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Cognitive and social/behavioural development at 3-4 years in relation to family background

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Abstract

This longitudinal study assesses the attainment and development of children followed between the ages of 3 and 7 years. Over 700 children were recruited to the study during 1998 and 1999 from 80 pre-school centres. Both qualitative and quantitative methods (including multilevel modelling) are used to explore the effects of pre-school experience on children's cognitive attainment and social/behavioural development at entry to school and any continuing effects on such outcomes up to 7 years of age. In addition to the effects of preschool experience, the study investigates the contribution to children's development of individual and family characteristics such as gender, family size, parental education and employment. This overview describes the research design and discusses a variety of research issues (methodological and practical) in investigating the impact of pre-school provision on children's developmental progress. A parallel study is being carried out in England (EPPE).

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Effective Pre-school Provision in Northern Ireland (EPPNI)

Cognitive and Social/behavioural Development

At 3-4 years

In

Relation to Family Background

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and do not reflect those of the funding bodies

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OVERVIEW OF THE PROJECT

This longitudinal study assesses the attainment and development of children followed between the ages of 3 and 7 years. Over 700 children were recruited to the study during 1998 and 1999 from 80 pre-school centres. Both qualitative and quantitative methods (including multilevel modelling) are used to explore the effects of pre-school experience on children's cognitive attainment and social/behavioural development at entry to school and any continuing effects on such outcomes up to 7 years of age. In addition to the effects of pre-school experience, the study investigates the contribution to children's development of individual and family characteristics such as gender, family size, parental education and employment. This overview describes the research design and discusses a variety of research issues (methodological and practical) in investigating the impact of pre-school provision on children's developmental progress. A parallel study is being carried out in England (EPPE).

Previous Research on the Effects of Early Education in the UK

There has been little large-scale, systematic research on the effects of early childhood education in the UK. The 'Start Right' Enquiry (Ball 1994; Sylva 1994) reviewed the evidence of British research and concluded that small-scale studies suggested a positive impact but that large-scale research was inconclusive. The Start Right enquiry recommended more rigorous longitudinal studies with baseline measures so that the 'value added' to children's development by pre-school education could be established.

Research evidence elsewhere on the effects of different kinds of pre-school environment on children's development (Melhuish et al. 1990; Melhuish 1993; Sylva & Wiltshire 1993; Schweinhart & Weikart 1997; Borge & Melhuish, 1995; National Institute of Child Health Development 1997) suggests positive outcomes. Some researchers have examined the impact of particular characteristics, e.g. gender and attendance on children's adjustment to nursery classes (Davies & Brember 1992), or adopted cross-sectional designs to explore the impact of different types of pre-school provision (Davies & Brember 1997). Feinstein, Robertson & Symons (1998) attempted to evaluate the effects of pre-schooling on children's subsequent progress but birth cohort designs may not be appropriate for the study of the influence of pre-school education. The absence of data on children's attainments at entry to pre-school means that neither the British Cohort Study (1970) nor the National Child Development Study (1958) can be used to explore the effects of pre-school education on children's progress. These studies are also limited by the time lapse and many changes in the nature of pre-school provision which have occurred. To date no research using multilevel models (Goldstein 1987) has been used to investigate the impact of both type of provision and individual centre effects. Thus little research in the UK has explored whether some forms of provision have greater benefits than others.

In the UK there is a long tradition of variation in pre-school provision both between types (e.g. playgroup, local authority or private nursery or nursery classes) and in different parts of the country reflecting different levels of funding and geographical conditions (i.e. urban/rural and local access to centres). A series of reports (House of Commons Select Committee 1989; DES Rumbold Report 1990; Ball 1994) have questioned whether Britain's pre-school education is as effective as it might be and have urged better co-ordination of services and research into the impact of different forms of provision (Siraj-Blatchford 1995). The EPPNI and EPPE projects are thus the first large-scale British studies on the effects of different kinds of pre-school provision relating experience in particular centres and type of centre to child development.

Overview of Research Methods

The EPPNI and EPPE projects investigate three issues that have important implications for policy and practice:

•the effects on children of different types of pre-school provision,
•the 'structural' (e.g. adult-child ratios) and 'process' characteristics (e.g. interaction styles) of more effective pre-school centres, and
•the interaction between child and family characteristics and the kind of pre-school provision a child experiences.

The research design was chosen to enable investigation of the progress and development of individual children (including the impact of personal, socio-economic and family characteristics), and the effect of individual pre-school centres on children's outcomes at entry to school, through to age 7. The growing field of school effectiveness research has developed an appropriate methodology for the separation of intake and school influences on children's progress using so called 'value added' multilevel models (Goldstein 1987, 1995). As yet, however, such techniques have not been applied to the pre-school sector, although recent examples of value added research for younger ages at the primary level have been provided by Tymms et al. (1997); Sammons & Smees (1998); Jesson et al. (1997); Strand (1997); and Yang & Goldstein (1997). These have examined the relationship between baseline assessment at reception to infant school through to age 7.

The 8 aims of the EPPNI Project

•To produce a detailed description of the 'career paths' of a large sample of children and their families between entry into pre-school education and the first three years of primary school.

•To compare and contrast the developmental progress of 800+ children from a wide range of social and cultural backgrounds who have differing pre-school experiences.

•To separate out the effects of pre-school experience from the effects of education in the first three years of primary school.

•To establish whether some forms of pre-school experience are more effective than others in promoting children's cognitive and social/emotional development during the pre-school years (ages 3-4) and the first three primary years (4-7 years).

•To discover the individual characteristics (structural and process) of pre-school education in centres found to be most effective.

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

•To investigate the medium-term effects of pre-school education on educational performance at age 7 in a way which will allow the possibility of longitudinal follow-up at later ages to establish long-term effects, if any.

•To relate the use of pre-school provision to parental labour market participation.

The sample: Centres and children

In order to maximise the likelihood of identifying the effects of various types of provision, the EPPNI sample was stratified by type of centre and geographical location. The centres were chosen to include a selection of nursery classes and schools, playgroups, private day nurseries, reception classes and reception groups. Thus examples of all major types of pre-school centre in Northern Ireland were included in the study.

Over 700 children were recruited from 80 pre-school centres from all Education & Library Boards in Northern Ireland. Children and their families were selected randomly in each centre to participate in the EPPNI Project. All parents gave written permission for their children to participate. In order to examine the impact of no pre-school provision, an additional sample of 150 children with no pre-school experience were recruited from the year 1 classes which EPPNI children entered.

The progress and development of pre-school children in the EPPNI sample is being followed over four years until the end of year 3 of primary school. Details about length of sessions and number of sessions normally attended per week have been collected to enable the amount of pre-school education experienced to be quantified for each child in the sample. Two complicating factors are that a substantial proportion of children have moved from one form of pre-school provision to another (e.g. from playgroup to nursery class) and some will attend more than one centre in a week. Careful records are necessary in order to examine issues of stability and continuity, and to document the range of pre-school experiences to which individual children can be exposed.

Child assessments

Around the third birthday, or up to a year later if the child entered pre-school provision after three, each child was assessed by a researcher on four cognitive tasks: verbal comprehension, naming vocabulary, knowledge of similarities seen in pictures, and block building. A profile of the child's social and behavioural adjustment was completed by the member of the pre-school staff who knew the child best. If the child changed pre-school before school entry, he or she was assessed again. At school entry, a similar cognitive battery was administered along with knowledge of the alphabet and rhyme/alliteration (literacy measures). The year 1 teacher completed the social behavioural profile.

Further assessments are made at the end of Year 2. In addition to standardised assessments of reading and mathematics, information on school progress, attendance and special needs will be collected. At age 7, children will also be invited to report themselves on their attitudes to school.

Measuring child/family characteristics known to have an impact on children's development

1)Information on individual 'child factors' such as gender, language, health and birth order was collected at parent interview.

2)Family factors were investigated also. Parent interviews provided detailed information about parent education, occupation and employment history, family structure and pre-school attendance. In addition, details about the child's day care history, parental attitudes and involvement in educational activities (e.g. reading to child, teaching nursery rhymes, television viewing etc) have been collected and analysed.

Pre-school Characteristics and Processes

Regional researchers interviewed centre managers on: group size, child staff ratio, staff training, aims, policies, curriculum, parental involvement, etc. 'Process' characteristics such as the day-to-day functioning within settings (e.g. child-staff interaction, child-child interaction, and structuring of children's activities) were also studied. The Early Childhood Environment Rating Scale (ECERS) which has been recently adapted (Harms, Clifford & Cryer 1998) and the Caregiver Interaction Scale (Arnett 1989) were also administered. The ECERS includes the following sub-scales:

- Space and furnishings
- Personal care routines
- Language reasoning
- Activities
- Interaction
- Programme structure
- Parents and staffing

In addition four additional ECERS sub-scales (ECERS-E) describing educational provision in terms of: Language, Mathematics, Science and the Environment, and Diversity were also used in each pre-school centre.

Case Studies

In addition to the quantitative data collected about children, their families and their pre-school centres, detailed qualitative data will be collected using case studies. The case studies were of some "effective" pre-school centres (chosen retrospectively as 'more effective' on the basis of the analyses of ECERS-R, ECERS-E and Inspection Report). This will add the fine-grained detail to how processes within centres articulate, establish and maintain good practice.

The methodology of the EPPNI project is thus mixed. These detailed case studies will use a variety of methods of data gathering, including documentary analysis, interviews and observations and the results will help to illuminate the characteristics of more successful pre-school centres and assist in generating guidance on good practice. Particular attention will be paid to parent involvement, teaching and learning processes, child-adult interaction and social factors in learning. Inevitably there are difficulties associated with the retrospective study of process characteristics of centres and it will be important to examine field notes and pre-school centre histories to establish the extent of change during the study period.

Analytic Strategy

The EPPNI research was designed to enable the linking of three sets of data: information about children's attainment and development (at different points in time), information about children's personal, social and family characteristics (e.g. age, gender, SES etc), and information about pre-school experience (type of centre and its characteristics).

Longitudinal research is essential to enable the impact of child characteristics (personal, social and family) to be disentangled from any influence related to the characteristics of pre-school centre attended. Given the disparate nature of children's pre-school experience it is vital to ensure that the influences of age at assessment, amount and length of pre-school experience and pre-school attendance record are accounted for when estimating the effects of pre-school education. This information is also important in its own right to provide a detailed description of the range of pre-school provision experienced by different children and any differences in the patterns of provision used by specific groups of children/parents and their relationship to parents' labour market participation. Predictor variables for attainment at entry to primary school will include prior attainment (verbal and non-verbal sub scales), social/emotional profiles, and child characteristics (personal, social and family).

The extent to which it is possible to explain (statistically) the variation in children's scores on the various measures assessed at entry to primary school will provide evidence about whether particular forms of pre-school provision have greater benefits in promoting development by the end of the pre-school period. Analyses will test out the impact of measures of pre-school process characteristics, such as the scores on various ECERS scales and pre-school centre structural characteristics such as ratios. This will provide evidence as to which measures are associated with better cognitive and social/behavioural outcomes in children.

Identifying continuing effects of pre-school centres at age 7

Cross-classified multilevel models have been used to examine the long term effects of primary schools on later secondary performance (Goldstein & Sammons, 1997). In the EPPNI research it is planned to use such models to explore the possible mid-term effects of pre-school provision on later progress and attainment at primary school at age 7. The use of cross classified methods explicitly acknowledges that children's educational experiences are complex and that over time different institutions may influence cognitive and

social/behavioural development for better or worse. This will allow the relative strength of any continuing effects of pre-school attendance to be ascertained, in comparison with the primary school influence.

The Linked Study in England 1997-2003

The Effective Provision of Pre-school Education (EPPE) project is a linked project and is under the directorship of Professor Kathy Sylva, Professor Edward Melhuish, Professor Pam Sammons, and Professor Iram Siraj-Blatchford. The study explores the characteristics of different kinds of early years provision and examines children's development in pre-school, and influences on their later adjustment and progress at primary school up to age 7 years. It will help to identify the aspects of pre-school provision which have a positive impact on children's attainment, progress, and development, and so provide guidance on good practice. The research involves 141 pre-school centres randomly selected throughout 5 regions of England. The study investigates all main types of pre-school provision attended by 3 to 4 year olds in England: playgroups, private day nurseries, nursery classes, nursery schools, local authority nurseries and combined centres. The data from England and Northern Ireland offer opportunities for potentially useful comparisons.

Summary

The EPPNI project studies the complicated effects of amount and type of pre-school provision experienced by children and their personal, social and family characteristics on subsequent progress and development. Assessment of both cognitive and social/behavioural outcomes are made. The relationships between pre-school characteristics and children's development can be explored. The results of these analyses and the findings from the qualitative case studies of selected centres can inform both policy and practice. Comparisons with the English study (EPPE) can further illuminate the interpretation of results.

EXECUTIVE SUMMARY

In the first stage of the EPPNI study parents were interviewed concerning child and family characteristics and also children were assessed on social/behavioural and cognitive development. The data provided on child and family characteristics and social/behavioural and cognitive development at the start of the study were used to investigate social/behavioural and cognitive development at 3-4 years in relation to a range of parental, family, child, home and childcare factors. The analysis provides information about associations between variables and should not be automatically interpreted in terms of causality. It is possible that unmeasured factors are producing the effects found. The explanation of cognitive development provided by the analyses presented here is strong whereas the explanation of social/behavioural development leaves much of the variation between children unexplained. This may be explained in part by variation in the sophistication and reliability of measurement available for the two aspects of development. The findings can be summarised as follows:

Parents:
▪Mother's qualification was significantly related to peer sociability and worried/upset behaviour. Children whose mothers had attained a high qualification were rated higher on these variables.

▪For cognitive development two parent variables were significant; socio-economic status and mother's qualifications, showed powerful effects.

Family:
▪None of the family variables had a significant effect on any social/behavioural variables at this first stage in the study.

▪Children with three or more siblings scored lower on cognitive development. Larger families may result in less parent attention being available for any individual child. This decreased individual attention from parents may be the reason for the effects on cognitive development.

Child:
▪Gender had a significant effect on co-operation/conformity and cognitive development, girls scored higher than boys on both.

▪Children with low birth weights and younger children had lower cognitive scores and scored higher on the confidence sub-scale as reported by the pre-school carer.

▪Children with previous behaviour problems were more likely to have lower cognitive development scores. Behaviour problems were also significantly associated with cooperation/conformity, peer sociability and anti-social behaviour. This indicates that early behaviour problems observed at home continue into the pre-school setting.

Home:
▪Those children who had more experience of playing with friends outside of the home showed less peer sociability, confidence and worried/upset behaviour.

▪Those children who had more experience of playing with friends at home showed higher co-operation/conformity and confidence.

▪The variables, whether the child had a regular bedtime and rules concerning TV and video could be regarded as a marker for the degree of structure in the child's home life. These variables were associated with increased confidence. A regular bedtime was also associated with worried/upset behaviour.

▪Higher home learning environment was associated with higher cognitive scores. The effect on cognitive development was particularly pronounced. After age, it was one of the variables with the strongest effect on cognitive development. It's effect was stronger than either social class or parental education, which have often been found to be amongst the strongest predictors of children's cognitive development in previous studies.

▪The importance of the home learning environment indicates that what parents do is more important than who parents are in regard to cognitive development.

Childcare History:
▪Being cared for in a group of children outside the home (e.g. nurseries) before entering the study was slightly associated with increased worried/upset behaviour.

▪Type of target centre attended was significantly associated with several of the social/behavioural variables.

▪Those children who attended private day nurseries scored higher on cognitive development.

▪Time in target centre was associated with cognitive development scores.

INTRODUCTION

The Effective Pre-school Provision in Northern Ireland (EPPNI) project is a research study of children's progress and development from age three to seven years, and how progress relates to their pre-school centre experience and family background.

In the first stage of the study parents were interviewed concerning child and family characteristics and also children were assessed on social/behavioural and cognitive development. The data provided on child and family characteristics and social/behavioural and cognitive development at the start of the study can be used to investigate social/behavioural and cognitive development at 3–4 years in relation to a range of parental, family, child, home and childcare factors.

Much of the data on parents, families and the home, from the EPPE study, has been related to cognitive development by Sammons *et al.* (1999). This paper considered whether the differences in children's level of cognitive attainment was related to the pre-school centre that they attended. Sammons *et al.* (1999) demonstrated that much of the variance in cognitive attainment was related to selected child, parent and home variables. It was further demonstrated that, after allowing for the effects of these child, parent and home variables, there was no significant relationship between cognitive attainment and the type of pre-school attended at the start of the study.

This paper considers the relationship of social/behavioural development and cognitive attainment to the range of variables available in the EPPNI study that measure characteristics of the children, their parents, their family, their home and childcare history. A wide range of variables is considered and the nature of associations between family background and children's development are explored.

The Sample

The focus of the EPPNI study is on the effects of pre-school experience upon children's development. The EPPNI sample was stratified by type of centre and geographical location.

The first stage of the study involved 698 children recruited from 80 pre-school centres, including 176 children from nursery classes, 158 children from playgroups, 141 children from private day nurseries and 223 children from reception groups/classes. The children were aged between 3 years and 4 years 6 months (mean 43.3 months; S.D. = 5.5 months) at the beginning of the study. For 12 families, parents were unavailable for interview. Hence this paper is based on the analysis of data from 686 parental interviews.

METHOD OF DATA COLLECTION

Social/behavioural development

A pre-school centre worker who was familiar with the child was asked to complete the Adaptive Social Behavior Inventory (ASBI) (Hogan *et al.*, 1992). The ASBI provided measures of social/behavioural development.

The Adaptive Social Behavior Inventory (ASBI)

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. A copy of the Adaptive Social Behavior Inventory is included in Appendix 1.

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 have wording suitable for adults of varying education

♦ to have content relevant to a range of home, neighborhood 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.

The three-scale resolution of the ASBI items used by Hogan *et al.* (1992) is described in Appendix 2.

Parental interview

Shortly after these assessments of cognitive and social/behavioural development had been completed, one of the child's parents or guardians was interviewed. In the vast majority of cases the interview was with the child's mother. Parents were interviewed either in person when they were at the pre-school centre, or by telephone. The interview followed a semi-

structured format with answers to most questions being coded into an established set of categories, and a small number of open-ended questions that were coded post hoc. The length of the interviews varied, depending on the complexity of the information to be collected, the conciseness of the parents and other factors. A typical interview might take between fifteen and forty minutes of the parent's time depending upon the complexity of the information supplied by the parent. The interview contained questions dealing with the parents, the family, the child's health, development and behaviour, the child's activities in the home, the use of pre-school provision and the childcare history.

RESULTS
Section A   Developing the Outcome Variables
Social/behavioural development – factor analysis of ASBI items

It was considered important to establish the underlying factors revealed by the empirical data and this was provided by the data available from the EPPE sample. In order to establish the factor structure of the ASBI data a factor analysis was used. The data from the 30 items of the ASBI were entered into a factor analysis using the SPSS software. The method used was Principal Components Analysis with a varimax rotation. This analysis initially produced 5 orthogonal factors; i.e. factors that are not correlated with each other. This is the 5-factor resolution of the ASBI data.

The ASBI items that loaded most heavily on the 5 factors were identified. These items were averaged for each factor to produce factor scores. Examination of the ASBI items loading most heavily on the 5 factors led to the following names being assigned to the factors:

Factor 1   Co-operation/conformity
Example item: is obedient and compliant

Factor 2   Peer sociability
Example item: will join a group of children playing

Factor 3   Confidence
Example item: is confident with other people

Factor 4   Antisocial
Example item: teases other children, calls them names.

Factor 5   Worried/upset
Example item: gets upset if you don't pay enough attention

The interrelationships between the five factors can be seen in Table 1.

Table 1 Correlations between the five factors

	Peer sociability	Confidence	Antisocial	Worried/upset
Co-operation/ Conformity	0.56**	0.40**	-0.45**	-0.19**
Peer sociability	1.00	0.66**	-0.02	0.06**
Confidence		1.00	0.07**	0.15**
Antisocial			1.00	0.35**

** significant at the 0.01 level (2 – tailed)

The correlations reveal the moderately strong positive association between co-operation/conformity, peer sociability and confidence, the moderately strong negative association between co-operation/conformity and antisocial behaviour and the weak negative association between co-operation/conformity and worried/upset behaviour. In addition peer sociability is strongly associated with confidence, and antisocial and worried/upset behaviour are moderately associated. Rather surprisingly there is a weak positive association between confidence and worried/upset behaviour.

Measures of cognitive development

At the start of the study all children were administered four sub-scales of the British Ability Scales (BAS). These were block building, picture similarities, verbal comprehension and picture naming. These four sub-scales were used to compute a total BAS score as an index of children's cognitive attainment at the start of the study. The scores on the four sub-scales and the total score were correlated as shown in Table 2.

Table 2 Correlations between BAS sub-scales

	Picture similarities	Verbal comprehension	Picture naming	Total score
Block building	0.44**	0.44**	0.45**	0.71**
Picture similarities		0.41**	0.47**	0.75**
Verbal comprehension			0.63**	0.81**
Picture naming				0.83**

** significant at the 0.01 level (2 – tailed)

Relationship between the five ASBI factors and cognitive development

Five social/behavioural factors and cognitive development

The 5-factor solution to ASBI was also correlated with BAS sub-scales and BAS total score and this is shown in Table 3.

Table 3 Correlations between BAS and ASBI 5-factor solution

	Block building	Picture similarities	Verbal comprehension	Picture naming	Total score
Co-operation/ Conformity	0.18**	0.20**	0.26**	0.24**	0.32**
Peer sociability	0.10**	0.15**	0.25**	0.23**	0.26**
Confidence	0.10**	0.14**	0.23**	0.22**	0.25**
Antisocial	0.04	-0.05**	-0.05**	0.02	0.05**
Worried/ Upset	0.00	-0.01	0.01	0.02	0.00

** significant at the 0.01 level (2 – tailed)

The pattern of correlations is of low to moderate associations between co-operation/conformity, peer sociability, confidence and all BAS sub-scales, with no association between antisocial and worried/upset behaviours and BAS sub-scales.

SECTION B   DEVELOPING A MODEL OF FACTORS AFFECTING CHILDREN'S DEVELOPMENTAL LEVEL

In order to establish which variables have a significant association with the child development variables of ASBI scores and BAS scores a multiple linear regression was chosen. The first stage of such an analysis requires the selection of possible predictor variables, i.e. the independent variables to be used in the analysis. This section describes the choice of variables from the areas of parental, family, child, home and childcare characteristics.

Parental characteristics

Parental socio-economic status and employment

The parental interview collected information on the employment of the parents. The occupations of the parents were classified according to the Office of Populations Census and Surveys (OPCS) (1995) occupational classification. Hence the paternal and maternal occupational classifications are available as a basis for a classification of socio-economic status (SES). In much research the father's occupational status is taken as the basis for the classification of the socio-economic status of the family. In this study, however, there are many fathers (112, 13 per cent of the sample) for whom data are unavailable: often these are absent fathers. An alternative is to use the occupational classification of the mother, but many mothers live in households with the father as sole breadwinner. A way of overcoming these problems is to assign to the family a socio-economic classification based upon the occupation of the parent with the highest occupational status. This strategy has been adopted here based upon employment at the start of the study. Hence, there are three occupational status measures based on mother's occupation, father's occupation, and mother's and father's occupations combined. Of these three measures, the mother's and father's occupations combined showed the highest correlation with the child's total BAS score at the start of the study. Hence, this was chosen as the measure of socio-economic status of the family for subsequent multi-variate analyses.

Educational qualifications of parents

Qualifications of parents are correlated with each other. Hence, in predicting child's outcomes, similar results often occur when either parent's qualifications are used as a predictor variable. In the EPPE study, mother's qualifications showed a higher correlation with the child's BAS score at the start of the study, and was chosen as the most appropriate measure of parental education for analyses of child outcome variables, hence it is used in the current study also.

Parental occupations and qualifications are themselves associated. Hence measures of socio-economic status and parental education are similarly related. The question is raised of whether variables of socio-economic status and parental education should be used together as predictor variables. In this case, including both socio-economic status of the family and mother's qualifications as predictor variables in a multiple regression accounted for significantly more variance than only using one as a predictor variable. When both of these variables, socio-economic status of the family and mother's qualifications, were used in a multiple regression predicting child's total BAS score, adding any other parental occupation or parental education variable did not significantly increase the variance accounted for in the regression model.

Parental age

Data were also available on parental ages. Mother's age was used in the multiple linear regression models of a child's development level.

Marital status

The issue of whether the child was living with one or both parents was dealt with by the lone parent variable considered under family characteristics below.

Family characteristics

The next set of explanatory variables to be considered concern the characteristics of the child's family. These reflect the number of siblings and whether it is a lone parent family or not.

Child characteristics

Gender and age
Children's development is influenced by gender and age and these two explanatory variables were entered into a multiple linear regression model of development.

Perinatal variables
The parental interview produced several variables concerned with the birth and early postnatal period of the child's life. These variables were birth weight, prematurity and early health difficulties (e.g. breathing, stomach, heart or other problems in the first two months of life). These variables were entered into the regression analyses.

Child health, development and behaviour
Data were collected on the incidence and help/treatment received for health, developmental and behaviour problems since birth. These data were used to construct indices of previous health problems, previous developmental problems, and previous behaviour problems. Another child variable was health in the last six months.

All of these child variables were tested in the regression models for child developmental outcomes.

Home characteristics

Home learning environment
The parental interview asked several questions concerned with learning and play activities in the home. An index of the home learning environment (HLE) was constructed from the answers to these questions. There were seven types of home learning activities covered in the parental interview. These were
♦ reading
♦ library visits
♦ playing with letters or numbers
♦ painting and drawing
♦ playing/teaching alphabet or letters
♦ playing/teaching with numbers/shapes
♦ playing/teaching of songs/nursery rhymes.

From the answers given in the interview each activity was rated on a scale 0–7 where 0 is not occurring and 7 is occurring very frequently. These ratings were then combined to form the Home Learning Environment index (HLE). This index was related to the scores on the British Ability Scales (BAS) for the children at the start of the study. The correlation between the index of Home Learning Environment and total BAS score was 0.26. This index was also related to both measures of socio-economic status of the family (r=0.14) and educational qualifications of the mother (r=0.20). While there is a positive association between HLE and parents' socio-economic status and mothers' qualifications, there are families which are high on SES and mothers' qualifications which provide a home environment low on the HLE index. Conversely there are families low on SES and mothers' qualifications who provide a home high on the HLE index.

Other aspects of the home environment
Other aspects of the home environment that were available from the parental interview include:
♦ whether there were rules about bed time
♦ whether there were rules about TV watching
♦ the amount of TV watching
♦ the frequency of playing with friends at home
♦ the frequency of playing with friends out of home.

These home environment variables were all included in the range of variables used in developing regression models of the child's social/behavioural and cognitive development.

Childcare characteristics

Parents were asked about their use of childcare from the child's birth until starting in the target centre. For each childcare arrangement, the child's age at the start and end of the period of childcare, and the number of hours per week were recorded. From this record the child's experience of childcare besides attending the target centre was established in terms of:
♦ Total amount of relative care before entering the study
♦ Total amount of other individual care before entering the study
♦ Total amount of group care before entering the study
♦ Time in the target pre-school centre before entering the study.

Total amount of relative care

This referred to care by a relative of the child and might be grandparent, aunt, uncle, elder sibling or other relative. Overwhelmingly the most common form of relative care was by grandparents.

Total amount of individual care
This referred to care by an individual who was not a relative of the child. It might be care by a childminder, nanny, neighbour or friend.

Total amount of group care
This referred to care in group settings such as day nursery or playgroup, before starting at the target centre, where the child was recruited to the study.

Time in target centre
Children in the study start at the target pre-school centre at different ages and attend for different times. These variations have been discussed in Melhuish *et al.* 1999. Variables reflecting the early age of starting are the child's age when starting at the target pre-school, and the elapsed time since the start at pre-school and the child entering the study. Variables affecting the attendance of the child are the sessions and hours per week attended. From these variables it is possible to construct a variable of the time at the target pre-school centre before the start of the study. This latter variable shows the highest correlation of these interrelated variables with the child's total BAS score at the start of the study. When any other of the variables related to previous attendance at the target pre-school are added to a multiple regression model of child's BAS score, which includes this predictor variable of previous target attendance, no significant increase in variance accounted for occurred. Hence this was the variable reflecting age of starting and time at the target centre used in regression models of child's developmental level.

Type of target centre
This referred to the type of target centre the child was attending at entry to the study. There are five different types: nursery class/school, playgroup, private day nursery, reception class and reception group.

These variables reflecting the child's childcare history were used in regression models of child developmental level. The total list of independent variables in the regression model is included here.

Parental characteristics
Socio-economic status
Mother's level of employment
Father's level of employment
Mother's qualifications
Father's qualifications
Mother's age
Father's age
Marital status

Family characteristics
Lone parent
Number of siblings

Child characteristics
Birth weight
Perinatal health difficulties

Previous developmental problems
Previous behaviour problems
Previous health problems

Home characteristics
Home learning environment
Rules about bedtime
Rules about TV
Play with friends at home
Play with friends elsewhere

Childcare characteristics
Total relative care before entering the study
Total individual care before entering the study
Total group care before entering the study
Time in target centre before entering the study

Analysis strategy

The parent, family, child, home and childcare variables were entered into a regression model using the "enter" method. The variables that had statistically significant effects were retained in the model. The other factors were then reentered and removed one at a time to ensure all variables with statistically significant effects were included. The final regression models for each outcome variable retained only the predictor variables found to have statistically significant effects on the outcome variable.

The cognitive data is used in regression analyses in Section C. The data on social/behavioural development are dealt with in terms of the five-factor solution as this provides the most detailed breakdown of results Following the analyses of the cognitive data the five-factor resolution of social/behavioural data is used in regression analyses in Section D.

SECTION C   COGNITIVE DEVELOPMENT

The children in the study were all assessed for their level of cognitive attainment at the start of the study. The assessment used were four sub-scales of the British Ability Scales (BAS). These sub-scales (block building, picture similarities, verbal comprehension and picture naming) were summed to produce an overall assessment of cognitive attainment. The final regression model including only significant predictor variables is presented.

Final regression model for overall cognitive scores

R = 0.71
R^2 = 0.50
Adjusted R^2 = 0.49
$F_{(26, 676)}$ = 24.83, significance $p < 0.001$

	Standardized β	Significance
PARENTS		
SES – comparison to professional		
Intermediate	-0.13	0.001
Skilled non-manual	-0.16	0.000
Skilled manual	-0.16	0.000
Semi-skilled	-0.14	0.000
Unskilled	-0.17	0.000
Unemployed/student	-0.09	0.005
Mother's qualifications. – comparison to none		
16 vocational	*n.s.*	
16 academic	n.s.	
18 vocational	n.s.	
18 academic	n.s.	
Degree/postgraduate	0.09	0.008
FAMILY		
Number of siblings – comparison to none		
Sibs = 1	*n.s.*	
Sibs = 2	*n.s.*	
Sibs = 3+	-0.09	0.014
CHILD		
Age	0.67	0.000
Birth weight	0.15	0.000
Developmental problems – comparison to none		
Low	n.s.	
Moderate–high	-0.09	0.001
Behavioural problems – comparison to none		
Low	-0.07	0.017
Moderate-high	-0.06	0.052
HOME		
Learning environment	0.17	0.000
CHILDCARE		
Time in target centre	-0.11	0.001
Type of target centre – comparison to nursery class/school		
Playgroup	n.s.	

Private Day Nursery	0.09	0.035
Reception Class	n.s.	
Reception Group	n.s.	

The regression model for overall cognitive development was very strong accounting for more than 49 per cent of the variance. As expected, overwhelmingly the strongest variable was age at assessment. The next strongest effects were for the variables: home learning environment, socio-economic status, birth weight and the childcare variable of time at target centre. This group of variables all showed strong effects of the same order of magnitude. Other significant effects were mother's qualification, number of siblings, previous developmental and behaviour problems and type of target centre.

Summary of Section C: Regression Analyses for Cognitive Development

The regression model accounts for 49 per cent of the variance. This is high in relation to most studies of cognitive development in the early years. There are many variables that show significant effects upon cognitive development at the start of the study. Some of these effects are powerful and others are relatively weak. The effects for the various categories of parental, family, child, home and childcare variables are summarized below.

Parents
In the final regression model, two parent variables were significant; socio-economic status and mother's qualifications. For socio-economic status, all groups scored significantly less than the professional group. Mother's qualifications were also significant. Where mothers with qualifications lower than degree or no qualification, the children's BAS scores were similar. However children whose mothers had a degree/postgraduate qualification scored higher than mothers' with no qualifications.

Family
Of the family variables number of siblings was the only significant variable in predicting children's cognitive scores. Where there were three or more siblings cognitive scores decreased significantly.

Child
Amongst the child variables: age and birth weight were strong significant predictors of cognitive scores, with older children and children of higher birth weight scoring higher.

Home
Of the variables related to home environment, the variable home learning environment had a powerful effect. Children from homes rated as having a greater home learning environment scored higher on the BAS.

Childcare
Amongst the childcare history variables, time in target centre, and attendance at a private day nursery showed significant effects. Children who attended private day nursery scored higher than children attending nursery classes/schools.

SECTION D   SOCIAL/BEHAVIOURAL DEVELOPMENT

Analysis of the five social/behavioural factors

The Principal Components Analysis produced five factors, which are analysed in this section. These are the factors of co-operation/conformity, peer sociability, confidence, antisocial and worried/upset behaviour. These factors were analysed for the effects of parent, family, child, home and childcare variables as described earlier. In the following pages only the variables which emerged with statistically significant effects are shown in the final regression models.

Co-operation/conformity
The Principal Components Analysis produced co-operation/conformity. (This factor was essentially equivalent to compliance (see appendix 2) in the three-factor resolution of ASBI data.)

Final regression model of predictors for co-operation/conformity

R = 0.28
R^2 = 0.08
Adjusted R^2 = 0.07
F (8, 658) = 7.06, significance p<0.001

Variable	Standardized β	Significance
PARENTS		
FAMILY		
CHILD		
Gender	-0.12	0.002
Age	0.16	0.000
Previous behaviour problems – comparison to none		
Low	-0.08	0.050
Moderate-high	-0.11	0.005
HOME		
Peer play at home – comparison to none		
1 day a week	0.13	0.002
2 days a week	n.s.	
3 days a week	n.s.	
4 or more days a week	n.s.	
CHILDCARE		

The variable of co-operation/conformity was derived from the Principal Components Analysis of ASBI items, and was highly correlated with the compliance scale (r=0.87).

Parent
None of the parental variables, for example socio-economic status, parental qualifications, or age, were significantly related to co-operation/conformity.

Family
None of the family variables, for example number of siblings or whether or not it was a lone parent family, were significantly related to co-operation/conformity.

Child
Several child variables were related to co-operation/conformity. Girls were rated significantly higher than boys, and older children were also rated higher on co-operation/conformity. Previous behavioural problems were also related to lower co-operation/conformity scores.

Home
Peer play at home once a week was significantly related to higher co-operation/conformity scores. Children with peer play at home more than once a week showed no difference in their scores when compared to children with no peer play at home.

Childcare
The childcare variables were total relative care, individual care and total group care before entering the study and time in the target centre and type of target centre. Of these variables none were significantly related to co-operation/conformity.

Final regression model of predictors for peer sociability

R = 0.21
R^2= 0.05
Adjusted R^2 = 0.03
F (12,654) = 2.55, significance p<0.0005

Variable	Standardized β	Significance
PARENTS		
Mother's qualification – comparison to none		
16 vocational	n.s.	
16 academic	n.s.	
18 vocational	n.s.	
18 academic	n.s.	
Degree/postgraduate	0.12	0.008
FAMILY		
CHILD		
Age	0.09	0.022
Previous behaviour problems – comparision to none		
Low	n.s.	
Moderate-high	-0.08	0.028
HOME		
Peer play out of home – comparison to none		
1 day a week	n.s.	
2 days a week	n.s.	
3 days a week	-0.08	0.044
4 or more days a week	n.s.	
CHILDCARE		

Parent
Of the parent variables only mother's qualification was significantly related to peer sociability. Where the mother had a degree or postgraduate qualification the child scored higher on the peer sociability sub scale than children whose mother had no qualifications.

Family
None of the family variables, for example number of siblings or whether it was a lone parent family, were significantly related to peer sociability.

Child
Age was related to peer sociability, with older children scoring higher. Moderate-high previous behaviour problems were associated with lower peer sociability.

Home

Children with peer play out of home three days a week scored significantly lower than children who had no peer play. Peer play out of home more or less frequent than this showed no significant effect on peer sociability.

Childcare
None of the childcare variables, for example total individual care, total group care or total relative care before entering the study, were significantly related to peer sociability.

Final regression model of predictors for confidence

R = 0.24
R^2= 0.06
Adjusted R^2 = 0.03
$F_{(17, 657)}$ = 2.30, significance $p<0.002$

Variable	Standardized β	Significance
PARENTS		
FAMILY		
CHILD		
Age	0.20	0.004
Previous developmental problems- comparison to none		
Low	0.08	0.040
Moderate-high	n.s.	
HOME		
Regular bed time	0.08	0.053
Rules concerning tv/video	0.09	0.019
Peer play at home – comparison to none		
1 day a week	0.12	0.008
2 days a week	n.s.	
3 days a week	n.s.	
4 or more days a week	n.s.	
Peer play out of home – comparison to none		
1 day a week	-0.12	0.014
2 days a week	n.s.	
3 days a week	n.s.	
4 or more days a week	n.s.	
CHILDCARE		
Type of target centre – comparison to nursery class/school		
Playgroup	0.11	0.028
Private day nursery	0.11	0.046
Reception class	-0.12	0.028
Reception group	n.s.	

Parent

None of the parental variables, for example socio-economic status, parental qualifications, or age, were significantly related to confidence.

Family
None of the family variables, for example number of siblings or whether it was a lone parent family, were significantly related to confidence.

Child
Of the child variables age and previous developmental problems were related to the confidence sub scale. Older children scored higher as did children with a low level of previous developmental problems.

Home
Several home variables were related to confidence. In homes with a regular bed time and/or rules concerning TV and video (both of which may be regarded as a proxy variable for degree of structure in the home) children scored higher on confidence. Peer play at home once a week was associated with higher confidence, while peer play out of home once a week was associated with lower confidence.

Childcare
The regression model shows that children attending playgroups or private day nurseries have greater confidence than children attending nursery class/schools. While children attending reception classes have lower confidence than those at nursery classes/schools.

Final regression model of predictors for antisocial behaviour

R = 0.28
R^2 = 0.08
Adjusted R^2 = 0.06
F (10, 664) = 5.34, Significance p<0.001

Variable	Standardized β	Significance
PARENTS		
FAMILY		
CHILD		
Previous behaviour problems- comparison to none		
Low	0.08	0.048
Moderate-high	0.08	0.039
Home		
CHILDCARE		
Type of target centre – comparison to none		
Playgroup	n.s,	
Private day nursery	0.21	0.000
Reception class	n.s.	
Reception group	n.s.	

The factor of antisocial behaviour was derived from the factor analysis of ASBI items, and is equivalent to a sub-scale of disruptive behaviour (see appendix No.2).

Parent
None of the parental variables, for example socio-economic status, parental qualifications, or age, were significantly related to antisocial behaviour.

Family
None of the family variables, for example number of siblings or whether or not it was a lone parent family, were significantly related to antisocial behaviour.

<u>Child</u>
Of the child variables only previous behaviour problems had a significant effect. Those children with previous behaviour problems scored higher on antisocial behaviour than those who had none.

<u>Home</u>
None of the home variables were significantly related to antisocial behaviour.

<u>Childcare</u>
Children who attended private day nurseries were rated higher on antisocial behaviour than children who attended nursery classes/schools.

Regression model for worried/upset behaviour

$R = 0.26$
$R^2 = 0.07$
Adjusted $R^2 = 0.04$
$F(15, 652) = 2.97$, Significance $p < 0.001$

	Standardized β	Significance
PARENTS		
Mothers qualification – comparison to none		
16 vocational	n.s.	
16 academic	n.s.	
18 vocational	n.s.	
18 academic	0.13	0.003
Degree/postgraduate	0.10	0.030
FAMILY		
CHILD		
HOME		
Regular bed time	0.08	0.048
Peer play out of home – comparison to none		
1 day a week	-0.11	0.010
2 days a week	-0.08	0.050
3 days a week	-0.10	0.020
4 or more days a week	n.s.	
CHILDCARE		
Group care	0.08	0.040
Type of target centre – comparison to nursery class/school		
Playgroup	0.10	0.038
Private Day Nursery	0.10	0.025
Reception Class	n.s.	
Reception Group	n.s.	

Of the parent variables only mother's qualifications was significant. Where the mother had attained an 18 academic or degree/postgraduate qualification children scored higher, than when the mother had no qualifications.

Family
None of the family variables, for example number of siblings or whether it was a lone parent family, were significantly related to worried/upset behaviour.

Child
The child variables were birthweight, perinatal health difficulties, previous developmental and behaviour problems. However none of the child variables were significantly related to scores on the worried/upset sub scale.

Home
In homes with a regular bed time (which might be regarded as a proxy variable for degree of structure in the home) children scored higher on the worried sub scale. Peer play out of home once, twice and three times a week was associated with worried/upset behaviour.

Childcare
Three aspects of previous childcare experience had significant effects. Those children with more group care had higher worried scores. Children attending playgroups and private day nurseries scored higher on the worried/upset sub scale than children attending a nursery class/school.

SUMMARY OF SECTION D   REGRESSION ANALYSES FOR SOCIAL/BEHAVIOURAL DEVELOPMENT

The regression models accounted for a relatively small part of the total variance of the children's scores on the social/behavioural measures in the first stage of the study. Nonetheless there are a range of variables which do show significant effects. Some of the significant effects are quite strong and others are relatively weak. It is a characteristic of studies with very large samples that weak effects can still prove to be statistically significant upon social/behavioural development. The effects for the various categories of independent variables, i.e. parent, family, child, home, and childcare, are summarized here.

Parent
The parental variables had few effects. The variables of socio-economic status, mother's qualifications, mother's age, father's age, mother's part/full-time employment, father's part/full-time employment were all used in the regressions. The variable mother's qualification was significantly related to both peer sociability and worried/upset behaviour. For peer sociability the children whose mother had attained a degree/postgraduate qualification were rated more highly than other children in the study. While for the worried/upset variable the children whose mother had attained an 18 academic qualification or above were rated higher than those whose mothers had not.

Family

The family variables were number of siblings and whether or not it was a lone parent family. Neither of these variables had a significant effect on any of the social/behavioural variables at this first stage in the study.

Child

The child variables had effects on all measures of social/behavioural development except for the worried/upset behaviour variable. Gender had a significant effect on co-operation/conformity with girls scoring higher than boys.

Age had significant effects on co-operation/conformity, peer sociability and confidence, with older children scoring higher. There were no age effects on antisocial or worried/upset behaviour when all other variables had been accounted for.

The child's level of previous behaviour problems, reported by the parent, had a significant effect on co-operation/conformity, peer sociability and anti-social behaviour. Those children with low and moderate-high levels of previous behaviour problems scored lower on co-operation/conformity, with moderate to high levels of previous behaviour problems children scored lower on peer sociability. Children with a low level of previous behaviour problems scored higher on confidence. Those children with previous behaviour problems scored higher on antisocial behaviour, indicating that early behaviour problems observed at home are continuing in their effect into the pre-school environment.

Those children with a low level of previous developmental problems scored higher on confidence than those with none.

Home

Variables deriving from the home environment had significant effects on all five measures of social/behavioural development. The variables whether the child had a regular bed time and rules concerning TV and video were aimed at tapping the degree of structure in the child's home life. Children with regular bed time were found to have higher scores on confidence and worried/upset behaviour than children who did not. Children in households with rules concerning TV and video scored higher on confidence than households which did not.

Co-operation/conformity and confidence were influenced by peer play at home. Children who played with friends at home once a week scored higher on these variables of social/behavioural development than those who did not. Peer sociability, confidence, and worried/upset behaviour were influenced by peer play out of home with children who played with friends out of home scoring less on these variables than those who did not.

Childcare

Variables related to the child's childcare experience had significant effects on three of the measures of social/behavioural development. Considering childcare before starting at the target centre, more group care was associated with higher levels of worried/upset behaviour.

Concerning type of target centre, at this early stage, the effects were few and relatively weak. Children who attended playgroups were rated higher on confidence and worried/upset behaviour than those who attended nursery class/school. Children who attended private day nurseries had higher confidence, antisocial behaviour and worried/upset behaviour. While children who attended reception class were rated lower on confidence than those who attended nursery school. Again it should be noted that these ratings were taken at an early stage of the study so the effect of the different types of target centre have not yet truly emerged.

SUMMARY AND DISCUSSION

The final regression models accounted for a small part of the variation amongst children for social/behavioural development, but a large part of the variation for cognitive development. Hence the explanatory value of the models is much stronger for cognitive development.

Parents

The parental variables had few effects upon social/behavioural development, while having stronger predictive powers for cognitive development. Socio-economic status, mother's qualifications and mother's age were all used in the regressions. Socio-economic status had no effect on the social/behavioural variables at this first stage in the study. Mother's qualification had a significant effect on peer sociability and worried/upset behaviour. For both of these social/behavioural variables the children of mothers who had attained a degree/postgraduate qualification were rated higher than other children in the study. For cognitive development two parent variables were significant: socio-economic status and mother's qualification. For socio-economic status all groups scored significantly less than the professional group. Mother's qualifications were also significant. Mothers with a degree/postgraduate qualification, their children's BAS scores were higher than children whose mothers had no qualifications. The results relating to parent variables are similar to findings in other studies (e.g. Davie, Butler & Goldstein 1972). They reflect the greater resources (personal and material) that are often more available to parents of higher SES and qualifications for providing a nurturing environment for their children.

Family

The family variables had no significant effects on any of the social/behavioural variables at this first stage in the study. However children with three or more siblings scored lower on cognitive development. Larger families may result in less parental attention being available for any individual child. This decreased individual attention from parents may be the reason for the effect on cognitive development.

Child

The child variables included gender, age, aspects of previous health, previous developmental problems and previous behaviour problems.

Gender had a significant effect on co-operation/conformity and cognitive development scores. Girls scored higher than boys on both. These results suggest that pre-school gender differences are precursors of later gender differences found in schools.

Age was an important variable, being associated with increased co-operation/conformity, peer sociability and confidence and higher cognitive development scores, reflecting general developmental trends.

Children with lower birth weights had lower cognitive development scores. Where children had previous developmental problems (e.g. speech problems, late to walk) they were more likely to have lower cognitive development scores. Children with a low level of previous developmental problems had higher confidence. These may reflect a general developmental effect for development related problems.

Where children had previous behaviour problems reported by the parent, they had lower co-operation/conformity and peer sociability and higher antisocial behaviour. Children also have lower cognitive scores. This indicates that early behaviour problems observed at home continue into the pre-school environment.

Home

Several aspects of the home environment were recorded from the parent interview, including the home learning environment, play with friends in different settings, television watching and household rules.

Co-operation/conformity and confidence were influenced by peer play at home. Children who played with friends at home once a week scored higher in these variables of social/behavioural development. Peer sociability, confidence and worried/upset behaviour were influenced by peer play out of home, with children who played with friends scoring less in these subscales.

The variables : whether the child had a regular bed-time and rules concerning watching TV and videos could be regarded as markers for the degree of structure in the child's home life. Children with a regular bed-time were found to have higher scores on confidence and worried/upset bahaviour. Children in households with rules concerning watching TV and videos scored higher on confidence.

The variable home learning environment produced the strongest effect on the cognitive scores after age. The correlation between learning environment and total BAS scores was 0.26 which indicates the strength of association, which is greater than that between BAS scores and demographic variables such as socio-economic status and parental education that have often been found to be amongst the strongest predictors of children's cognitive development (e.g. Davie, Butler and Goldstein 1972). The importance of the home learning environment indicates that what parents do is more important than who parents are.

It is rare for a large-scale study, longitudinal or not, to include process variables indicative of family interaction processes or patterns of experience in the home other than the standard structural demographic variables such as social class or parental education. The strength of the effect of this variable could well be informative to projects targeted on improving the home environment of children with regard to reducing social exclusion, for example Sure Start. The components of the variable learning environment in the home provide a starting point for consideration of which aspects of family life may be involved in efforts to produce measurable beneficial effects upon children's development.

It is quite possible that the strong relationship between home learning environment and cognitive scores is mediated by some intervening unmeasured factor. Those parents who answer the questions concerned with learning environment in a way leading to a high score may well have other characteristics, which lead their children to have higher cognitive scores. This question would require a detailed study of home experiences contributing to cognitive development, and may ultimately be unanswerable. At this stage, the home learning environment would appear to be a good starting point for a project concerned with improving children's development. One possible way forward would be a randomized control trial or other systematic study of an intervention e.g. a parent support programme, targeted on the components of the home learning environment.

<u>Childcare</u>

The childcare history variables considered were relative care (e.g. grandmother), individual care (e.g. childminders), group care (e.g. day nurseries, playgroups) and time at the target centre (i.e. centre the child attended upon entering the study). These variables were all measured in terms of total time before entering the study. Of these variables, group care was associated with higher levels of worried/upset behaviour. Children who had been in the target centre longer at the time of assessment surprisingly had lower cognitive scores.

Additionally the type of target centre the child attended upon entry to the study was considered. At this early stage, the effects were few and relatively weak. Children who attended playgroups were rated higher on confidence and worried/upset behaviour than those who attended nursery class/school. Children who attended private day nurseries had higher confidence, antisocial behaviour and worried/upset behaviour. While children who attended reception class were rated lower on confidence than those who attended nursey school. Children who attended private day nursery scored higher than children attending nursery classes/schools on cognitive development scores. Again it should be noted that these ratings were taken at an early stage of the study so the true effect of the different type of target centres has not yet fully emerged.

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APPENDIX 1   ADAPTIVE SOCIAL BEHAVIOR INVENTORY

Name of child .... Name of Centre ....

Date of Birth ....Name of administrator...

Date of administration .... **R or NSAA**

1. Understands others' feelings, like when they are happy, sad or mad123

2. Is helpful to other children123

3. Is obedient and compliant123

4. When you give him/her an idea for playing, he/she frowns,

   shrugs shoulders, pouts or stamps foot123

5. Follows rules in games123

6. Gets upset when you don't pay enough attention123

7. Is sympathetic toward other children's distress, tries to comfort

         others when they are upset123

8. Waits his/her turn in games or other activities123

9. Is open and direct about what he/she wants123

10. Cooperates with your requests123

11. Can easily get other children to pay attention to him/her123

12. Says nice or friendly things to others, or is friendly towards others123

13. Will join a group of children playing123

14. In social activities, tends to just watch other123

15. Follows household or pre-school centre rules123

16. Says 'please' and 'thank you' when reminded123

17. Asks or wants to go play with other children123

18. Is calm and easy-going123

19. Plays games and talks with other children123

20. Shares toys or possessions123

21. Teases other children, calls them names123

22. Is confident with other people123

23. Prevents other children from carrying out routines123

24. Tends to be proud of things she/he does123

25. Accepts changes without fighting against them or becoming upset123

26. Bullies other children123

27. Is interested in many and different things123

28. Is worried about not getting enough

(where enough might include attention, access to toys, food/drink etc.)123

29. Is bossy, needs to have his/her way123

30. Enjoys talking with you123

R or N – Rarely or Never   S – Sometimes   AA – Almost Always

APPENDIX 2: THE THREE-SCALE RESOLUTION OF ASBI ITEMS

In developing the inventory, Hogan *et al.* (1992) conducted a factor analysis of data from 545 3-year-old American children. The factor analysis strategy was chosen to maximize the independence of the factors and an orthogonal rotation procedure was selected. This procedure produces uncorrelated factors. Another criterion was to produce similar factor solutions for boys and girls. The factor analysis led to the selection of 30 items that comprised three scales: Social Competence (Express), Comply and Disrupt.

The **social competence** scale contains items such as:

♦'understands others' feelings, like when they are happy, sad or mad';

♦'is open and direct about what he/she wants'.

Note: Hogan *et al.* (1992) named this scale Express. In this paper the more transparent term Social Competence will be used.

♦The **comply** scale contains items such as:

♦'is helpful to other children';

♦'shares toys or possessions'.

Sample items from the **Disrupt** scale are:

♦'gets upset when you don't pay enough attention';

♦'is bossy, needs to have his/her way'.

Three-scale resolution for ASBI

The 30 items of the ASBI were used to compute the social competence, comply and disrupt scales as described by Hogan *et al.* (1992). Scores on the social competence, comply and disrupt scales were produced by computing the average of the items scores for the items contributing to each of the scales. The interrelationships between the three scales can be seen in Table 4.

Table 4 Correlations between social competence, comply and disrupt

	Social competence	Comply
Comply	0.52**	
Disrupt	0.02	-0.51**

** significant at the 0.01 level (2 – tailed)

Social competence shows a positive association with comply but almost no association with disrupt. There is a negative association between social competence and disrupt. This indicates

that children high on social competence are also likely to be rated as compliant; and children rated as highly compliant are unlikely to be rated as disruptive.

Relationship of the five-factor and three-scale resolutions

The five factors produced by the factor analysis of the EPPE data were then correlated with the thee scales produced by the Hogan *et al.* method of combining items. The resulting correlations can be seen in Table 5.

Table 5 Correlations of three-factor and five-factor solutions to ASBI data

	Social competence	Comply	Disrupt
Co-operation/ Conformity	0.25**	0.87**	-0.37**
Peer Sociability	0.77**	0.31**	-0.02
Confidence	0.58**	0.16**	0.15**
Antisocial	0.02	-0.21**	0.69**
Worried /upset	0.01	-0.20**	0.57**

** significant at the 0.01 level (2 – tailed)

It would appear from these correlations that co-operation/conformity and comply are extremely similar ($r = 0.87$) antisocial and worried/upset are strongly correlated with disrupt ($r = 0.69$ and 0.57) while peer sociability and confidence are both highly related to social competence ($r = 0.77$ and $r = 0.58$).

Inspection of the items contributing to co-operation/conformity and comply confirms almost complete overlap and that they can be regarded as functionally equivalent.

Inspection of the items contributing to antisocial, worried/upset and disrupt shows that the disrupt scale is a combination of the antisocial and worried/upset items.

The items which make up social competence are almost the same as the list of items which is made by adding those loading most heavily on peer sociability with those loading most heavily on confidence. Hence it would appear that the five-factor solution has split the items of the social competence scale into two separate contributing factors. To summarize:

♦ Social competence is separated into factors of peer sociability (factor 2) and confidence (factor 3).

♦ Comply is equivalent to compliance/conformity (factor 1).

♦ Disrupt is separated into antisocial (factor 4) and worried/upset (factor 5) behaviours.

Three social/behavioural scales and cognitive development

The three ASBI scales developed by Hogan *et al.* were correlated with the four BAS sub-scales and total score of the BAS as shown in Table 6.

Table 6 Correlations between BAS and ASBI three-scale resolution

	Block building	Picture similarities	Verbal comprehension	Picture naming	Total Score
Social competence	0.12**	0.16**	0.27**	0.26**	0.30**
Comply	0.18**	0.20**	0.25**	0.23**	0.30**
Disrupt	-0.06	-0.06	-0.05	-0.03	-0.07

** significant at the 0.01 level (2 – tailed)

All the BAS scores show a similar pattern of significant low to moderate levels of association with the social competence and comply dimensions, but almost no association with the disrupt dimension.

This pattern is congruent with the conclusions reached earlier about the nature of the equivalence between the three- and five-factor resolutions to the ASBI data.