

The long-term role of the home learning environment in shaping students' academic attainment in secondary school

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Abstract

Purpose – *The purpose of this paper is to explore the relationships between the characteristics of the home learning environment (HLE) and students' academic attainments in secondary school in England at age 14 and 16.*

Design/methodology/approach – *This research study uses multilevel statistical models to investigate the strength and significance of relationships between various measures of the HLE at ages three, six, 11 and 14, and students' academic attainment in secondary school.*

Findings – *Multilevel models show that early years HLE and specific dimensions of later HLE are positive predictors of students' later academic attainment at age 14 and 16, when the influence of various individual, family and neighbourhood characteristics are controlled.*

Originality/value – *The paper presents unique findings on the role of the HLE in shaping students' academic success at secondary school, including a range of measures of the HLE obtained at different ages. The results show that the early years HLE measured at age three continues to show effects on later attainment, over and beyond the effects of later HLE and other significant influences such as family socio-economic status and parents' qualification levels.*

Keywords *Academic attainment, GCSE, Home learning environment*

Paper type *Research paper*

Introduction

The family represents the first and probably most influential learning context where very young children typically acquire language, knowledge, skills, and behaviours. This has the potential to shape their readiness for school, attitudes toward learning, and their later academic attainment.

The home learning context has been studied extensively, especially in the area of developmental psychology, and has been linked to the child's cognitive and social development (Bradley, 1994). Much attention has been given to the relationship between the home learning environment (HLE) and the development of language and vocabulary (Rodriguez and Tamis-LeMonda, 2011; Son and Morrison, 2010) or early cognitive attainment like early literacy and numeracy in pre-school (Anders *et al.*, 2012; Hartas, 2011; Skwarchuk, 2009). The important role of HLE was also linked with later school readiness (Forget-Dubois *et al.*, 2009), pre-reading and reading, spelling, and mathematics attainment at primary school age (Hartas, 2012; Sammons *et al.*, 2004; Melhuish *et al.*, 2008; Niklas and Schneider, 2013). In a longitudinal study of pre-school in England, Sammons *et al.* (2002, 2004) and Melhuish *et al.* (2008) showed that their measure of early years HLE had an independent influence on the educational outcomes, with strong positive effects in predicting later attainment at school that were above and beyond the effects of parental

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educational level and the family socio-economic status (SES). This emphasises the importance of studying the HLE as a potential predictor of academic attainment while taking into account the influence of other child, family and school characteristics.

The present study conceptualises the early years “HLE” as the frequency of educationally oriented activities undertaken by parents and their young children within the home – as opposed to those occurring in a pre-school or school setting or extension of that setting, such as school set homework, or school organised visits. It uses a measure of the early years HLE based on parents’ reports of the frequency with which they engage in various learning activities (Melhuish *et al.*, 1999, 2008; Sammons *et al.*, 2002, 2004). Although the HLE is likely to reflect the parents’ economic, social and cultural capital, the index of early years HLE was found to be only moderately associated with parents’ social-economic status and educational levels (Melhuish *et al.*, 1999, 2008). Sylva *et al.* (2004) also showed that for the children’s intellectual and social development, the activities that parents undertake with their children at home are more essential than who they are.

Although the nature of HLE in the early years has received attention, very few studies have studied the way the HLE changes over time, as the children get older and move through different phases of education (Bradley *et al.*, 2000, 2001). Moreover, there is relatively little evidence on whether the early years HLE has any long-lasting effects on later educational outcomes, when children move on from primary school into secondary education. This paper makes new contributions in several ways. First, by investigating the ways in which the HLE changes over time for a large sample of children followed longitudinally from age three years plus to age 16. Second, by exploring the longer term relationships with students’ secondary school academic outcomes, and third by identifying specific dimensions of the HLE at different ages and reveals that some aspects are stronger predictors of later attainment than others. Thus, it investigates the role of the early years HLE and measures home and educational computing, enrichment and outing activities at later ages, the interactive learning experiences between parents and children, as well as their own individual activities, parental support and interest in school, as factors shaping the academic attainment in primary and secondary school.

Methods

Sample

The sample is drawn from the longitudinal, government funded Effective Pre-school, Primary and Secondary Education Project (EPPSE) conducted in England. More details about the sampling and methodology can be found in Melhuish *et al.* (1999) and Sylva *et al.* (2004). Over 17 years, the project studied the academic and social-behavioural development of 3,172 children from pre-school (age 3+ years) to age 16. This sample also included 315 children who had not attended any pre-school and represented the “no pre-school (home)” comparison group. In terms of national comparisons, the characteristics of the sample and their attainments in national assessments and later in public examinations at General Certificate of Secondary Education (GCSE) remained broadly representative across time.

At age 14, the sample consisted of 2,574 students who had valid Year 9 academic data. In total, 52 per cent were females and 48 per cent were males. The majority of the adolescents (74 per cent) were of White UK heritage, while Bangladeshi young people represented the smallest ethnic group (1 per cent) (see Table I). The average age was 14.21 years (SD = 0.28).

At age 16, valid Year 11 academic data were available for 2,746 students, although the sample sizes varied slightly on different academic outcome measures. The distributions of the background characteristics remained very similar to the ones presented at age 14. The average age was 16.22 years (SD = 0.29).

For Year 9, we used multiple imputation to deal with the missing data. Additionally, the analyses conducted on the non-imputed data set led to very similar patterns of results to the ones obtained on multiple imputation data sets. Therefore, we chose to present the set of results on the non-imputed data for both Years 9 and 11.

Table 1 Selective background characteristics of the sample at age 14

	Year 9 English TA n = 2,574		Year 9 Mathematics TA n = 2,574		Year 9 Science TA n = 2,575	
	n	%	n	%	n	%
<i>Gender</i>						
Male	1,311	50.9	1,306	51.9	1,312	51.0
Female	1,263	49.1	1,268	48.1	1,263	49.0
<i>Ethnicity</i>						
White European	85	3.3	85	3.3	83	3.2
Black Caribbean	101	3.9	100	3.9	101	3.9
Black African	53	2.1	54	2.1	54	2.1
Any other ethnic minority	59	2.3	59	2.3	59	2.3
Indian	58	2.3	58	2.3	58	2.3
Pakistani	132	5.1	125	4.9	134	5.2
Bangladeshi	25	1.0	25	1.0	25	1.0
Mixed	149	5.8	151	5.9	149	5.8
White UK	1,911	74.3	1,916	74.5	1,911	74.2
<i>Number of siblings in the house (at age 3/5)</i>						
No siblings	514	20.2	513	19.7	514	20.2
1-2 siblings	1,618	63.7	1,619	63.6	1,617	63.6
3+ siblings	409	16.1	409	16.8	411	16.2
<i>Early years home learning environment (HLE) index</i>						
< 13	238	9.6	235	10.3	238	9.5
14-19	576	23.1	576	25.0	579	23.2
20-24	621	24.9	623	23.4	622	24.9
25-32	779	31.3	783	29.7	777	31.2
> 33	278	11.2	276	11.6	277	11.1
<i>Type of pre-school</i>						
Nursery class	515	20.0	518	40.7	518	20.1
Playgroup	531	20.6	532	17.0	530	20.6
Private day nursery	356	13.8	357	11.6	353	13.7
Local authority day nursery	338	13.1	336	15.6	340	13.2
Nursery schools	440	17.1	440	1.9	439	17.0
Integrated (combined) centres	145	5.6	145	0.1	145	5.6
Home	249	9.7	246	13.1	250	9.7
<i>Mother's qualification (at age 3/5)</i>						
None	559	22.3	558	22.3	561	22.4
Vocational	386	15.4	385	15.4	386	15.4
16 academic	1,002	40.0	1,004	40.1	1,001	40.0
18 academic	197	7.9	197	7.9	197	7.9
Degree or higher degree	323	12.9	323	12.9	322	12.9
Other professional	37	1.5	38	1.5	38	1.5
<i>Father's qualification (at age 3/5)</i>						
None	430	16.9	429	16.9	433	17.0
Vocational	308	12.1	307	12.1	306	12.0
16 academic	623	24.5	624	24.6	623	24.5
18 academic	179	7.1	178	7.0	179	7.0
Degree or higher degree	333	13.1	337	13.3	334	13.1
Other professional	29	1.1	29	1.1	29	1.1
Absent father	637	25.1	635	25.0	636	25.0
<i>Family highest SES (at age 3/5)</i>						
Professional non-manual	165	6.5	167	6.6	163	6.4
Other professional non-manual	605	23.9	605	23.9	606	23.9
Skilled non-manual	876	34.6	879	34.7	874	34.5
Skilled manual	398	15.7	395	15.6	400	15.8
Semi-skilled	349	13.8	348	13.7	349	13.8

(continued)

Table 1

	Year 9 English TA n = 2,574		Year 9 Mathematics TA n = 2,574		Year 9 Science TA n = 2,575	
	n	%	n	%	n	%
Unskilled	68	2.7	68	2.7	69	2.7
Unemployed/not working	73	2.9	72	2.8	74	2.9
<i>Free school meal (at year 9)</i>						
No FSM	2,041	80.2	2,040	80.2	2,044	80.3
FSM	504	19.8	504	19.8	503	19.7
<i>Family earned income (at age 7)</i>						
No salary	488	24.2	485	24.1	488	24.2
£2,500-17,499	442	21.9	440	21.8	442	21.9
£17,500-29,999	375	18.6	375	18.6	376	18.7
£30,000-37,499	245	12.2	246	12.2	245	12.2
£37,500-67,499	375	18.6	379	18.8	374	18.6
£67,500-132,000+	90	4.5	90	4.5	90	4.5

Measures

Academic attainment: At age 14, students' academic attainment was measured by the national curriculum level awarded for teacher assessment (TA) in the core subjects English, maths and science. In Year 9, students were awarded TA levels from level 1 to level 8 in these subjects.

At age 16, four separate measures of students' academic attainment were obtained based on the grades achieved in GCSE public examinations in English and maths, the total GCSE and equivalents new point score and whether or not the student achieved five or more GCSE and equivalents at grades A*-C including GCSE English and maths at the end of Year 11, an important benchmark indicator used for school accountability in England. The measures representing the grades achieved for English and maths were transformed into numerical values from symbolic letters ("A", "B", etc.), while the total GCSE score was maintained in its original scale. The dichotomous indicator was preserved with the original coding (0 for "not achieved" and 1 for "achieved"). Distributions and descriptive statistics of Year 9 and Year 11 academic attainment outcomes can be seen in Figure 1. The academic grades form approximately normal distributions and show very similar profiles to the pattern in national data sets.

Around seven out of ten (70 per cent) students gained a grade C or higher in GCSE English, with only 5 per cent being unable to attain a grade E or higher in GCSE English. Over two-thirds (67 per cent) students gained a grade C or higher in GCSE maths, with just over one in ten students (11 per cent) being unable to attain a grade E or higher in GCSE maths.

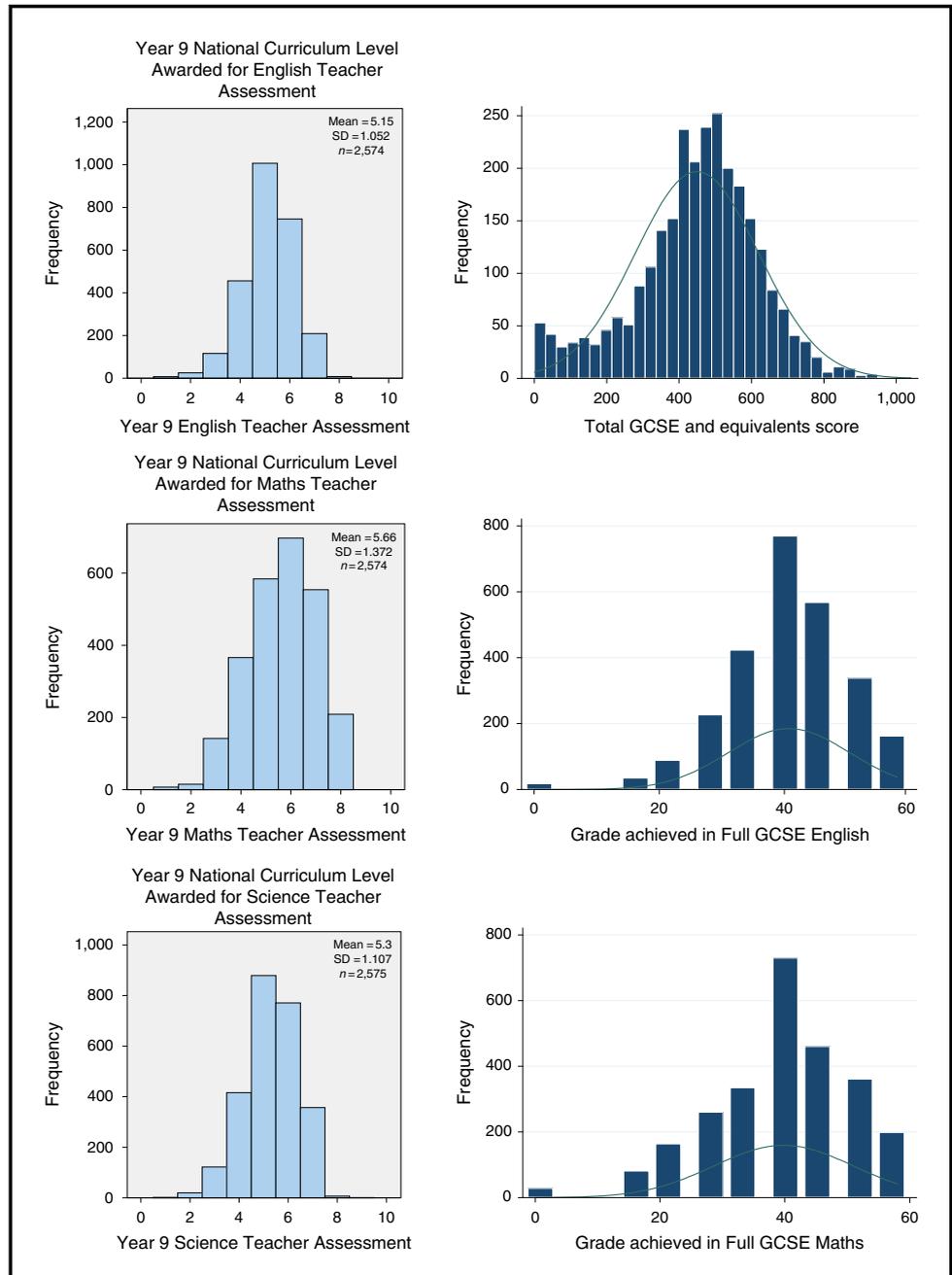
Individual characteristics. These include gender, age in months in their year group, ethnic group, birth weight, number of siblings, number of early behavioural problems and number of early developmental problems as reported by the parents in pre-school interviews when children were recruited to the EPPSE study.

Family characteristics. These include mother's age, parental education levels, family salary, family SES[1] and student's eligibility for free school meals (FSM – a proxy measure for low income).

HLE. The frequency of parent-child learning activities and routines during the pre-school years (based on parental report of activities) were aggregated into a continuous scale, while the HLE measures at Key Stage 1 (KS1, age seven), Key Stage 2 (KS2, age 11) and Key Stage 3 (KS3, age 14) were multi-dimensional, containing several factors. The technical details regarding the creation of these measurements and the relationship between the constructs across time can be found in author's (forthcoming) *Early years HLE*.

We measured the extent to which parents reported that they and their children engaged in different educational activities during the early years. The frequencies of educational activities,

Figure 1 Distributions of academic attainment at Year 9 and Year 11



such as taking the child to the library, reading to the child, listening to the child read, practicing numbers with the child and teaching songs and nursery rhymes were integrated into a scale measure of the early years HLE (Melhuish *et al.*, 2008). The early years home learning scale has a range of 0-45; the higher the value, the better the quality of the early years HLE. The Cronbach's α for this scale is 0.59. Based on this continuous scale, we created five HLE categories by selecting the top and bottom 10 per cent and then splitting the remaining 80 per cent in roughly three groups for medium low, medium and medium high HLE. Table II illustrates that the early years HLE shows a linear relationship with the average academic attainment at age 14. Similar association was found for academic attainment at age 16.

Table II Means and SDs by early years HLE categories

Early years HLE	Year 9 English TA			Year 9 Mathematics TA			Year 9 Science TA		
	<i>n</i>	Mean	SD	<i>n</i>	Mean	SD	<i>n</i>	Mean	SD
0-13	238	4.7	1.1	235	5.1	1.4	238	4.8	1.1
14-19	576	4.9	1.1	576	5.4	1.4	579	5.1	1.1
20-24	621	5.1	1.0	623	5.6	1.3	622	5.3	1.1
25-32	779	5.3	1.0	783	5.9	1.3	777	5.5	1.0
33-45	278	5.7	0.9	276	6.4	1.2	277	5.9	0.9

During KS1, when children were approximately seven years old, parents reported on interactions with their child at home via a parent questionnaire. The survey covered activities such as the frequency of reading to or with the child, taking the child out on educational visits, computing activities, sport activities, dance, etc. Exploratory and confirmatory factor analyses indicated that the individual KS1 HLE measures linked to four latent factors with examples items in brackets: home computing (e.g. parent uses computer with the child in educational ways), one-to-one interaction (e.g. parent reads to the child), expressive play (e.g. The child paints/draws/makes models) and enrichment outings (e.g. parent goes on educational visits with the child) (Sammons *et al.*, 2008a, b).

Another parent questionnaire was administered at the end of KS2 at age 11. Parents were asked to indicate their level of involvement in different learning activities at home. They reported on activities such as the frequency of internet usage, taking the child out to physical activities (dance, sport, etc) and educational visits, computing activities and any help they gave the child in different school subjects. From these individual items, four factors were extracted using exploratory and confirmatory analyses: educational computing (e.g. parent and child use the internet for learning), parent-child learning processes (e.g. parent teaches a school subject), individual child activities (e.g. child reads on their own) and computer games (e.g. parent and child play computer games together) (Sammons *et al.*, 2011).

The KS3 HLE measure incorporates information sourced not just from the parent, but from the adolescents themselves. This innovation was designed to take account of the greater independent influence the adolescent, at age 14, could exert over their own HLE. Five KS3 HLE factors were extracted from the individual items using exploratory and confirmatory factor analyses: learning support and resources (e.g. parent giving help with difficult homework), computer use (e.g. child uses computer for e-mail), parental interest in school (e.g. parent talked to them about their school work), academic enrichment (e.g. read on your own for pleasure) and parental academic supervision (e.g. parents make sure I do my homework) (Sammons *et al.*, 2014).

Neighbourhood characteristics

Free school meal (FSM) at secondary school level. A measure of the student intake of the secondary schools is represented by the percentage of all students in the school who were eligible for FSM at school level.

Percentage of white British

The percentage of White British citizens in the neighbourhood of the students' postcode was collected from the census and was matched to the EPPSE data set.

Results

Early years home learning and academic attainment at age 14 and 16

A range of multilevel statistical models were used to investigate which individual (age, gender, ethnicity), family (SES, income) and neighbourhood characteristics predicted variation in attainment outcomes at age 14 and again at age 16. Results reveal that, after controlling for a range of individual and family characteristics, the early years HLE continues to predict students'

later educational success in secondary school demonstrating long-lasting positive effects on academic attainment at age 14 and 16. At age 14, the two highest early years HLE categories were statistically significant (e.g. 25-32 and 33-45), while later, at 16, only the highest category was statistically significant. Students who had experienced a more favourable learning environment in the early years (scores in the highest HLE category vs the lowest HLE category) obtained statistically significantly better grades in English (an effect equivalent to a fifth of a TA level), mathematics (effect equivalent to almost a half of a TA level) and science (equivalent to a third of a TA level) at age 14 than students who scored very low on the HLE overall scale.

Later, at age 16, the same students were doing better overall taking into account other significant predictors (obtaining 48 points more on total GCSE scores, see Table III), but also sustained their previous good results, obtaining statistically significant better grades in GCSE English and maths (more than half a grade in each subject) than students who did not participate in these activities. Multilevel logistic regression indicated that they were also almost three times more likely to achieve the benchmark measures of achieving five GCSEs at grades A*-C including English and maths. These results extend findings obtained at younger ages and show that the early years HLE remains highly important in predicting better secondary school academic outcomes up to age 16.

KS1 HLE and academic attainment at age 14 and 16

Of the four dimensions of the KS1 HLE measured at age seven, only the enrichment outings activities was a statistically significant net predictor of academic attainment in English and science, but not maths, at age 14. Children who were taken by their parents to educational visits and the library obtained on average a seventh of a TA level more in English and science (a statistically significant different effect) than children who were not engaged in these activities during primary school. Enrichment activities continued to have a positive and statistically significant influence on later academic attainment, at age 16, moderate levels being associated with higher GCSE grades in maths and a significant positive probability of achieving five or more GCSEs at grades A*-C including English and maths when compared with students with low levels of engagement.

Additionally, moderate usage of computers as learning opportunities in primary school significantly predicted on average 14 points more on the Total GCSE score than low or no educational computing. Again these effects of the KS1 HLE are net of those found for the early years HLE measure and of individual, family and neighbourhood influences controlled in the model.

KS2 HLE and academic attainment at age 14 and 16

Children who used computers moderately with their parents or on their own for educational purposes up to the end of primary school, went on to gain better grades in English and mathematics (with almost a fifth of a TA level more) at age 14 and 16 than children who rarely used the computers. Children who were reported to engage in painting, making models, dancing and reading on their own at age 11 were also significantly more likely to obtain better grades in science at age 14.

KS3 HLE and academic attainment at age 14 and 16

With children moving into adolescence, there is an increased independence from parents which is reflected in the nature of the interactions and activities young people participate in at home with their parents. The HLE measured at age 14 incorporated thus, both parents' and students' reports on the type of activities they engaged in at home. We investigated the influence of the five dimensions of KS3 HLE (learning support and resources, computer use, parental interest in school, academic enrichment and parental academic supervision) as predictors of academic attainment at age 16, while controlling for the early years HLE and the specific KS1 HLE and KS2 HLE factors that were statistically significant, as well as a range of individual, family and neighbourhood characteristics.

Young people who reported that they spent time reading on their own, going with their families on educational visits or to the library at age 14, obtained significantly higher total GCSE scores

Table III Results of multilevel contextualised model for predicting total GCSE score

<i>Fixed effects</i>	<i>Coef.</i>	<i>Total GCSE score</i>		<i>Sig.</i>
		<i>SE</i>	<i>Effect size</i>	
<i>Age</i>	2.70	0.84	0.14	**
<i>Gender</i>	25.67	6.15	0.19	***
<i>Ethnic group (compared with White UK)</i>				
White European	19.24	17.04	0.14	
Black Caribbean	37.82	16.84	0.28	*
Black African	3.62	24.28	0.03	
Any other ethnic minority	18.70	20.97	0.14	
Indian	48.77	22.24	0.37	*
Pakistani	52.97	19.09	0.40	**
Bangladeshi	101.91	31.43	0.76	**
Mixed race	-15.91	13.58	-0.12	
<i>Early behavioural problems (compared with none)</i>				
1+ behavioural problem	-38.85	9.07	-0.29	***
<i>Early health problems (compared with none)</i>				
1+ health problem	-15.90	6.65	-0.12	*
<i>Number of siblings at age 3/5 (compared with none)</i>				
1 sibling	6.48	8.29	0.05	
2 siblings	-0.72	8.74	-0.01	
3+ siblings	-23.18	10.27	-0.17	*
Missing	67.04	47.87	0.50	
Year 11 FSM (compared with no)	-42.03	8.36	-0.32	***
<i>KS1 family salary (compared with no earned salary)</i>				
£2,500-15,000	14.12	9.93	0.11	
£17,500-27,500	22.73	10.63	0.17	*
£30,000-35,000	32.03	12.20	0.24	**
£37,500-66,000	34.69	11.41	0.26	**
£67,500-132,000	39.20	19.29	0.29	*
Missing	16.65	10.08	0.12	
<i>Parents' highest SES at age 3/5 (compared with professional, non-manual)</i>				
Other professional non-manual	-5.50	13.90	-0.04	
Skilled non-manual	-19.76	14.74	-0.15	
Skilled manual	-41.60	16.03	-0.31	**
Semi-skilled	-40.34	16.55	-0.30	*
Unskilled	-35.51	23.47	-0.27	
Never worked	-30.27	22.86	-0.23	
<i>Parents' highest qualifications level at age 3/5 (compared with none)</i>				
Vocational	29.22	11.94	0.22	*
Academic age 16	38.81	9.42	0.29	***
Academic age 18	42.76	12.72	0.32	***
Other professional	47.29	24.63	0.35	
Degree	69.43	13.28	0.52	***
Higher degree	78.94	18.68	0.59	***
Absent father or missing mother's	42.83	40.85	0.32	
Missing	-102.19	50.03	-0.77	*
<i>Early years HLE (compared with 0-13)</i>				
14-19	7.20	10.58	0.05	
20-24	4.80	10.76	0.04	
25-32	22.58	10.74	0.17	*
> 33	48.43	13.44	0.36	***
<i>KS1 HLE educational computing (compared with low)</i>				
KS1 HLE educational computing medium	14.28	7.22	0.11	*
KS1 HLE educational computing high	0.15	10.57	0.00	

(continued)

Table III

<i>Fixed effects</i>	<i>Coef.</i>	<i>Total GCSE score</i>		<i>Sig.</i>
		<i>SE</i>	<i>Effect size</i>	
<i>KS3 HLE academic enrichment (compared with low)</i>				
KS3 HLE academic enrichment medium	39.77	6.73	0.30	***
KS3 HLE academic enrichment high	63.11	9.62	0.47	***
FSM school level (continuous)	0.11	0.36	0.03	
% White British neighbourhood (continuous)	-0.36	0.22	-0.13	
Intercept	374.25	21.13		
Variance-school level	7701.87	951.69		***
Variance-student level	17,763.03	579.71		***
Total variance	25,464.90			
Number of students	2,497			
Number of schools	610			
Deviance (-2 × Log Restricted-Likelihood)	31,642.29			
Intra-school correlation (ICC)	0.3025			
% Reduction student variance	15.1			
% Reduction school variance	28.3			
% Reduction total variance	19.6			

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

(more than 60 points, see Table IV), better grades in GCSE English and maths (more than half a grade) than their peers who engaged less in these activities. Similarly, engaging in academic enrichment activities at medium and high levels (compared with low levels) significantly increased the probability of achieving five or more GCSE exams including English and maths with grades A*-C by almost three times.

Parental interest in their child's learning manifested in reporting that they talked to their 14 years olds about school work, experiences and the subjects for the GCSE also predicted a significantly higher probability of a student going on to achieving five or more GCSE exams at age 16 including English and maths with grades A*-C than students whose parents had showed low levels of reported interest at age 14.

Discussion

The present research contributes new knowledge to our understanding of the role of the HLE and its influence on children and young people's attainment across different phases of education in England. It shows that the measure of the early years HLE investigated here that focuses on parents' reports of the frequency with which they engage in specific learning activities with their child at a young age continues to predict variations in students' academic attainment up to age 16, even when other important and moderately associated measures (such as income, family SES and parental qualifications) are controlled. The quality and frequency of parent-child interactions in the early years still shows a significant positive effect on academic attainment after more than ten years in school both at age 14 and 16, and this effect is not removed when later measures of the HLE at age seven, 11 or 14 are modelled. The contribution of the child's HLE has received rather less attention in past research than the impact of structural factors such as parents' occupations, income or qualifications. Yet this research demonstrates that the early years HLE can be as strong a net predictor as some of these structural measures. Moreover, where it has been studied, often only relatively crude indicators are adopted (e.g. the number of books at home or access to the internet). In this study the impact of a more finely differentiated and robust measure of early parental support was investigated. In addition, this study has modelled the effects of HLE experiences at various ages and shown that these can all influence attainment into adolescence (ages 14 and 16 in national assessments and national GCSE examinations) in England. The HLE at later ages is also influential but does not remove the effects of the early years experiences of parental support.

While it is recognised that the parent is the child's first educator, relatively little is known about what kinds of parent-child activities are of particular importance at different ages. Dearing and

Tang (2010) emphasised that the HLE is an important means used by the parents to teach their children the skills and knowledge necessary for successful adaptation to the social and cultural environment. However, the size of the effect of home learning is debated (some studies finding larger effects on attainment – Sammons *et al.*, 2004, 2008a; Melhuish *et al.*, 2008) while others a weaker influence (Hartas, 2011). Much depends on the quality of the HLE measure and extent of control for other associated measures like family SES, parents' qualification levels and income.

In addition, few studies have examined how the impact of the HLE on academic attainment changes over time as children move from pre-school into primary and later secondary education. The longitudinal nature of our data allowed us to look into the long-lasting effects of individual, family and school characteristics measured at very young age, but also over time, on their academic achievement up to the end of compulsory education and beyond that on different post-16 career choices and destinations. This has policy implication, especially when designing parent intervention programmes that have as their prime focus guiding parents about how to interact appropriately with their children to help support their cognitive and social development and the types of learning activities and play they can engage in. In addition to the cognitive impact that can lead to future educational benefits, such interactions can also provide important positive emotional and bonding opportunities. On the same sample, it was found that the early years HLE shaped social-behaviour, particularly young children's self-regulation, which also supports learning (Sammons *et al.*, 2003, 2008b).

This finding is even more relevant as a good quality early years HLE is not necessarily a feature of a socially and financially successful family. Melhuish *et al.* (2008) showed that the early years learning environment is only modestly associated with the family's SES or parents' education level (correlations approximately 0.3). Moreover in qualitative case studies of children and families that succeed against the odds, Siraj-Blatchford (2010) showed that some disadvantaged families have high aspirations for their children and provide significant educational support through a good quality HLE.

Closing the educational equity gap is increasingly seen as a major societal goal. Our findings suggest that efforts to improve the HLEs of socially and financially disadvantaged children may prove a worthwhile focus for interventions to boost their cognitive development in the early years, but may also support their later academic achievement through into secondary schooling.

Another advantage of following the same sample of children over 13 years of pre-school and schooling from three to 16 is that we could measure the features of their HLE at different ages. As children became older, the measures of their later HLE become more complex and multi-dimensional. We also recognised that parents' direct involvement in learning may alter or diminish as children move up through the grade levels (Drummond and Stipek, 2004), but also that when children move from primary to secondary school, they become more independent and interested in their peer-groups rather than mainly spending time with their families. Therefore, parents tend to have more supervisory and advisory roles at home, like monitoring or helping with the homework (Davis and Lambie, 2005) or may support learning through enrichment type activities like educational visits. Additionally, by recording the young people's own reports on their extra-school educational activities, we seek to recognise the young person's own potential to influence their home learning context.

At older ages, we showed the importance of using computers, which has been linked to negative effects because it might reduce learning time if the focus is on gaming rather than educational activities (Gentile *et al.*, 2004). Our results reveal that when it is used alone or in partnership with the parents and for educational purposes, it can have a positive influence on academic outcomes.

Another important finding is related to the enrichment activities from secondary schools, namely, the importance of continuing the visits to the library and reading on their own. Clark and Rumbold (2006) in their research review concluded that reading for pleasure has real educational and social consequences. In this paper, our results are in accord with this view and we demonstrate the clear and significant positive impact of educational enrichment activities in predicting overall academic attainment. The findings that reading and library visits are positively associated not only with outcomes in English but also with overall GCSE results is in line with previous studies (Sullivan, 2001). Parents who help children to develop reading habits are also more likely to show

greater interest in their school work and experiences and have higher academic expectations for them (Castro *et al.*, 2015). Our findings also support this conclusion, students with parents who show interest in their school life when they were 14, have better chances to get good GCSE results at age 16.

Supporting parents to engage in promoting their children's cognitive development from a young age and developing ways to inform and build good relationships with their child's school may also prove of value in promoting better educational outcomes, especially for children from disadvantaged backgrounds who are at greater risk of underachievement.

In conclusion, this study provides new evidence about the way that parental involvement in home learning activities can support children's cognitive and social development from very early ages and all along their academic career. It shows that the quality of the HLE has important effects, net of the influence of other important family characteristics such as income, SES or parents' qualification levels. The research indicates that different features of the HLE can be measured at different ages. It shows in particular that the early years (pre-school period) experiences at home have long-term consequences but also that enrichment experiences in early adolescence, especially reading at home are also predictive of academic success. It also shows that such effects are net of other important predictors that have received more attention in studies of educational disadvantage, such as income, family SES and parents' own qualification levels.

Implications for policy and practice

- Fostering a good quality HLE is a worthwhile focus for improving children's academic attainment.

Note

1. Family SES was based on the highest SES status of the mother or the father in their current occupation at entry to the study.

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