver Interaction Scale instrument show a significant relationship with developmental gains in three of the social behavioural outcomes. Table 4.6 provides a summary of results with only significant effects reported; *positive* denoting a positive significant effect and *negative* shows a negative significant effect. Children who attend pre-school centres that score highly on the 'Positive relationships' scale made on average more developmental gains in 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability'. The other scales which provide measures of less

[48] The ECERS-E 'Diversity' subscale includes items on individual learning needs, gender equity and multicultural education.

favourable types of adult-child interaction (i.e. 'Detachment', 'Permissive' and 'Punitive') by contrast show a significant negative impact on certain aspects of children's social behavioural development over the pre-school period.

Table 4.6 Impact of quality of provision as measured by the Caregivers Interaction Scale on children's social behavioural developmental gains (using the complex value added models)

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-Social / Worried
Positive	**positive**	**positive**	**positive**	
Punitiveness		**negative**		
Permissive	**negative**	**negative**		
Detachment		**negative#**	**negative**	

verging on statistical significance

The analyses of both ECERS and Caregiver Interaction Scale measures indicate that aspects of pre-school centre quality vary significantly both between individual centres and by type of provision (see EPPE Technical Paper 6a). The multilevel analyses reported here also demonstrate that process measures of observed pre-school centre quality are statistically significant predictors of changes in young children's social behavioural development over the pre-school period. To summarise, better quality of provision is associated with a positive impact on several different aspects of social behaviour. These findings on the importance of quality for social behaviour are in line with those reported elsewhere (EPPE Technical Paper 8a) on cognitive progress. Taken together they indicate that young children who attend pre-school settings with higher quality characteristics tend to make more cognitive progress and show better social behavioural development, and thus are better prepared for the start of primary school.

Staff Qualifications

Information was collected as part of the Centre Manager's Interview about the numbers, qualifications and hours worked by staff of the pre-schools in the EPPE study (for further details about the characteristics of centres from these interviews see EPPE Technical Paper 5).

In order to explore the impact of staff qualifications a number of measures were constructed from these data. Centres were categorised according to the percentage of unqualified, Level 2, Level 3-4, and Level 5 staff hours using classifications based on the "Early Years Education, Childcare and Playwork: A frame of nationally accredited qualifications" (QCA, 1999) classification scheme. The study of staff qualification levels is complicated at the centre level because staff vary in their qualifications and also in the hours they work with children (contact time). Therefore, the percentage of total staff time (hours) at different levels of qualification was calculated for each centre.

Quality characteristics (both overall ECERS-E and ECERS-R and subscales) also show a significant link with centre managers' qualification levels (see EPPE Technical Paper 6). Further analyses of additional observational measures of quality (the Caregiver Interaction Scale subscales described above) also show a statistically significant link with level of centre managers' qualifications. Centres where managers had higher qualification levels scored significantly higher in caregivers' interactions with children in terms of 'Positive relationships', and lower in terms of 'Detachment' and 'Permissiveness'. (See Chart D.5 in Appendix D.) Overall, a

significant relationship between the percentage of level 5[49] staff's contact time and centres' scores on these three Arnett scales was identified. This finding is in accord with that for centre managers' qualification levels and ECERS measures of environmental quality. Therefore, we can conclude that higher levels of centre manager and staff qualifications are associated with more positive aspects of adult-child interaction and negatively associated with less favourable indicators of adult-child interaction (for further details of the classification of and extent of variations between types of provision in measures of centre manager and staff qualifications see EPPE Technical Paper 5).

There are indications that higher staff qualifications (i.e. trained teachers) have some impact in promoting young children's social behavioural development. Children who attended centres where proportionately more staff time were at level 5 (50-100% of staff hours) showed a positive relationship in 'Co-operation & Conformity' and reductions in 'Anti-social / Worried' behaviour. In addition, higher proportions of staff hours with relatively low-level qualifications (level 2) were associated with poorer outcomes for 'Peer Sociability' and 'Co-operation & Conformity'.

The relationship between qualifications and young children's social behavioural development is likely to be related with and to the influence of centre type and quality, because of the different patterns of staff recruitment in different types of settings. It is suggested that staff qualification levels probably have an indirect effect on children's development through their association with better quality of pre-school provision, although staff with level 5 qualifications may have a better knowledge of young children's social behavioural development and this may lead to improved adult-child interactions and communication.

Ratios

It is very difficult to study the effects of ratio as a stand-alone variable in existing British practice, without using an experimental study. Munton et al (2002) provide an example of a quasi-experimental study and provide further discussion of ratios and their relationships with staff qualifications and training in the early years. Complexities in measuring class size and ratios in reception classes and in Key Stage 1 have been described by Blatchford et al (2002a and b). The possible effects of ratio in EPPE are inevitably confounded with training, resources and pedagogical practices. Moreover, children from socio-economically disadvantaged and/or minority ethnic backgrounds were concentrated in LA day care and combined centres whereas children from more advantaged backgrounds were clustered in private day nurseries.

The study has compared three kinds of information on staffing ratios in EPPE pre-school centres:

1) The statutory minimum levels (for when the EPPE children were in pre-school provision)[50]

The minimum staffing level across the 6 types of pre-school provision in the EPPE sample is not uniform. In playgroups, private day nurseries, local authority day care and the combined centres the ratios of 1 adult to 8 children in the age group 3-5 are laid down by the 1989 Children Act. This sets out the statutory levels of staffing which would enable a pre-school setting to comply with the appropriate Children Act inspection framework, which historically was undertaken by Social Services. All settings with children under three are required to have this inspection of care. In addition, after the introduction of the Desirable Learning Outcomes, the Government introduced an education inspection conducted by the Office for Standards in Education (OFSTED). In the other 'educational' forms of provision, nursery classes and nursery schools, the ratios are 1 adult to 13 children for three to five-year-olds, although in nursery schools it can quite often be as low as 1:10 because the head teacher has a major teaching function in addition to administration. These government ratios are determined by the Nursery Education Act (1996). Inspections are conducted by OFSTED but they are similar to school inspections. The integrated centres may differ from these arrangements i.e. if their local authority considers them as nursery schools, they can have the 'education' ratios. However, most integrated centre heads have negotiated lower ratios with their LA because they argue they need lower ratios to carry out the

[49] Level 5 includes QTS via PGCE, BEd, Cert Ed and DipEd.

[50] Note that social services inspections are now carried out by OFSTED in line with National Standards for Daycare. The requirement is for settings with children under eight to be inspected as daycare settings.

family support aspects of their work. Integrated centres are inspected under both social services and education frameworks.

2) Interview data from the centre managers' interviews

It was possible to calculate staffing levels from the managers' reports of the number of children and staff in their centre. These figures did not necessarily reflect the usual number of children and adults in the centre at any one time and thus provide only a very limited guide to actual ratios usually experienced by children in the centres.

3) Observational data from EPPE research officers' visits

Independent observations on 'usual' ratios were made over a period of time by research officers during their visits to centres to assess children. In these time-point observations, the number of children in the centre, the number of paid staff, and also the number of voluntary staff were observed. Volunteer staff were only included in the staffing levels if they attended the centre on a regular basis, over a substantial period of time, sufficient to serve as unpaid staff rather than casual visitor. Field officer observations were made on the basis of at least 20 or more separate visits to each centre.

Table 4.6 shows that within each type of provision there was variation between centres in their staff child ratios. This demonstrates the need to explore the impact of both type and ratio in models of children's social behavioural development. It cannot be assumed that all centres of a particular type have similar ratios in practice, thus any comparisons merely based on statutory ratios are likely to be flawed. In general the figures for the ratio of children to adults including volunteers are similar to those without volunteers except in playgroups, where the addition of volunteers reduced the mean observed ratio from 8:43 to 6:96.

Table 4.6 Descriptive Statistics showing the Ratio of Children to Adults (not including volunteers) by Type of Provision

	Statutory Ratios	N of centres	Ratio not including volunteers		Ratio including volunteers	
			Mean	sd	Mean	sd
Nursery class	1:13	25	11.51	2.23	11.13	2.44
Playgroup	1:8	34	8.43	3.20	6.96	2.31
Private day nursery	1:8	31	7.16	1.57	7.04	1.56
LA day care	1:8	24	6.69	1.11	6.69	1.11
Nursery school	1:13	20	8.48	3.11	8.00	3.22
Integrated centres	1:13	7	7.63	1.59	7.63	1.59
All	n/a	141	8.37	2.83	7.85	2.65

The relationship between the Early Childhood Environment Rating Scales (ECERS-E and ECERS-R) ratios has also been examined. There is little evidence of associations between centre ratios and quality characteristics as measured by ECERS-R. However, the ECERS-E, which has a more educational focus showed a significant though weak positive correlation between observed ratio including volunteers and average total score on ECERS-E (r=0.21). This indicates a tendency for quality scores on this measure to be higher in centres with higher ratios. This may reflect the higher ECERS scores to be found in the maintained (Local Education Authority) sector (with statutory ratios of 1:13, see EPPE Technical paper 6 and 6a). The relationships between ratios and the ECERS quality measures are notably weaker than those found between quality and centre manager's child care/education qualifications levels.

Ratios are also confounded with staff qualifications and quality. Centres where staff have higher qualifications tend to have higher statutory ratios while centres with lower qualified staff have

what used to be called 'more favourable' ratios (using the assumption that 'lower' may be 'better' for children). Moreover, some centres with high quality scores on the ECERS observational profiles also have high ratios, especially nursery classes. The important exception to this is the integrated centres, which have high quality scores on ECERS but have low ratios. Some centres with the 'least favourable' ratios offer the highest quality of pedagogy and facilities especially nursery classes. They also have the most highly qualified staff and better facilities.

The variables 'ratio of children to adults not including and including volunteers' were tested in the complex value added models described in Section 3 (controlling for prior social behavioural development, age and all measures found to be significant predictors of children's social behavioural gains). The results show no significant relationships between ratios and young children's developmental gains over the pre-school period for any social behavioural outcome.

It has been shown above that ratios vary in the EPPE study in systematic ways, in particular by type and quality. Therefore ratios, type and ECERS-R (a measure of quality) were all tested in the complex value added models. The results show that ratios, however measured, are not statistically significant predicators of young children's social behavioural development, when type and quality are controlled.

Amount of Pre-school Provision

The amount of pre-school centre provision children have experienced can be measured in various ways. Firstly, the number of months over which a child attended pre-school (created by measuring the number of months from cognitive assessment date[51] at entry to the EPPE study aged 3 plus to the start of primary school[52]) was tested. This indicator of 'duration' of pre-school (in terms of number of months) was not statistically significant in accounting for social behavioural developmental gains over the pre-school period in each of the four outcomes.

The amount of pre-school provision can also be examined by an exploration of the number of sessions per week children were *registered* for at their pre-school settings and also the number of sessions *attended* over the pre-school period from the cognitive assessment date at entry to the EPPE study to leaving the target pre-school (Note, once again, the number of months at the target pre-school before the child entered the EPPE study is not included in either of these measures). These two measures were tested in the complex value added models reported in Section 3.

The number of sessions per week children were registered for at their pre-school settings is generally considered a relatively crude indicator of amount of provision. Table 4.7 details the number of sessions per week for which children were registered at their target pre-school. As can be seen, no children in the EPPE pre-school experience sample were registered to attend only 1 session. The majority were registered to attend 5 sessions (44%) whilst 23 per cent were registered for 10 sessions a week. The mean number of sessions per week for which children are registered varied by type of provision with the highest providers generally being local authority day nurseries and the lowest playgroups (as shown in Table 4.8). It should be noted that some children will have changed the number of sessions per week they attended during the study and thus the number of sessions registered per week measure recorded at entry may not have applied throughout the pre-school period.

In the value added multilevel analyses the social behavioural outcomes of children registered for 5 sessions were compared to those of children registered for 2-4 sessions and also children registered for 6-10 sessions. The results showed no significant link with social behavioural developmental gains for number of sessions a child was registered to attend at his or her centre,

[51] The cognitive assessment date was chosen because ASBI assessments tended to be made after cognitive assessment, thus this date gives a clearer baseline for calculating 'duration'.

[52] Note that the number of months at the target pre-school before the child entered the EPPE study is not included in this duration measure.

after control for prior social behaviour, change of centre and children's background characteristics.

Table 4.7 Number of Sessions per week for which Children were Registered at Entry to the Study

Numbers of sessions per week	2	3	4	5	6	7	8	9	10
n	209	283	254	1267	97	11	75	15	642
%	7.3%	9.9%	8.9%	44.4%	3.4%	0.4%	2.6%	0.5%	22.5%

Note that the number of sessions per week registered was not known for 4 children

Table 4.8 Mean Number of Sessions per week for which Children are Registered According to Pre-school Type

	n of children	mean	sd	n of centres
Nursery class	588	5.84	1.87	25
Playgroup	609	3.69	1.47	34
Private Day Nursery	513	5.29	2.67	31
LA Day Care	432	8.00	2.64	24
Nursery school	519	6.27	2.13	20
Integrated centre	192	6.89	2.35	7
All	2853	5.76	2.56	141

Note that the number of sessions per week registered was not known for 4 children

Attendance records are generally considered a better indication of quantity of pre-school provision than number of sessions registered per week, because holiday closures and absences are taken into account in the calculation. However, a limitation of the attendance variable used (which measures the total number of sessions attended over the pre-school period from the cognitive assessment date at entry to the EPPE study to leaving the target pre-school based on centre registers) is that attendance is only measured for the target pre-school centre. As reported in Table 1.2 in Section 1, just under a quarter of the sample (23.0%) moved from the target pre-school centres from which they were recruited at entry to the study during the pre-school period. Thus for these children who changed pre-school, the attendance measure only accounts for a proportion of their pre-school experience. Table 4.9 shows that children varied in their attendance by type of pre-school provision with the highest attenders generally being found in local authority day nurseries and the lowest playgroups (from which over half the children change target pre-school during the pre-school period).

Those children who attended 130 or fewer sessions at the target pre-school were compared in the multilevel analyses to children who attended for 131-200 sessions, 201- 400 sessions and over 400 sessions[53]. The results of the analyses indicate that the measure of target pre-school centre attendance for over 400 sessions (since the cognitive baseline assessment date as children entered the EPPE study) showed a significant positive relationship with increases in anti-social / worried behaviour. In other words children who attended more sessions tended to exhibit more anti-social / worried behaviour. However, it is important to note that the 277 children showing this high level of attendance are predominantly in local authority and private day nurseries. Therefore, it is not possible to draw definitive conclusions that the impact of high levels of attendance is independent of type of provision.

The results also indicated that children who attended between 131-200 pre-school sessions tended to have higher scores on the 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' outcomes compared with children who attended 130 or fewer sessions.

[53] The number of children in these groups are as follows: 130 or fewer sessions n=957 (33.5%), 131-200 sessions n=715 (25.0%), 201-400 sessions n=613 (21.5%) and over 400 sessions n=277 (9.7%). Attendance information was not available from centre records for 295 children (10.3%).

As noted above, the attendance measure is confounded by type and mobility with playgroups showing more change than other types. Total number of sessions attended tends to be lower for those children who change centre. Unstable arrangements (usually playgroups) leading to artificially low attendance figures because such children often moved to other centres but no details of attendance at non-target pre-school centres were available. Hence it seems likely that the significant impact reported above for attendance on the social behavioural outcomes may be viewed as a conservative estimate of the effect of quantity of sessions of pre-school attended. The real relationship may well be stronger, but limitations of the data available may have diluted this association.

Table 4.9 Attendance (mean total number of sessions at target centre during study period) by Pre-school Type

	n of children	mean	sd	n of centres
Nursery class	**485**	**176.0**	**90.0**	**25**
Playgroup	**570**	**113.7**	**77.6**	**34**
Private day nursery	**490**	**245.8**	**164.9**	**31**
LA day care	**401**	**319.8**	**193.3**	**24**
Nursery school	**482**	**160.4**	**72.7**	**20**
Integrated centre	**134**	**263.5**	**157.6**	**7**
All	**2562**	**199.7**	**145.3**	**141**

Note that attendance information was not known for 295 children

Child Age at Start of Pre-school Centre

Children who enter the target pre-school centre at an earlier age are mostly drawn from private day nurseries and local authority nurseries. Table 4.10 shows the mean age and distribution of children in terms of age in months at entry to target centres.

Table 4.10 Age in months at start of target pre-school to according to pre-school type

	n of children	mean	sd	min	max	n of centres
Nursery class	**588**	**43.9**	**4.0**	**28.1**	**52.0**	**25**
Playgroup	**609**	**34.0**	**3.8**	**21.4**	**50.5**	**34**
Private Day Nursery	**516**	**25.5**	**12.1**	**1.2**	**51.3**	**31**
LA Day Care	**433**	**26.2**	**11.9**	**1.0**	**50.1**	**24**
Nursery school	**519**	**43.5**	**4.1**	**35.2**	**52.3**	**20**
Integrated centre	**192**	**34.0**	**10.0**	**3.3**	**49.8**	**7**
All	**2857**	**35.0**	**11.0**	**1.0**	**52.3**	**141**

Results in Technical Paper 7 show that an earlier age at entry to target pre-school is linked to higher social behavioural outcomes studied at age 3 years plus including higher anti-social scores. Analyses have been conducted to explore the impact of age starting in target pre-school in more detail. The categories tested are age at start of target pre-school under 24 months old, between 24 months to 30 months, between 30 months to 36 months and age at start of target pre-school 36 months or above.[54] In terms of social behavioural development over the pre-school period measured by the value added models, the results show that a younger age at entry to target pre-school does not result in increased social behavioural development when prior social behavioural development is controlled. This is also the case in the contextualised models detailed in Section 2 when prior social behavioural development is not controlled (note that the conexteualised models in Section2 include all children in the EPPE sample with pre-school centre experience).

[54] The number of children in these groups are as follows: age at start of target pre-school under 24 months old n= 360 (12.6%), between 24 months to 30 months n= 276 (9.7%), between 30 months to 36 months n= 703 (24.6%) and age at start of target pre-school 36 months or above = 1518 (53.1%).

Parental Involvement

As part of the exploration of the contribution of parents to young children's learning, the extent to which parents became involved with their child's pre-school centre was investigated using various sources of data. From the centre managers' interview, variables were constructed reflecting the frequency of parental visits to the centre, production of written materials for parents, parental education activities, parental involvement in meetings, staff opinions of the value of parental involvement and staff opinions on how well their centre caters for parents. Whilst information from these interviews cannot provide a complete and comprehensive measure of all aspects of 'parental involvement', it does give an indication of the perceptions of the centre managers in the EPPE study about the extent and nature of the contact they have with their parents. Those variables reflecting frequency of parental visits to the centres and parental involvement in meetings were significantly related to children's social behavioural development over the pre-school period. Centres where these aspects of parental involvement were reported to be higher showed significant positive effects on developmental gains in 'Independence and Concentration,' Cooperation & Conformity', and 'Peer Sociability' and reductions in anti-social/worried upset behaviour.

Section 5: The Impact of Pre-School Provision: Comparison of Home Children to Children who attended a Pre-school Centre

In order to make comparisons of the cognitive attainment and social behavioural development of children who have had no or only minimal pre-school centre experience with those EPPE children who experienced pre-school provision, an additional sample of home children was included in the research. Home children were classified as those who had experienced less than 10 weeks at 2 sessions per week (i.e. less than 50 hours) of pre-school before entering school. It should be noted that home children may have had experience of toddler groups, childminders, nannies or other carers[55] but no or only minimal pre-school institutional experience. This section presents the results of contextualised multilevel analyses establishing whether home children score less highly on the social behavioural factors at primary school entry than children who have had some form of pre-school experience, after controlling for the impact of any significant differences attributable to child, parent and home learning environment characteristics.

It had been hoped to recruit 500 home children during the first weeks of reception amongst children starting at primary schools that the main EPPE pre-school sample entered[56]. In practice the recruitment of home children proved very difficult. This is likely to be due to the increased access to, and take up of, pre-school provision (perhaps reflecting Government policy to expand pre-school provision since 1997 onwards). Many children recorded as having no pre-school centre experience on their school records were subsequently found at parental interview to have attended a centre and thus were not eligible for the home sample. It proved possible to identify just under 200 children from meeting the home child requirement from 10% of the primary schools which the EPPE children from target pre-school centres entered. A further 100+ home children were recruited from a small number of other primary schools. Amongst home children recruited, the main reasons reported in the parental interview for the child not having had any centre based pre-school experience were that there was no appropriate provision close to hand, no pre-school places available, the parent wanted to spend more time with the child or the child was 'clingy'/unsettled[57].

The mean number of EPPE children per primary school is 4 with a standard deviation of 5. In terms of numbers of children from the EPPE sample (both children with pre-school experience and home children), just under half of the primary schools only have one child, a sixth of the schools have two children and one school notably has 60 children (all home children). Chart E.1 in Appendix E shows the distribution of EPPE children (both with and without pre-school provision) in primary schools.

EPPE Technical Paper 3 reported that some of the local authorities in the study, during the reconfiguration of their early years services, had found areas where there was a lack of early years provision or lack of knowledge about the provision that existed. Therefore some groups of children, and in two of the five regions especially minority ethnic groups, were over-represented in the 'home' category. The sample of 'home' children reflects this anomaly and this has led to clusters of 'home' children being recruited in some areas from particular schools, with an over-representation of minority ethnic groups. The EPPE home sample is probably therefore typical of the way in which 'pockets' of home children are unevenly distributed in some localities.

[55] Childminders, nannies and informal carers may provide a stimulating learning environment but the study had no measures of this. Information about the home learning environment provided by parents was collected from parental interviews for all children in the sample.

[56] The 2857 EPPE children with pre-school experience entered 770 different primary schools.

[57] Other reasons related to the provision itself were that the provision did not fit parental work patterns, it was unaffordable or parents were unhappy with the level of hygiene. Additionally, a small number of parents wanted to teach their child at home, were housebound or felt that their child was too young to attend.

Characteristics of the Home Children Compared with Children who Attended a Pre-school Centre

Table 5.1 provides descriptive statistics for the home children compared with children in the main EPPE sample who attended pre-school. As can be seen, home children differ considerably in some of their background characteristics from other EPPE children with pre-school education experience. For example, home children are more likely to be from ethnic minority groups, in particular Pakistani, with a higher proportion of children for whom English is an additional language recorded in the home child category. Furthermore, a considerably higher percentage of home children are from larger families and have mothers with no formal qualifications. A third of home children (compared with just over a fifth of children with pre-school experience) receive free school meals. However, it should be noted that the FSM data for reception aged children provides only a partial measure of socio-economic disadvantage since many young children have home dinners at this age and therefore do not take up their entitlement to this benefit. This is likely to be particularly marked for children from certain ethnic minority groups (e.g. Bangladeshi).

Table 5.1: The Characteristics of Home Children Compared with Children with Pre-school Experience

		Children with Pre-school Experience		Home children	
		n	%	n	%
Gender:	**male**	1489	52.1	146	46.5
	female	1368	47.9	168	53.5
Ethnicity*	**White UK**	2127	74.5	168	53.5
	White European	118	4.1	4	1.3
	Black Caribbean	116	4.1	0	0
	Black African	64	2.2	2	0.6
	Black other	22	0.8	0	0
	Indian	55	1.9	12	3.8
	Pakistani	75	2.6	102	32.5
	Bangladeshi	25	0.9	15	4.8
	Chinese	5	0.2	0	0
	Other	62	2.2	4	1.2
	Mixed heritage	185	6.5	7	2.2
English as an additional language		249	8.7	118	38.2
Receiving free school meals		598	22.5	103	33.9
3 or more siblings		374	13.4	109	39.5
Mother has no formal qualification		501	18.1	146	57.0
Area	**East Anglia**	559	19.6	91	29.0
	Shire Counties	594	20.8	10	3.2
	Inner London	656	23.0	11	3.5
	North-east	503	17.6	75	23.9
	Midlands	545	19.1	127	40.4

*not known excluded

The mean and standard deviation for the four social behavioural primary school entry factors are shown for both home children and the main EPPE pre-school sample in Table 5.2. It can be seen that on 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' the home children's mean factor scores are lower than those of children with pre-school experience. As a group, therefore, children without pre-school experience show poorer social behavioural development in these outcomes than other children who attended pre-school. In

contrast, for the 'Anti-social / Worried' outcome, home children are rated slightly lower in their anti-social / worried behaviour by their teachers (note that the difference between raw ratings for this outcome between the home and pre-school groups is very small and smaller than raw differences on the other social behavioural outcomes). This suggests that home children may exhibit slightly less anti-social / worried behaviour at entry to primary school than EPPE children who experienced pre-school. However, without further analyses, it cannot be concluded that these lower factor scores are a direct result of lack of pre-school experience due to the different characteristics of the home child sample which are also likely to influence their social behavioural development. Nonetheless the data would suggest that there is an association that is worth further exploration to separate the impact of no pre-school centre experience from other factors. For further discussion of the impact of multiple disadvantage and risk of SEN for the home group compared with the EPPE children experiencing pre-school centre provision see Appendix F and EYTSEN[58] Technical Paper 1.

Table 5.2: Descriptive Statistics of Primary School Entry Factors for Home Children Compared with Children who attended Pre-school

	Children with Pre-school Experience			Home Children		
	n	mean	sd	n	mean	sd
Independence & Concentration	**2562**	**3.54**	**0.83**	**304**	**3.16**	**0.88**
Co-operation & Conformity	**2570**	**3.92**	**0.68**	**308**	**3.62**	**0.78**
Peer Sociability	**2568**	**3.65**	**0.71**	**308**	**3.12**	**0.84**
Anti-social / Worried	**2567**	**1.74**	**0.66**	**308**	**1.72**	**0.63**

A Contextualised Analysis of the Home Children's Social Behavioural Development at Primary School Entry Compared to Children who Attended a Pre-school Centre

In order to explore in detail home children's social behavioural development at entry to primary school, a strategy for analysis was employed where children with no pre-school provision were compared firstly to all children with pre-school provision as a group and then to children from six different types of pre-school provision included in the study. In addition, the impact of pre-school was also examined by comparing the social behavioural development of children with varying durations of pre-school provision.

A categorical variable indicating pre-school centre provision versus no pre-school centre attended was added to the contextualised models described in Section 2. Table 5.3 shows the results of the multilevel analyses indicating that, after controlling for the impact of child, parent and home learning environments influences, home children remain at a social behavioural disadvantage in terms of 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' compared with children who have had pre-school experience. The findings reported in Table 5.3 suggest that there is no statistically significant difference between the home and pre-school groups in terms of 'Anti-social / Worried' behaviour.

Table 5.3 shows that after controlling for the child, parent and home learning environments factors noted in Section 2, a child with pre-school experience attains on average for 'Independence & Concentration' a score 0.22 points higher than a child without such experiences. By way of comparison, having a mother with a degree, adds 0.26 score points on a child's 'Independence & Concentration' rating compared to children whose mothers have no qualifications at all. Similarly, data for 'Co-operation & Conformity' reveal an estimate of 0.12 points increase for pre-school vs. home as compared with a 0.21 points increase for having a mother with a degree. Therefore, for 'Co-operation & Conformity', the effect of attendance at pre-school centre is statistically significant but somewhat smaller in terms of points score than a mother's academic qualifications at degree level. Similarly, Chart E.2 in Appendix E shows

[58] Early Years Transition and Special Educational Needs

illustratively the effect sizes for the categorical predictor variables for 'Independence & Concentration'.

Table 5.3: Multilevel results showing the effect of no pre-school provision on social behavioural development at primary school entry

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried
No pre-school centre provision (compared to pre-school centre provision)	**-0.217* (0.068)**	**-0.118* (0.057)**	**-0.359* (0.058)**	**-0.061 (0.056)**

* Statistically significant at 0.05 level Standard error given in brackets

It is also of interest to examine the impact on children's social behavioural development of no pre-school provision compared with the six different types of pre-school provision examined within the EPPE research. Thus, type of pre-school was added to the model with no pre-school provision as the comparison group. The results suggest that all types of pre-school provision compared to none show a positive significant relationship with better social behavioural development for 'Independence & Concentration' and 'Peer Sociability'. Children that attend nursery classes, nursery schools and integrated centres show significantly higher factor scores in 'Co-operation & Conformity'. It appears that only one type of provision shows a significant difference for anti-social / worried behaviour. Children who attended local authority day care show higher levels in this area in comparison with the home group (note that a high score on 'Anti-social / Worried' relates to worse in anti-social / worried behaviour). Table 5.4 reports the types of pre-school provision showing a positive, statistically significant (at the 0.05 level) impact on social behavioural development.

Table 5.4: Multilevel results showing the effect of no pre-school provision compared to different types of pre-school provision on social behavioural development at primary school entry

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried
Nursery Classes	**positive**	**positive**	**positive**	
Playgroups	**positive**		**positive**	
Private Day Nurseries	**positive**		**positive**	
LA Day Care	**positive**		**positive**	**positive(worse)**
Nursery Schools	**positive**	**positive**	**positive**	
Integrated Centres	**positive**	**positive**	**positive**	

Statistically significant at 0.05 level

Additionally, the impact of pre-school provision can be explored by examining the 'duration' of pre-school (measured from date of entry to the target pre-school centre) using the following categories:

- no pre-school centre experience i.e. home children (n=314)
- up to 1 years pre-school experience (n=556)
- 1-2 years pre-school experience (n=1095)
- 2-3 years pre-school experience (n=774)
- more than 3 years pre-school experience (n=290).

Table 5.5 shows the results of the contextualised analysis of all EPPE children (home and those with pre-school experience) taking into account the above variables measuring the varying categories of 'duration' of pre-school in addition to child, parent and home environment factors discussed in Section 2. In general, the results show that children who have spent more time in pre-school have significantly better social behavioural development in these areas. The exception is for the 'Anti-social / Worried' outcome where children who attended for over three

years show significantly higher anti-social / worried behaviour. Chart 5.1 displays the effect sizes for the varying degrees of duration of pre-school centre experience, illustrating that the strongest effect is for the 'Peer Sociability' outcome. However, it is important to note that not all effects are statistically significant. Details of the statistical significance are shown in Table 5.5.

Table 5.5 Multilevel results showing the impact of the net effect of varying categories of 'duration' of pre-school centre experience on social behavioural development at primary school entry after controlling for child, parent and home learning environment characteristics

Compared to no pre-school centre experience i.e. home children	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-social / Worried
< 1 yr pre-school	0.270* (0.075)	0.170* (0.063)	0.357* (0.065)	-0.031 (0.062)
1-2 yrs pre-school	0.193* (0.070)	0.105 (0.059)	0.364* (0.061)	0.079 (0.058)
2-3 yrs pre-school	0.212* (0.073)	0.114 (0.061)	0.372* (0.064)	0.099 (0.060)
> 3 yrs pre-school	0.229* (0.084)	0.071 (0.071)	0.400* (0.072)	0.148* (0.068)

* Statistically significant at 0.05 level

In summary, although as a group home children differ from the EPPE pre-school sample in terms of their background characteristics (being generally more disadvantaged), these differences do not fully account for differences in their social behavioural development. In other words, after controlling for the impact of child, parent and home learning environments influences, the gap in social behavioural development between home children and those who have had pre-school experience is not merely attributable to differences in the background characteristics of these two groups. In particular for the three outcomes 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability', pre-school experience is shown to confer a significant advantage with attendance at any pre-school provision showing a positive impact in terms of better child social behavioural development at start of primary school. In addition, duration of pre-school centre experience is significant showing that children who have spent more time in pre-school have higher social behavioural development for 'Independence & Concentration' and 'Peer Sociability'. The findings for the outcome 'Anti-social / Worried' suggest that generally there is no significant difference between home children and children who have experienced pre-school. The exception is for children who attend local authority day care (see Table 5.4) and children who have experienced more than 3 years pre-school[59] (see Table 5.5); children in these groups tend to exhibit more anti-social / worried behaviour.

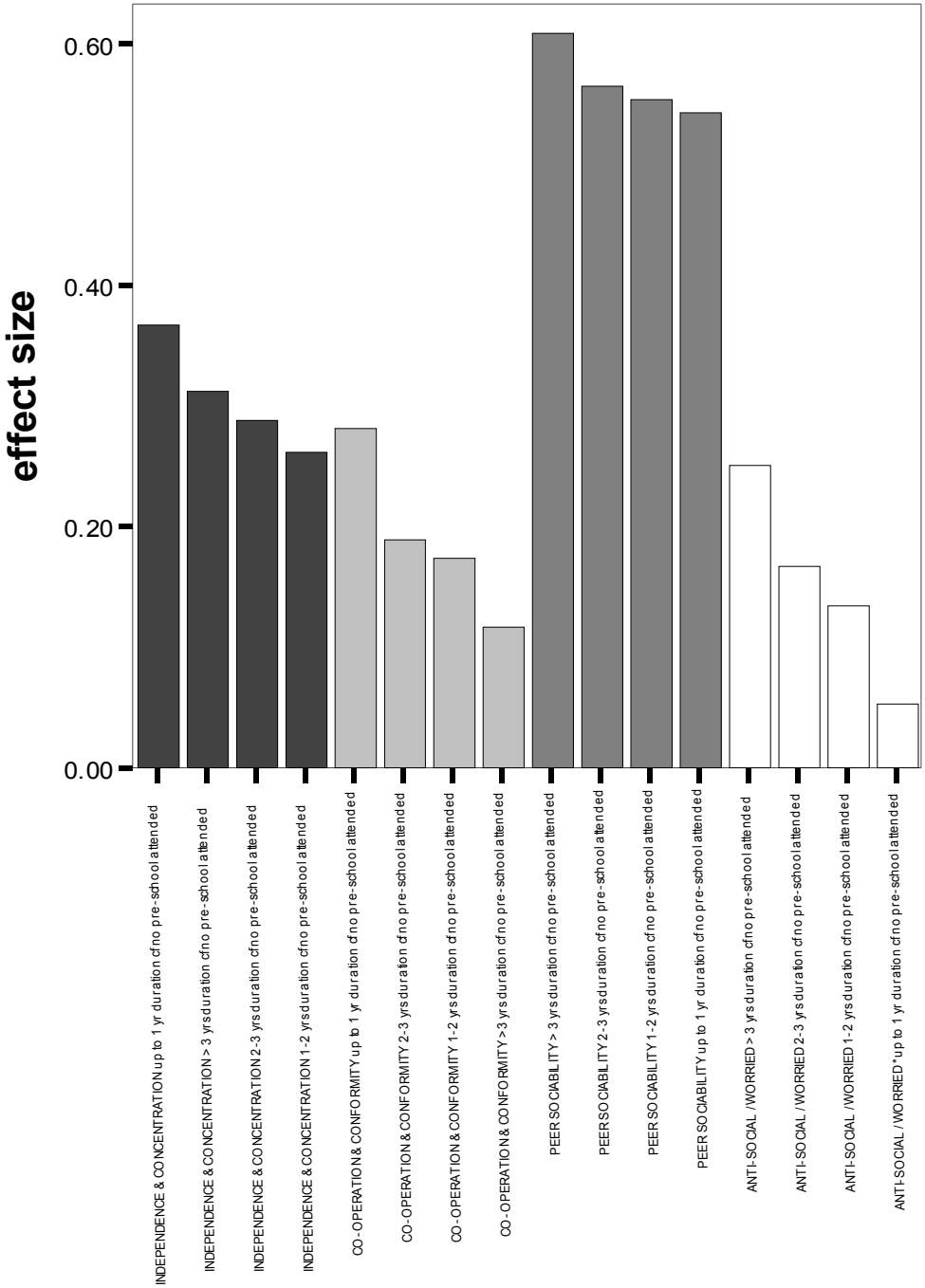
As children continue through the educational system, further analyses will be conducted to explore the social behaviour and cognitive attainments of these children during Key Stage 1 to establish whether the 'gap' in both cognitive and social behavioural development between home children and those who experienced pre-school reduces or remains constant as they progress through school.

[59] Note that the group of children with more than 3 years pre-school centre experience also has high levels of group care (including target and other group care) prior to entry to the study. High levels of group care show a statistically significant impact on increased anti-social / worried behaviour (see Section 2).

Chart 5.1 Effect sizes for amount of pre-school experience compared with none (the home group) for social behavioural development at primary school entry

* denotes a negative effect.

Note that the effect sizes do not take into account the size of groups. It is also important to note that not all effects are statistically significant (details of the statistical significance are shown in Table 5.5).



Section 6: Summary of Main Findings from Analyses of Social Behavioural Outcomes at Entry to Primary School

This report describes the results of analyses of different aspects of young children's social behavioural development over the pre-school period. Change in social behaviour was measured from entry to the EPPE study (age 3 years plus) until the start of primary school (rising 5 years). Four measures of children's social behaviour were constructed from individual rating scales completed by their class teachers at entry to primary school, namely 'Independence & Concentration', 'Co-operation & Conformity', 'Peer Sociability' and 'Anti-social / Worried'. A range of statistical methods has been used to analyse data for around 2800 children, representing around 95 per cent of the total child sample at entry to the EPPE pre-school study. Multilevel modelling has been used to identify and explore pre-school centre effects on social behavioural outcomes. Contextualised analyses investigate a range of measures which are predictors of young children's social behaviour measured at a given time point, entry to primary school. In addition, the extent of developmental gains or change in social behaviour over the pre-school period is also analysed using longitudinal value-added models.

The analyses have explored the extent of variation in children's scores on the four social behaviour measures at primary school entry for different sub-groups of children. The analyses reported in Section 2 identify a number of statistically significant predictors of social behaviour. Taken together a number of child, family and home environment characteristics of children are found to account for a significant proportion of the total variation in different aspects of social behaviour (ranging from 7 to 16 per cent). Although statistically significant, such characteristics account for a much lower proportion of the variance in children's scores for social behaviour than is the case in equivalent analyses of their cognitive attainments at entry to primary school (see EPPE Technical Paper 8a for details of results for cognitive outcomes). This finding indicates that cognitive attainment is more susceptible to child, family and home environment influences than social behaviour for this pre-school age group.

When developmental gains or changes in young children's social behaviour are measured longitudinally over time for the pre-school period the impact of child, family and home environment characteristics is found to be smaller than when variations in social behaviour are explored cross-sectionally, at any one time point. It must be remembered that such characteristics showed relationships with prior social behaviour (measured at entry to the target pre-school at age 3 years plus). Prior social behaviour is used as the baseline for measuring later change/developmental gains in social behaviour up to primary school entry. Nonetheless, a number of characteristics continue to show a small, but statistically significant influence on social behavioural change over the pre-school period. Interestingly, such characteristics show a stronger association with teacher's ratings of children's behaviour for 'Independence & Concentration' and 'Co-operation & Conformity' than for 'Peer Sociability' or 'Anti-social/Worried' behaviour.

The analyses have considered both the child's level of development at entry to primary school and the developmental gain (progress) over the pre-school period having allowed for previous attainment measured at entry to the study. The effects of child, family, home environment and child care variables on children's social behaviour measured at start of primary school, and on developmental gains or change over the pre-school period are summarised below. In all cases the relationships are statistically significant, when the influence of other measures is controlled. The findings identify general tendencies for different groups of children, but do not apply to every individual in a specific group. For example, with reference to gender, girls were rated more favourably than boys and showed greater developmental gains over the pre-school period for 'Independence and Concentration', 'Co-operation & Conformity'. They were also perceived to show less 'Antisocial / Worried' behaviour at the start of primary school. Similar results were reported by Maccoby (1998).

In relation to SES, children with a parent in a professional occupation had the highest teacher ratings, and made the greatest developmental gains over the pre-school period, for 'Peer Sociability'. In contrast, children with an unemployed father were rated less favourably, and made fewer developmental gains over their time in pre-school for 'Peer Sociability. Children living in families with better socio-economic circumstances have been found to show developmental advantages on social competence in several studies, e.g. in Australian studies summarised by Amato (1987). The EPPE findings on family effects on social behavioural development fit with this pattern of results.

Referring to the home learning environment, various parental activities in the home that offer learning opportunities to the child (library visits, reading, painting/drawing, teaching alphabet, letters/numbers, songs/poems/rhymes) showed significant relationships with ratings of children's social behaviour at entry to primary school and with developmental gains over the pre-school period. A more positive home learning environment was associated with more favourable outcomes, and with greater developmental gains during pre-school, for all four social behavioural outcomes. The finding that aspects of home experience are important for social development is not new (see, for example, Eisenberg et al., 1999; Howes et al., 1994). However the detailing of specific everyday activities that may be particularly beneficial is a unique contribution of this study.

Results from the contextualised analysis reported in section 2 show that children who spent longer in pre-school (measured from start date at target pre-school centre to date started primary school) were rated by class teachers as showing more 'Anti-social / Worried' behaviour at primary school entry. In other words, a longer time (in years and months) spent in pre-school, is associated with slightly more 'Anti-social / Worried' behaviour, although it should be noted that only a small proportion of children in total show difficulties for this behavioural outcome. This effect is primarily related to LA day care nurseries and private day nurseries where a substantial proportion start under 2 years of age and some under one year. However, when a measure of pre-school centre quality was added to the model (i.e. ECERS-R), the impact of duration was reduced (although still remained significant). This suggests that higher quality in pre-school centres tends to reduce, but not eliminate, the negative effect of a longer time spent in pre-school centres on 'Anti-social / Worried' behaviour. It is important to note the significant positive link of duration of pre-school with young children's cognitive progress over the pre-school period (see EPPE Technical Paper 8a).

There are results from other studies that show similar patterns to the effects of group care found in the EPPE study. In particular, the National Institute of Child Health and Development (NICHD) longitudinal study of 1300 children in the USA found that the more time children spent in non-maternal care arrangements across the first 4.5 years of life, the more externalising problems and conflict with adults they manifested at 54 months, as reported by mothers, caregivers, and/or teachers. These effects remained even when quality, type, and instability of child care were controlled, and when maternal sensitivity and other family background factors were taken into account. The magnitude of quantity-of-care effects were modest and smaller than those of maternal sensitivity and indicators of family socio-economic status, though typically greater than those of other features of child care, maternal depression, and infant temperament (NICHD, 2002; NICHD, in press). The finding of increased anti-social behaviour being associated with an early start in day care has also been found by a number of other studies e.g. Baydar & Brooks-Gunn (1991), Hofferth (1999). In two of these studies, Haskins (1985) and Egeland & Heister (1995), the increased antisocial behaviour at 3-5 years of age, which was associated with early day care, dissipated when the children were 8 years and older. NICHD also find a positive impact of childcare on cognitive outcomes.

Variations in centre effectiveness

These results point to the need to make appropriate control for differences in the characteristics of young children who attend different pre-school settings, both at the level of individual centres and by type of provision, if valid comparisons of the impact of pre-school are to be made.

The multilevel analyses of children's social behavioural gains over the pre-school period show that significant centre level variance in children's social behavioural outcomes remains, even when account is taken of prior social behaviour and other intake differences (in terms of child, family and home environment characteristics). It is relevant to note that pre-school centre differences are smaller for the 'Anti-social / Worried' dimension than for the other three social behavioural outcomes, suggesting that variations in the characteristics of pre-schools may have less influence on this behavioural dimension than on other areas.

Despite the relatively small number of children in the EPPE sample in some centres (mean = 20.3), a number of statistically significant outlier centres were identified. These centres were ones where children showed significantly better or, by contrast, significantly poorer developmental gains[60] in particular dimensions of social behaviour than predicted, given their prior social behaviour at entry to pre-school and background characteristics. In all, just over a third (37%) of the 141 centres were identified as performing broadly as expected (compared with other pre-school settings in the sample) across all areas of social behavioural development assessed, when intake differences are controlled. By contrast, 18 centres (12.8%) were found to be statistical outliers (performing significantly above or significantly below expectation for one or more dimension of social behaviour). This is likely to be a conservative estimate of the extent of differences in effectiveness between individual centres, since with small numbers of children in the sample at the centre level an effect has to be larger to reach statistical significance.

It should be noted that variations in centre effects on young children's cognitive development were generally stronger than those found for social behavioural development (just over one in five centres was identified as an outlier for progress in one or more cognitive outcome as described in EPPE Technical Paper 8a). It appears therefore that, in general, pre-schools vary more in their impact on cognitive than on social behavioural outcomes.

Typically centres vary in their effects on different social behavioural outcomes. No centre performed significantly above or significantly below expectation for all four developmental outcomes assessed. Pre-school centre effects in different aspects of social behaviour are moderately correlated. This suggests that pre-school settings (pre-school centres), which are more effective in promoting particular aspects of social behaviour, will also tend to promote better child outcomes in other dimensions measured in the EPPE study. The individual centre profiles for the four social behavioural dimensions show that a number of centres could be distinguished with broadly positive effects whereas others were generally poorer for developmental gains.

Over a fifth of children (23%) had left their target centre[61] before starting primary school and moved to other provision. This varied significantly for different types of provision, being very uncommon for those in nursery classes or nursery schools. By contrast the majority of playgroup children (52%) had moved centre, often to a different form of provision. The much higher incidence of movement from playgroups has implications for the analysis of the effects of this type of provision, and the effects of individual centres. The high degree of mobility means that it is very difficult to measure the impact of playgroups on children's social behaviour development (either at the level of individual centres or as a type of provision) accurately. Nonetheless, the results indicate that child mobility at pre-school was not found to be significant in predicting differences in young children's social behavioural development.

The impact of pre-school – type, quantity and quality

Elsewhere it has been shown that attending a pre-school centre has an important influence on young children's cognitive progress (see EPPE Technical Paper 8a). The findings for social behavioural development also support this interpretation. Children without pre-school experience (the 'home' group) may be at a disadvantage in terms of 'Peer Sociability', 'Independence & Concentration' and 'Co-operation & Conformity' when they start primary school, as these behaviours are likely to be important for successful adjustment to primary school. Indeed for 'Peer Sociability', an earlier start at pre-school is a particular advantage. In addition,

[60] i.e. positive or negative outliers

[61] i.e. the pre-school centre in which they were recruited to the EPPE study

'Independence & Concentration' is modestly associated with cognitive attainment at entry to school and hence would be expected to promote classroom learning. Comparable findings about the positive impact of pre-school attendance on social behavioural outcomes have been identified in the parallel pre-school study (EPNNI) in Northern Ireland (see EPPNI Technical Papers 4 and 5).

In one area, however, there are differences. An extended time in pre-school (associated with a younger starting age - e.g. at age 2 years or below - at entry to the target pre-school often associated with Local Authority and Private Day nurseries) is linked with poorer outcomes for 'Anti-social / Worried' behaviour both at age 3 years plus (the start of the pre-school study) and at rising five years (start of primary school). For cognitive outcomes, however, an earlier start is associated with better progress and higher attainment at entry to primary school. This pattern of poorer antisocial behaviour, yet higher cognitive attainment, associated with an early start in group care, has also been found in the major American study of child care (NICHD, 2002).

Quality of pre-school provision (as measured by the total observational schedule ECERS-R) was positively related to better child outcomes in 'Co-operation & Conformity'. The results of analyses of the ECERS-R subscales suggest that two specific aspects of quality measured by this instrument (language and reasoning and social interaction) are associated with better social behavioural outcomes at primary school entry. In addition, other observational measures of adult child interactions (the Arnett Caregiver Interaction Scale), are related to three of the social behavioural outcomes. These findings indicate that high quality of pre-school is associated with more positive impacts on social behavioural developmental gains. These results are supported by other studies (e.g. NICHD, 2002) finding positive effects for quality of child care upon social development. Howes & Olencik (1986) found that higher quality child care was associated with increased co-operation for children and both Lamb et al. (1992) and Vandell et al. (1988) report better social adjustment for children was associated with higher quality child care.

Type of provision effects were identified for several social behavioural outcomes, again in line with findings for cognitive outcomes. The results suggest differences on the factor 'Co-operation & Conformity' where children in nursery classes and integrated settings (i.e. combined centres) made greater developmental gains during the pre-school period. The difference is statistically significant when nursery classes and integrated centres are compared with playgroups, private day nurseries and local authority day nurseries. It appears that nursery classes also show a particularly positive impact for Peer Sociability compared with playgroups and local authority day nurseries. Overall effective provision was found in all types of setting; however the proportion of effective settings was higher in the maintained (LEA) sector.

There are indications that poorer outcomes in terms of the factor 'Anti-social / Worried' behaviour are associated with private and local authority day nurseries, and this appears to be linked with the higher levels of group care experienced by these children before entry to the study related to an earlier start at pre-school. These differences are statistically significant in comparison with nursery classes and nursery schools. There are no significant differences in effectiveness between nursery schools and nursery classes or integrated centres for any of the social behavioural outcomes.

Overall, the results show that there was significant variation between individual centres in effectiveness on social behavioural gains within each type of provision; thus it can be concluded that differences between individual pre-school centres are likely to be more important than differences between types of provision.

Significant variations in centre managers' qualification levels have been shown to exist amongst the EPPE sample of centres, and the proportion of staff hours at different qualification levels also varies. Centre managers' qualification levels are significantly positively associated with the observed quality profiles of centres (EPPE Technical Paper 5), with centres where managers reported they had level 5 qualifications showing higher observed measure of quality. Findings from the Researching Effective Pedagogy in Early Years (REPEY) Project that drew on the

EPPE sample indicate that the observed behaviour of other staff is positively influenced by the presence of a member of staff with level 5 qualifications (see Siraj-Blatchford et al, 2002)

The multilevel analyses of changes in young children's social behavioural development showed significant positive relationships between proportion of staff time at level 5 (higher qualification) and two outcomes, 'Co-operation & Conformity' and reductions in 'Anti-social / Worried' behaviour. Controlling for the impact of child, parent and home environment influences, including prior social behaviour, the results also suggest that a higher proportion of staff hours at a relatively low level of qualification (level 2) is associated with poorer child outcomes at start of primary school for 'Peer Sociability'. Improving staff qualifications and training levels may be effective strategies to help improve the quality of pre-school provision.

Children who do not attend a pre-school centre

Data were collected for a group of home children with none or minimal pre-school experience. Comparison of the home sample with the main EPPE sample of children who attended a pre-school showed that both the characteristics and the social behavioural development of home children vary significantly. It is not possible to conclude with certainty that differences in social behaviour found for the home group are directly a consequence of their lack of pre-school experience, due to the home children's very different characteristics. A controlled experiment (which would not be feasible on either ethical or practical grounds) would be needed to draw firm conclusions. Nonetheless, contextualised multilevel analyses of social behavioural assessments by class teachers at entry to primary school explored the impact of child, family and home environment factors and illustrate that, even when these influences are controlled, home children's social behaviour is rated as poorer for three areas 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' than those of children in the EPPE sample who attended any of the six types of pre-school provision studied. This result, combined with the findings reported elsewhere on the advantages of an early start date and on 'duration' of pre-school for cognitive progress (see EPPE Technical Paper 8a), suggest that pre-schooling has a positive impact on young children's social behavioural development in all areas except the 'Anti-social / Worried' dimension. The implication of these results is that children without pre-school experience may be at a disadvantage in terms of 'Peer Sociability', 'Independence and Concentration' and 'Co-operation and Conformity' as well as cognitive attainment when they start primary school. Therefore, the positive impact of duration should not be ignored for cognitive outcomes and important aspects of social behaviour.

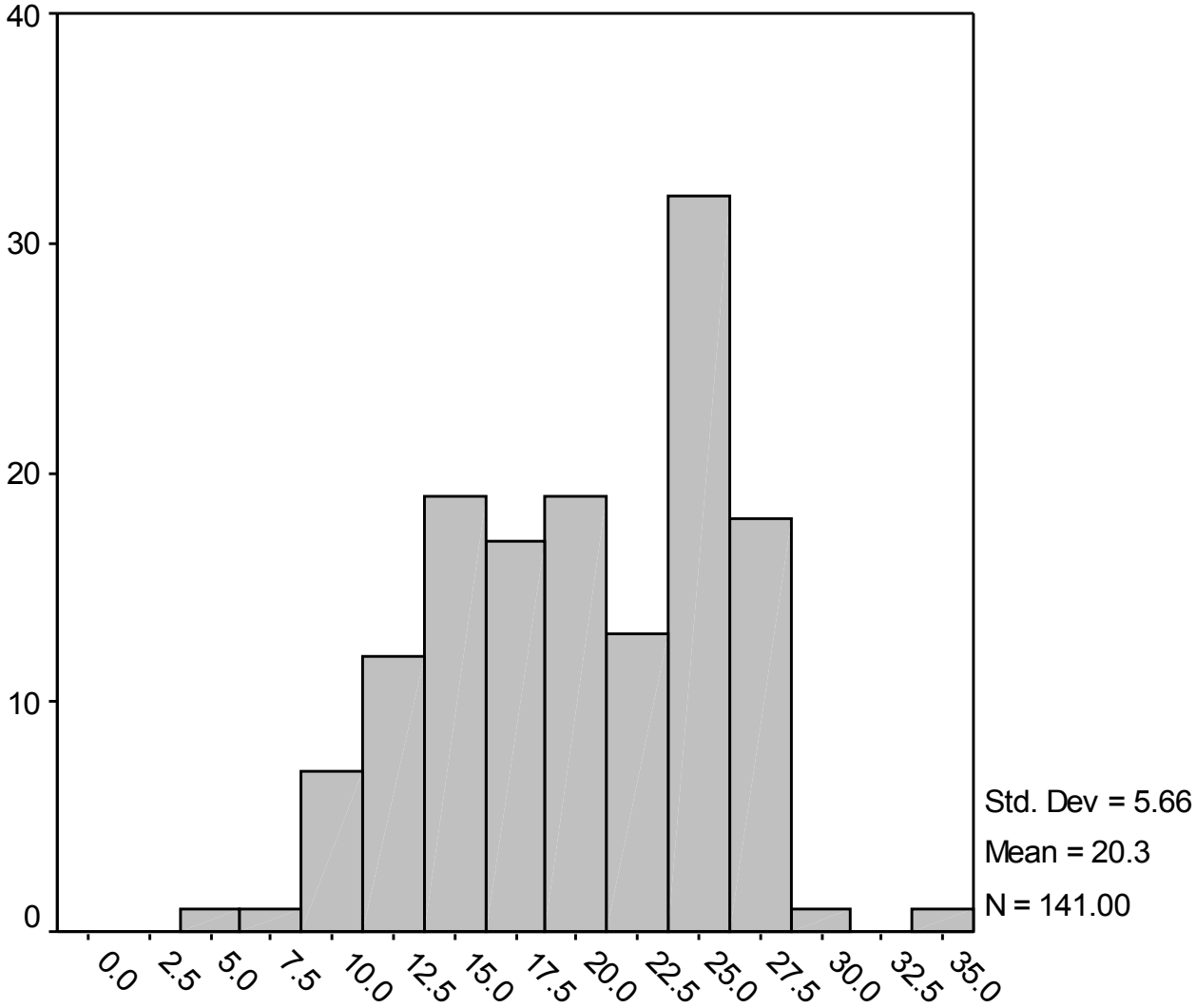
Future analyses will explore the progress and development of the main EPPE sample and the home group over Key Stage 1. Such analyses will help to establish whether the positive impact of pre-school on young children's cognitive and social behavioural development remains significant as children move through their first years at primary school.

The analyses in this paper have focussed on young children's social behavioural development at two time points and have also measured developmental gains in social behaviour over the pre-school period from start at target pre-school (age 3 years plus) until start of primary school (age rising 5 years). A separate paper presents the findings for cognitive attainment and progress for the same group of children up to primary school entry (EPPE Technical Paper 8a). There are important links between social behavioural development and cognitive attainment as a number of studies of school age children have demonstrated. Brief details of these associations have been reported for the EPPE sample in this paper. There are weak but significant associations between young children's cognitive scores and various dimensions of social behaviour (see Table 1.10 in Section 1). The multilevel analyses indicate that prior cognitive development is a statistically significant predictor of young children's subsequent social behaviour, although it makes little difference to estimates of the impact of different pre-school centres on social behavioural outcomes at the start of primary school. A separate study focussing on the special educational needs (SEN) of children in the sample has investigated different classifications of children who may be viewed as at risk. The results of the Early Years Transition and Special Educational Needs (EYTSEN) project reveal that only a small proportion of pre-school children were classified as 'at risk' for both cognitive and social behavioural measures at the start of primary

school. These children, however, may be especially vulnerable at this transition phase (see EYTSEN Technical paper 1 for further details). Home children were significantly more likely to be identified as at risk of SEN for both cognitive outcomes and several measures of social behaviour (EYTSEN Technical Paper 2). It will be important to explore whether such the weak but significant associations between young children's social behaviour and cognitive attainments during pre-school remain stable or increase in strength as children grow older and progress through primary school. Further analyses will explore the continuing impact of pre-school over Key Stage 1, particularly the impact of type, quality and effectiveness of pre-school settings attended and, for the 'home' group, the extent to which lack of pre-school attendance continues to influence subsequent outcomes.

Appendix A

Chart A.1 Number of EPPE children in pre-school centres



Assessments at entry to primary school / The Child Social Behavioural Questionnaire (CSBQ)

When the children started in the primary school, data on the children were collected in the first term. Teachers with at least 1 month's experience of working with a particular child would rate that child on the Child Social Behaviour Questionnaire (CSBQ), which is a revised and expanded version of the ASBI (see Appendix C) devised by the EPPE team. The items were derived by adding 10 items taken from the Strengths & Difficulties Questionnaire (Goodman, 1997) to the original ASBI and 5 from a rating scale developed by Peter Blatchford at The Institute of Education, University of London. The extra 15 items were selected to sample behaviours emerging in 5-year-old children, which were not included in the original ASBI, including independence, attention related behaviours, empathy and adherence to classroom routines. This questionnaire consists of 45 items rated on a 5-point scale:

1=rarely/never 2= not often 3=sometimes 4=usually 5=almost always

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

Factor 1: Independence & Concentration (Cronbach alpha = 0.92)

2. Thinks things out before acting
14. Easily distracted, concentration wanders (note that this item is reversed in the analysis)
17. Can move to a new activity on completion of a task
19. Can independently select and return equipment as appropriate
23. Constantly fidgeting or squirming (note that this item is reversed in the analysis)
33. Perseveres in the face of difficult or challenging tasks
36. Likes to work things out for self; seeks help from teacher/other children only as a last resort; can work independently
42. Restless, overactive, cannot stay still for long (note that this item is reversed in the analysis)
45. Sees tasks through to the end, good attention span

Factor 2: Co-operation & Conformity (Cronbach alpha = 0.94)

4. Tries to be fair in games
5. Is obedient and compliant
7. Follows rules in games
10. Can behave appropriately during less structured sessions, with no more than one reminder
11. Waits his/her turn in games or other activities
13. Co-operates with your requests
21. Follows school rules
22. Says "please" and "thank you" when reminded
25. Is calm and easy-going
26. Can work easily in a small peer group
28. Shares toys or possessions
35. Accepts changes without fighting against them or becoming upset

Factor 3: Peer Sociability (Cronbach alpha = 0.87)

15. Can easily get other children to pay attention to him/her
18. Will join a group of children playing
20. In social activities, tends to just watch other (note that this item is reversed in the analysis)
24. Asks or wants to go play with other children
27. Plays games and talks with other children
30. Is confident with other people
31. Will invite others to join in a game

Factor 4: Anti-social / Worried (Cronbach alpha = 0.84)
6. When you give him/her an idea for playing, he/she frowns, shrugs shoulders, pouts or stamps foot
8. Gets upset when you don't pay enough attention
29. Teases other children, calls them names
32. Prevents other children from carrying out routines
37. Bullies other children
40. Is worried about not getting enough (where enough might include attention, access to toys, food/drink etc.)
41. Is bossy, needs to have his/her way

Factor 5: Empathy & Pro-social (Cronbach alpha = 0.89)
1. Understands others' feelings, like when they are happy, sad or mad
3. Is helpful to other children
9. Is sympathetic toward other children's distress, tries to comfort others when they are upset
16. Says nice or friendly things to others, or is friendly towards others
39. Apologises spontaneously after a misdemeanour
44. Offers to help other children who are having difficulty with a task in the classroom

Factor 6: Openness (Cronbach alpha = 0.78)
12. Is open and direct about what he/she wants
34. Tends to be proud of things she/he does
38. Is interested in many and different things
43. Enjoys talking with you

Chart A.2 Distribution of primary school entry social behavioural factor 1: Independence & Concentration

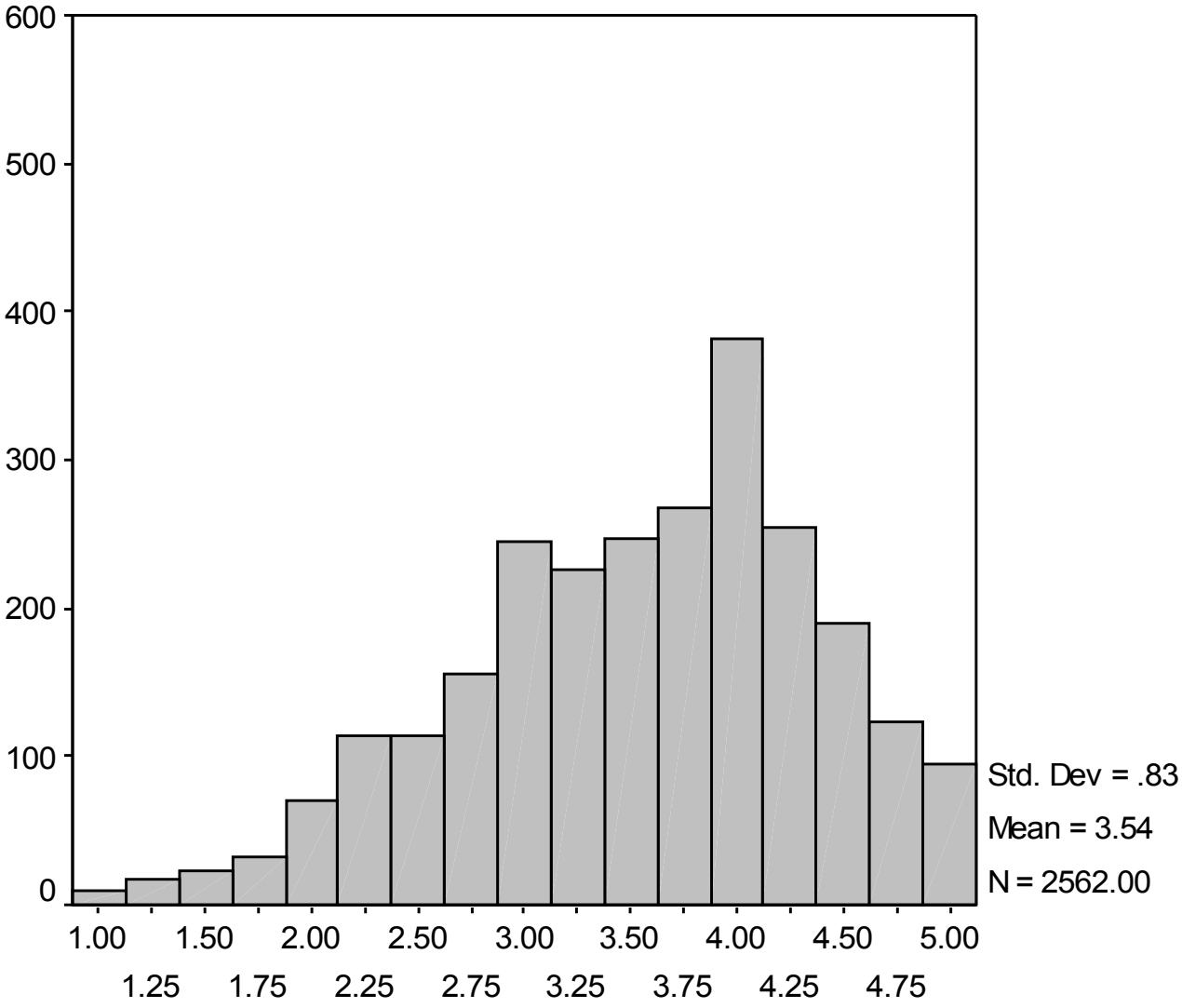


Chart A.3 Distribution of primary school entry social behavioural factor 2: Co-operation & Conformity

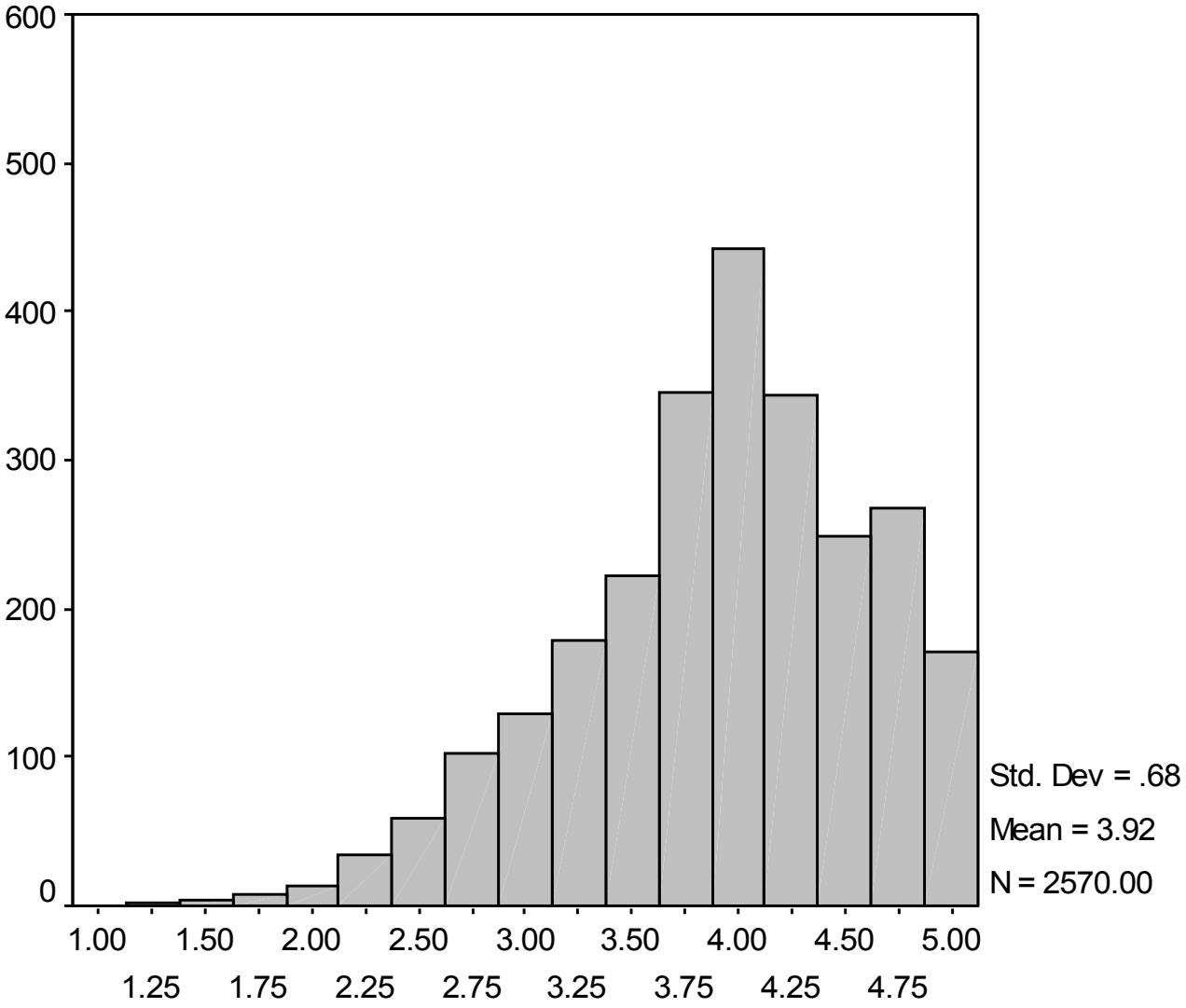


Chart A.4 Distribution of primary school entry social behavioural factor 3: Peer Sociability

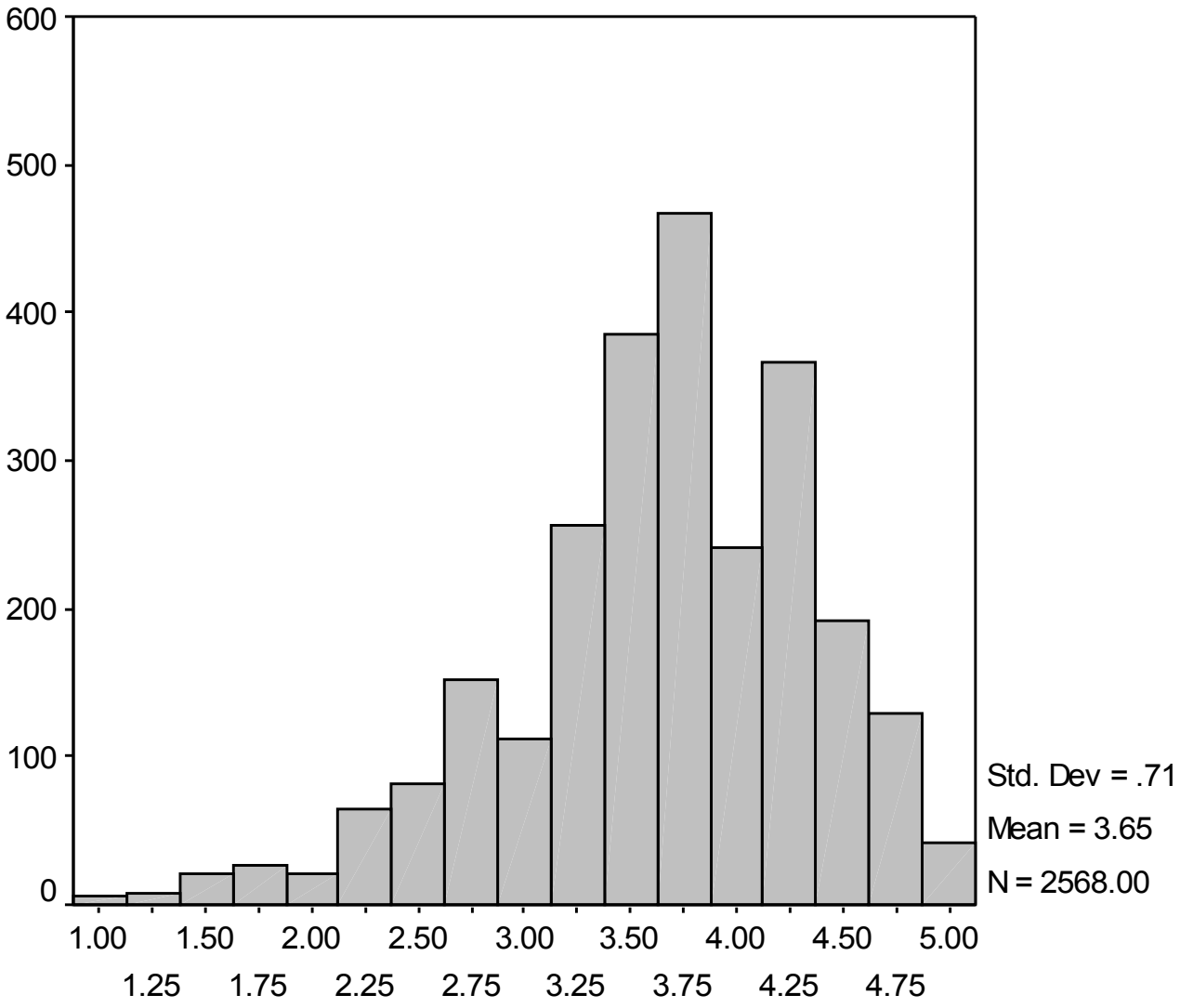
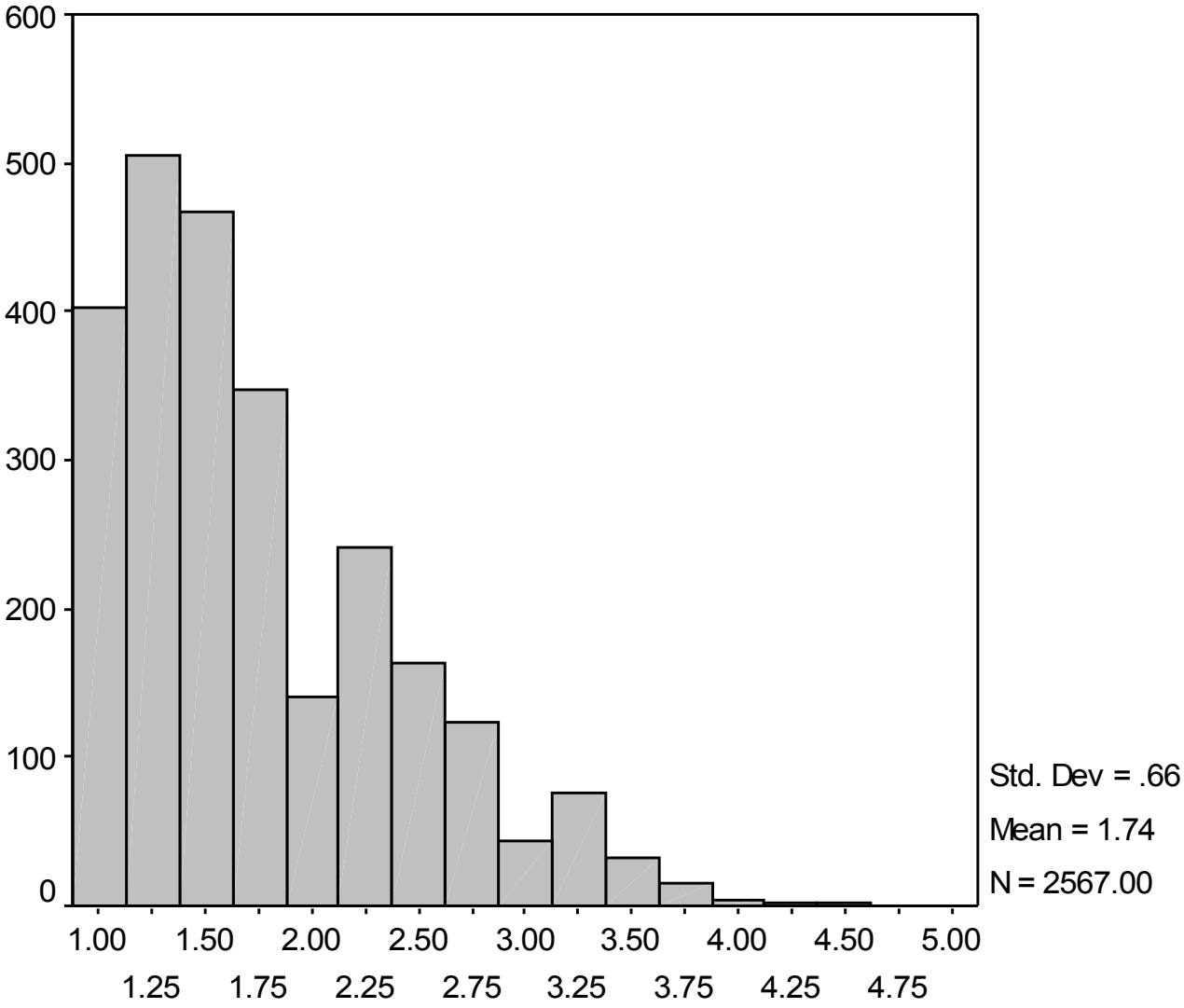


Chart A.5 Distribution of primary school entry social behavioural factor 4: Anti-social / Worried



Note that a high score on Factor 4 ‘Anti-Social / Worried’ relates to an increase in anti-social/worried behaviour

Chart A.6 Independence & Concentration versus Co-operation & Conformity

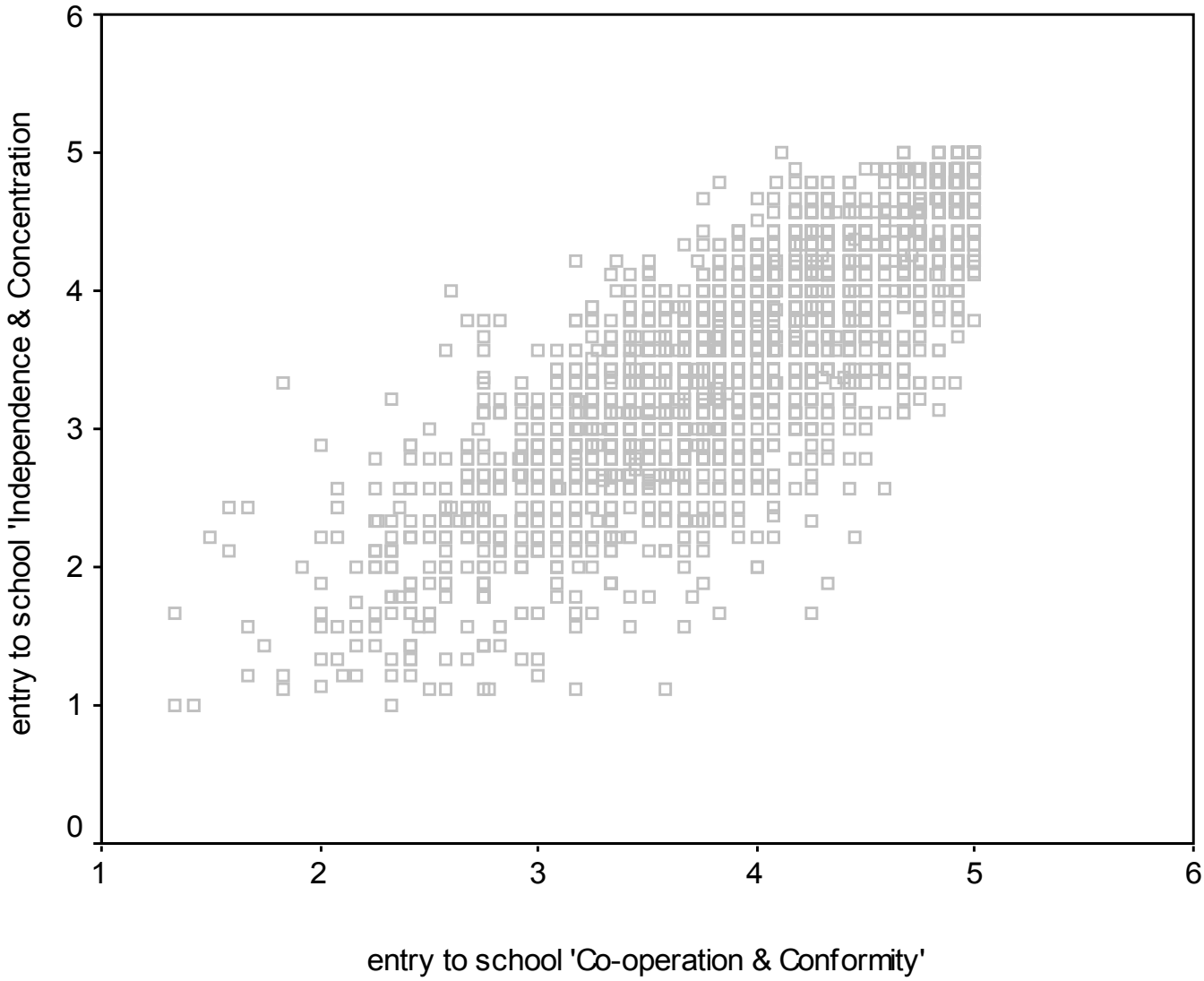
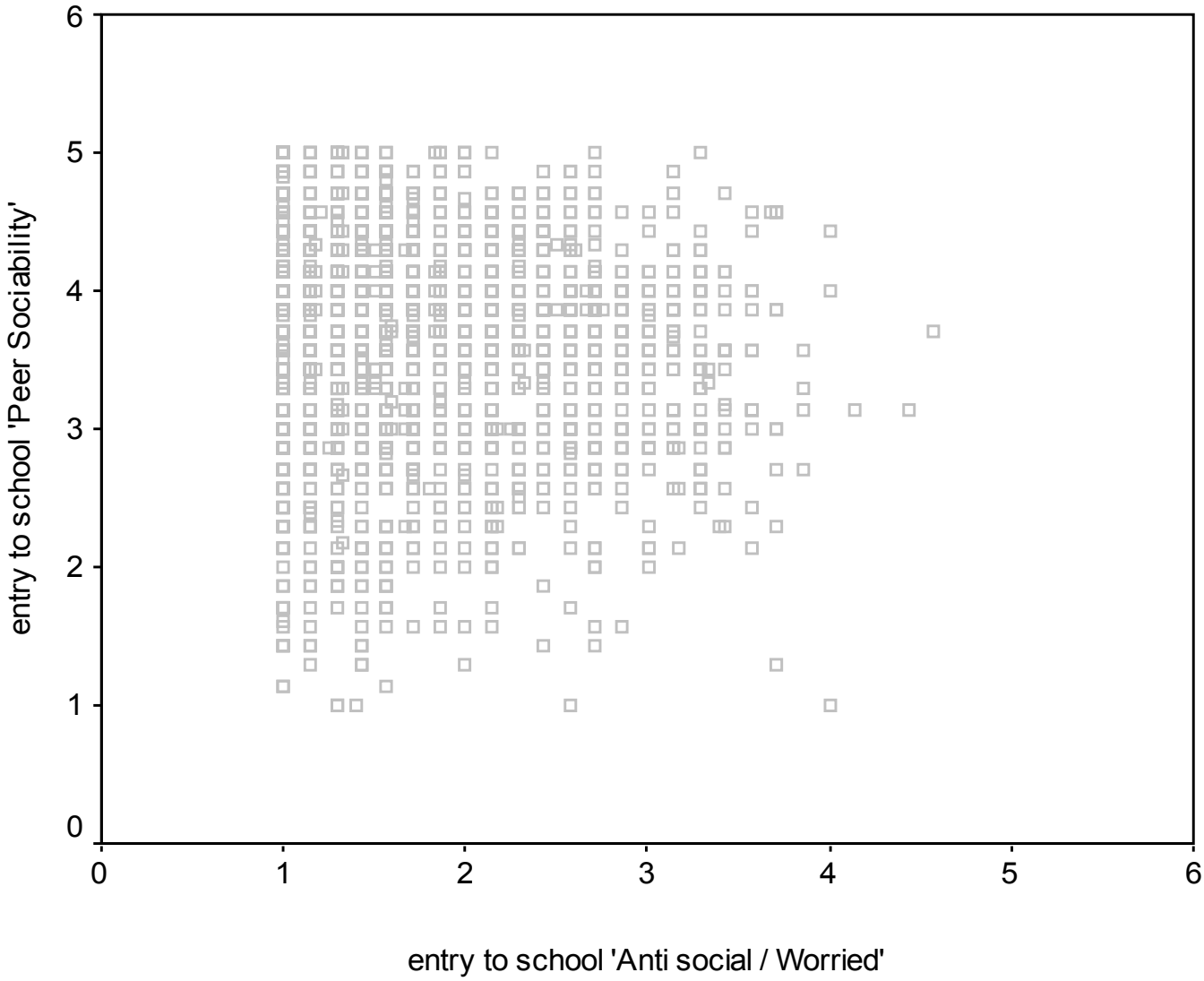


Chart A.7 Peer Sociability versus Anti-social / Worried



Appendix B

Table B.1 'Independence & Concentration' Contextualised Model

(Impact of Child, Parent, Home Environment, Developmental and other Measures on 'Independence & Concentration' Development at Entry to Primary School)

		Estimate	SE
Gender (girls compared to boys)		0.296*	0.033
Age at entry to primary school assessment (centred around mean)		0.022*	0.004
No. of siblings (compared to none)	1-2	0.124*	0.040
	3+	0.121*	0.057
Birthweight (compared to average / above average)	very low	-0.362*	0.129
	low	-0.211*	0.063
English as an additional language (compared to English as mother tongue)		-0.141*	0.068
Free school meal eligibility (compared to not eligible)		-0.120*	0.044
Mother's highest level of qualification (compared to none)	vocational	0.091	0.058
	academic age 16	0.113*	0.049
	academic age 18	-0.029	0.069
	degree	0.256*	0.070
	higher	0.117	0.102
	other	0.419*	0.141
Father's highest level of qualification (compared to none)	vocational	-0.076	0.055
	academic age 16	0.034	0.045
	academic age 18	-0.012	0.065
	degree	0.041	0.062
	higher	0.241*	0.090
	other	-0.284	0.157
Frequency of library visits (compared to never)	special occasions	0.071	0.056
	monthly	0.157*	0.047
	fortnightly	0.119*	0.052
	weekly	0.099	0.055
Frequency child paints/draws at home (compared to never)	1-4 times a week	0.191*	0.087
	5-7 times a week	0.244*	0.088
Frequency parent teaches letters / numbers (compared to daily)	Never	-0.141*	0.055
	1-2 times a week	-0.084	0.046
	3-4 times a week	-0.090#	0.047
	5-6 times a week	0.030	0.060
Frequency parent teaches abc (compared to never)	1-2 times a week	0.113*	0.052
	3 times a week	0.134*	0.061
	4-7 times a week	0.141*	0.062
Frequency parent teaches songs, poems and nursery rhymes (compared to never)	1-2 times a week	0.083	0.066
	3-5 times a week	0.149*	0.063
	6 times a week	0.136*	0.067
	7+ times a week	0.166*	0.067
Frequency child plays with friend at home (compared to never)			
	< once a week	0.043	0.095
	1-2 times a week	0.080*	0.038
	3-4 times a week	0.026	0.052
	5-7 times a week	0.005	0.053
Developmental problems (compared to none)		-0.206*	0.051
Sought help for any behavioural / developmental problems (compared to no help)		-0.085*	0.035
Change of pre-school (compared to no change)		-0.023	0.041

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

Table B.2 'Co-operation & Conformity' Contextualised Model
(Impact of Child, Parent, Home Environment, Developmental and other Measures on 'Co-operation & Conformity' Development at Entry to Primary School)

		Estimate	SE
Gender (girls compared to boys)		0.240*	0.026
Age at entry to primary school assessment (centred around mean)		0.009*	0.004
Ethnicity (compared to white UK)	white european	0.005	0.077
	black caribbean	0.021	0.075
	black african	0.206*	0.098
	black other	-0.002	0.167
	indian	0.110	0.112
	pakistani	0.080	0.110
	bangladeshi	-0.014	0.178
	other	-0.046	0.103
	mixed	0.011	0.055
No. of siblings (compared to none)	1-2	0.112*	0.033
	3+	0.099*	0.047
English as an additional language (compared to English as mother tongue)		-0.154*	0.076
Free school meal eligibility (compared to not eligible)		-0.135*	0.036
Mother's highest level of qualification (compared to none)	vocational	0.006	0.048
	academic age 16	0.078#	0.041
	academic age 18	0.007	0.058
	degree	0.222*	0.059
	higher	0.052	0.085
	other	0.279*	0.115
Father's highest level of qualification (compared to none)	vocational	-0.012	0.046
	academic age 16	0.044	0.038
	academic age 18	0.031	0.054
	degree	0.021	0.052
	higher	0.152*	0.075
	other	-0.202	0.127
Frequency parent reads to child (compared to daily)	rarely	-0.139	0.081
	weekly	-0.113	0.089
	several times a week	-0.075*	0.034
	twice daily	-0.029	0.044
Frequency of library visits (compared to never)	special occasions	0.034	0.046
	monthly	0.081*	0.039
	fortnightly	0.046	0.044
	weekly	0.052	0.046
Frequency parent teaches abc (compared to never)	1-2 times a week	0.066	0.043
	3 times a week	0.077	0.051
	4-7 times a week	0.104*	0.051
Frequency parent teaches songs, poems and nursery rhymes (compared to never)	1-2 times a week	0.089	0.056
	3-5 times a week	0.163*	0.053
	6 times a week	0.147*	0.056
	7+ times a week	0.168*	0.056
Developmental problems (compared to none)		-0.134*	0.039
Behavioural problems (compared to none)	1 behavioural problem	-0.196*	0.045
	2 + behavioural problems	-0.029	0.090
Change of pre-school (compared to no change)		-0.006	0.034

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

Table B.3 'Peer Sociability' Contextualised Model
(Impact of Child, Parent, Home Environment, Developmental and other Measures on 'Peer Sociability' Development at Entry to Primary School)

		Estimate	SE
Age at entry to primary school assessment (centred around mean)		0.016*	0.004
Ethnicity (compared to white UK)	white european	-0.050	0.075
	black caribbean	0.010	0.080
	black african	0.121	0.102
	black other	0.132	0.172
	indian	-0.106	0.108
	pakistani	-0.244*	0.099
	bangladeshi	-0.601*	0.174
	other	-0.119	0.101
	mixed	0.015	0.058
No. of siblings (compared to none)	1-2	-0.022	0.035
	3+	-0.121*	0.050
Father's employment (compared to work full-time)	not working	-0.132*	0.049
	self employed	0.020	0.045
	other	0.010	0.087
	father absent	0.021	0.041
Family SES (compared to professional non-manual)	intermediate non-manual	-0.029	0.052
	skilled non-manual	-0.057	0.053
	skilled manual	-0.091	0.061
	semi-skilled manual	-0.235*	0.064
	unskilled manual	-0.142	0.107
	never worked	-0.195	0.108
Frequency parent teaches songs, poems and nursery rhymes (compared to never)	1-2 times a week	0.105	0.057
	3-5 times a week	0.123*	0.054
	6 times a week	0.222*	0.057
	7+ times a week	0.198*	0.057
Frequency child plays with friend at home (compared to never)			
	< once a week	0.101	0.083
	1-2 times a week	0.087*	0.033
	3-4 times a week	0.020	0.046
	5-7 times a week	0.046	0.047
Developmental problems (compared to none)		-0.206*	0.041
Behavioural problems (compared to none)	1 behavioural problem	-0.136*	0.046
	2 + behavioural problems	0.085	0.097
Change of pre-school (compared to no change)		0.041	0.037

*Statistically significant at 0.05 level

Table B.4 'Anti-social / Worried' Contextualised Model
(Impact of Child, Parent, Home Environment, Developmental and other Measures on 'Anti-social / Worried' Development at Entry to Primary School)

		Estimate	SE
Gender (girls compared to boys)		-0.059*	0.027
Age at entry to primary school assessment (centred around mean)		0.010*	0.004
Ethnicity (compared to white UK)	white european	0.013	0.071
	black caribbean	-0.030	0.073
	black african	0.130	0.096
	black other	0.086	0.160
	indian	-0.145	0.104
	pakistani	-0.210*	0.094
	bangladeshi	-0.138	0.164
	other	0.158	0.091
	mixed	0.034	0.054
No. of siblings (compared to none)	1-2	-0.140*	0.033
	3+	-0.173*	0.047
Free school meal eligibility (compared to not eligible)		0.123*	0.035
Mother's highest level of qualification (compared to none)	vocational	0.020	0.047
	academic age 16	-0.075*	0.040
	academic age 18	-0.041	0.056
	degree	0.177*	0.053
	higher	-0.028	0.074
	other	-0.130	0.112
Frequency of library visits (compared to never)	special occasions	-0.087#	0.046
	monthly	-0.127*	0.039
	fortnightly	-0.049	0.044
	weekly	-0.022	0.045
Frequency child paints/draws at home (compared to never)	1-4 times a week	-0.198*	0.070
	5-7 times a week	-0.203*	0.070
Frequency parent teaches songs, poems and nursery rhymes (compared to never)	1-2 times a week	-0.044	0.055
	3-5 times a week	-0.101#	0.051
	6 times a week	-0.097	0.055
	7+ times a week	-0.118*	0.055
No regular bedtime (compared to regular bedtime)		-0.074*	0.037
Behavioural problems (compared to none)	1 behavioural problem	0.181*	0.044
	2 + behavioural problems	0.083	0.089
Number of non-parental carers (compared to only parental carers)			
	1 non-parental carer	0.049	0.032
	2 non-parental carers	0.044	0.039
	3 non-parental carers	0.126*	0.057
	4+ non-parental carers	0.037	0.076
Duration of pre-school (centred around mean)		0.004*	0.001
Change of pre-school (compared to no change)		-0.013	0.035

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

Effect Sizes

Effect sizes (ES) are most commonly used in experimental studies where there is a control group and an experimental group. Following Glass et al (1981), the effect size can be defined as:

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

or $$\Delta = \frac{\bar{X}_{Exp} - \bar{X}_{Cont}}{SD_{pooled}}$$

The EPPE study is not an experimental study, rather it explores naturally occurring variation in pre-school provision and, in particular, pre-school centre effects. It employs multilevel models to separate pre-school centre level variance in child outcome measures from that attributable to differences at the individual child level, recognising the hierarchical nature of the data (Goldstein, 1995). Effect size is essentially a mean difference involving the 'fixed' part of the model. Thus, the above equation would be suitable even if the means were derived from the multilevel model. Furthermore, in a multilevel model, the (standardised) between-school variance of an effect can also be estimated.

In this technical paper, effect sizes have been calculated for a number of contextualised and value added models, using both the child level variance[62] and coefficients from the multilevel statistical models. The formulae used for the categorical and continuous variables are detailed below and have the advantage of being relatively quick to calculate and readily understandable. For categorical predictor variables, the effect size has been calculated following Tymms et al (1997) (a method also used by Strand, 2002):

ES = categorical predictor variable coefficient / √child level variance

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

For continuous predictor variables, the effect size has been taken as follows and describes the change on the outcome measure that will be produced by a change of one standard deviation on the continuous predictor variable, standardised by the within school SD adjusted for covariates in the model – the level 1 SD:

*ES = continuous predictor variable coefficient*SD continuous predictor variable / √child level variance*

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

Charts showing effect sizes for both categorical and continuous predictor variables have been produced providing an indication of the relative magnitude or importance of potential predictor (explanatory) variables. It is important to note that the charts displaying effect sizes for the two types of variables are not directly comparable and that effect sizes do not give an indication of statistical significance of particular predictors (information about this is provided in accompanying tables which show the multilevel estimates and their associated standard errors). Effect sizes for some categorical measures are large but may only apply to very small numbers of children (e.g. the very low birthweight group or specific ethnic groups) and may not always be statistically significant. Effect sizes for continuous measures may appear relatively modest but generally apply to all children.

When interpreting effect sizes, Coe (2002) reports the danger of using terms like 'small', 'medium' and 'large' stating that,

[62] Using the child level variance from the multilevel models (i.e. amount of variation in the outcome measure attributable to the individual child after controlling for prior attainment in value added models and other significant background characteristics in contextualised and value added models) tends to increase the effect size compared to calculations which use a raw standard deviation (i.e. amount of variation in the outcome measure before controlling for prior attainment, etc).

'Glass et al (1981, p104) are particularly critical of this approach, arguing that the effectiveness of a particular intervention can only be interpreted in relation to other interventions that seek to produce the same effect. They also point out that the practical importance of an effect depends entirely on its relative costs and benefits. In education, if it could be shown that making a small and inexpensive change would raise academic achievement by an effect size of even as little as 0.1, then this could be a very significant improvement, particularly if the improvement applied uniformly to all students, and even more so if the effect were cumulative over time.' Coe (2002)

Effect sizes can be useful for comparisons between studies but interpretations must be made with caution and with reference to the outcomes concerned.

The influence of different categorical predictor variables (child, family, home learning environment characteristics, etc.) in the contextualised models described in Section 2 and 5 illustrate the impact on attainment at a given point in time (entry to primary school). These effect sizes are generally considerably larger than those identified in the value added analyses (reported in Section 3 and 4), which measure children's cognitive progress over time in pre-school. This is because of the strong relationships with prior attainment (at entry to the study at age 3 years plus), which is controlled in the models of progress.

Further analyses are planned which will investigate effect sizes further by means of the calculation of confidence limits. This will aid interpretation of effect sizes for predictor measures relating to small sub-groups of children in particular (see discussion by Coe, 2002).

Appendix C

Assessments entry to Pre-school / Adaptive Social Behaviour Inventory (ASBI)

On the EPPE project a pre-school centre worker who was familiar with the child was asked to complete the Adaptive Social Behaviour Inventory (ASBI) (Hogan et al, 1992). The ASBI provided measures of social/behavioural development. This is the measure used in the NICHD study of Early Child Care, (see NICHD, 2002). The ASBI was developed by Hogan et al. (1992) as a general measure of the social and behavioural development of pre-school children. It was developed because there was not a measure then available that produced measures of social competence, pro-social and antisocial behaviours for pre-school children. Conceptually, social competence was regarded as multi-faceted and separate from behaviour problems. Hence, a child might have varying degrees of social skills and behaviour problems simultaneously. The inventory contains 30 items that were chosen:

- to be appropriate to pre-school children, particularly 3-year-olds
- to be written in a style suitable for adults of varying education
- to have content relevant to a range of home, neighbourhood and day-care settings
- to sample behaviours related to social skills
- to sample behaviours related to social knowledge
- to sample behaviours related to positive emotion
- to sample behaviours related to self-control
- to sample behaviours related to behaviour problems.

Another consideration was to choose positive and negative behaviours that had been identified as potentially related to children's experience with adults and other children. The response choices for each of the 30 items are: 1 – rarely or never, 2 – sometimes and 3 – almost always.

A factor analysis of these 30 items resulted in the extraction of 5 underlying factors. Factor scores for each child were calculated by averaging the ratings given by the teacher for the questions that form each factor. Internal consistency scores, using Cronbach alpha measuring whether respondents respond to items in a systemic way across the items, are also given[63]. As a rule of thumb, values above 0.60 are considered appropriate.

Factor 1: Co-operation &Conformity (Cronbach alpha = 0.88)

2. Is helpful to other children
3. Is obedient and compliant
5. Follows rules in games
8. Waits his/her turn in games or other activities
10. Co-operates with your requests
15. Follows household or pre-school centre rules
16. Says "please" and "thank you" when reminded
18. Is calm and easy-going
20. Shares toys or possessions

Factor 2: Peer Sociability (Cronbach alpha = 0.85)

1. Understands others' feelings, like when they are happy, sad or mad
7. Is sympathetic toward other children's distress, tries to comfort others when they are upset
11. Can easily get other children to pay attention to him/her
12. Says nice or friendly things to others, or is friendly towards others
13. Will join a group of children playing
14. In social activities, tends to just watch other (note that this item is reversed in the analysis)
17. Asks or wants to go play with other children
19. Plays games and talks with other children

Factor 3:Confidence (Cronbach alpha = 0.70)

9. Is open and direct about what he/she wants
22. Is confident with other people
24. Tends to be proud of things she/he does
27. Is interested in many and different things

[63] Cronbach alpha was also calculated for the scales produced by Hogan (see Hogan et al, 1992)

30. Enjoys talking with you

Factor 4: Anti-social (Cronbach alpha = 0.70)
21. Teases other children, calls them names
23. Prevents other children from carrying out routines
26. Bullies other children
29. Is bossy, needs to have his/her way

Factor 5: Worried / Upset (Cronbach alpha = 0.61)
4. When you give him/her an idea for playing, he/she frowns, shrugs shoulders, pouts or stamps foot
6. Gets upset when you don't pay enough attention
25. Accepts changes without fighting against them or becoming upset (note that this item is reversed in the analysis)
28. Is worried about not getting enough (where enough might include attention, access to toys, food/drink etc)

Table C.1 'Independence & Concentration' Value Added Model
(Impact of Prior Social Behavioural Development, Child, Parent, Home Environment and other Measures on 'Independence & Concentration' Development over the Pre-school Period)

		Estimate	SE
Prior social behavioural development – Co-operation & Conformity (centred around mean)		0.618*	0.037
Age at entry to study assessment (centred around mean)		-0.004	0.004
Age at entry to primary school assessment (centred around mean)		0.023*	0.004
Gender (girls compared to boys)		0.237*	0.031
No. of siblings (compared to none)	1-2	0.080*	0.037
	3+	0.066	0.053
Birthweight (compared to average / above average)	very low	-0.372*	0.118
	low	-0.163*	0.058
Mother's highest level of qualification (compared to none)			
	vocational	0.097	0.053
	academic age 16	0.096*	0.045
	academic age 18	-0.003	0.064
	degree	0.240*	0.065
	higher	0.093	0.097
	other	0.356*	0.133
Father's highest level of qualification (compared to none)	vocational	-0.042	0.051
	academic age 16	0.031	0.041
	academic age 18	0.047	0.060
	degree	0.062	0.056
	higher	0.252*	0.084
	other	-0.203	0.148
Frequency of library visits (compared to never)	special occasions	0.031	0.052
	monthly	0.134*	0.044
	fortnightly	0.107*	0.049
	weekly	0.078	0.051
Frequency child paints/draws at home (compared to never)	1-4 times a week	0.213*	0.080
	5-7 times a week	0.242*	0.081
Frequency parent teaches letters/numbers (compared to daily)	never	-0.145*	0.051
	1-2 times a week	-0.060	0.043
	3-4 times a week	-0.064	0.044
	5-6 times a week	0.042	0.056
Frequency parent teaches songs, poems and nursery rhymes (compared to never)			
	1-2 times a week	0.065	0.061
	3-5 times a week	0.115*	0.057
	6 times a week	0.136*	0.061
	7+ times a week	0.147*	0.061
Developmental problems (compared to none)		-0.123*	0.048
Sought help for any behavioural / developmental problems (compared to no help)		-0.083*	0.032
Change of pre-school (compared to no change)		-0.013	0.041

* Statistically significant at 0.05 level

Table C.2 'Co-operation & Conformity' Value Added Model
(Impact of Prior Social Behavioural Development, Child, Parent, Home Environment and other Measures on 'Co-operation & Conformity' Development over the Pre-school Period)

		Estimate	SE
Prior social behavioural development - Co-operation & Conformity (centred around mean)		0.549*	0.039
Prior social behavioural development – Confidence (centred around mean)		-0.122*	0.030
Prior social behavioural development – Anti-social (centred around mean)		-0.146*	0.038
Age at entry to study assessment (centred around mean)		-0.002	0.003
Age at entry to primary school assessment (centred around mean)		0.009*	0.004
Gender (girls compared to boys)		0.199*	0.025
No. of siblings (compared to none)	1-2	0.069*	0.031
	3+	0.056	0.045
Ethnicity (compared to white UK)	white european	-0.016	0.067
	black caribbean	0.061	0.071
	black african	0.182*	0.091
	black other	-0.027	0.151
	indian	0.038	0.099
	pakistani	0.017	0.091
	bangladeshi	-0.165	0.153
	other	-0.040	0.087
	mixed	0.019	0.051
Free school meal eligibility (compared to not eligible)		-0.100*	0.034
Mother's highest level of qualification (compared to none)			
	vocational	0.008	0.045
	academic age 16	0.051	0.038
	academic age 18	0.014	0.054
	degree	0.198*	0.055
	higher	0.031	0.080
	other	0.211#	0.107
Father's highest level of qualification (compared to none)	vocational	0.046	0.050
	academic age 16	0.082#	0.043
	academic age 18	0.086	0.057
	degree	0.069	0.054
	higher	0.192*	0.075
	other	-0.103	0.121
	absent	0.045	0.042
Frequency parent reads to child (compared to daily)	rarely	-0.193*	0.073
	weekly	-0.123	0.083
	several times a week	-0.079*	0.031
	twice daily	-0.019	0.041
Frequency parent teaches songs, poems and nursery rhymes (compared to never)			
	1-2 times a week	0.079	0.052
	3-5 times a week	0.132*	0.049
	6 times a week	0.142*	0.052
	7+ times a week	0.147*	0.052
No regular bedtime (compared to regular bedtime)		0.070*	0.034
Behavioural problems (compared to none)	1 behavioural problem	-0.151*	0.042
	2 + behavioural problems	0.039	0.086
Change of pre-school (compared to no change)		0.025	0.035

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

Table C.3 'Peer Sociability' Value Added Model
(Impact of Prior Social Behavioural Development, Child, Parent, Home Environment and other Measures on 'Peer Sociability' Development over the Pre-school Period)

		Estimate	SE
Prior social behavioural development – Peer Sociability (centred around mean) (note that a squared term is also significant)		0.326*	0.041
Prior social behavioural development – Confidence (centred around mean)		0.183*	0.039
Age at entry to study assessment (centred around mean)		-0.005	0.004
Age at entry to primary school assessment (centred around mean)		0.018*	0.004
Ethnicity (compared to white UK)	white european	-0.018	0.071
	black caribbean	0.007	0.075
	black african	0.142	0.097
	black other	0.156	0.163
	indian	-0.053	0.103
	pakistani	-0.157	0.094
	bangladeshi	-0.565*	0.165
	other	-0.041	0.097
	mixed	0.021	0.055
Family SES (compared to professional non-manual)	intermediate non-manual	-0.056	0.050
	skilled non-manual	-0.073	0.052
	skilled manual	-0.096	0.060
	semi-skilled manual	-0.200*	0.063
	unskilled manual	-0.122	0.103
	never worked	-0.201	0.104
Father's employment (compared to work full-time)	not working	-0.113*	0.047
	self employed	0.012	0.042
	other	0.011	0.082
	father absent	0.014	0.038
Frequency parent teaches songs, poems and nursery rhymes (compared to never)	1-2 times a week	0.054	0.054
	3-5 times a week	0.069	0.051
	6 times a week	0.156*	0.054
	7+ times a week	0.115*	0.054
Frequency child plays with friend at home (compared to never)			
	< once a week	0.096	0.079
	1-2 times a week	0.073*	0.031
	3-4 times a week	0.017	0.043
	5-7 times a week	0.038	0.044
Behavioural problems (compared to none)	1 behavioural problem	-0.110*	0.044
	2 + behavioural problems	0.103	0.093
Change of pre-school (compared to no change)		0.024	0.037
% of children in centre with mothers who have a degree or higher (centred around mean)		-0.002*	0.001

* Statistically significant at 0.05 level

Table C.4 'Anti-social / Worried' Value Added Model
(Impact of Prior Social Behavioural Development, Child, Parent, Home Environment and other Measures on 'Anti-social / Worried' Development over the Pre-school Period)

		Estimate	SE
Prior social behavioural development - Co-operation & Conformity (centred around mean)		-0.448*	0.038
Prior social behavioural development – Confidence (centred around mean)		0.228*	0.030
Prior social behavioural development – Anti-social (centred around mean)		0.241*	0.038
Age at entry to study assessment (centred around mean)		-0.003	0.003
Age at entry to primary school assessment (centred around mean)		0.012*	0.004
Ethnicity (compared to white UK)	white european	-0.007	0.066
	black caribbean	-0.070	0.070
	black african	0.094	0.089
	black other	0.120	0.149
	indian	-0.139	0.098
	pakistani	-0.211*	0.088
	bangladeshi	-0.154	0.151
	other	0.110	0.086
	mixed	0.006	0.051
No. of siblings (compared to none)	1-2	-0.098*	0.031
	3+	-0.122*	0.045
Free school meal eligibility (compared to not eligible)		0.092*	0.036
Mother's highest level of qualification (compared to none)	vocational	0.006	0.045
	academic age 16	-0.042	0.038
	academic age 18	-0.057	0.054
	degree	-0.184*	0.055
	higher	-0.027	0.080
	other	-0.085	0.106
Father's highest level of qualification (compared to none)	vocational	-0.015	0.050
	academic age 16	-0.103*	0.043
	academic age 18	-0.076	0.057
	degree	0.001	0.054
	higher	-0.090	0.074
	other	0.092	0.119
	absent	-0.132*	0.062
Father's employment (compared to work full-time)	not working	-0.066	0.046
	self employed	0.011	0.039
	other	-0.151*	0.074
	father absent	0.089	0.062
Frequency of library visits (compared to never)	special occasions	-0.044	0.043
	monthly	-0.107*	0.036
	fortnightly	-0.038	0.040
	weekly	0.015	0.042
Frequency child paints/draws at home (compared to never)	1-4 times a week	-0.161*	0.064
	5-7 times a week	-0.153*	0.064
No regular bedtime (compared to regular bedtime)		-0.096*	0.034
Behavioural problems (compared to none)	1 behavioural problem	0.135*	0.041
	2 + behavioural problems	-0.016	0.085
Number of non-parental carers (compared to only parental carers)			
	1 non-parental carer	0.040	0.030
	2 non-parental carers	0.033	0.036
	3 non-parental carers	0.113*	0.053
	4+ non-parental carers	0.014	0.071
Change of pre-school (compared to no change)		-0.043	0.034

* Statistically significant at 0.05 level

Table C.5 Complex Value Added Models in Four Social Behavioural Outcomes
(Impact of Prior Social Behavioural Development, Child, Parent, Home Environment, and other Measures on Social Behavioural Development over the Pre-school Period)

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-Social / Worried
Prior social behavioural development - Co-operation & Conformity (centred around mean)	**positive**	**positive**		**negative**
Prior social behavioural development – Peer Sociability (centred around mean)			**positive**	
Prior social behavioural development – Confidence (centred around mean)		**negative**	**positive**	**positive**
Prior social behavioural development – Anti-social (centred around mean)		**negative**		**positive**
Age at entry to study assessment (centred around mean)				
Age at entry to primary school assessment (centred around mean)	**positive**	**positive**	**positive**	**positive**
Gender (girls compared to boys)	**positive**	**positive**		
Ethnicity (compared to white UK) white european				
black caribbean		**positive**		
black african				
black other				
indian				
pakistani				**negative**
bangledeshi			**negative**	
other				
mixed				
No. of siblings (compared to none) 1-2	**positive**	**positive**		**negative**
3+				**negative**
Birthweight (compared to average/above) low	**negative**			
very low	**negative**			
FSM eligibility (compared to not eligible)		**negative**		**positive**
Mother's highest level of qualification (compared to none) vocational				
academic age 16	**positive**			
academic age 18				
degree	**positive**	**positive**		**negative**
higher				
other	**positive**	**positive**[#]		
Father's highest level of qualification (compared to no qualifications) vocational				
academic age 16		**positive**[#]		**negative**
academic age 18				
degree				
higher	**positive**	**positive**		
other				
absent				**negative**
Family SES (compared to professional non-manual) intermediate non-manual				
skilled non-manual				
skilled manual				
semi-skilled manual				
unskilled manual			**negative**	
never worked				
Father's employment (compared to work full-time) not working				
self employed			**negative**	
other				
father absent				**negative**

[#] just failed to reach statistical significance at 0.05 level

Table C.5 continued

	Independence & Concentration	Co-operation & Conformity	Peer Sociability	Anti-Social / Worried
Frequency parent reads to child (compared to daily)				
rarely		**negative**		
weekly				
several times a week		**negative**		
twice daily				
Frequency of library visits (compared to never)				
special occasions				
monthly	**positive**			**negative**
fortnightly	**positive**			
weekly				
Frequency child paints /draws at home (compared to never)				
1-4 times a week	**positive**			**negative**
5-7 times a week	**positive**			**negative**
Frequency parent teaches letters/numbers (compared to daily)				
never	**negative**			
1-2 times a week				
3-4 times a week				
5-6 times a week				
Frequency parent teaches songs, poems and nursery rhymes (compared to never)				
1-2 times a week				
3-5 times a week	**positive**	**positive**		
6 times a week	**positive**	**positive**	**positive**	
7+ times a week	**positive**	**positive**	**positive**	
Frequency child plays with friend at home (compared to never)				
< once a week				
1-2 times a week			**positive**	
3-4 times a week				
5-7 times a week				
No regular bedtime (compared to regular bedtime)		**negative**		**negative**
Developmental problems (compared to none)	**negative**			
Behavioural problems (compared to none)				
1 behavioural problem		**negative**	**negative**	**positive**
2 + behavioural problems				
Sought help for any behavioural / developmental problems (compared to no help)	**negative**			
Number of non-parental carers (compared to only parental carers)				
1 non-parental carer				
2 non-parental carers				
3 non-parental carers				**positive**
4+ non-parental carers				
Change of pre-school (compared to no change)				
% of children in centre with mothers who have a degree or higher (centred around mean)			**negative**	

Note that a high score on 'Independence & Concentration', 'Co-operation & Conformity' and 'Peer Sociability' relates to more positive outcomes whereas a high score on 'Anti-social / Worried' relates to an increase in Anti-social / worried behaviour.

Appendix D

Chart D.1 'Independence & Concentration' value added model - Effect sizes of categorical predictor variables

*denotes a negative effect

Note that the effect sizes shown do not take into account the size of groups. Some large effects (e.g. mother's qualification other professional) apply to very small numbers of children and not all are statistically significant. Details of the statistical significance of different measures are shown in Table C.1.

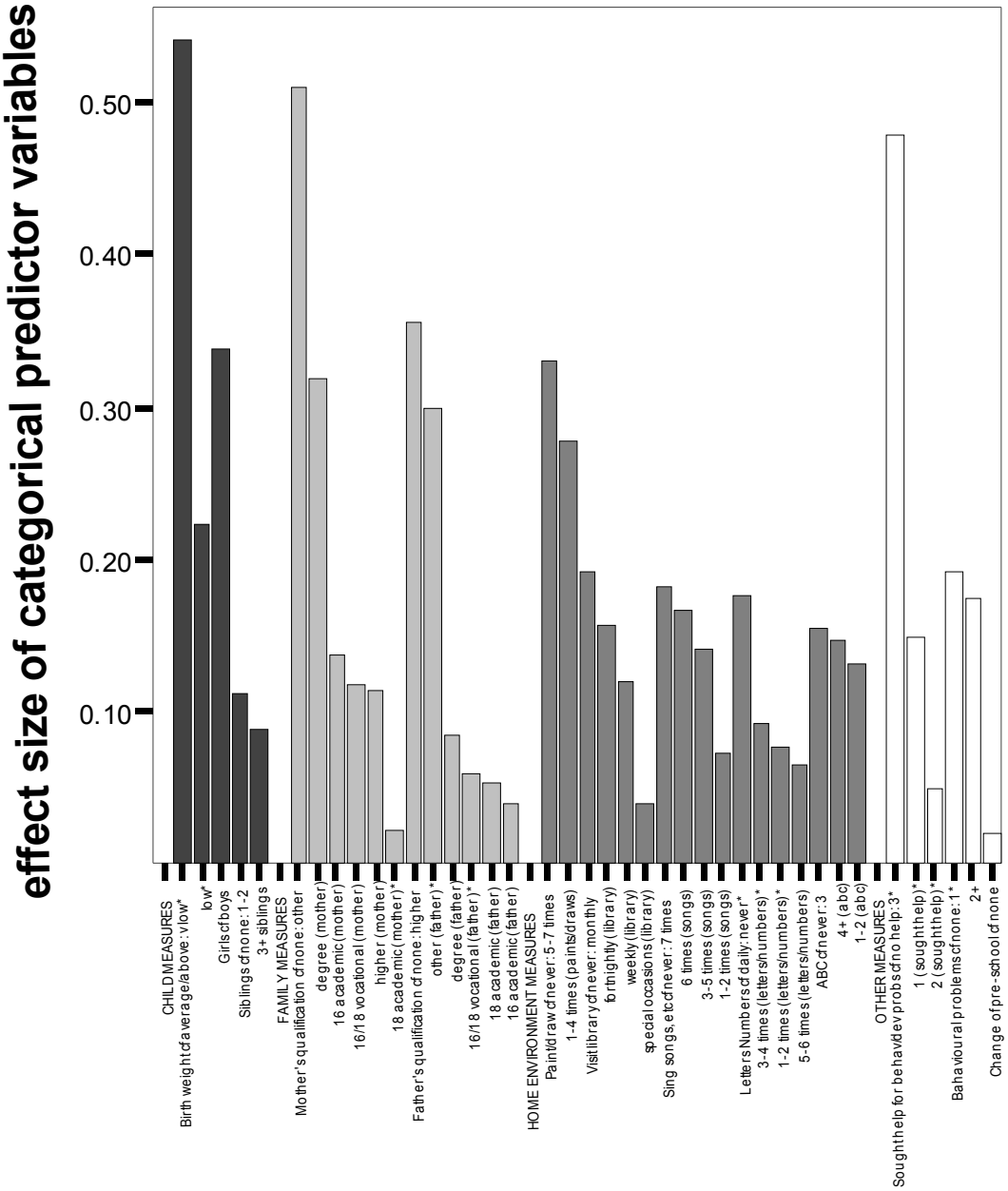


Chart D.2 'Independence & Concentration' value added model - Effect sizes of continuous predictor variables

It should be noted that effect sizes for continuous measures might appear modest but generally apply to all children in the sample, in contrast to those for some categorical predictors that apply to very small sub-groups.

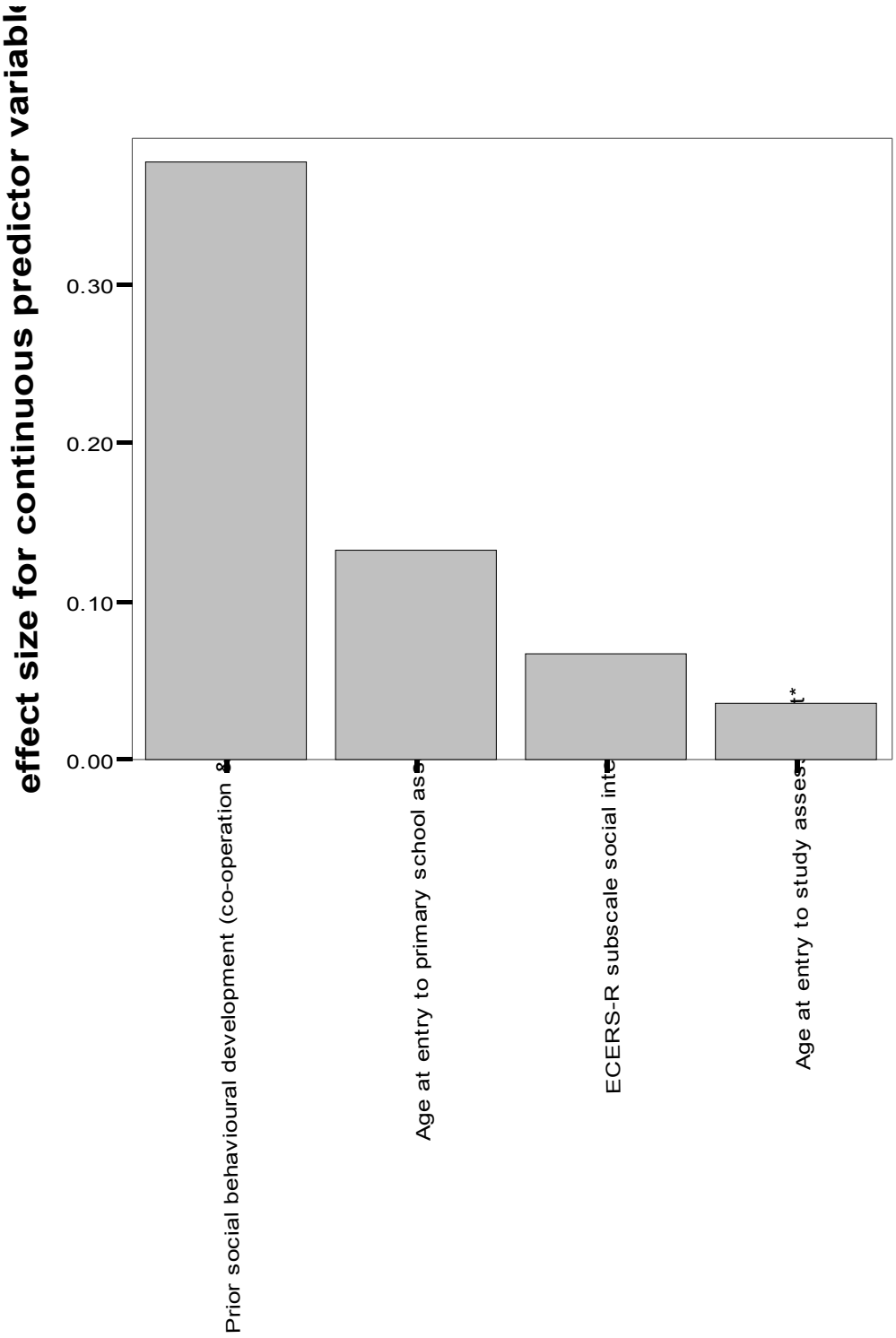


Chart D.3 'Co-operation & Conformity' value added model - Effect sizes of categorical predictor variables

*denotes a negative effect

Note that the effect sizes shown do not take into account the size of groups. Some large effects (e.g. mother's qualification other professional) apply to very small numbers of children and not all are statistically significant. Details of the statistical significance of different measures are shown in Table C.2.

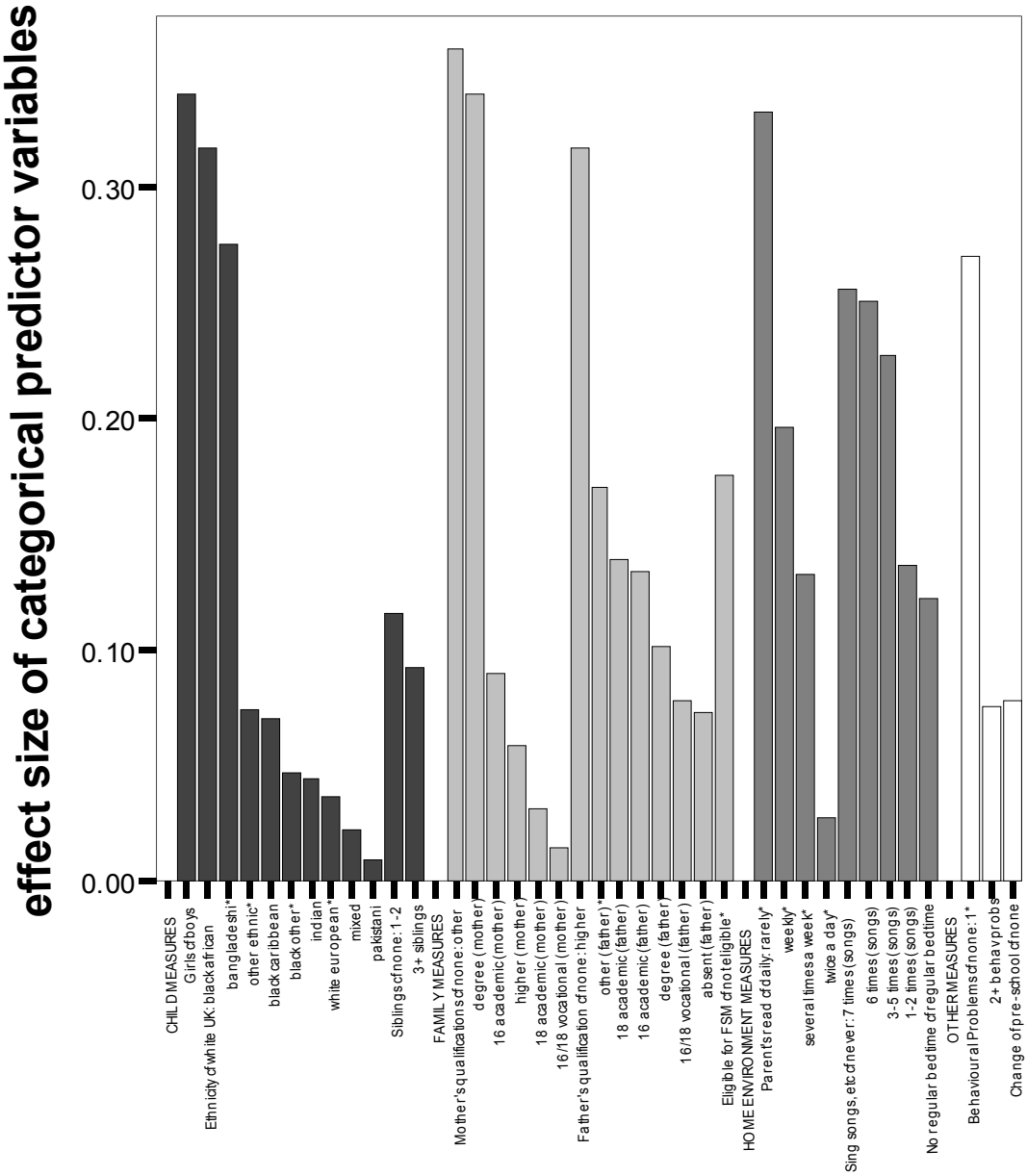
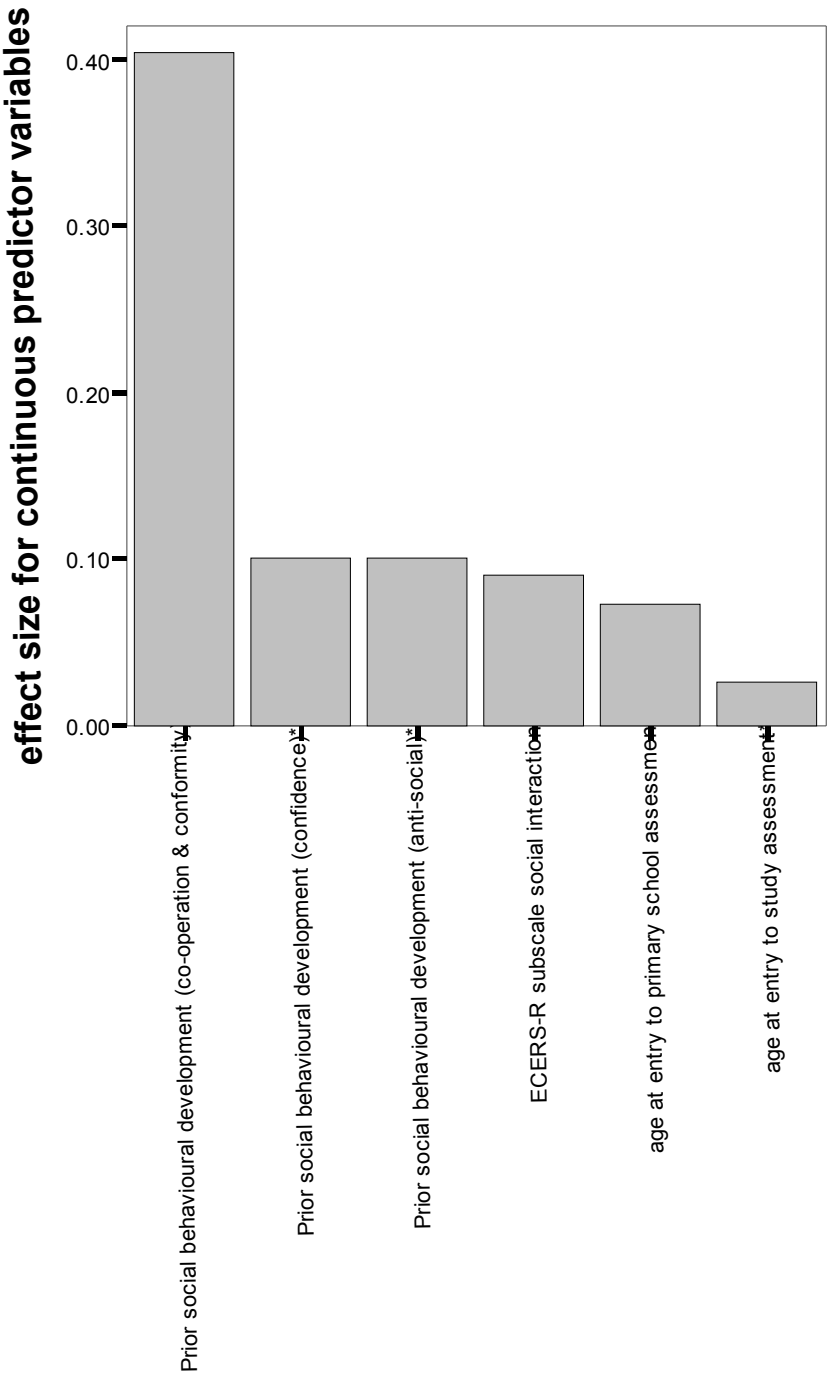


Chart D.4 'Co-operation & Conformity' value added model - Effect sizes of continuous predictor variables

It should be noted that effect sizes for continuous measures might appear modest but generally apply to all children in the sample, in contrast to those for some categorical predictors that apply to very small sub-groups.



The Caregivers Interaction Scale and ECERS: comparing separate measures of quality

The table below shows that the two 'quality' rating scales are highly correlated. Note that the Arnett Caregiver Interaction Scale assesses the 'relationships' which staff establish with children while the Early Childhood Environment Rating Scales (ECERS-R and ECERS-E) provide a broader profile that includes social interactions but also resources, curriculum and facilities.

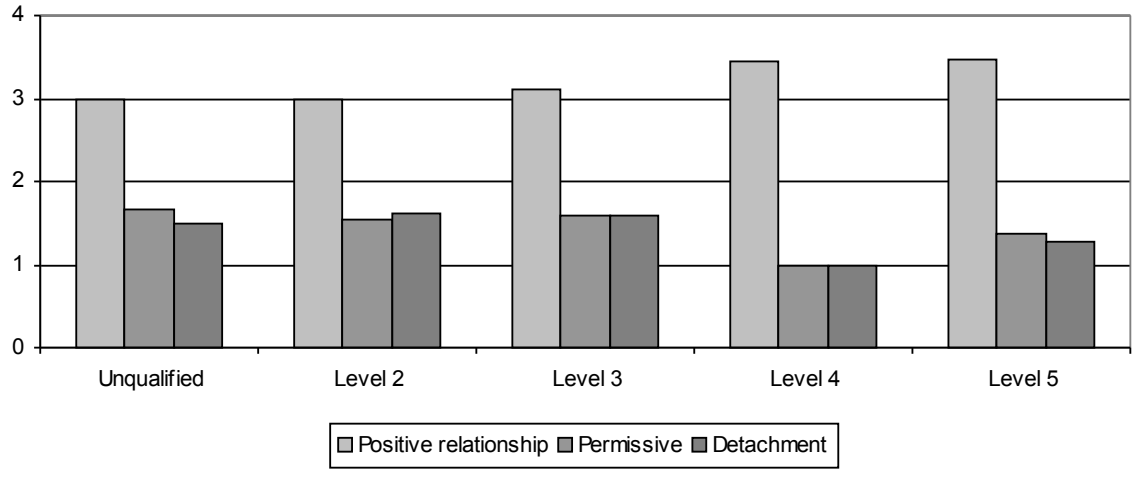
Table D.1

		Positive relationship	Punitiveness	Permissive	Detachment
ECERS_E	Average total	0.59**	-0.18*	-0.32**	-0.45**
	literacy subscale	0.58**	-0.24**	-0.35**	-0.46**
	maths subscale	0.47**	-0.14	-0.28**	-0.36**
	science/envir subscale	0.45**	-0.05	-0.30**	-0.32**
	diversity subscale	0.48**	-0.19*	-0.22**	-0.39**
ECERS_R	Average total	0.58**	-0.23**	-0.33**	-0.49**
	space & furnishings subscale	0.31**	-0.15	-0.15	-0.34**
	personal care routines subscale	0.29**	-0.02	-0.13	-0.20*
	language and reasoning subscale	0.64**	-0.21*	-0.47**	-0.48**
	pre-school activities subscale	0.42**	-0.05	-0.25**	-0.26**
	social interaction subscale	0.68**	-0.36**	-0.42**	-0.68**
	organisation & routine subscale	0.44**	-0.23**	-0.20*	-0.41**
	adults working together subscale	0.42**	-0.20*	-0.19*	-0.30**

The Caregivers Interaction Scale and Centre Managers' Highest Childcare Qualification

Using the 5-point scale, it was observed that 'Positive relationship' differed significantly by manager qualification ($H(4)=21.5$, $p<.01$), as did 'Permissivness' ($H(4)=14.6$, $p<.05$), and 'Detachment' ($H(4)=12.0$, $p<.05$). 'Punitiveness' did not differ by manager qualification ($H(4)=4.9$, $p=.29$).

Chart D.5



Appendix E

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

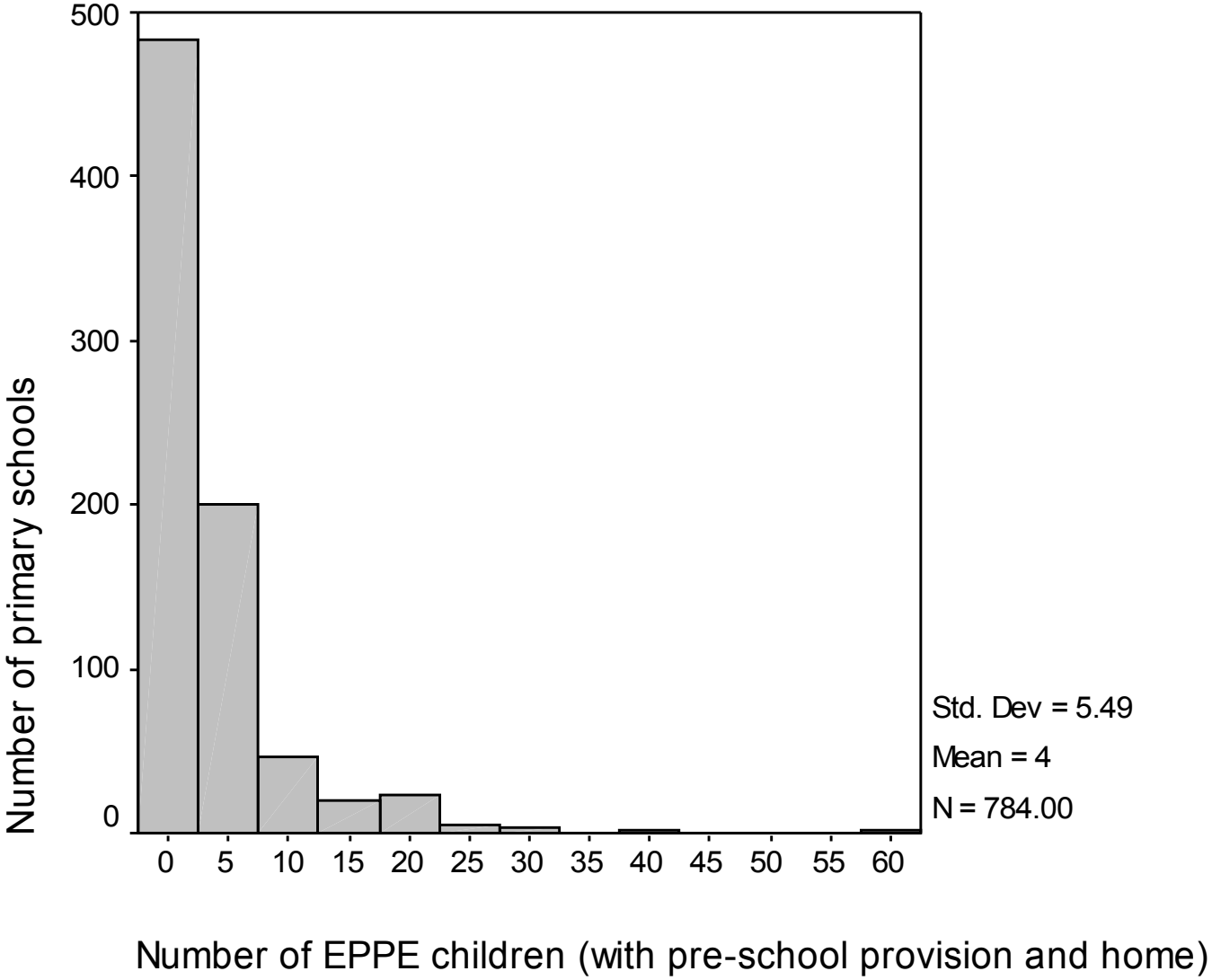


Chart E.2 Independence & Concentration contextualised model (home children vs. children who attended a pre-school centre) at entry to primary school - Effect sizes of categorical predictor variables

*denotes a negative effect

Note that the effect sizes shown do not take into account the size of groups. Some large effects (e.g. for ethnicity, or mother's qualification other professional) apply to very small numbers of children and not all are statistically significant. Details of the statistical significance of different measures are shown in Table E.1.

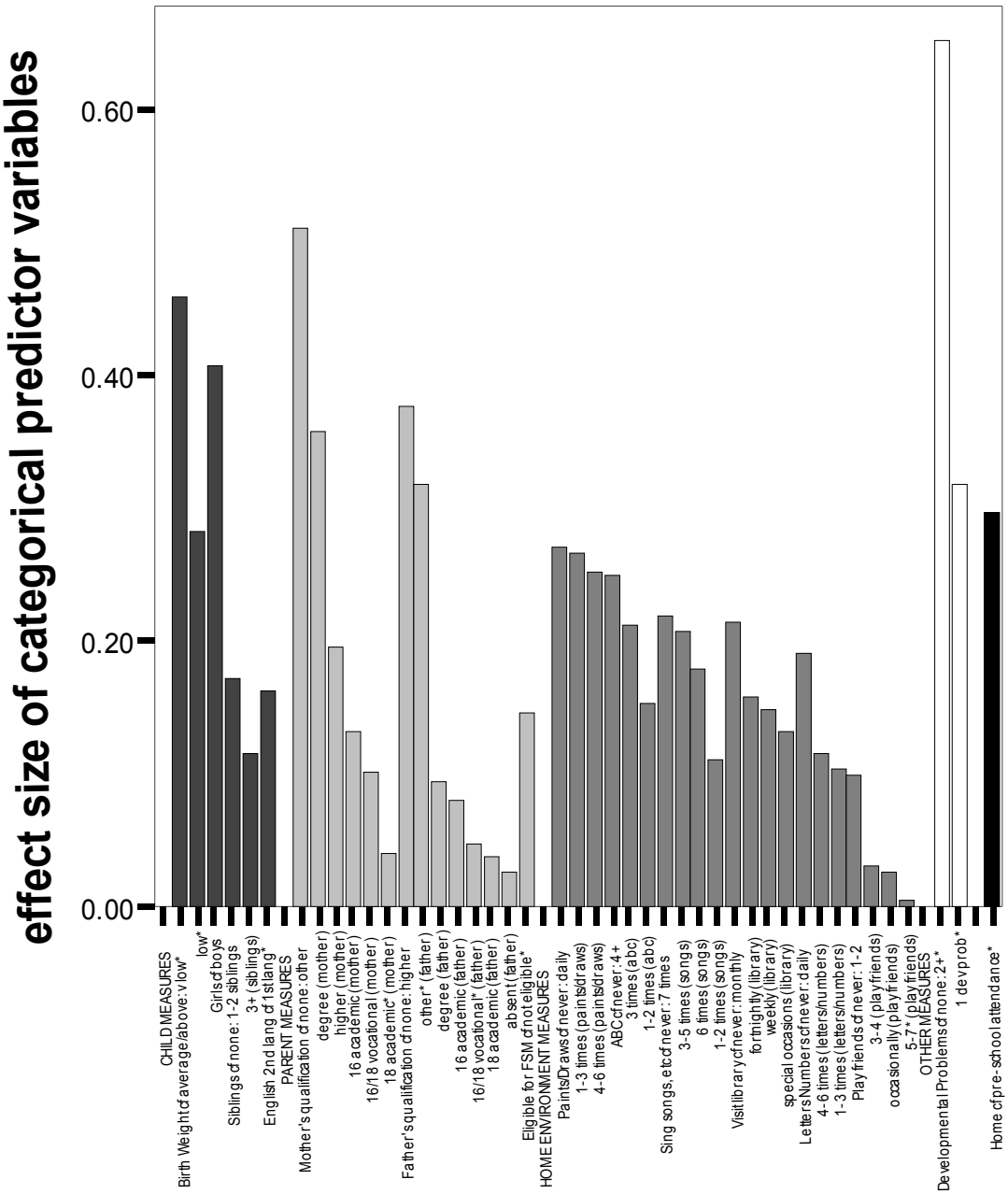
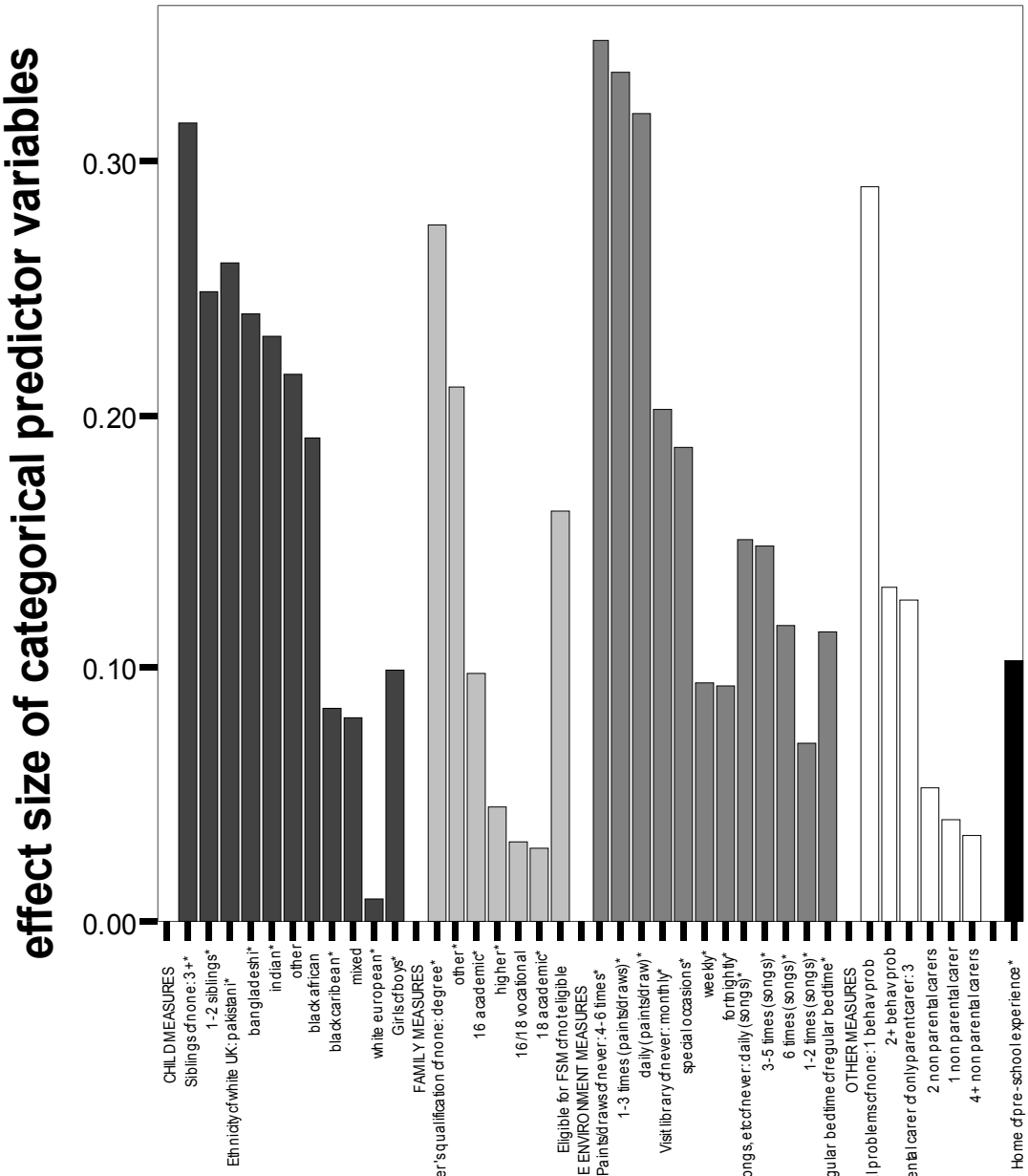


Chart E.3 Anti-social / Worried contextualised model (home children vs. children who attended a pre-school centre) at entry to primary school - Effect sizes of categorical predictor variables

*denotes a negative effect

Note that the effect sizes shown do not take into account the size of groups. Some large effects (e.g. for ethnicity, or mother's qualification other professional) apply to very small numbers of children and not all are statistically significant. Details of the statistical significance of different measures are shown in Table E.2.



Appendix F

Findings from the EYTSEN study

Further analyses were conducted to investigate the impact of 'multiple disadvantage' as part of the 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 home learning environment. All the variables were chosen because they related to low baseline attainment when looked at in isolation (as described above). Where indicators were closely related, such as first language and ethnicity, only the most significant was included.

Table F.1 Multiple disadvantage indicators

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

In the analysis of 'at risk' categories, social behavioural outcomes have a much weaker relationship with children's background characteristics at primary school entry than cognitive outcomes (in line with overall findings reported in EPPE Technical Paper 7). Relationships between the incidence of multiple disadvantage and young children's social behavioural development at primary school were also investigated. The results show that multiple disadvantage shows a significant association with increased risk of behaviour difficulties for 'Peer Sociability' in line with findings at entry to pre-school. In addition, at primary school entry there are indications that multiple disadvantage is beginning to show a significant association with increased risk of 'Anti-social / Worried' behaviour.

Table F.2 Multiple disadvantage and percentage identified at social behavioural risk at entry to primary school 'at risk'

Number of factors	All children		'at risk' Anti-social / Worried	'at risk' Peer sociability
	n	%		
0	637	23.5	19.9	16.9
1-2	1345	49.6	50.2	45.3
3-4	575	21.3	22.3	27.8
5+	151	5.5	7.7	10.1
Unknown	149	--	--	--

In the sample, 23.5% of children experienced none of the indicators of disadvantage selected. This group was much less likely to be identified as at strong social behavioural risk at entry to primary school (only 19.9%/16.9% of children in this group experienced none of the disadvantage factors in terms of 'Anti-social / Worried' and 'Peer Sociability' respectively). By contrast, those experiencing 5 or more factors (only 5.5% of all children in the EPPE sample) formed 10.1% of those identified as at strong social behavioural risk in 'Peer Sociability' at entry to primary school (this is nearly twice as higher as expected).

Glossary of terms

'Anti-social / Worried' At primary school entry, teachers rated the social behaviour of EPPE children using the CSBQ. A factor analysis of the 45 items resulted in the extraction of 6 underlying factors. Primary school entry factor 4 measures the child's tendency to show behaviour that is disruptive to others or that is aggressive or destructive. Often, but not always, such behaviour occurs together with indications of worry or upset by the child. This scale is termed 'Anti-social / Worried'. Similarly, a factor analysis of the ASBI (rated by a pre-school worker at entry to the study) resulted in the extraction of 5 underlying factors with entry to study factor 4 and 5 measuring 'Anti-social' and 'Worried / Upset' behaviour.

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

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

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

Baseline measures Social behavioural ratings given by the careworker at entry to the study. These social behavioural scores are subsequently employed as prior social behavioural measures in a value added analysis of pupils' social behavioural outcomes.

Birth weight Babies born weighing 2500 grams (5lbs 8oz) or less are defined as below normal birth weight, fetal 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 Caren, 1989).

Caregiver Interaction Scale (CIS) A rating scale consisting of 26 items completed by an observer of the interactions between caregivers and children. The items are grouped to produce 4 subscales: positive relationships, punitiveness, permissiveness and detachment. The CIS was developed by Arnett (1989).

- Positive relationships is a subscale made up of 10 items indicating warmth and enthusiasm interaction with children by the caregiver.
- Punitiveness is a subscale made up of 8 items indicating harsh or over-controlling behaviour in interaction with children by the caregiver.
- Permissiveness is a subscale made up of 4 items indicating avoidance of discipline and control of children by the caregiver.
- Detachment is a subscale made up of 4 items indicating lack of involvement in interaction with children by the caregiver.

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

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

Compositional effects The impact of peer group measures on a child's individual outcomes. For example, when the characteristics of children in a centre (measured as a centre level

aggregated variable) show a significant relationship with outcomes at the individual child level, after controlling for the same variable at the individual level. For further details see Harker (2001).

'Confidence' At entry to the study, pre-school workers rated the social behaviour of EPPE children using the ASBI. A factor analysis of the 30 items resulted in the extraction of 5 underlying factors. Entry to study factor 3 measures the child's apparent confidence in his/her own ability and is termed 'Confidence'.

***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 social behavioural development at entry to primary school, controlling for child, family and home learning environment characteristics (but not prior social behaviour). These models are equivalent to the cross-sectional multilevel models in Section 2 of EPPE Technical Paper 8a exploring children's cognitive attainment over the pre-school period, controlling for significant child, parent and home learning environment characteristics.

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.

'Co-operation & Conformity' At primary school entry, teachers rated the social behaviour of EPPE children using the CSBQ. A factor analysis of the 45 items resulted in the extraction of 6 underlying factors. Primary school entry factor 2 measures the child's co-operative behaviour and conformity to group norm and is termed 'Co-operation & Conformity'. Similarly, a factor analysis of the ASBI (rated by a pre-school worker at entry to the study) resulted in the extraction of 5 underlying factors with entry to study factor 1 measuring 'Co-operation & Conformity'.

CSBQ The Child Social Behaviour Questionnaire (CSBQ) is an extension of the ASBI and has 45 items concerning a child's social behaviour rated by teachers at entry to school. The items can be combined produce factors that are measures of different aspects of the child's' social behaviour. For further details see Appendix A.

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, 1999d) 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 although in the case of EPPE, both cognitive and social behavioural) while controlling for the influence of intake differences in child / student characteristics.

'Empathy & Pro-social' At primary school entry, teachers rated the social behaviour of EPPE children using the CSBQ. A factor analysis of the 45 items resulted in the extraction of 6 underlying factors. Primary school entry factor 5 measures the child's ability to show empathy or understanding for another child's feelings and is termed 'Empathy & Pro-social'.

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

Factor scores Factor scores for each child were calculated by averaging the ratings given by the teacher / pre-school centre worker for the questions that form each factor.

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

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

'Independence & Concentration' At primary school entry, teachers rated the social behaviour of EPPE children using the CSBQ. A factor analysis of the 45 items resulted in the extraction of 6 underlying factors. Primary school entry factor 1 measures the child's ability to play or work independently showing a certain level of concentration and is termed 'Independence & Concentration'.

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

Language attainment Composite formed by adding together the scores for two of the BAS assessments (naming vocabulary and verbal comprehension).

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 (e.g. young children, pre-school centres, LEAs), essentially a generalisation of multiple regression.

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

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

Outliers Pre-school centres where children made significantly greater/less social behavioural developmental gains than predicted on the basis of prior social behaviour and other significant child, parent and home learning environment characteristics.

Pedagogical strategies Strategies used by the educator to support learning. These include the face interactions with children, the organisation of the resources and the assessment practices and procedures.

'Peer Sociability' At primary school entry, teachers rated the social behaviour of EPPE children using the CSBQ. A factor analysis of the 45 items resulted in the extraction of 6 underlying factors. Primary school entry factor 3 measures the child's ability to play or work well with peers and in groups and is termed 'Peer Sociability'. Similarly, a factor analysis of the ASBI (rated by a pre-school worker at entry to the study) resulted in the extraction of 5 underlying factors with entry to study factor 2 measuring 'Peer Sociability'.

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

Principal components analysis This is a statistical technique for extracting the most important underlying factors from the correlations (measures of association) between a set of variables, and hence enables many separate variables to be reduced to a few underlying factors.

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

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

Sampling profile / procedures The EPPE sample was constructed by:

- Five regions (six LEAs) randomly selected around the country, but being representative of urban, rural, inner city areas.
- Pre-schools from each of the 6 types of target provision (nursery classes, nursery schools, local authority day care, 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 non-manual, intermediate non-manual, skilled non-manual, skilled manual, semi-skilled manual, unskilled manual, 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 percent of cases fall within one standard deviation of the mean and 95 percent of cases fall within two standard deviations.

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

Value added models Longitudinal multilevel models exploring children's social behavioural developmental gains over the pre-school period, controlling for prior social behaviour and significant child, parent and home learning environment characteristics. These models are equivalent to the value added multilevel models in Section 3 of EPPE Technical Paper 8a 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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