



Department
for Education

Effective pre-school, primary and secondary education project (EPPSE 3-16+)

**How pre-school influences children and
young people's attainment and
developmental outcomes over time**

Research Brief

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**Brenda Taggart*, Kathy Sylva, Edward Melhuish+\$, Pam Sammons\$
and Iram Siraj***

***UCL Institute of Education, University College London, + Birkbeck,
University of London, \$University of Oxford**

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Background: The early years landscape

Since the early 1990's early childhood education (ECE) in England has changed dramatically. Once seen as simply a preparation for school, what happens to young children between the age of 3 and 5 is now an important phase of education in its own right and one with long term implications for children as learners.

One driver for change was the increasing numbers of women entering the workforce, leading to a growing awareness of the importance of ECE and care. Another, was international tests¹ that focused on educational 'standards' and led to an increased interest in the skills and dispositions children have when entering statutory schooling with at age 5. This drew attention to the pre-school phase where children attended some form of group day-care provision either in a school/private nursery, crèche, playgroup or other types of setting. There were concerns about the extent to which early years providers included 'education' as well as 'care' and prepared children for the demands of a national curriculum. Curriculum guidelines (DfEE/SCAA; 1996; DfEE 1999), were introduced to help the workforce improve their educational offer, especially in literacy and maths, with a view to aligning early years practices with the later statutory national curriculum. During this period, (when the EPPSE study recruited families into the research) provision for early years was far from uniform. As non-statutory, the sector had expanded according to the laws of supply and demand with a growing number of voluntary and private providers alongside provision funded by the state. There were considerable geographical and socio-economic differences in the parents' access to a pre-school and the quality and nature of the provision varied widely (DfES, 1990, Sylva & Pugh, 2005).

Since the 1990s there has been radical reform (Taggart et al., 2008; Taggart, 2010a). Notable policy changes have included: The Early Years Foundation Stage (DfES 2006; DCSF, 2009; DfE, 2012 revised) that sets out the statutory requirements for children's safety, welfare and good development that includes monitoring and assessment arrangements; inspections carried out by the Office for Standards in Education against a common framework for all providers (revised Ofsted, 2014); universal entitlement to a funded nursery place for every 3 (2005) and 4 (2000) year old (DES/DWP, 2002) funded provision for disadvantaged 2 year olds (DfE, 2011) and significant investment in up-skilling the workforce (Mathers et al., 2011; Mathers & Sylva, 2007; Nutbrown 2012). These reforms have been implemented to increase access to pre-school and so enhance children's development including their emotional, physical, social and intellectual capabilities. In addition they were intended to help address the effects of disadvantage and place all children on sound learning trajectories. The Effective Pre-school, Primary and Secondary Education (EPPSE) research has contributed evidence that has underpinned many of these reforms.

¹ PISA = Programme for International Student Assessment; TIMSS = Trends in International Mathematics and Science Study; PIRLS = Progress in International Reading Literacy Study (see PIRLS 2001).

Introduction to the EPPSE Project (EPPSE 3- 16+) 1997 - 2014

This Research Brief summarises some of the findings from The Effective Pre-school, Primary and Secondary Education Project (EPPSE), a longitudinal study (1997 – 2014) funded by the Department for Education². The main focus of EPPSE was to investigate the influence of pre-school on children's academic and social-behavioural outcomes. The research also studied the role of the home learning environment (HLE), the family, neighbourhood and other school experiences on children's learning, progress and dispositions. It was able to do this because of the sample and methodology used. EPPSE recruited to the study 2,800 children from 6 English Local Authorities who attended 141 pre-school settings spanning the private, voluntary and maintained sectors (Sylva et al., 2004a, 2004b). When these children entered school (age 5) a further 380 children, who had little/no pre-school experience joined the study (the 'home' or no pre-school group).

Children were assessed on their cognitive/academic and social-behavioural development at entry to the study and their parents interviewed to obtain social demographic and background information. They were followed up throughout their school careers until just after they completed compulsory education. The main reporting ages were 3, 5, 6, 7, 10, 11, 14 and 16 (see Appendix 1). At the end of each Key Stage assessment data was obtained from the National Pupil Database and social-behavioural profiles compiled from teachers' reports. Teachers, parents and students were regularly sent questionnaires about their views and circumstances.

In addition to child, family and school information EPPSE compiled measures of pre-school quality from two internationally recognised observation instruments: ECERS-R (Harms et al., 1998) and ECERS-E (Sylva et al., 2003 revised 2011) that together explored a setting's structural and process characteristics as well as curriculum provision.

This short summary of the influence of pre-school at different time points cannot detail all of the findings from this 17 year project, instead it summarises some of the key findings on the importance of pre-school over time. Information on other important predictors, such as family characteristics etc. can be found in many Technical Papers and end of phase reports. For information on the economic returns of pre-school, student's views of school, case studies of effective practice, children who succeed against the odds and many other strands of this programme of research readers are advised to visit <http://www.ioe.ac.uk/research/153.html>

²The 4 phases of the research are: The Effective Provision of Pre-school Education (EPPE, 1997 – 2003), Effective Pre-school and Primary Education project (EPPE 3-11, 2003 – 2008), Effective Pre-school, Primary and Secondary Education project (EPPSE 3-14, 2008 – 2011) and Effective Pre-school, Primary and Secondary Education project (3-16+, 2011 – 2014).

Key findings on the influence of pre-school on outcomes

EPPSE explored pre-school as a predictor of outcomes over time. Data was analysed using multilevel modelling (Goldstein, 1995) enabling the net influence of attendance (attending v non attending), duration (in months), effectiveness and the quality of settings to be estimated having already taken account of other (individual, family, etc.) background characteristics. The key findings are outlined below:

- Pre-school has a positive and long term impact on children's attainment, progress and social-behavioural development.
- At school entry (age 5), attending pre-school improved children's academic and social outcomes with an early start (before 3) and attending a high quality setting being particularly beneficial. Full time attendance led to no better gains than part-time (half day) provision.
- Pre-school continued to influence outcomes throughout primary school especially if it was of high quality. At age 11, high quality pre-school was especially important for boys, pupils with SEN and those from disadvantaged backgrounds. High quality pre-school enhanced the maths outcomes for disadvantaged pupils and for those of low qualified parents.
- The pre-school influence continued during secondary school. Those who attended high quality pre-school had higher attainment and better social-behavioural development at age 14 (KS3). By age 16 (KS4) there were no lasting pre-school effects on social behaviours but attending a pre-school predicted better GCSE results. This positive influence was greater for those who had started at an earlier age (before 3) or who had attended a pre-school of high quality. Beyond compulsory schooling, students who attended pre-school were more likely to go onto higher academic study, taking four or more AS/A levels³.
- At a range of time points, disadvantaged children gained from high quality pre-school. It reduced the risk of anti-social or worried behaviour and improved attainment. It was particularly importance for children who had a less stimulating home learning environment or who were from families where parents had poor or no qualifications.
- The Institute of Fiscal Studies (IFS) estimated that pre-school attendance and attending a pre-school of high quality lead to positive financial returns over life time earnings to the individual, a household and the Exchequer.

³ Higher academic route = 4 or more AS/A levels, Lower academic route = 3 or fewer AS/A levels, Vocational route = those who did not take any AS/A levels

The enduring legacy of pre-school

The focus of this Research Brief is on pre-school but the EPPSE findings, detailed in many reports (see Appendix 2 for key documents) describe children not on their own, but as part of families and neighbourhoods. Findings on the strength (Effect Size) of the pre-school influence are usually reported alongside other background factors contained in the statistical models. This enables the strength of any one predictor, such as pre-school quality, to be compared with other individual, (gender etc.), family (SES etc.), and home learning environment (Early Years etc.) characteristics. Appendix 3 gives examples of the strength of other influences on children's development, and may help to put the findings on pre-school in wider context.

Greater attendance, duration and quality of pre-school all enhanced pupil's attainment, progress and development at different time points.

Entry to school (age 5)

When children entered school around the age of 5 the benefits of having attended any pre-school became apparent. Those who attended pre-school, compared to those who did not, had better attainment in language, pre-reading and early number concepts after controlling for the influence of background characteristics. With higher scores for independence, concentration, co-operation, conformity and peer sociability, the pre-school group appeared to be better socially adjusted.

At this age, the duration of attendance was also important with an earlier start (under 3 years) being related to better development for language, pre-reading, early number concepts and non-verbal reasoning. A longer duration (in months) also improved independence, concentration and sociability. Going to pre-school part time (half a day) was found to be just as good as having attended full time.

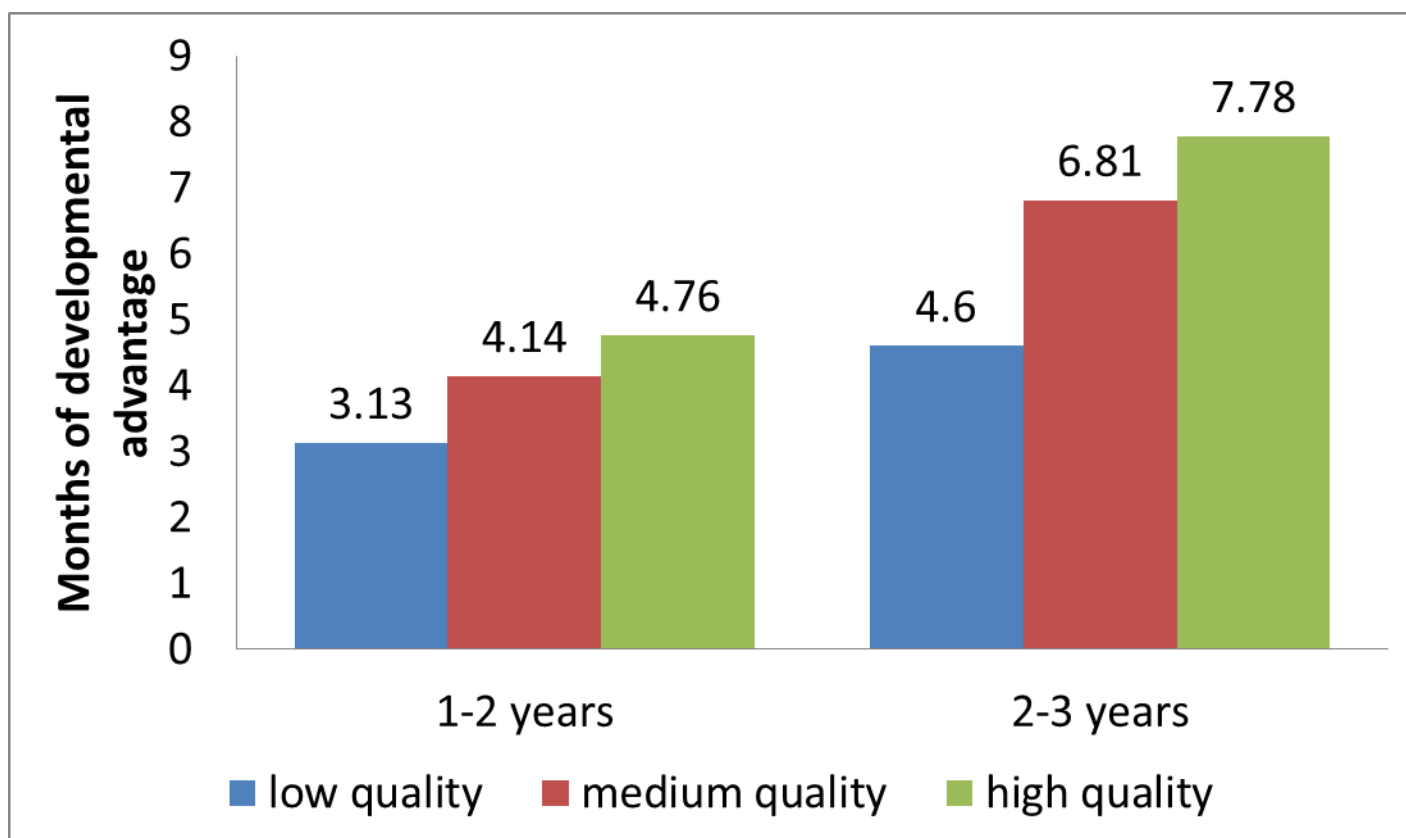
The quality of the pre-school was identified as positive for a range of academic outcomes but the effects were strongest for pre-reading. Children who attended pre-school centres of high quality also showed reduced anti-social/worried behaviour when they entered school.

Although good quality was found across all types of settings it was highest overall in the education maintained sector (integrated settings⁴, nursery schools and nursery classes). The maintained sector had staff with higher qualifications, with a good proportion of trained teachers interacting with children on a daily basis.

⁴ In 1997 combined or integrated centres were the newest form of provision. They combined 'education' and 'care' and often provided 'wrap-around' services such as parental support, health advice etc. Most were former nursery schools that became the model for the development of Sure Start Children's Centres.

Fig 1 below shows the advantage in terms of months of development of longer duration and higher quality on literacy at school entry. It shows that children who attended high quality pre-school for 2-3 years were nearly 8 months ahead in their literacy development compared to children who had not attended pre-school.

Figure 1: Development advantage (in months) for duration and quality of pre-school on literacy at school entry (home as comparison)



Primary school (age 7 – 11)

The beneficial effects of pre-school remained evident to the end of Key Stage 1 (age 7) and 2 (age 11), although for some outcomes they were not as strong as they had been at school entry.

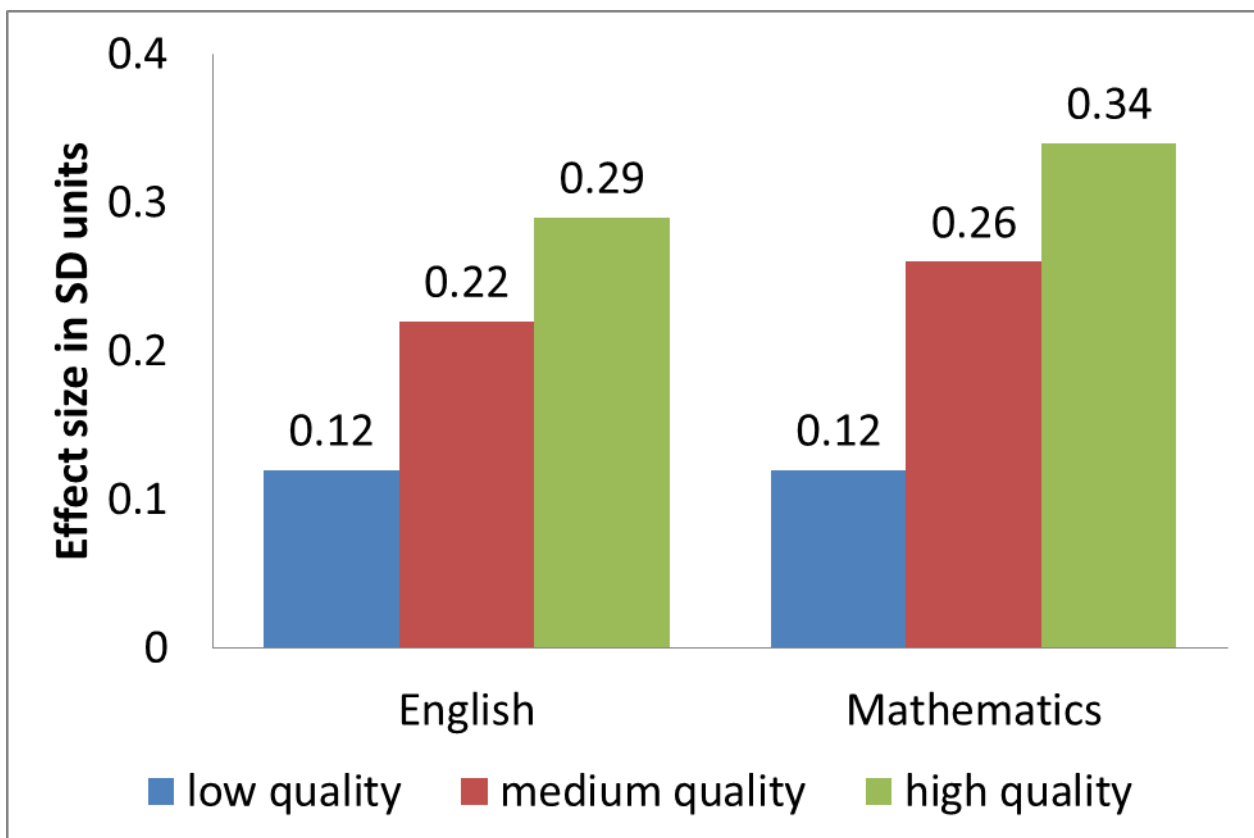
Attending any pre-school showed positive effects for English, maths and pro-social behaviour at the end of KS2. However, these effects were largely carried by settings of medium or high quality. Attending a low quality pre-school no longer showed any significant effects however, the number of months a child attended pre-school (duration) continued to have an effect on their progress throughout KS1, although this was stronger for academic skills than for social-behavioural development. At the end of KS2 the effects of duration no longer reached statistical significance.

The quality of pre-school attended continued to show small positive effects throughout the primary years. Children who attended high quality pre-school had statistically significant better attainment in reading and maths at age 6. At age 7 the relationship between quality and academic attainment

was weaker but still evident. In addition, the combined effect of high quality and longer duration had the strongest effect on development. At this age the effect of quality alone on social-behavioural development was no longer significant.

As Fig 2 shows, the benefits of both medium and high quality pre-school persisted to the end of KS2 (age 11) for attainment in Reading/English and maths. In addition, attending a more effective pre-school (one that promoted early number concepts) had particular benefits for later attainment in maths.

Figure 2: Influence of pre-school quality on academic outcomes age 11 (home as comparison)



There were also benefits at age 11 for the social-behavioural development of boys (ES⁵ from 0.28 to 0.45 depending on the outcome), for children with SEN (ES from 0.23 to 0.39), and for children from disadvantaged backgrounds (ES from 0.29 to 0.34) where they had attended higher quality pre-school.

⁵ES = Effect sizes which compare the relative strength of different influences. An ES of 0.1 is relatively weak, one of 0.35 moderately strong, one of 0.7 strong.

Children who had attended poor quality pre-school (compared to the no pre-school group) showed no significant benefits other than slightly better pro-social behaviour but this was offset by poorer rating for hyperactivity.

In addition, the quality of pre-school positively influenced pupils own views of their primary school and the extent to which they reported, they 'enjoyed school'. An analyses of questionnaires returned by pupils showed that 'Enjoyment of primary school' was slightly higher in pupils who had attended a high quality pre-school (ES=0.18) and pupils' views of a positive social (primary school) environment were significantly influenced by the quality of their pre-school (ES=0.20). For more detail see Sammons et al., 2008a; Sammons et al., 2008b. One way to interpret these findings is that attendance at a high quality pre-school enhanced children's capacity to enjoy their primary school.

Secondary school (age 11 – 16)

Although somewhat reduced, the influence of pre-school on outcomes remained significant at the end of Key Stage 3 (age 14 see Sammons et al., 2011a; 2011b) and 4 (age 16 see Sammons et al., 2014a; 2014b; 2014c; 2014d)

At age 14 there was no statistically significant influence detected for attendance at pre-school, but it is worth noting that at age 14 the academic measure (Key Stage 3 National Assessments) changed during the period of assessment (see Sylva et al., 2013, Sammons et al., 2011). Attendance was important again at age 16 where attending pre-school predicted higher total GCSE score (ES=0.31), more full GCSE entries (ES=0.21), better grades in GCSE English (ES=0.23) and maths (ES=0.21) and a higher probability of achieving 5 A*-C including English and maths (OR⁶=1.48). The benefit of attending any pre-school was equivalent to 41 points at GCSE which represents the difference between getting 7 GCSE at 'B grades versus 7 GCSE at 'C' grades, or 7 'C' grades versus 7 'D' grades etc.

Similarly at age 14 there was no influence detected for the duration of pre-school but, as with attendance above, this was significant at age 16 with students who spent longer in pre-school (between 2 or 3 years) obtaining higher total GCSE scores (ES=0.38), better grades in GCSE English (ES=0.28) and in maths (ES=0.30), and entering for more GCSE exams (ES=0.24).

The influence of quality remained throughout secondary schooling on a range of outcomes. At age 14, pre-school quality predicted academic and social-behavioural outcomes especially where it was of high quality or where the pre-school was particularly effective (see later section on what makes an effective pre-school). High quality pre-school continued to show an effect on attainment in maths (ES=0.28 for high quality versus low quality). In science, only those who had attended a

⁶ OR = Odds Ratios represent the odds of achieving certain benchmark performance indicators given certain characteristics relative to the odds of the reference group.

high or medium quality pre-school continued to show significantly better attainment than the no pre-school group.

At age 14, students who attended a pre-school that was highly effective in promoting pre-reading skills had better outcomes for English. For maths, all pre-school effectiveness groups (ES=0.36 for high; ES=0.22 for medium; ES=0.30 for low effectiveness) had better KS3 results than the no pre-school group. Attendance at a high (ES=0.33) or medium effective (ES=0.19) pre-school predicted better outcomes in science compared to the no pre-school group.

Higher pre-school quality also predicted better self-regulation, pro-social, hyperactivity and anti-social behaviour at the end of KS3 (age 14) as seen in Figures 3 and 4 below.

Figure 3: Influence of the quality of pre-school on positive social behaviours at age 14 (home as comparison)

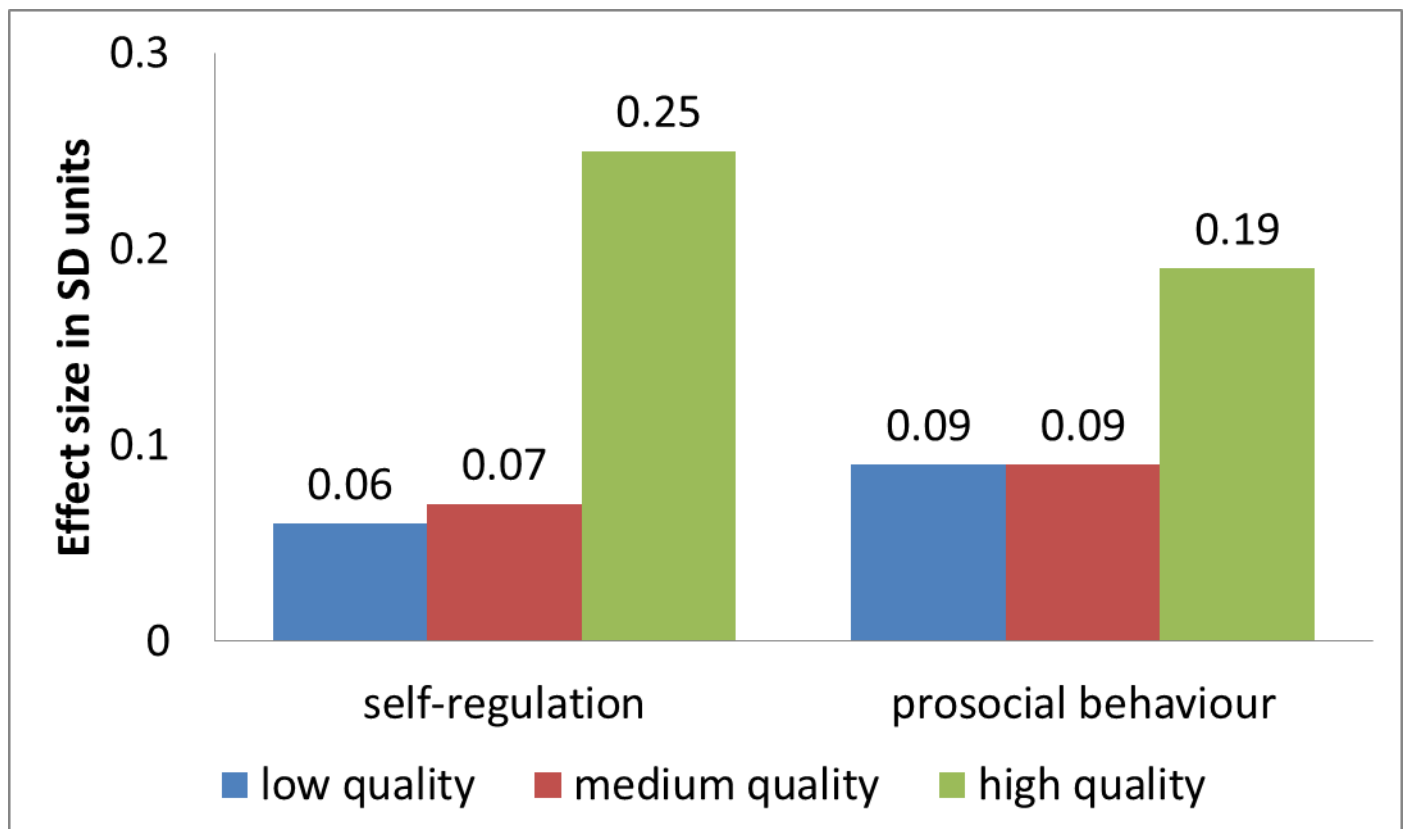
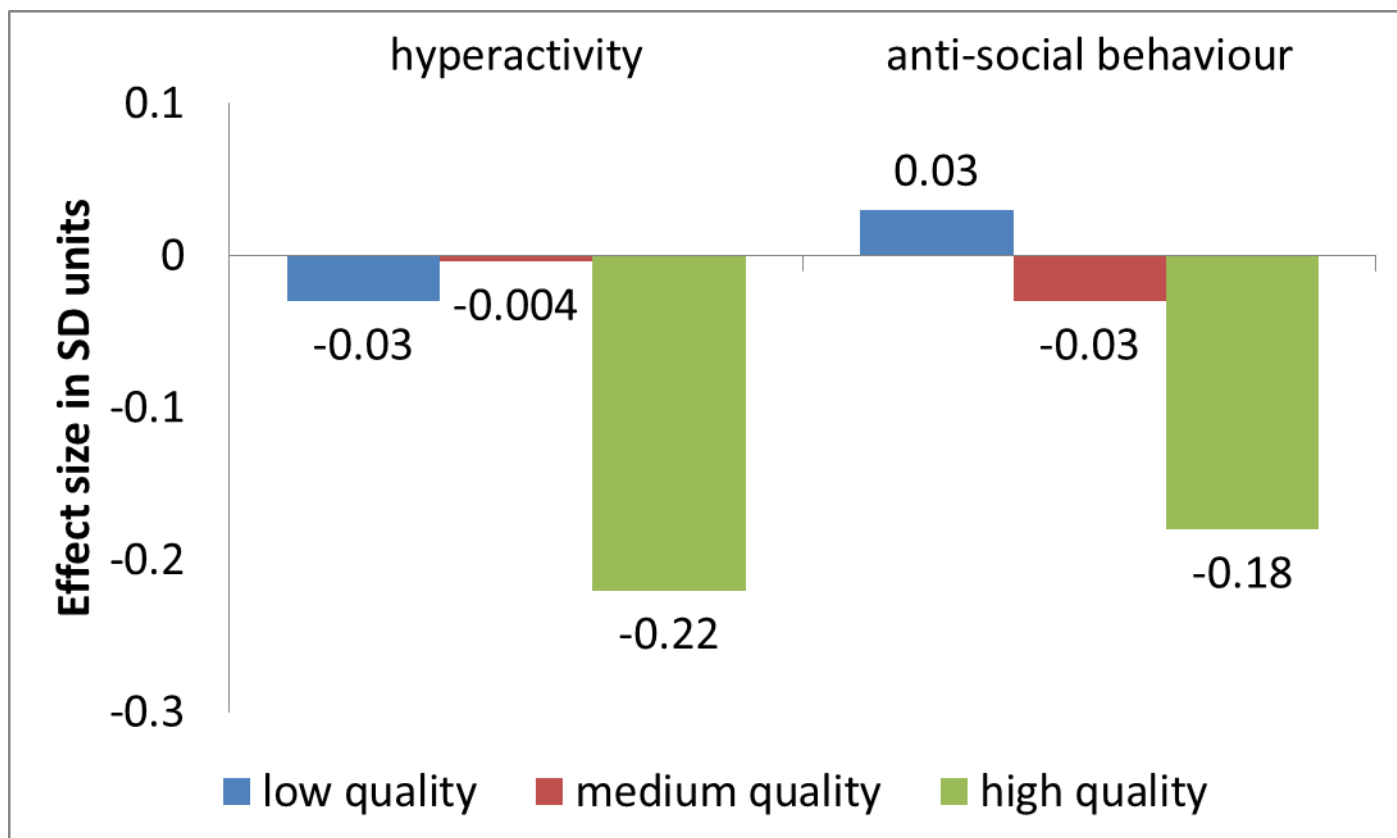


Figure 4: Influence of the quality of pre-school on negative social behaviours at age 14 (home as comparison)



At the end of secondary school (age 16) pre-school quality still predicted academic attainment with high quality being associated with better total GCSE scores (ES=0.37) and English (ES=0.31) and maths (ES=0.36) grades. Students who had attended high quality pre-schools were more likely to achieve 5 A*-C including English and maths (OR=1.69).

As Table 1 below shows, the benefit of attending any pre-school, compared to none, is equivalent to 41 points at GCSE. This is the equivalent to the difference between getting 7 GCSE at 'B' grades versus 7 GCSE at 'C' grades, or 7 'C' grades versus 7 'D' grades etc. Attending for longer duration or a high quality pre-school showed even stronger effects.

Table 1: Total GCSE scores showing the influence of pre-school attendance, duration and quality

<i>Comparison group is no pre-school</i>	Effect Size	Point score difference	Equivalent to GCSE grades (approx)*
Attending any pre-school	0.31	41	7 grades
Attending any pre-school for 2 years or more	0.38	51	8 grades
Attending high quality pre-school	0.37	49	8 grades

*e.g. this represents the difference between getting 7 GCSE at 'B' grades versus 7 GCSE at 'C' grades, or 7 'C' grades versus 7 'D' grades) etc. Each difference in grade at GCSE is the equivalent of 6 points.

In addition, students who attended a more effective pre-school (for pre-reading) were entered for more GCSEs (ES=0.25), obtained better grades in English (ES=0.31), and had a higher probability of achieving 5 A*-C including English and maths (OR=1.73). The effectiveness of the pre-school in promoting early number concepts was apparent in better GCSE grades in maths (ES=0.35) and total GCSE score (ES=0.48).

An analyses of the 'joint effects' of pre-school quality and gender showed that boys who had attended a medium (ES= 0.33) or a high quality (ES= 0.41) pre-school obtained significantly higher grades in GCSE maths than those in lower quality or who did not attended pre-school.

Although the effect of pre-school quality on social-behavioural development was weaker than at earlier time points, students who had attended high quality pre-schools had better self-regulation (ES=0.14), pro-social behaviour (ES=0.16) and reduced hyperactivity (ES=-0.20), when they reached age 16.

Beyond compulsory education age 16+

As Table 1 above shows there is an enduring influence of pre-school attendance, quality and duration on academic outcomes at age 16. Beyond age 16, pre-school attendance (OR = 2.79), duration (OR = 4.38), quality (OR = 2.79) and effectiveness (OR = 3.06) all predicted a greater likelihood of following a higher academic route after GCSEs (studying 4 or more AS levels), rather than a vocational one⁷.

Predicted economic returns to individuals, households and society

Estimates of the benefits upon future earnings of attending a pre-school and the additional benefits of attending one of high quality was conducted by the Institute of Fiscal Studies (Cattan et al., 2014).

Cattan and colleagues calculations explored the likely earnings/benefits of attending any pre-school vs. not attending, and attending pre-schools of different quality. Each of the effects was modelled for lifetime gross earnings to the individual, a household and on specific returns to the Exchequer.

- Children who had attended pre-school are likely to earn, on average, around £27,000 more over their working lives than children who receive little or no pre-school experience, and around £36,000 more taking into account the earnings of other members of their household.

⁷ Higher academic route = 4 or more AS/A levels, Lower academic route = 3 or fewer AS/A levels, Vocational route = those who did not take any AS/A levels

Attending pre-school also translates into an estimated benefit of around £16,000 lifetime benefits to the Exchequer (per household).

- There were also greater financial benefits for children who attended a high or medium quality pre-school compared to those who went to pre-schools of low quality. The benefits of higher quality, for individual life time earnings were around £12,000, rising to £19,000 for a household. The benefits to the Exchequer associated with higher quality were estimated at around £8,000 (per household).

The economic findings add further to the empirical argument in favour of pre-school attendance and high quality provision.

Disadvantaged groups

Disadvantaged children often suffer from multiple 'risk' factors such as living in poverty, in a workless household and/or where parents have poor academic qualifications. The rich EPPSE data is well placed to explore what happens to different groups of children, with different background characteristics, over time. Given the limitations of this Research Brief readers are strongly advised to look at the project reports for the full range of findings, only a few of which are highlighted below.

The long term consequences of living in poverty

The impact of living in poverty can have long term consequences. Overall students living in poorer households (eligible for Free School Meals) had lower full GCSE grades in English and maths and those in more disadvantaged neighbourhoods had lower GCSE scores at age 16 and poorer development in self-regulation and pro-social behaviour even after allowing for family disadvantage.

Pre-school cannot eliminate the adverse effects of disadvantage but it can ameliorate these. Pre-school, especially if it is of high quality, can act as a 'protective' factor for disadvantaged children. For instance high quality pre-school reduced the risk of anti-social/worried behaviour for children during their early years with disadvantaged children doing better if they had attended a pre-school with a mixture of children from different social backgrounds rather than going to a setting containing largely numbers of disadvantaged children. Of particular importance is the finding that having attended a high quality pre-school reduced the effects of multiple disadvantage on later attainment and progress in primary school (Hall et al., 2012).

Can pre-school make a difference to children with SEN?

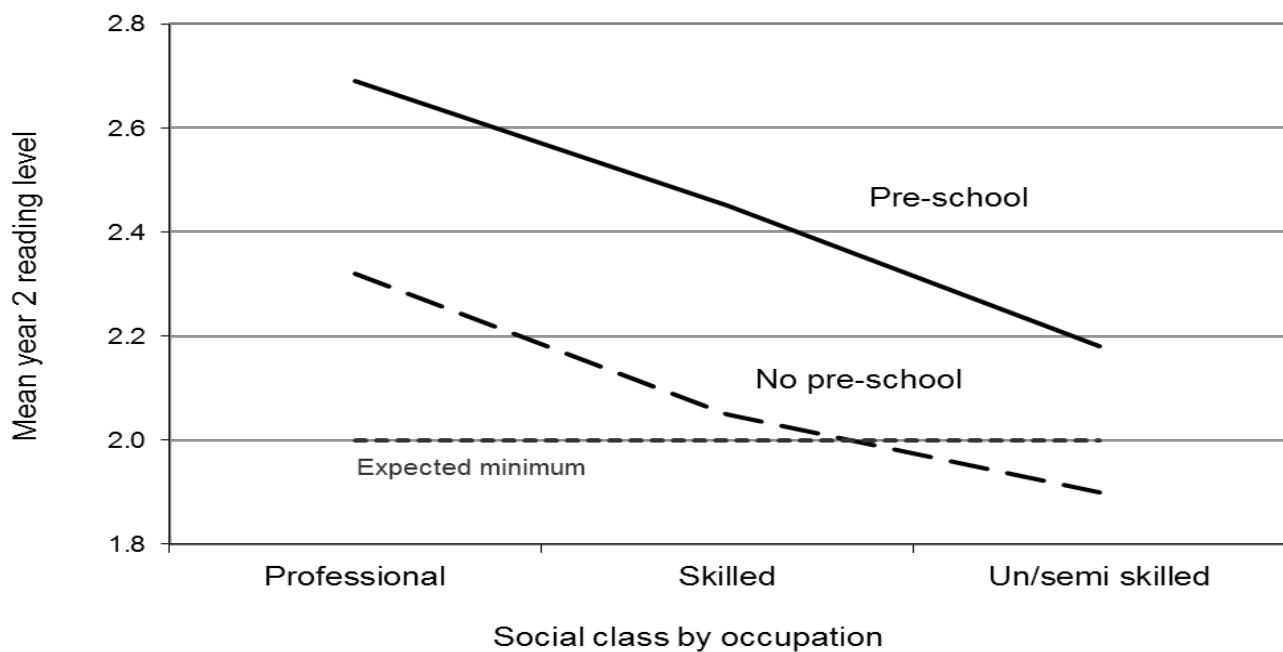
One in three children assessed by EPPSE during pre-school were 'at risk' of developing learning difficulties. This fell to one in five by the time they started primary school, suggesting that pre-school can be an effective intervention for the reduction of special educational needs (SEN).

By age 7, whilst only 2.3% of the EPPSE sample had full statements of SEN, more of the children who had not been to pre-school fell into this category. Further analyses of attainment in KS2 showed that high quality pre-school reduced the risk of later SEN identification. For more information on SEN and early years see Sammons et al., 2002; 2004; 2008c; , Anders et al, 2010; Taggart et al., 2004; 2006, Taggart 2010b.

Can pre-school make a difference to children from low SES families?

Attending pre-school made a particular difference to the attainment of children from lower socio-economic groups. Fig 5 below shows that for the most disadvantaged groups it can make the difference between achieving the nationally expected level or falling behind by the end of Key Stage 1. Thus the consequences of attending pre-school are particularly important for this group as children who are already falling behind by age 7 are likely to need additional help throughout Key Stage 2 to help them catch up. Later interventions such as Reading Recovery etc. also tend to be more expensive the older the child is.

Figure 5: The influence of pre-school attendance on reading (age 7) by social class groups



Does the quality of pre-school make a difference to disadvantaged children?

At age 11 having attended a high quality pre-school was especially beneficial for boys, pupils with special educational needs (SEN) and those from disadvantaged backgrounds for most social-behavioural outcomes. For maths, high quality pre-school was especially beneficial for the most disadvantaged pupils (ES=0.21) and for those of low qualified parents (ES=0.28). Children from less stimulating homes were more responsive to the quality of pre-school provision than those from homes that had high levels of stimulation and intellectual challenge.

By age 14 having attended a high quality pre-school showed particular benefits for those children who were disadvantaged due to a poor early years Home Learning Environment (HLE). These young people showed better self-regulation at secondary school if they had attended a pre-school of high quality rather than low quality or no pre-school (ES=0.50).

By age 16 the quality of pre-school was especially important for children whose parents had low or no qualifications. Table 2 below shows that students of low qualified parents who attended high quality pre-school had better grades in GCSE English (ES= 0.35) and in maths (ES= 0.25) compared to similar students who had not attended pre-school.

Table 2: The influence of high quality pre-school for children of parents with low qualifications on GCSE English and maths.

<i>Comparison group – Low qualified parents with no pre-school</i>	Effect size	Point score difference	Equivalent to GCSE grades (approx.)
GCSE English Students with low qualified parents attending high quality pre-school.	0.35	2.62	Just under half a grade
GCSE – Maths Students with low qualified parents attending high quality pre-school.	0.25	2.27	A third of a grade

As a mixed methods study, the EPPSE quantitative data explored ‘protective’ factors which helped to ameliorate the negative effects of poverty and disadvantage. These findings are complemented by in-depth qualitative analyses that explore, through child and family case studies, the stories of children on different developmental pathways including those who ‘succeed against the odds’ (Siraj-Blatchford, 2010a; Siraj-Blatchford et al., 2011; Siraj et al., 2014).

What makes a high quality, effective pre-school?

This Research Brief has summarised the benefits of high quality pre-school. Quality can be expressed in many ways but in the EPPSE study ‘quality’ was measured using three internationally recognised observation instruments: the Early Childhood Environment Rating Scale-Revised (ECERS-R, Harms et al., 1998), the Early Childhood Environment Rating Scale-Extension (ECERS-E, Sylva et al., 2003) and the Child-Care Interaction Scale (Arnett 1989). These quality ratings have predicted, over time, better outcomes and this makes for a persuasive argument regarding the benefits to children of providing good, high quality early learning experiences.

The ECERS-R has 7 sub-scales: Space and furnishing, Personal care routines, Language and reasoning, Activities, Social interactions, Organisation and routines and Adults working together. The ECERS-E has of 4 sub-scales: Literacy, Maths, Science/environment, and Diversity.

The following is an abbreviated example of an ECERS-E item and how it can be scored to capture quality with ratings from ‘low’ (inadequate) to ‘high’ (excellent) for the quality of interactions and extending children’s abilities in taking and listening.

Table 3: Abbreviated ECERS-E item: Talking and Listening

Inadequate	Minimal	Good	Excellent
<p>Very little encouragement or opportunity for children to talk to adults.</p> <p>Most verbal attention from adults is of a supervisory nature.</p>	<p>Some conversation between adults and children does occur.</p> <p>Children are mostly permitted to talk amongst themselves. There is little adult intervention to extend conversation.</p>	<p>Interesting experiences are planned by adults and drawn upon to encourage talk and the sharing of ideas.</p> <p>Children are encouraged to ask and answer questions.</p> <p>Adults create one-to-one opportunities to talk with children by initiating conversations with individuals.</p>	<p>Adults provide scaffolding for children’s conversations with them, that is, they accept and extend children’s’ verbal contributions in conversation.</p> <p>Children are often encouraged to talk in small groups and adults encourage their peers to listen to them.</p>

Although the rating scales provide indications of quality on more global domains, the quantitative analyses was limited in providing information on the day-to-day practices that appear to make a difference to children's outcomes.

In order to look more closely at pre-school pedagogy the EPPSE study conducted analyses on all 141 pre-schools to see whether or not some settings were more 'effective' than others. An effective setting is one in which a child makes attainment and progress beyond what could have been predicted given their background characteristics. The EPPSE definition of 'effectiveness' is based on child outcomes (e.g. pre-reading, verbal comprehension scores etc. detailed in Sylva et al., 1999) which is understood as a necessary but insufficient component of quality on its own.

Having established that some pre-schools are more 'effective' than others⁸ (Sylva et al., 2004a; 2004b) EPPSE sought to investigate the day-to-day practices evident in 'excellent' and 'good' setting in order to describe some of the characteristics of effective provision (Siraj-Blatchford 2008; Siraj-Blatchford et al., 2002; 2003).

Case studies were conducted in 12 settings, across a range of providers, selected on the basis of the quantitative analyses of their children's outcome data which demonstrated the effectiveness of the setting. To be included as an effective pre-school in the case studies a setting also had to have consistently high ECERS scores. This combination of high ECERS scores and high effectiveness ratings yielded a sample of settings that were studied to help explain what makes a good quality/effective pre-school. Highly effective provision was related to outcomes but also to the quality of the child care and pedagogical practices on offer. The relationship between ratings of quality and child outcomes has been explored earlier in this Research Brief but it is worth noting that many of the characteristics of effective settings, as identified in the case studies findings, are captured by the ECERS. This is especially so for the ECERS-E with its focus on the pedagogy⁹.

Whilst the settings chosen for the case studies showed a great deal of variation in the conditions and services they provided (e.g. salaries ranging from £3,000 to £24,000), the research nevertheless saw patterns in the observational data that enabled distinctions to be made that differentiated excellent and good settings. The findings showed that children benefitted in high quality, effective settings that:

- viewed academic and social development as equally important but maintained a strong educational focus, especially where a higher proportion of trained teachers working alongside less well qualified staff. There was no tendency for centres that were more effective in promoting children's intellectual development to be less effective at promoting

⁸ In highly effective (excellent) setting children made progress significantly above what would have been expected given their individual/home characteristics.

⁹ Pedagogy refers to instructional techniques/strategies/interactive processes that enables learning to take place as well as aspects of the learning environment (organisation of materials etc.) and how they are harnessed to foster learning.

social-behavioural development (or vice versa). In other words the most effective centres promoted both.

- had strong leadership and long serving staff who had a good knowledge of the early years curriculum, child development and young children as learners;
- provided a good balance of practitioner initiated and freely chosen play activities, with adults that extended children's learning opportunities and provide on-going formative feedback;
- provided adult-child interactions that involved 'sustained shared thinking' and open-ended questioning to extend children's thinking being mindful of differentiation and children's individual needs;
- had behaviour policies that supported children rationalising and talking through areas of conflict;
- encouraged parental involvement and hold regular discussion with parents about their child's progress.

This Research Brief can only capture some of the key findings of the exploration of effective pre-school pedagogy and practice. For more details see Siraj-Blatchford et al., 2002; 2003; 2008.

The EPPSE sample

The EPPSE study was commissioned in 1997 to investigate the influences on children development, most notably pre-schooling. To this end 2,800 children were recruited to the study from 6 English Local Authorities. These children, from four academic cohorts came from different types of pre-school provision (141 in total) spanning the private, voluntary and maintained sectors (Taggart et al., 1999). At entry to the study, age 3, children were assessed on their cognitive/academic and social-behavioural development and their parents interviewed to obtain social demographic and background information (Melhuish et al., 1999). When these children entered compulsory schooling (age 5) a further 310 children, who had little/no pre-school experience joined the study (the 'home' or no pre-school group, see Sammons et al., 2003a; 2003b).

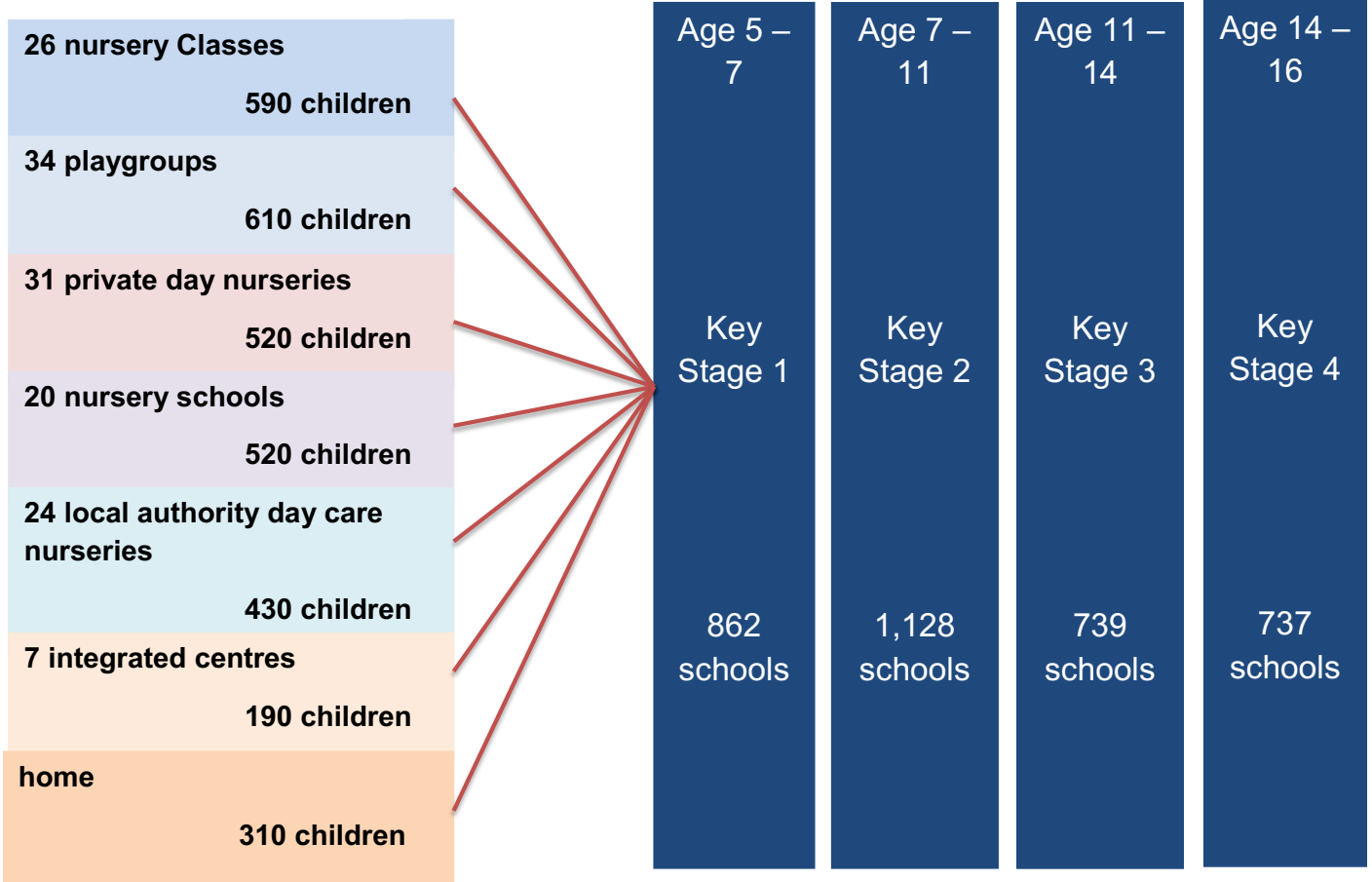
All children continued to be monitored throughout their school careers until 6 months after they left compulsory education as illustrated below. Cognitive/academic assessment were at entry to the study (aged 3) and entry to school (age 5) on a range of assessment from the British Ability Scales (Elliot et al. 1996) and at the end of each Key Stage (aged 7, 11, 14 and 16) from information obtained from the National Pupil Database¹⁰. Standardised assessment were also administered at ages 6 and 10. Social-behavioural profiles were derived from reports from pre-school and school staff - see Sylva et al., 2014 for further details.

¹⁰ The 'no pre-school group' had all assessments apart from the age 3 assessments.

Figure 6 The EPPSE sample and assessment points

Design of EPPSE: 6 Local authorities, 141 pre-schools, 3,000 children

Pre-School (3 – 5 yrs) 



EPPSE aims and methodology

The specific aims of EPPSE changed depending on the age of the children, but can be summarised as an exploration of the:

- short, medium and long term effects on children's academic and social-behavioural development from attending pre-schools of different type, with varying levels of quality and for different periods of time (duration);
- characteristics of effective pre-schools and primary schools with a focus on pedagogy;
- influence of a range of primary and secondary school characteristics on student outcomes;
- influence of child characteristics and a range of background family demographics on outcomes.

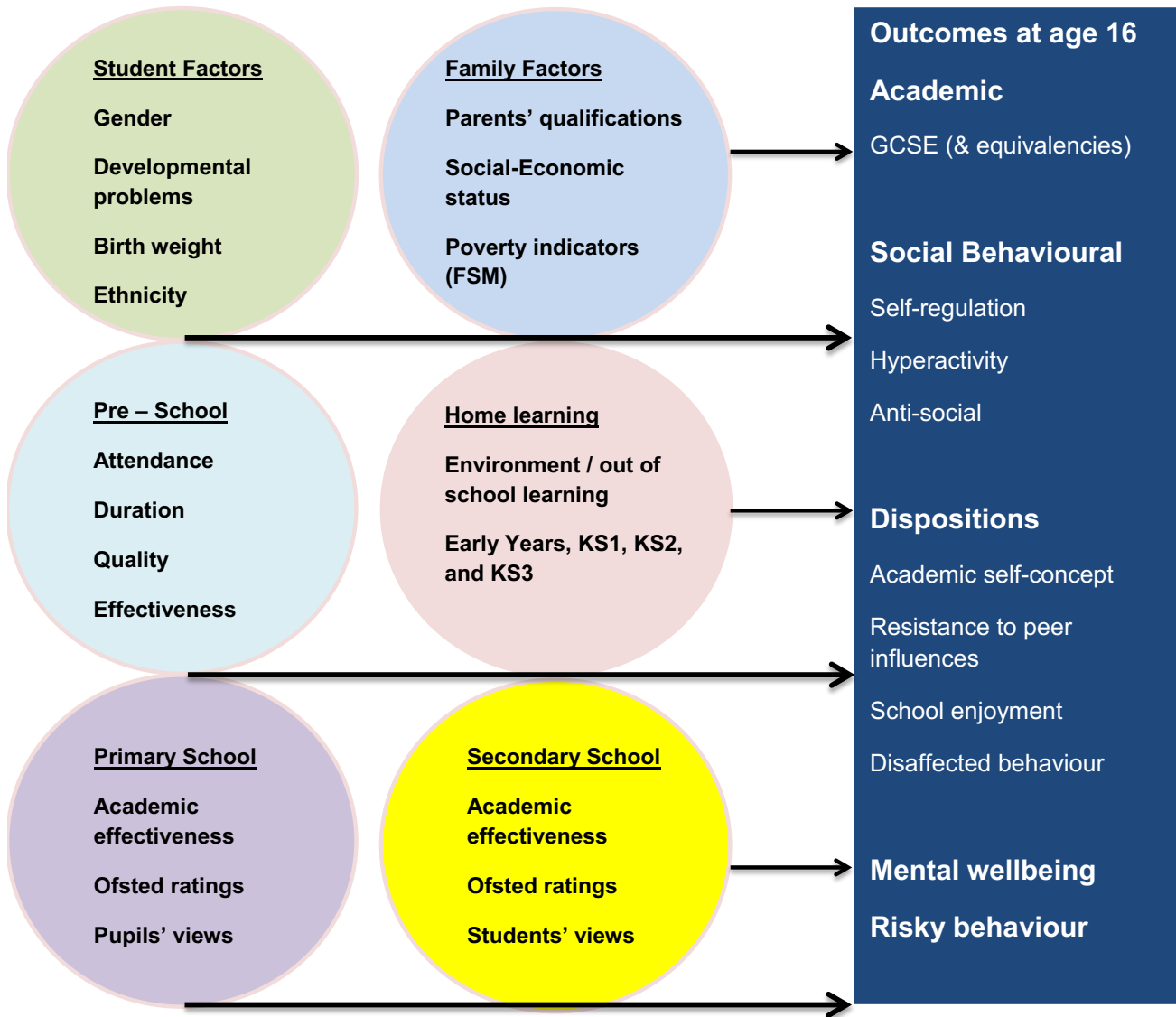
EPPSE was the first study in Europe to apply a 'mixed methods' (Sammons et al., 2005; Siraj-Blatchford et al., 2006) approach to the study of pre-school children developed from school effectiveness or 'value-added' approaches to institutional effects. This quantitative approach sees children nested in families, communities and settings and includes exploratory and confirmatory factor analyses along with multilevel modelling to determine the relative strength of different influences on outcomes. Family information was obtained through interviews and questionnaires, the Index of Multiple Disadvantage (Noble et al., 2004; 2008), as well as parental perceptions were used to explore aspects of the neighbourhood and information from schools have been obtained from the National Pupil Database and Ofsted reports.

Results are commonly reported as statistical effect sizes (ES¹¹) which allows for a comparison of the strength of different predictors both in isolation and in combination. For example, EPPSE analyses the influence of pre-school, net of other influences such as gender etc. (child level), mothers qualifications etc. (family level) as illustrated in Figure 7 for outcomes at age 16.

Whilst this Research Brief has focussed on pre-school, the quantitative analyses allows comparisons to be made between a wide range of background factors at child level (gender, low birth weights etc.), family (parental qualifications, income, SES etc.) and the home learning environment (Early Years, KS1 etc.). Appendix 3 gives some examples and readers are encouraged to look at the end of phase reports for more examples. For more details of the quantitative methodology see Sammons, 2010.

¹¹Effect sizes compare the relative strength of different influences. An ES of 0.1 is relatively weak, one of 0.35 moderately strong, one of 0.7 strong.

Figure 7: Influences on outcomes at age 16 and post 16 destinations



In addition to the quantitative analyses, EPPSE as a mixed methods study, also used qualitative data and case study methodology to provide ‘thick descriptions’ of the structure and process characteristics associated with effective settings (see Siraj-Blatchford 2010a; Siraj-Blatchford et al., 2002; Siraj-Blatchford et al., 2003) and information on children who ‘succeeded against the odds’ (Siraj-Blatchford, 2010b; Siraj-Blatchford et al., 2011; Siraj et al., 2014).

The EPPSE research came to an end in 2014 but the methodology used has provided inspiration for other longitudinal studies in England and elsewhere. Examples include the Millennium Cohort Study (Hansen & Joshi. 2007) and the Study of Early Education and Development (SEED see <http://www.seed.natcen.ac.uk/the-findings.aspx>).

Evidence informed policy and practice

EPPSE has, for many years, informed major policy decisions affecting young children (Sylva & Pugh 2005; Taggart et al, 2008). It has been referenced in many Parliamentary debates, DfE Research Strategies, National Childcare Strategies, Policy Reviews and international reports. The following examples, give an indication of policy engagement: EPPSE findings have featured in HM Treasury Comprehensive Spending Reviews and National Childcare Strategies since 2000. The National Audit Office (2012) used EPPSE to justify increasing investment in early years. The DfE (2013) cites EPPSE findings on 'what works' in raising quality in the context of a £5 billion-a-year expenditure in early education. EPPSE evidence underpins the free entitlement to the poorest 40% (some 260,000) of two-year-olds (DFE/DH 2012). Two major policy reviews on poverty and life chances, (Field 2010 and Allen 2011) used EPPSE evidence to promote policies to improve the prospects of disadvantaged children through early interventions.

In addition to informing policy, EPPSE findings have been used extensively to support developments in initial teacher and practitioner training. In the Edexcel A2 Psychology textbook (Brain, 2009) EPPSE is used to demonstrate how research is applied to the real world.

EPPSE has had a significant impact on the early years curriculum, pedagogy and the development of the workforce. The Field Report (2010) recommended the national implementation of the ECERS-E for quality assurance. Findings from the pre-school case studies underpinned the original Early Years Foundation Stage (DCSF, 2009) and its revision in 2012 (Siraj-Blatchford 2008a & b). Tickell's (2011) independent review of the EYFS referenced EPPSE throughout. EPPSE was the only research evidence referred to in the press release announcing the expansion of the Teach First programme. Practices, such as 'sustained shared thinking' identified by EPPSE are now taken for granted as 'best practice' in the UK and abroad (179 books were identified as containing the phrase in 2013 - up from 21 in 2008).

Findings about staff qualifications and quality have been used extensively to improve the quality of the workforce. HM Treasury cited EPPSE evidence in justifying the £125m Transformation Fund, set up to improve the quality of pre-school through enhancing the qualifications of staff (DfES 2006). The independent Nutbrown review (2012) made extensive reference to EPPSE to propose changes in the qualification framework.

EPPSE has had extensive international reach – see UNESCO (2008), Australia's Government (2009), Brazil's Government (2006) for examples. EPPSE has raised the nation's awareness and understanding of the importance of early years education and has had regular press coverage in national and professional journals and the broadcast media. The findings have formed an essential part of the debate about home (Wheeler 2010) and pre-school effects.

EPPSE and the international evidence on the benefits of pre-school

This RB cannot detail all of the international evidence on the benefits of pre-school but this section cites examples of studies that confirm many of EPPSE's main findings.

Early day care was found in EPPE to relate to increased cognitive outcomes better independence and peer sociability at 5 years but also to increased anti-social behaviour. These findings are similar to those in the US, Germany and Northern Ireland (NICHD, 2002; Anders et al., 2012; Melhuish et al., 2001; 2002).

Similarly to EPPSE, the US National Institute of Child Health and Development Study (NICHD) found that family characteristics have a greater impact on outcomes for children than pre-school factors. However, the effect of attending pre-school (versus not) on developmental progress is greater than the effect of some social disadvantage. (NICHD, 2002). EPPSE findings on disadvantage are mirrored elsewhere (see Melhuish, 2004a) and are the basis of policy initiatives all over the world (Young, 1996).

The short and long-term, positive effects of pre-school education have been shown conclusively in several countries, e.g. USA, France, Norway, Switzerland, Canada, Denmark, Northern Ireland and New Zealand (see Melhuish 2004a; 2011).

The contribution of high quality to children's developmental progress has been shown in many studies, often using the ECERS observational scale (Melhuish, 2004a and b).

Other studies have linked pre-school to the wider benefits for society. Studies of programmes in the US such as High Scope/Perry Pre-School; California Abecedarian; Chicago Child-Parent Centers (Reynolds et al., 2011) provide evidence on the longer-term benefits that result from early childhood interventions with children and their parents. These small scale experimental studies of intensive programmes with children and parents indicate that benefits can include higher rates of high-school graduation, greater academic achievement, lower teenage pregnancy, and lower juvenile crime (see Schweinhart et al., 1993).

Again in the US the 'Head Start' and 'Early Head Start' were large-scale integrated early childhood programmes, introduced to boost the school readiness of disadvantaged children with a 'whole child' approach (including parenting practices) which focus on a child's cognitive, social-emotional and health needs. These programmes provide evidence of a range of benefits including positive parenting, improved home learning environment, improved school readiness and better cognitive outcomes at ages 3 and 4, and (for children enrolled in Early Head Start) better social and emotional development at age 3.

Head Start provides evidence for longer term outcomes such as reduced grade repetition, reduced special educational needs, lower rates of teenage pregnancy, higher high school graduation rates, higher enrolment in college, and lower rates of criminal activity as teenagers and adults (Oden et

al., 2000a, b). It also showed benefits for language and literacy development and improved health outcomes (US DHHS, 2010)

Outside of the US, the OECD (Organisation for Economic and Co-operation and Development) comparisons show a relationship between attending pre-primary school and better student reading at age 15. This is strongest in school systems that: offer pre-primary education to a larger % of the population; do so over a longer period of time; have smaller pupil-to-teacher ratios in pre-primary school; and invest more per child at pre-primary level (OECD, 2011).

In Sweden, the Andersson study of children from low- and middle-resource areas of two large cities showed that the earlier a child entered centre or family day care, the stronger the positive effect on academic achievement at age 13 (Andersson, B. 1992). For children entering child care age 2 or under, the academic benefit was 10-20% better compared to children who stayed at home.

In France, a national survey found that performance in primary school is correlated with length of time spent in pre-primary education, even after controlling for background characteristics (Jarousse et al., 1992). Each year of kindergarten reduced the likelihood of being kept back in the first grade of primary school, especially for those from the most disadvantaged families.

In New Zealand there is evidence from The Competent Children and The Competent Learners Study (Hodgen. E.; 2007) that children who attended effective childhood education achieved higher scores for cognitive (literacy and numeracy) and attitudinal competencies at age 16 and that children from low-income families with four years of early childhood education experience achieved as well at literacy and communication as children from high-income families (Wylie et al., 1999).

These studies consistently point to the short, medium and long term benefits of early education for a range of outcomes that improve the outcomes for not just the individual but for society as a whole. As many of these programmes are targeted at disadvantaged children they demonstrate the global interest in early education as a way of combating social exclusion.

Conclusion

The EPPSE findings reported in this Research Brief focus exclusively on how children's outcomes and development are influenced by pre-school¹² and makes a persuasive argument that early investment can pay long term dividends. Whilst the strength of the influence of pre-school changed as the EPPSE children turned into teenagers, having positive early learning experiences continued to shape these young people's lives beyond compulsory education.

Going to a high quality pre-school was especially important when starting school and remained so beyond the age of 16. It influences both attainment and progress in early school careers and set children on particularly beneficial learning trajectories, especially if they came from more disadvantaged backgrounds where it provided them with a better start to school. Whilst the influence of pre-school weakened over time it nevertheless provides an important foundation on which to build future learning pathways.

EPPSE has also provided insights into the day-to-day experiences that enhance children's learning. The descriptions of effective pedagogy have contributed to the global debate about what constitutes high quality and how to get the balance right between early 'education' and 'care'. The case studies in effective setting have also shown how 'play' environments can be used to provide the basis for instructive learning.

Whilst this RB has focuses on pre-school, the paramount importance of their family should not be forgotten. The full contextualised results contained in the EPPSE Technical Papers and end of phase reports show the pre-school effects **alongside** other important influences. For instance, whilst the pre-school remains as significant influence to age 16, there are also important effects from the Early Years Home Learning Environment (EY HLE) and many family characteristics such as the qualification level of the mother or being in a household with multiple disadvantages.

EPPSE has shown that pre-school can help to ameliorate some of the disadvantages of growing up in poverty or in households where parents have poor levels of qualifications or provide little intellectual stimulation. It cannot however, do this in isolation. To improve outcomes for children they need supportive families with stimulating home learning environments, high quality pre-school followed by effective primary and secondary school.

The many ways in which EPPSE has contributed to the development of local, national and international policies for young children marks it out as an important, indeed, seminal study.

¹² See the EPPSE website www.ioe.ac.uk for findings on individual (gender etc.), family (SES etc.), home learning environments (Early Years, KS1 etc.) the neighbourhood, primary and secondary school (effectiveness, Ofsted judgements etc.) as predictors of academic, social-behavioural, dispositional and well-being outcomes.

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Appendix 1 EPPSE sample cohort information and assessment time points for the academic year (2013/14)

A1Table 1: EPPSE cohort information for academic year 2013/14

Cohort	DOB	Pre-school Entry to study (age 3+)	Primary School				Secondary School		Post 16 Compulsory Education (KS5)		H.E.= 1 st Year Uni (age 19)	H.E.= 2 nd Year Uni (age 20)	H.E.= 3 rd Year Uni (age 21)	
			KS1		KS2		KS3	KS4	Year 12 A/S = (age 17)	Year 13 A = (age 18)				
			Entry to Reception (age 5)	Year 1 (age 6)	Year 2 (age 7)	Year 5 (age 10)	Year 6 (age 11)	Year 9 (age 14)	Year 11 GCSE (age 16)	Year 12 A/S = (age 17)				Year 13 A = (age 18)
1	Sept 92 – Aug 93	Sept 95– Aug 96	Sept 96– Aug 97	Sept 97– Aug 98	Sept 98 – Aug 99	Sept 02 – Aug 03	Sept 03 – Aug 04	Sept 06 – Aug 07	Sept 08 – Aug 09	Sept 09– Aug 10	Sept 10 – Aug 11	Sept 11 – Aug 12	Sept 12 – Aug 13	Sept 13 – Aug 14
2	Sept 93 – Aug 94	Sept 96– Aug 97	Sept 97– Aug 98	Sept 98– Aug 99	Sept 99 – Aug 00	Sept 03 – Aug 04	Sept 04 – Aug 05	Sept 07 – Aug 08	Sept 09 – Aug 10	Sept 10 – Aug 11	Sept 11 – Aug 12	Sept 12 – Aug 13	Sept 13 – Aug 14	Sept 14 – Aug 15

Key Stage (KS) Assessment time points

 KS1 National Assessments (Year 2)

 KS2 National Assessments (Year 6)

 KS3 National Assessments (Year 9)

 KS4 GCSEs (Year 11)

Appendix 2 Key EPPSE Reports

This findings in this RB are taken from a number of Technical Papers and end of phase reports.

For more information see the following key documents or go to <http://www.ioe.ac.uk/research/4586.html> for a full list of publications.

The Pre-school phase:

Final report and associated technical papers <http://dera.ioe.ac.uk/18189/> There are twelve technical papers associated with this phase of the research – see also www.ioe.ac.uk/eppse

Sylva, K., Melhuish, E.C., Sammons, P., Siraj-Blatchford, I. and Taggart, B. (2004). The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 12 -The Final Report: Effective Pre-School Education. London: DfES / Institute of Education, University of London. http://www.ioe.ac.uk/EPPE_TechnicalPaper_12_2004.pdf

Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I. and Taggart, B. (2004), The Effective Provision of Pre-School Education (EPPE) Project: Final report. London: SureStart DfES Publications Ref SSu/FR/2004/01

<http://www.education.gov.uk/publications/eOrderingDownload/SSU-FR-2004-01.pdf>

Research Brief: http://www.ioe.ac.uk/RB_Final_Report_3-7.pdf

<http://www.education.gov.uk/publications/eOrderingDownload/SSU-SF-2004-01.pdf>

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http://www.ioe.ac.uk/EPPE_TechnicalPaper_08a_2002.pdf

Social-behavioural

Sammons, P., Sylva, K., Melhuish, E.C., Siraj-Blatchford, I., Taggart, B. and Elliot, K. (2003). The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 8b -Measuring the Impact of Pre-School on Children's Social/Behavioural Development over the Pre-School Period. London: DfES / Institute of Education, University of London. http://www.ioe.ac.uk/EPPE_TechnicalPaper_08b_2003.pdf

The Primary Phase:

End of Key Stage 1

Sammons, P., Sylva, K., Melhuish, E.C., Siraj-Blatchford, I., Taggart, B., Elliot, K. and Marsh A. (2004). The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 11 - The Continuing Effects of Pre-school Education at Age 7 Years. London: DfES / Institute of Education, University

http://www.ioe.ac.uk/EPPE_TechnicalPaper_11_2004.pdf

End of KS 2, age 11

Final report of the end of the primary phase <http://dera.ioe.ac.uk/id/eprint/8543>

Sylva, K., Melhuish, E.C., Sammons, P. Siraj-Blatchford, I. and Taggart, B. (2008). Final Report from the Primary Phase: Pre-school, School and Family Influences on Children's Development during Key Stage 2 (7-11). Nottingham: DCSF Research Report 61 / Institute of Education, University of London

http://www.ioe.ac.uk/End_of_primary_school_phase_report.pdf

<http://www.education.gov.uk/publications/eOrderingDownload/DCSF-RR061.pdf>

Final Report Brief from the Primary Phase: Pre-school, School, and Family Influences on Children's development during Key Stage 2 (Age 7-11 (2008). Research Brief RB061

http://www.ioe.ac.uk/End_of_primary_school_phase_research_brief.pdf

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Sammons, P., Sylva, K., Melhuish, E.C., Siraj-Blatchford, I., Taggart, B. and Hunt, S. (2008). The Effective Pre-School and Primary Education 3-11 Project (EPPE 3-11): Influences on Children's Attainment and Progress in Key Stage 2: Cognitive outcomes in Year 6. London: DCSF / Institute of Education, University of London

<http://dera.ioe.ac.uk/id/eprint/18190>

http://www.ioe.ac.uk/Cog_report_Yr6.pdf

<http://www.education.gov.uk/publications/eOrderingDownload/DCSF-RR048.pdf>

Social- Behavioural

Sammons, P., Sylva, K., Melhuish, E.C., Siraj-Blatchford, I., Taggart, B. and Jelcic, H. (2008). The Effective Pre-School and Primary Education 3-11 Project (EPPE 3-11): Influences on Children's Attainment and Progress in Key Stage 2: Social/behavioural outcomes in Year 6. London: DCSF / Institute of Education, University of London.

<http://dera.ioe.ac.uk/id/eprint/18192>

http://www.ioe.ac.uk/Socs_report_Yr_6.pdf

<http://www.education.gov.uk/publications/eOrderingDownload/DCSF-RR049.pdf>

Combined academic and social behavioural Research Brief

http://www.ioe.ac.uk/Cogs_soc RB_Yr6.pdf

The Secondary Phase:

End of Key Stage 3: Year 9, age 14 report and research brief

Research Report <http://dera.ioe.ac.uk/id/eprint/14069>

Sylva, K., Melhuish, E.C., Sammons, P., Siraj-Blatchford, I. and Taggart, B. (2012). Effective Pre-school, Primary and Secondary Education 3-14 Project (EPPSE 3-14) - Final Report from the Key Stage 3 Phase: Influences on Students' Development from age 11-14. Department for Education Research Report 202.

http://www.ioe.ac.uk/KS3_final_report.pdf

<https://www.education.gov.uk/publications/standard/publicationDetail/Page1/DFE-RR202>

Effective Pre-school, Primary and Secondary Education 3-14 Project (2012) (EPPSE 3-14) - Final Report from the Key Stage 3 Phase: Influences on Students' Development from age 11-14 Research Brief RB202

<https://www.education.gov.uk/publications/standard/publicationDetail/Page1/DFE-RB202>

http://www.ioe.ac.uk/KS3_final_report_RB.pdf

Academic <http://dera.ioe.ac.uk/id/eprint/14069>

Sammons, P., Sylva, K., Melhuish, E.C., Siraj-Blatchford, I., Taggart, B., Toth, K., Draghici, D. and Smees, R. (2011a). Effective Pre-School, Primary and Secondary

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http://www.ioe.ac.uk/EPPSE_3/14_students_attainment_and_progress_in_KS3_Academic_outcomes_RR.pdf

Research Brief : http://www.ioe.ac.uk/Final_EPPSE_cogs_KS3_RB.pdf

Social-behavioural

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<http://dera.ioe.ac.uk/id/eprint/18197>

http://www.ioe.ac.uk/Final_EPPSE_3_14_socs_KS3_report.pdf

Research Brief

http://www.ioe.ac.uk/final_EPPSE_3_14_socs_KS3_RB.pdf

End of Key Stage 4: Year 11

Sylva, K., Melhuish, E.C., Sammons, P., Siraj, I. and Taggart, B. with Smees, R., Toth, K. & Welcomme W. (2014) Effective Pre-school, Primary and Secondary Education 3-16 Project (EPPSE 3-16) Students' educational and developmental outcomes at age 16 Department for Education Research Report RR354

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<https://www.gov.uk/government/publications/influences-on-students-development-at-age-16>

Research Brief (2014)

http://www.ioe.ac.uk/images/Research_Briefings_231x211/RB354/Students_educational_and_developmental_outcomes_at_age_16_Brief.pdf

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/351499/RB354 - Students_educational_and_developmental_outcomes_at_age_16_Brief.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/351499/RB354_-_Students_educational_and_developmental_outcomes_at_age_16_Brief.pdf)

Academic

Sammons, P., Sylva, K., Melhuish, E.C., Siraj, I., Taggart, B., Toth, K. & Smees R. (2014) Effective Pre-school, Primary and Secondary Education 3-16 Project (EPPSE 3-16) Influences on students' GCSE attainment and progress at age 16
Department for Education Research Report RR352

http://www.ioe.ac.uk/Research_Home/16-Influences-Students-GCSE-Attainment-Progress-RR.pdf

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/373286/R352 - Influences on Students GCSE Attainment and Progress at Age 16.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/373286/R352_-_Influences_on_Students_GCSE_Attainment_and_Progress_at_Age_16.pdf)

Research Brief

[http://www.ioe.ac.uk/images/Research_Briefings_231x211/RB352 - Influences on Students GCSE Attainment and Progress at Age 16 Brief.pdf](http://www.ioe.ac.uk/images/Research_Briefings_231x211/RB352_-_Influences_on_Students_GCSE_Attainment_and_Progress_at_Age_16_Brief.pdf)

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/351495/RB352 - Influences on Students GCSE Attainment and Progress at Age 16 Brief.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/351495/RB352_-_Influences_on_Students_GCSE_Attainment_and_Progress_at_Age_16_Brief.pdf)

Social-behavioural

Sammons, P., Sylva, K., Melhuish, E.C., Siraj, I., Taggart, B., Smees R., & Toth, K. with Welcomme W. (2014) Effective Pre-school, Primary and Secondary Education 3-16 Project (EPPSE 3-16) Influences on students' social-behavioural development at age 16
Department for Education Research Report RR351

http://www.ioe.ac.uk/Research_Home/16-Influences-Students-Social-Behavioural-Development-RR.pdf

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/394507/R351 - Influences on students social-behavioural development at age 16.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/394507/R351_-_Influences_on_students_social-behavioural_development_at_age_16.pdf)

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Post 16

Taggart, B., Sammons, P., Siraj, I., Sylva, K., Melhuish, E.C., Toth, K., Smees R. & Hollingworth*, K., with Welcomme W. (2014) Effective Pre-school, Primary and Secondary Education 3-16 Project (EPPSE 3-16) Post age 16 destinations. Institute of Education, London/Department for Education

Research Report

http://www.ioe.ac.uk/Research_Home/16-Destinations-RR.pdf

Report on students who are not in Education, Employment or Training (NEET)

Siraj, I., Hollingworth*, K., Taggart, B., Sammons, P., Melhuish, E.C., Sylva, K. (2014) Effective Pre-school, Primary and Secondary Education 3-16 Project (EPPSE 3-16) Report on students who are not in Education, Employment or Training (NEET) Institute of Education, London/Department for Education

Research Report

http://www.ioe.ac.uk/Research_Home/16-Report-students-NEET-RR.pdf

The Economic Effects of Pre-school Education and Quality

Cattan, S., Crawford, C., and Dearden, L. (2014) The Economic Effects of Pre-school Education and Quality. Institute for Fiscal Studies. IFS Report R99

<http://www.ifs.org.uk/uploads/publications/comms/R99.pdf>

Appendix 3: Contextualised models showing the strength of main predictors for maths at different time points

A3 Table 1: The effects on maths at age 7

Factors	Effect size	Description
Age	0.47	Older Children higher attainment
Birth Weight	0.42	Normal birth weight higher than very low
EAL	0.20	Children with EAL attained lower scores
Developmental problems	0.57	Early developmental problems = predictor of low attainment.
Parents Qualifications	0.47	Higher qualified = higher attainment
Social- Economic status	0.31	Higher SES = higher attainment
Free school meals	0.27	Eligible for FSM = negative predictor.
Early year HLE	0.61	Higher Early years HLE = higher attainment
Pre-School	0.20	Attending vs. non-attending
Quality (ECERS-E) by duration	0.41	High quality and long duration = better results

A3 Table 2: The effects on maths at age 11

Factors	Effect size	Description
Gender	0.19	Boys show higher attainment than girls
Birth Weight	0.48	Normal birth weight higher than very low
Ethic groups	0.45	Indian heritage higher than children of White UK heritage
Need for EAL support	0.64	Need of EAL support = predictor of low attainment
Developmental problems	0.15	Early developmental problems = predictor of low attainment.
Parents Qualifications	0.71	Higher qualified = higher attainment
Social- Economic status	0.36	Higher SES = higher attainment
Free school meals	0.15	Eligible for FSM = negative predictor.
Early year HLE	0.42	Higher Early years HLE = higher attainment
KS1 HLE	0.17	Moderate personal interactions better than high
Pre-School	0.26	Attending vs. non-attending
Pre-School quality (ECERS_E)	0.34	High quality pre-school = higher attainment
Pre-School effectiveness	0.40	High effective pre-school = higher attainment
Primary School effectiveness	0.38	High effective primary school = higher attainment

A3 Table 3: The effects on maths at age 14

Factors	Effect size	Description
Age	0.15	Older pupils perform better than younger
Birth Weight	0.40	Normal birth weight higher than very low
Ethnicity	0.37	Indian heritage higher than children of White UK heritage
Developmental problems	0.16	Early developmental problems = predictor of low attainment.
Behavioural problems	0.18	Early behavioural problems = predictor of low attainment
Number of siblings	0.19	Three siblings or more predict lower cognitive achievement
Parents Qualifications	0.50	Higher qualified = higher attainment
Free school meals	0.31	Eligible for FSM = negative predictor.
Social- Economic status	0.36	Higher SES = higher attainment
Family income	0.21	Pupils from families with a high income perform better
Early year HLE	0.38	Higher scores on Early Years HLE are associated with higher attainment
KS2 HLE	0.17	Moderate computing usage is better than frequent computer usage
Pre-School attendance	0.26	Attending vs. non-attending
Pre-School quality (ECERS-E)	0.28	High quality pre-school = higher attainment

A3 Table 4: The effects on maths at age 16

Factors	Effect size	Description
Age	0.14	Older pupils perform better than younger
Ethnicity	0.53	Indian students higher total GCSE score
Health Problem	0.16	Early health problems = predictor of low attainment
Behavioural problems	0.27	Early behavioural problems = predictor of low attainment
Number of siblings	0.17	Three siblings or more predict lower cognitive achievement
Parents Qualifications	0.74	Higher qualified = higher attainment
Mother's age	0.10	Older mothers = higher attainment
Free school meals	0.37	Eligible for FSM = negative predictor.
Social- Economic status	0.66	Higher SES = higher attainment
Family income	0.28	Pupils from families with a high income perform better
Early year HLE	0.45	Higher Early years HLE = higher attainment
KS1 HLE	0.11	Moderate outing = higher attainment
KS2 HLE	0.15	Moderate computing = higher attainment
KS3 HLE	0.47	High academic enrichment = higher attainment
Pre-School attendance	0.21	Attending vs. non-attending
Pre-School quality (ECERS-E)	0.26	High quality pre-school = higher attainment



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Any enquiries regarding this publication should be sent to us at:

Deborah.wilson@education.gsi.gov.uk or www.education.gov.uk/contactus

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