Department for Education

Influences on students' GCSE attainment and progress at age 16

Effective Pre-School, Primary & Secondary Education Project (EPPSE)

Research Brief

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Introduction

The Effective Pre-school, Primary and Secondary Education study (EPPSE) has investigated the academic and social-behavioural development of a national sample of approximately 3,000 children across different phases of education, from the age of 3+ years to age 16. This Research Brief focuses on the relationships between a range of individual student, family, home, pre-school, primary and secondary school characteristics and students' attainment at age 16, the end of compulsory education. It outlines the main findings about the factors that influence students' GCSE results and their academic progress across five years of secondary schooling from Year 6 to Year 11. For the full details of the GCSE research and the results of other analyses of EPPSE students' attitudes, social behaviour, and secondary school experiences at age 16, and their destinations after Year 11 see Sammons et al., 2014a, b, c and d; Taggart et al, 2014; Siraj et al., 2014 and Sylva et al., 2014.

Key findings

Individual student, family and neighbourhood characteristics continue to influence academic outcomes at age 16

1) Girls had better results than boys in GCSE English, a higher total GCSE score on average and were entered for more full GCSEs.

2) Students' examination attainment is strongly influenced by the education level of their parents. Taking account of other background characteristics, students with highly qualified parents had much higher attainment, equivalent to two GCSE grades higher and 4 extra full GCSE exam entries. Parents' highest qualification level was the strongest net predictor of better attainment in GCSE English and maths and of achieving the key benchmark indicator 5 A*-C including English & maths.

3) Other indicators of socio-economic disadvantage (especially family SES, income and FSM status) are also moderately strong predictors of the equity gap in GCSE attainment.

4) Positive parenting experiences, especially a more stimulating early years Home Learning Environment (HLE) when children were young helps to promote better long term outcomes. The early years HLE remained a significant predictor of better GCSE results. Home learning in adolescence is also important. Experiencing a more academically enriching HLE in KS3 predicted better GCSE attainment and progress.

5) Student background characteristics also predicted progress made across five years of secondary schooling from KS2 to KS4. Students with the following characteristics made greater progress between KS2 and KS4: those older for their year group (Autumn versus Summer-born), girls, from families with more highly qualified parents, higher socio-economic status (SES) groups, higher income families, and those not eligible for FSM.

6) Living in a disadvantaged neighbourhood (in terms of the proportion of children in families on a low income) predicted poorer GCSE results. In addition, living in a neighbourhood perceived as 'unsafe' predicted lower grades in GCSE English and maths, and also poorer progress in maths. The percentage of White British residents in a neighbourhood was a negative predictor of students' progress in English while living in a neighbourhood with higher crime rates predicted poorer progress in maths.

Pre-school attendance, quality and duration also show long term effects on academic outcomes

7) Having attended any pre-school was a positive predictor of total GCSE scores at age 16, more full GCSE entries, better grades in English & maths and a higher probability of achieving 5 A*-C GCSEs including English & maths. The impact is higher the longer children had spent in pre-school (in months) and if the pre-school was of high quality. But even lower quality pre-school had a weak positive effect.

8) The effect of attending any pre-school compared to none is equivalent to achieving an additional 7 grades at GCSE (i.e. 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 pre-school for 2 years or more, or attending high quality pre-school, compared to none, is equivalent to an additional 8 grades.

9) Pre-school can help to combat the effects of disadvantage. It has a particular impact for students of low qualified parents. For this group, if they had experienced a high-quality pre-school they had better grades in GCSE English (just under half a grade) and maths (a third of a grade) compared to similar students who had not attended any pre-school. There was also some indication that effects of high quality were more notable for boys.

10) Pre-school attendance, effectiveness and quality also predict significantly better student progress from KS2 to KS4 in terms of promoting a higher total GCSE score after controlling for KS2 attainment.

The academic effectiveness of Primary school continues to influence academic outcomes in KS4

11) Students who had attended a more academically effective primary school had an advantage in later mathematics attainment. Attending a high versus a low academically effective primary school predicted better GCSE maths grades. Moreover, students who had attended a medium or highly effective primary school were almost twice as likely to achieve the English Baccalaureate (EBacc) as those who had attended a less effective primary school.

Ofsted inspection indicators, and CVA measures of secondary school quality, predict students' attainment and progress

12) Secondary school quality, as captured by Ofsted judgements and DfE Contextual Value Added (CVA) measures, influenced both students' attainment at GCSE and their progress across KS4. For example, being educated in a secondary school rated as 'outstanding' by Ofsted, compared to Inadequate, predicted better grades in GCSE

English & GCSE maths and a greater likelihood of achieving 5 A*-C GCSE, 5 A*-C GCSE including English & maths, as well as the EBacc benchmark. Ofsted ratings of secondary school quality also predicted greater progress by EPPSE students from KS2 to KS4 in GCSE English & maths.

13) Attending a more academically effective secondary school (using DfE Contextual Value Added data) predicted total GCSE score (ES=0.42) but not GCSE English or GCSE maths.

Students' secondary school experiences also influence GCSE outcomes

14) Attending a secondary school where teachers were reported to have a strong focus on learning, where relationships between teachers and students were good in terms of trust, and where teachers provided more feedback were all significant predictors of better GCSE outcomes .

15) Students GCSE attainment and progress was boosted if they attended a secondary school rated as having a more favourable overall school 'behaviour climate' in KS3. The effects were particularly noticeable for maths and English grades and the number of full GCSE entries.

16) The amount of time students said they spent on homework predicted better academic attainment at GCSE and also better progress across KS2 to KS4. Engagement in homework is likely to reflect student motivation, the nature of the tasks set and the priority given to setting and marking homework by secondary schools. Doing homework helps to increase the opportunity to learn and can foster independence and study skills.

Background and Aims

Previous phases of the EPPSE project have revealed how different individual child, family, neighbourhood characteristics have influenced children's attainment, progress and development from the early years in pre-school into adolescence up to age 14 in KS3 of secondary education. They have also shown how the home learning environment (HLE), pre-school, primary and secondary schools shape educational outcomes at different ages. For full details visit www.ioe.ac.uk/eppse

This Research Brief presents the results of analyses of students' academic attainment at the end of Year 11, when the vast majority took General Certificate of Secondary Education (GCSE) or equivalent examinations.

The aims were to investigate:

- students' attainment in relation to individual student, family and HLE characteristics;
- students' progress between KS2 and KS4 across five years of secondary education (Year 6 to Year 11);
- the continuing influence of pre-school on students' later academic outcomes;
- the influence of primary school academic effectiveness on later outcomes;
- the influence of secondary school academic effectiveness and quality on students' academic attainment and progress.
- students' views and experiences of secondary school and how these influence their GCSE outcomes.

Methodology

The EPPSE 3+-16 project is a longitudinal study that has adopted an educational effectiveness and mixed methods design (Sammons et al., 2005; Siraj-Blatchford et al., 2006). This has enabled the study of individual, family and home influences, as well as the effects of pre-school, primary and secondary school measures on children's academic and developmental outcomes from the early years on into adolescence across different phases of education. This RB focuses on quantitative analyses of factors that predict students' attainment at age 16 and their progress across five years of secondary schooling from KS2 to KS4. The analyses are based on multilevel statistical models that test the effects of various potential predictors of students' attainment in Year 11 as measured by their GCSE results.

For over 17 years EPPSE has gathered a wide range of data on a national sample of children's attainment and development at different ages. Interviews and questionnaire surveys have been used to collect details about their families and home learning environments (HLE). In addition, data on the quality and effectiveness of the pre-school, primary and secondary schools attended by the sample and the students' views and experiences of their schools has been obtained.

In order to examine the quality of the secondary schools attended by the EPPSE sample, external measures of the academic effectiveness of each secondary school (contextual value added performance indicators) were obtained from the Department for Education (DfE). Inspection data produced by the Office for Standards in Education (Ofsted) provides additional external indicators of the quality of schools attended by students. In addition, student questionnaires provide further measures of their secondary school experiences. The rich evidence base makes it possible to explore the influences of a wide range of measures on students' educational outcomes at the end of compulsory education. This RB focuses on academic GCSE results, but other findings on these students' social-behaviours, dispositions, views of school and post-16 destinations are available (Sammons et al., 2014b; 2014c; 20014d and Taggart et al., 2014). An overview of the main findings is provided in a final KS4 Report (Sylva et al., 2014).

The analyses employ the following separate GCSE measures as students' academic outcomes: total GCSE and equivalents point score; grade obtained in GCSE English & grade obtained in GCSE maths; and total number of full GCSE entries. In addition, the following benchmark indicators were also studied: whether or not a student achieved 5 or more GCSE/GNVQs at grades A*-C; 5 or more GCSE and equivalents at grades A*-C including GCSE English and maths; and the EBacc. The sample size used in analyses varies slightly for different outcomes, but includes a minimum of 2582 students (over 94% of the tracked KS4 EPPSE sample) and 81% of the original sample. For further details see Sammons et al., 2014a.

Findings

Raw differences in attainment for different student groups

Gender

On average, girls achieved better results in GCSE English than boys (a difference of about half a grade). Girls also obtained higher total GCSE scores (mean=472; SD=165) than boys (mean=428, SD=172). They were entered for more full GCSEs (mean=7.6; SD=2.7) than boys (mean 7.0, SD 2.8) and were more likely to achieve the three DfE benchmark indicators: GCSE 5 A*-C, 5 A*-C including English and maths, and the EBacc. For example, 62 % of girls compared with 52% of boys achieved the 5A*-C benchmark. At younger ages, girls in the sample had shown higher attainment in reading and English. They also had higher maths and science outcomes in primary school, but there were no longer any statistically significant gender differences in maths or science grades evident in their KS4 GCSE results in these subjects.

Ethnicity

Because of the relatively low numbers in the sample from different ethnic minority groups, differences found in the EPPSE study should be interpreted with caution. Nonetheless they are in line with findings from larger scale surveys using the national pupil data base. Compared with results for White UK students, those from Black Caribbean, Pakistani, Bangladeshi and Indian heritage backgrounds had higher total scores for GCSE attainment, on average. However, those from Pakistani background had somewhat lower scores for GCSE English and maths.

Family characteristics

Students with highly qualified parents (degree level) had higher average attainment compared to those whose parents had no qualifications. The difference represented 141 points for total GCSE score (the difference between four grade Bs rather than four grade Cs), 10 points in GCSE English, 13 points in GCSE maths (equal to two grades higher e.g., the difference between achieving a grade B instead of a grade D), and on average had 4 extra full GCSE exam entries. There were also relatively large differences associated with family socio-economic status (SES[1]).

Disadvantaged students as defined in terms of the key indicator of poverty, eligibility for Free School Meals (FSM[2]) had lower average attainment in all outcomes studied (mean

[1] Based on the Registrar General social classification of occupations

[2] Eligibility for Free School Meals (FSM) is a measure of family poverty.

382, SD 197 for FSM versus mean 465, SD 159 for the no FSM group). The differences approximated to just over a full GCSE grade in size in both English and maths.

The early years home learning environment (HLE) had been found to be closely correlated with attainment at younger ages. Although differences were less notable at age 16, than they had been in primary school, they remained significant. Students who had experienced a high versus a low quality early years HLE obtained higher GCSE results equating to approximately 10 grade points for both GCSE English and GCSE maths and 125 points for total GCSE score (mean 523, SD 132 for the high HLE group versus mean 398, SD 194, for the low HLE group).

The net impact of child, family and HLE characteristics as predictors of GCSE attainment

The group differences reported above only reveal the size of the equity gap in attainment for different groups of students in Year 11. They do not take into account the influence of other associated characteristics and so cannot show the relative strength of the various individual, family, HLE or neighbourhood characteristics in shaping differences in individual students' attainments. To enable this statistical models are used that include a range of predictors. In this way the 'net' contribution of each characteristic is measured, while controlling for the effects of other predictors in the model. Thus we can establish the 'net' effects of say FSM, while taking into account the impact of age, gender, family SES, the early years HLE, neighbourhood disadvantage etc. Results are reported in terms of effect sizes (ES[3]) when modelling total GCSE point score or GCSE grades in English and maths. Where the models are used to predict whether various benchmarks have been achieved (did a student obtain 5A*-C including English & maths or not) the results are shown in terms of the odds ratios (OR) representing the odds of a student achieving the benchmark performance, given certain characteristics relative to the odds of the reference group (e.g. the odds of achieving the benchmark for a student eligible for FSM versus those for a non-FSM student). Table 3 gives details of the background measures tested.

Ethnicity

Ethnic group was found to be a strong predictor of total GCSE score when the effects of other influences (parents' qualifications, FSM etc) are controlled. Given the small numbers the results should be treated with caution but they are in line with other research that suggests some ethnic minorities are achieving better results given their

[3] The strength of a predictor is expressed in Effect Sizes (ES). This is a statistical concept that shows the strength of the relationship between outcomes while controlling for other factors. An effect size of 0.1 is relatively weak, one of 0.5 moderate in size, one of 0.7 fairly strong. Some differences have also been shown in terms of GCSE points scores for illustration. In most cases only statistically significant effects have been reported.

particular circumstances than the White UK group. Students of Indian, Black Caribbean, Pakistani[4] and Bangladeshi[5] heritage obtained relatively higher total GCSE scores and, better grades in GCSE maths than students of White UK heritage when account was taken of the effects of differences in all other significant predictors in the models. Students of Indian and Bangladeshi heritage also had better results in GCSE English. The Black Caribbean, Indian and Pakistani groups were more likely to achieve 5 A*-C GCSE, including English and maths.

Family characteristics

Parents' highest qualification level, measured at entry to the study when children were age 3+, was a strong net predictor of better attainment in GCSE English - ES=0.69 (degree); ES=0.80 (higher degree) and GCSE maths - ES=0.65 (degree); ES=0.74 (higher degree) and achieving 5 A*-C including English and maths (OR=2.86 - for higher degree, OR=3.92 - for degree). All these comparisons are made against the reference group of students whose parents had no qualifications.

Family income, measured earlier in the study when the sample were in KS1, also showed large effects in terms of the likelihood of achieving 5 A*-C (OR=3.94 - income £67000 or over compared to no earned salary) and the EBacc (OR=4.04 - income larger than £67000 compared to no earned salary).

For grades in GCSE English both FSM (ES=-0.31) and family SES (ES=-0.49 for the unskilled manual group versus professional non-manual) had moderate negative effects. Similarly, family SES also had strong effects for grades in GCSE maths (ES=-0.66 - unskilled manual vs. professional non-manual). The SES effects for grades in GCSE English were similar in size to the continuing effects of the early years HLE (ES=0.51 - for high versus low early years HLE) and the KS3 enrichment HLE measure for English (ES=0.48 - for high versus low KS3 Enrichment). Interestingly, the early years HLE had a somewhat stronger impact on all measures of students' GCSE results than the FSM indicator.

Older students (for their year group e.g., Autumn born) and those with older mothers also showed better GCSE results, although the effects were fairly weak; the older the mother (at child's birth) the better the grades in GCSE English and maths and also the higher the likelihood of achieving the important overall benchmark indicators (5 A*-C and the EBacc) when compared with results for children born to younger mothers.

Table 1 summarises the main student and family characteristics that predicted different GCSE outcomes:

[4] This shows that for Pakistani students, their low raw scores are accounted for by background influences.
[5] There is only a small sample size of EPPSE students who are of Bangladeshi heritage.

Table 1:Student and family background characteristics that predict GCSE attainment

Academic outcome	Characteristics
Total GCSE score	parents' highest qualification level, KS3 HLE academic enrichment, early years HLE, gender.
GCSE grade in English	ethnicity, family SES, early years HLE, KS3 HLE academic enrichment, family income, gender.
GCSE grade in maths	family SES, ethnicity, KS3 HLE academic enrichment, early years HLE, Year 11 FSM.
Total number of full GCSE entries	family SES, ethnicity, family salary, early years HLE, KS3 HLE academic enrichment, gender.
Achieving 5 A*-C	early years HLE, parents' highest qualification level, KS3 HLE academic enrichment, gender.
Achieving 5 A*-C incl. English & maths	the early years HLE, KS3 HLE academic enrichment, ethnicity, family income, gender.
EBacc	KS3 HLE academic enrichment, parents' highest qualification level, gender.

Neighbourhood influences

Neighbourhood measures reflect the level of disadvantage of the neighbourhood the child lived in during pre-school/primary school and do not necessarily reflect later home moves. Levels of neighbourhood disadvantage based on family post code were measured by the Index of Multiple Deprivation (IMD Noble et al., 2004), and the Income Deprivation Affecting Children Index (IDACI Noble et al., 2008).. The IDACI indicator was a weak but significant predictor of lower grades in GCSE English (ES=-0.15) and in GCSE maths (ES=-0.16), and also a lower likelihood of attaining the benchmark GCSE performance indicators (OR ranges between 0.32-0.39). Students who had lived in more disadvantaged neighbourhoods in their early years showed poorer attainment in their GCSEs at age 16, over and above their own and their family characteristics. Nonetheless, these neighbourhood effects are relatively small compared with those of the family.

Levels of unemployment and crime, the percentage of White British residents and the percentage of residents with limiting long term illnesses were also included as measures of neighbourhood in the analyses and, except for the last measure, all were significant but weak negative predictors of outcomes. The percentage of White British living in a neighbourhood predicted poorer grades in GCSE English (ES=-0.20) and in maths (ES=-0.15) and the three benchmark indicators. Both levels of crime and unemployment had small negative effects on attainment in maths and slightly stronger negative effects on the number of full GCSE entries. The safer an area was perceived to be showed a small

but positive influence on GCSE maths, total GCSE score and achieving 5 A*-C. Taken together the findings confirm that 'place poverty' can also shape attainment over and above individual and family characteristics.

Pre-school

Four different measures of children's pre-school experience were tested: attendance (compared to none), duration (in months), quality of the pre-school setting (measured by ECERS-R & E; Harms et al., 1998, Sylva et al., 2003) and the effectiveness of the pre-school in promoting better outcomes for children at school entry. Having attended any pre-school was a positive predictor of total GCSE scores at age 16, more full GCSE entries, better grades in English & maths and a higher probability of achieving 5 A*-C GCSEs including English & maths. The impact is higher the longer children had spent in pre-school (in months) and if the pre-school was of high quality. But even lower quality pre-school had a weak positive effect. The effect of attending any pre-school compared to none is equivalent to achieving an additional 7 grades at GCSE (i.e. 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 pre-school for 2 years or more, or attending high quality pre-school, compared to none, is equivalent to an additional 8 grades.

Pre-school can help to combat the effects of disadvantage. It has a particular impact for students of low qualified parents. For this group, if they had experienced a high quality pre-school they had better grades in GCSE English (just under half a grade) and maths (a third of a grade) compared to similar students who had not attended any pre-school.

Pre-school attendance, effectiveness and quality also predict significantly better student progress from KS2 to KS4 in terms of promoting a higher total GCSE score after controlling for KS2 attainment.

Attendance

Attending any pre-school compared to none (the home group) predicted better GCSE outcomes. The effects were significant and represented 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). Those who attended a pre-school also had a higher probability of achieving 5 A*-C including English and maths (OR=1.48) when compared to the no pre-school group. Although relatively modest, these effects are still stronger than those found for 'age' (Autumn rather than Summer-born) and are similar or stronger than those related to gender.

Duration

The amount of time in months (duration of attendance) spent in pre-school also predicted GCSE outcomes. A longer duration showed stronger positive effects at age 16 than a shorter duration or no pre-school. Students who had attended pre-school for between 2

and 3 years (whether part-time or full-time) obtained higher total GCSE scores (ES=0.38) compared with those who had not attended a pre-school, and also achieved better grades in GCSE English (ES=0.28) and maths (ES=0.30), and were entered for more GCSE exams (ES=0.24).

Quality

The quality of pre-school experience was also influential and again predicted better GCSE results (total GCSE score – ES=0.37; GCSE English – ES=0.31; maths – ES=0.36). Those who had attended a high quality setting (compared to no pre-school) were more likely to achieve 5 A*-C including English and maths (OR=1.69). Although the effects identified at age 16 for GCSE outcomes were smaller than those identified for children's attainments in English and mathematics during primary school they remain statistically and educationally significant. 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 went on to obtain significantly higher grades in GCSE maths than those who had not attended a pre-school. Other 'joint' effects showed that students whose parents had low or no educational qualifications but who had attended a high quality pre-school went on to gain better grades in GCSE English (ES= 0.35) and maths (ES= 0.25) than similar students whose parents had low or no qualifications who had not attended any pre-school.

Effectiveness

How effective a pre-school was in promoting children's pre-reading skills was measured during the pre-school phase of the research. This indicator was also found to predict later attainment at age 16. Having attended a more effective pre-school predicted a greater number of GCSE entries (ES=0.25), better grades in GCSE English (ES=0.31), and a higher probability of achieving 5 A*-C including English and maths (OR=1.73). Similarly the measure of the effectiveness of the pre-school in promoting early number concepts showed positive and significant effects in predicting better r grades in GCSE maths (ES=0.35) and a higher total GCSE score (ES=0.48).

Taken together the findings about pre-school experiences all suggest that attending a pre-school helped to give a long term boost to academic outcomes and that the duration, quality and effectiveness of the particular pre-school attended was influential.

Primary school influences

The academic effectiveness of the primary school the EPPSE children had attended was measured during KS2 based on analyses of three years worth of national attainment data for all primary schools in England. These analyses produced contextualised (CVA type) measures of relative effectiveness. In line with findings at KS3 these measures of primary school experience continued to predict EPPSE students' attainment at age 16.

Students who had attended a more academically effective primary school for maths went on to gain significantly better grades in GCSE maths (ES=0.25), controlling for background influences. Similarly, students who had attended a medium or highly academically effective primary school were almost twice as likely to achieve the EBacc as students who had attended a primary school classified as of low academic effectiveness (OR=1.94).

Secondary school effectiveness and quality[6]

An overall indicator of the academic effectiveness of the individual secondary schools attended by the EPPSE sample was created based on DfE's performance derived from analyses of student progress from KS2-KS4 using the National Pupil Database (NPD). The EPPSE CVA measure combined DfE CVA scores for three years. This overall indicator was a significant predictor of EPPSE students' total GCSE score (ES=0.42), but it did not predict specific subject grades or the benchmark indicators. It is likely that students' overall total GCSE score is more susceptible to school influences, whereas individual subject grades in English and maths are more likely to reflect differences in departmental effectiveness (Sammons, Thomas & Mortimore, 1997).

Ofsted[7] inspection ratings provided several external measures of secondary school quality. Attending a higher quality secondary school (judged 'outstanding' compared to 'inadequate') in terms of the inspectors' judgment of 'quality of pupils' learning and their progress' predicted better GCSE English (ES=0.47) and maths (ES=0.47) results and a higher likelihood of gaining 5 A*-C, 5 A*-C including English and maths, and of the EBacc. Similarly, Ofsted ratings of 'learners attendance' ('outstanding' compared to 'inadequate') predicted higher grades in GCSE English (ES=0.50) and maths (ES=0.62) and more GCSE entries (ES=0.78). The probability of achieving 5 A*-C and 5 A*-C including English and maths was significantly higher for students that had the benefit of having attended a secondary school judged to have 'outstanding' attendance.

The 'social composition' of the secondary school's student intake (% of students entitled to FSM) predicted individual EPPSE students' GCSE outcomes over and above their own FSM status. Attending a secondary school where a there was a higher percentage of FSM students predicted lower grades in GCSE English (ES=-0.18), fewer full GCSE entries (ES=-0.55) and a lower probability of achieving 5 A*-C (OR=0.98). Although two

[6] The EPPSE CVA indicator is based on DfE CVA results for 4 successive years, covering the 4 EPPSE cohorts, 2006-2009 for all secondary schools attended by EPPSE students. The EPPSE results have an overall CVA averaged mean of 1004, which is close to the national CVA mean of 1000. The students in the sample (based on their secondary school's average CVA score) were divided into high, medium and low CVA effectiveness groups based on the average CVA score to 1 SD above or below the mean; nationally, approximately 10% of secondary schools are 1 SD above the mean and approximately 10% of secondary schools are 1 SD below the mean.

[7] N.B. inspection data relates to the time EPPSE students were in KS3 and were measured by the inspection frameworks in use between 2005 and 2010.

were quite weak these effects were statistically significant. The effect on number of GCSE entries was moderately strong.

Students' progress between KS2 and KS4

Academic progress was analysed by controlling for individual students' prior attainment at the end of primary school (KS2 national assessments) as a baseline and also by taking account of the effects of individual student, family, HLE, and neighbourhood influences. The models also controlled for the measure of disadvantage in the composition of the secondary school's intake. As expected fewer background characteristics predicted differences in students' progress between KS2 and KS4 than were found to predict GCSE attainment. This is because background characteristics also shaped KS2 results. In general the patterns identified for progress over five years in secondary school were similar to those found between KS2 and KS3 (Sammons et al., 2001). Overall, students with the characteristics summarised in Table 2 typically made greater overall academic progress and progress in specific subjects between KS2 and KS4:

Table 2:Student and family background characteristics as predictors of academic progress, controlling for prior KS 2 attainment

Characteristic	Academic outcome
Older for their year group (Autumn born)	total GCSE score - ES=0.16; GCSE English - ES=0.18; GCSE maths - ES=0.20.
Females	total GCSE score - ES=0.25, GCSE English - ES=0.27; GCSE maths - ES=0.13
Bangladeshi heritage N.B. small numbers	total GCSE score - ES=0.83; GCSE English - ES=0.66; GCSE maths - ES=0.88
Higher family incomes	GCSE score - ES=0.26; GCSE English - ES=0.34; GCSE maths - ES=0.21
Higher qualified parents	total GCSE score - ES=0.39; GCSE English - ES=0.59; GCSE maths - ES=0.42
Higher KS3 HLE academic enrichment	total GCSE score - ES=0.36; GCSE English - ES=0.37; GCSE maths - ES=0.45

Of the neighbourhood measures tested, only the percentage of White British residents was a significant predictor of poorer student progress in English. For progress in maths however, reported crime, level of unemployment, perceived neighbour safety, and the two overall measures of disadvantage (IMD and IDACI) were all significant and negative. These findings suggest that neighbourhood context can play a significant role in shaping

students' academic outcomes and progress up to age 16. Place poverty has effects over and beyond individual or family disadvantage.

Pre-school attendance, quality and effectiveness were all found to be significant predictors of EPPSE students' overall academic progress in terms of promoting a higher total GCSE score. However, they did not predict progress in English or maths. As noted earlier, total GCSE score is a broader measure of performance and is likely to reflect school influences in contrast to subject results that are more likely to reflect the influence of different subject departments. Similarly, the DfE CVA measure of individual secondary schools' academic effectiveness was found to be a moderately strong predictor of overall academic progress for the EPPSE sample in terms of predicting their total GCSE score (ES=0.53). By contrast, Ofsted ratings of secondary school quality predicted progress in specific GCSE subject grades in English and maths but not students' overall academic progress.

Students' experiences and views of secondary school

Questionnaire surveys in Year 9 and 11 provide important information about EPPSE students' dispositions, views and experiences of their secondary school in both KS3 and KS4. These students' self reported measures proved to be significant predictors of GCSE results and provide additional information about educational influences in secondary school. Further findings on these measures are presented in two separate technical papers (see Sammons et al., 2014c; Sammons et al., 2014d).

Attending a secondary school that students reported placed a greater 'emphasis on learning' in KS3 predicted significantly better GCSE attainment in Year 11 and more progress across the five years in secondary school. The strongest effects were on total GCSE score (ES=0.36). The effect on the overall academic progress was of similar strength (ES=0.33).

Students' attainment (in terms of all measures of GCSE results) was boosted if they attended a secondary school with a more favourable overall school 'behaviour climate'. The difference was particularly noticeable for grades in GCSE maths (ES= 0.41) English (ES=0.34) and the number of full GCSE entries (ES=0.41). For overall academic progress and progress in specific subjects across KS2 to KS4 the effects were similar and positive. Student reports of the quality of their secondary 'school environment' (attractive building, decoration of classrooms, cleanliness) and of School/learning resources (computers, technology facilities) also predicted better attainment (in total GCSE score and subject grades), although the effects were smaller. Similarly, small but positive effects were identified for the factor related to students' perceptions of how much they felt teachers valued and respected them and for 'Teacher support'.

Other factors related to reports students' on their secondary schools in Year 11 were important. In particular, students' rating of their school in terms of the factor 'Positive relationships ' between teachers and students in terms of trust, respect and fairness.

(ES=0.38 for total GCSE score, ES= 0.33 for English and ES=0.28 for maths). Teacher professional focus and provision of 'formative feedback' were also significant but weaker predictors of better results.

Homework

The amount of time students said they spent on homework strongly predicted better academic attainment at GCSE and also better progress across KS2 to KS4. This information was collected in surveys in both Year 9 and year 11. Because of this we could test whether earlier patterns of homework behaviour in KS3 predicted better outcomes in Year 11. The strongest positive effects were identified for students who spent 2-3 hours doing homework on a typical school night. Students spending between 2 and 3 hours on homework on an average weeknight (during Year 9) were almost 10 times more likely to achieve 5 A*-C (OR=9.97) than students who did not spend any time on homework. A similar result was found for the time spent on homework during Year 11 (OR=9.61). The pattern of results reflected a clear gradient with increasing time linked to increased results. Moderate to strong positive effects of time spent on homework were found in predicting total GCSE score, specific GCSE grades and the benchmark indicators, but also on overall academic progress and progress in specific subjects. These results show that independent study and effort put into homework by students are important contributors to academic success over and above other student background, family and neighbourhood influences.

Of course engagement in homework is likely to reflect student motivation, the nature of the tasks set and the priority given to setting and marking homework by secondary schools. Nonetheless, doing homework regularly can increase opportunity to learn and foster independence and study skills.

Conclusions and implications

These findings cover outcomes at GCSE that have very important consequences for students' subsequent further higher education and employment opportunities. Overall, the latest results confirm and extend earlier EPPSE findings. The life chances of some children are shaped by important individual, family, home and school experiences from an early age. There is no level playing field at the start of school or in later phases. These effects of disadvantage emerge at a young age and measures of individual student, family and neighbourhood characteristics continue to shape students' later academic outcomes through subsequent phases of their school careers. It is widely recognised that England has a large equity gap in achievement in international comparisons and that life chances and social mobility are highly stratified. However, EPPSE research indicates that some educational influences can help to ameliorate the effects of disadvantage. Pre-school effects remain evident, while primary and secondary school experiences are also relevant.

Disadvantage remains a complex and multi-faceted concept. The longitudinal EPPSE research indicates that disadvantage is by no means captured by one simple indicator such as the FSM status of a student. Poverty, in terms of FSM status, does not embrace the full range of characteristics which are shown in this report to shape students' academic outcomes across successive phases of education (e.g. parents' educational qualifications and the HLE support they can provide). The concept of multiple disadvantage is important and the challenges facing schools, parents and communities, in promoting better outcomes for students from disadvantaged homes and contexts remain strongly evident as illustrated by findings on the role of neighbourhood disadvantage and school composition that reveal the greater challenges facing schools that serve more students from disadvantaged communities.

Educational influences (including early experiences at pre-school) have a part to play in supporting those 'at risk' of poor attainment and can promote better outcomes by ameliorating the adverse effects of disadvantage. Nonetheless, the EPPSE results confirm equity gaps emerge early for all outcomes (cognitive/academic and social-behavioural) and remain strongly evident across different phases of education.

Taken together, the EPPSE research indicates that no single educational influence acts as a 'magic bullet' that can fully overcome the adverse impact of disadvantage. However, parental actions that provide a better home learning environment and also supportive educational environments (pre-school, primary and secondary school) can make a difference to children and young people's academic and other important educational outcomes and so have the potential to improve life chances. The KS4 findings reported here confirm that pre-school effects last and have particular relevance for policy making. The academic effectiveness of both primary and secondary school attended was found to predict EPPSE students' attainment and progress. Those fortunate enough to attend more academically effective or higher quality schools receive a significant boost in terms

of later GCSE outcomes. There are also clear implications for practitioners about the role of students' secondary school experiences, especially the overall behavioural climate of schools and quality of relationships between staff and students that can support school improvement strategies in KS3 and KS4.

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Table 3: Summary table of various predictors of students' GCSE outcomes[8]

	Total GCSE score	Total GCSE entries	GCSE English	GCSE maths
Individual student measures	**ES**	**ES**	**ES**	**ES**
Age	0.14		0.13	0.14
Gender	0.19	0.11	0.38	
Ethnicity	0.76 (B)†	0.58 (B)	0.55 (B)	0.53 (I)≠
Birth weight		-0.39		
Early behavioural problems	-0.29	-0.30	-0.17	-0.27
Early health problems	-0.12	-0.12	-0.14	-0.16
Number of siblings	-0.17	-0.33	-0.28	-0.17
Family measures				
Mother's age at age 3/5			0.15	0.10
Year 11 FSM	-0.32	-0.23	-0.31	-0.37
KS1 family salary	0.29	0.52	0.41	0.28
Parents' highest SES at age 3/5	-0.31	-0.58	-0.53	-0.66
Mothers' highest qualifications level at age 3/5	0.47	0.31	0.70	0.57
Fathers' highest qualifications level at age 3/5		0.25	0.33	0.40
Parents' highest qualifications level at age 3/5	0.59	0.36	0.80	0.74
HLE measures				
Early years HLE	0.36	0.51	0.51	0.45
KS1 HLE outing (medium)				0.11
KS1 HLE educational computing (medium)	0.11	0.13		
KS2 HLE educational computing (medium)		0.13	0.10	0.15
KS3 HLE computer (high)		0.15		
KS3 HLE academic enrichment (high)	0.47	0.43	0.48	0.47
Pre-school measures				
Pre-school attendance	0.31	0.21	0.23	0.21
Pre-school duration	0.38	0.24	0.28	0.30
Pre-school quality	0.37	0.20	0.31	0.26
Pre-school effectiveness pre-reading	0.27	0.25	0.31	
Pre-school effectiveness early number concepts	0.48	0.23		0.35
Primary school measures				
Primary school academic effectiveness - maths				0.25
Secondary school measures				
Secondary school academic effectiveness	0.42			
Secondary school quality – the quality of pupils' learning		0.93	0.47	0.47
Secondary school quality – attendance of learners		0.78	0.50	0.62

B†=Bangladeshi heritage; I≠=Indian heritage

[8] ES for other predictors are based on the models that included the combined measure of parental qualification levels. When multiple categories are significant (eg ethnicity) , the highest ES is presented.

Table 4: Summary table of various predictors of r Year 11 GCSE benchmark indicators

	Achieved 5 A*-C	Achieved 5 A*-C English & maths	EBacc
Individual student measures	**OR[9]**	**OR**	**OR**
Age		1.04	
Gender	1.45	1.24	1.74
Ethnicity		2.28(I)[ǂ]	
Developmental problems	0.68	0.67	
Behavioural problems	0.65	0.63	
Health problems	0.63		
Number of siblings	0.62	0.69	
Family measures			
Mother's age at age 3/5	1.33		1.39
Year 11 FSM	0.61	0.51	
KS1 family salary	3.94	1.95	4.04
Parents' highest SES at age 3/5	0.50	0.59	0.41
Mothers' highest qualifications level at age 3/5	3.14	4.11	
Fathers' highest qualifications level at age 3/5	2.48	2.07	3.16
Parents' highest qualifications level at age 3/5	3.58	3.92	2.83
School level FSM	0.98		0.96
HLE measures			
Early years HLE	3.61	2.90	
KS1 HLE outing (medium)		1.39	
KS1 HLE educational computing (medium)	1.36		0.51 (high)
KS3 HLE academic enrichment (high)	2.80	2.60	3.89
KS3 HLE parental interest (high)		1.34	
Pre-school measures			
Pre-school attendance		1.48	
Pre-school quality		1.69	
Pre-school effectiveness pre-reading		1.73	
Primary school measures			
Primary school academic effectiveness - maths			1.94
Secondary school measures			
Secondary school quality – the quality of pupils' learning	3.04	2.74	5.44
Secondary school quality – attendance of learners	2.89	2.74	

I[ǂ]=Indian heritage

[9] Odds Ratios represent the odds of achieving certain benchmark performance indicators given certain characteristics relative to the odds of the reference group.

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