



## School Effectiveness and School Improvement: An International Journal of Research, Policy and Practice

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/nses20>

### Protecting the development of 5-11-year-olds from the impacts of early disadvantage: the role of primary school academic effectiveness

Pam Sammons<sup>a</sup>, James Hall<sup>a</sup>, Kathy Sylva<sup>a</sup>, Edward Melhuish<sup>b</sup>, Iram Siraj-Blatchford<sup>c</sup> & Brenda Taggart<sup>c</sup>

<sup>a</sup> Department of Education, University of Oxford, Oxford, UK

<sup>b</sup> Birkbeck, University of London, London, UK

<sup>c</sup> Institute of Education, University of London, London, UK

Version of record first published: 20 Dec 2012.

To cite this article: Pam Sammons, James Hall, Kathy Sylva, Edward Melhuish, Iram Siraj-Blatchford & Brenda Taggart (2012): Protecting the development of 5-11-year-olds from the impacts of early disadvantage: the role of primary school academic effectiveness, *School Effectiveness and School Improvement: An International Journal of Research, Policy and Practice*, DOI:10.1080/09243453.2012.749797

To link to this article: <http://dx.doi.org/10.1080/09243453.2012.749797>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings,

demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

## Protecting the development of 5–11-year-olds from the impacts of early disadvantage: the role of primary school academic effectiveness

Pam Sammons<sup>a\*</sup>, James Hall<sup>a</sup>, Kathy Sylva<sup>a</sup>, Edward Melhuish<sup>b</sup>,  
Iram Siraj-Blatchford<sup>c</sup> and Brenda Taggart<sup>c</sup>

<sup>a</sup>Department of Education, University of Oxford, Oxford, UK; <sup>b</sup>Birkbeck, University of London, London, UK; <sup>c</sup>Institute of Education, University of London, London, UK

Whether or not more effective schools can successfully mitigate the impacts of early disadvantage upon educational attainment remains uncertain. We investigated 2,664 children aged 6–11 years and measured their academic skills in English and maths along with self-regulation at 6, 7, and 11. Experiencing multiple disadvantages before age 5 strongly impaired later self-regulation and academic attainment. However, attending a more academically effective primary school for just a single year was found to partially protect all outcomes at age 6. In addition, more academically effective primary schools significantly lessened the extent to which earlier abilities in reading, writing, and self-regulation predicted these same abilities at age 11. Thus, although attending a more academically effective primary school does not eliminate the adverse impacts of multiple disadvantage experienced at a younger age, it can mitigate them by promoting better academic attainment and self-regulation up to age 11 for children who had experienced more disadvantages.

**Keywords:** multiple disadvantage; protection; academic attainment; self-regulation; primary school

### Theoretical background

Early disadvantage is well known to have long-term detrimental effects on educational attainment (Power & Matthews, 1997), and although high-quality preschool has been proposed to offer *partial* protection (see Hall et al., this issue), it is simply implausible to expect preschool provision, no matter how high in quality, to be able to fully mitigate these detrimental effects (Rutter & Maughan, 2002; Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2010). Rather than investigate solely the effects of preschool, researchers must also ask whether *subsequent* schooling experiences can also protect, as well, and if so, then what aspects of school can protect later child outcomes, how strongly, and under what circumstances?

Researchers investigating the impacts of early disadvantage on educational attainment in the late 1960s and early 1970s advanced a form of social determinism (e.g., Coleman et al., 1966; Jencks et al., 1972). These studies argued that social

---

\*Corresponding author. Email: Pam.Sammons@Education.ox.ac.uk.

background was such a strong indicator of future outcomes that whatever education a child might subsequently receive, this simply could not alter the end result (Sammons, 1999). Such social determinism was always likely to elicit a response, and this period saw the emergence of two new traditions concerned with the drivers of child development. One is *school effectiveness research* (SER), now subsumed within educational effectiveness research (EER; Creemers & Kyriakides, 2008). The second is research investigating *developmental risk and resilience* by integration with sociological life-course theory (e.g., Elder, 1998; Schoon, 2006). Both fields seek to differentiate the effects of a child's background from the impacts of day-to-day interactions and processes (Rutter & Sroufe, 2000; Sammons, 1999), and this common interest even generated successful cross-over research (e.g., *Fifteen Thousand Hours*; Rutter, Maughan, Mortimore, & Ouston, 1979).

Since the emergence of the SER/EER and risk and resilience research traditions, both have continued to investigate whether education can mitigate the impacts of early disadvantage on later educational attainment, to what extent, and by what means. For example, Luthar (2006) synthesised the evidence from the field of risk and resilience research and concluded that education-based protection against the impacts of early disadvantage could be achieved through both (a) supportive teacher-child relationships and (b) classroom environments characterised as more organised, predictable, and supportive of behavioural self-regulation. In contrast, Mortimore and Whitty (2000) reviewed past EER literature and concluded that although *school-wide* approaches to mitigating disadvantage have merit, past research may have exaggerated their compensatory effects, although a major review by Scheerens and Bosker (1997) provided evidence that school effects matter most for the disadvantaged/vulnerable groups. When we draw together the evidence from both fields, it is apparent that the effectiveness of schools (rather than the effectiveness of *within-school* features such as teachers and classrooms) for mitigating disadvantage is only partially supported by the past research concerning both EER and risk and resilience.

Considering the potential *mechanisms* that may underlie the impacts of disadvantage, both the EER and risk and resilience traditions have shown early disadvantage to impair educational attainment by first delaying development prior to school (Heckman, 2008; Sammons, Sylva, Melhuish, Siraj-Blatchford, Taggart, & Hunt, 2008; Yates, Egeland, & Sroufe, 2003). In particular, two areas of early child development have been strongly implicated: early cognition (e.g., pre-reading skills) and early self-regulation (Masten & Coatsworth, 1998; Mortimore, 1995). However, this early *developmental-internalisation* of disadvantage has also enabled researchers to hypothesise one way in which the long-term impacts of disadvantage may be altered (Feinstein, 2003; Sacker, Schoon, & Bartley, 2002). If early cognitive and self-regulatory skills can be protected from the impacts of disadvantage, then the follow-on impacts for educational attainment might also be avoided (A. Goodman & Sianesi, 2005; Hayes, 2006).

Although such research goes some way towards questioning historic notions of educational social determinism, both the EER and risk and resilience research traditions have faced criticism. In particular, the early research of both fields was criticised for the measurement techniques each employed (Burchinal, Roberts, Hooper, & Zeisel, 2000; Sammons, 1999; Sammons & Luyten, 2009), and both fields faced criticism for neglecting to take into consideration the hierarchical nesting of factors known to drive development (Cicchetti & Curtis, 2007; Creemers,

Kyriakides, & Sammons, 2010; Teddlie & Reynolds, 2000). Partially in response, today both fields now emphasise a hierarchy of interacting factors that shape development (reflecting an ecological model of proximal to distal factors outlined by Bronfenbrenner, 1986), and both seek to document the processes which underlie the developmental impacts of early disadvantage and effective education (Leonard, Bourke, & Schofield, 2004; Luthar & Brown, 2007; Masten, 2007). However, the life-span of findings from such prior research is limited by the continual development of the underlying theoretical models of child development, and this limitation is exacerbated when applied to continually evolving educational policies and models of delivery (e.g., Berliner, 2002; Vanderlinde & Van Braak, 2010). It is in response to this past research and the educational contexts within which this has been applied that this paper seeks to examine how far the quality of the primary school attended (measured in terms of EER-based indicators of academic effectiveness) can protect against the adverse effects of early childhood disadvantage. The following relationships are here examined:

- (1) children's academic attainment and self-regulation between 6–11 years;
- (2) the developmental impact of multiple early disadvantages;
- (3) whether the developmental impact of experiencing a greater number of early disadvantages was lessened for those who subsequently attended more academically effective primary schools.

## **Method**

### ***Sample***

The Effective Preschool, Primary, and Secondary Education (EPPSE) Study is a longitudinal cohort study that has used an educational effectiveness design to study the development of over 3,000 children from age 3 years onwards. With the EPPSE sample of children currently aged 16+ years, a more detailed description of this sample can be found in the paper by Hall et al. (this issue), as well as in Sammons, Sylva, Melhuish, Siraj-Blatchford, Taggart, and Hunt (2008) and Sylva, Melhuish, Sammons, Siraj-Blatchford, and Taggart (2004). This paper studies those 2,664 children for whom EPPSE collected information concerning academic attainment at the end of primary school (Key Stage 2, at age 11 years). Here, we discuss the results of a multilevel structural equation model (a form of value-added statistical analysis) that allowed us to test the hypothesis that more academically effective primary schools could lessen the adverse developmental impact of experiencing multiple (early) disadvantages on child outcomes measured over time at ages 6, 7, and 11 years.

### ***Measures***

#### ***Birth age 5 years***

The EPPSE project recruited an initial sample of 2,857 children and families (after informed parental consent) from 141 preschools of six different types that were spread across five English regions during the period: January 1997–April 1999 (Sylva et al., 2004; Sylva, Sammons, Melhuish, Siraj-Blatchford, & Taggart, 1999). Children received a baseline assessment of their cognitive and social development

within 10 weeks of their entry into the study (at mean age: 3 years 3 months). This sample of preschool attendees was supplemented by the further recruitment of 315 “home” children who had received no (or minimal) preschool experience by school entry (rising 5 years). For both groups of children and families, the EPPSE team collected retrospective demographic data as well as information concerning day-to-day learning activities carried out between parents and 3–5-year-old children (termed the “home learning environment” [HLE]; Melhuish, Phan, et al., 2008). Both sources of data (demographics and HLE) were then used to construct an Index of Multiple (early) Disadvantage (IMD) – a measure that was based on prior work which informed the construction of Educational Priority Indices (EPI; Sammons, Kysel, & Mortimore, 1983) in England. Further demonstrating the similarity of EER and risk and resilience research, both the IMD and EPI are measures of disadvantage which closely resemble “Indices of Cumulative Risk” (see Hall et al., 2010). The IMD counts the incidence of the following 10 measures: (1) first language spoken (not English); (2) large family (>three siblings); (3) prematurity or low birth weight (<36 weeks gestation or <2,500 grams); (4) maternal qualifications (none); (5) father occupation (<semiskilled); (6) father employment (never employed); (7) maternal age (<17 years); (8) marital status (lone parent); (9) mother employment (never worked or unemployed); (10) home learning environment (bottom quartile).

#### *Age 6 years*

At the end of their 1st year of primary school (at child age 6 years), the EPPSE sample of children (preschool attendees and “home” children) received follow-up assessments measuring their academic attainment and their social/behavioural skills (Sammons et al., 2004a). Here, we examine standardized assessments of children’s attainment in reading (NFER-Nelson Primary Reading Level 1; France, 1981) and mathematics (Maths 6 Test; Hagues, Caspall, Clayden, NFER-NELSON, & Patilla, 1997), together with children’s self-regulation as assessed with the teacher version of the Strengths and Difficulties Questionnaire (SDQ; R. Goodman, 1997).

#### *Age 7 years*

One year after receiving researcher-rated standardized assessments of cognition and self-regulation, the EPPSE sample of children completed Key Stage 1 of the UK national curriculum and undertook national assessments of academic attainment in reading, writing, and mathematics (National Assessment Agency, 2008; Qualifications and Curriculum Authority, 2008). The EPPSE team subsequently obtained this information on academic attainment and supplemented these data on academic attainment with the repeated assessment of social/behavioural skills – again using the teacher version of the SDQ (Sammons et al., 2004b). Here, children’s abilities in reading, writing, and mathematics are examined alongside levels of self-regulation.

#### *Age 11 years*

Following on from the teacher assessments of children’s academic attainment and social/behavioural skills at the end of Key Stage 1 (age 7 years), children began Key Stage 2 of the UK national curriculum, which they experienced for the next 4 years

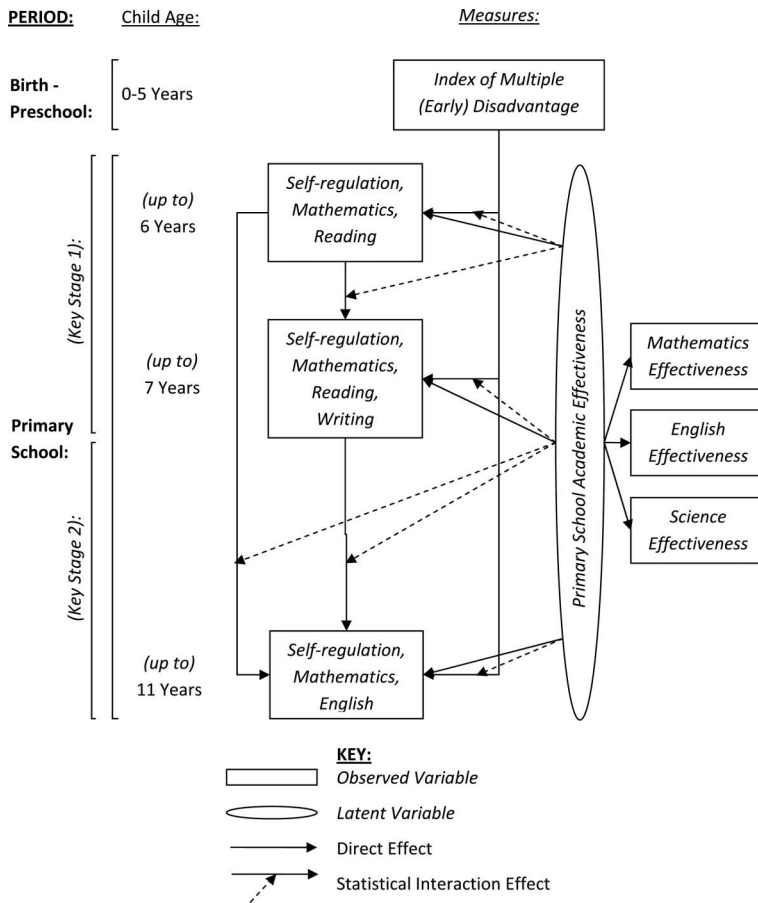
(until child age 11 years). Key Stage 2 ended with another round of national assessments of children's academic attainment (English and maths), and the EPPSE team once again asked teachers to assess the social/behavioural skills of children using the teacher-rated SDQ (see Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2008). Here, children's age 11 attainment in English and mathematics are examined in addition to age 11 self-regulation.

Finally, as well as collecting information on the sample children's academic attainment and behaviour at age 11 years, Key Stage 2 also saw the EPPSE team derive contextualised value-added indicators of the academic effectiveness (in English, maths, science) of each primary school that their sample of children attended – schools which most children had attended since age 5 (see Melhuish et al., 2006). To derive these three measures of academic effectiveness, the EPPSE team separately analysed nested national assessment data for 540,000 school children within 15,000 primary schools in England while controlling for individual prior attainment and underlying disadvantage related to characteristics of the *child* (e.g., gender differences), *family* (e.g., poverty), and/or *neighbourhood* (e.g., school composition; Melhuish et al., 2006; Melhuish, Sylva, et al., 2008). The three subject-specific measures of Primary School Academic Effectiveness were derived from contextualised value-added (CVA) multilevel regression analysis of 3 years' worth of longitudinal national attainment data for successive pupil cohorts (matched data for pupil attainment in the core subjects of English, mathematics, and science at age 7 and age 11 years) from 2002–2004. These school-level residual estimates of primary school academic effectiveness in the core subjects were derived from analyses that controlled for a wide variety of child, family, and neighbourhood characteristics including child prior attainment as well as social disadvantage. These residual estimates of academic effectiveness were then matched to all the primary schools attended by children in the EPPSE sample and are interpreted as indicators of the academic quality of the school experience of the EPPSE sample (see Melhuish et al., 2006; Sammons, Anders, et al., 2008, for further details).

### **Analytic approach**

Multilevel structural equation modelling (SEM) was used to reveal the “total” developmental impact of multiple early disadvantages in a *value-added* statistical examination of the EPPSE children's development between the ages of 6–11 years (see Figure 1). The statistical effects associated with disadvantage are referred to as “total” effects because they are composed of a “direct” effect in addition to the total of all “indirect” effects that operate via impacts to development that occurred at younger ages. For example, Figure 1 shows self-regulation at age 7 to be predicted by earlier multiple disadvantage both *directly* and *indirectly* via earlier impacts on both self-regulation and academic skills at age 6. Figure 1 also illustrates that the academic effectiveness of primary school was hypothesised to alter the direct and indirect developmental impacts of disadvantage (via the associations shared between attainment and self-regulatory behaviour over time).

Prior to conducting the SEM illustrated in Figure 1, a preliminary investigation was carried out into the potential consequence of children's cross-classified nesting within both pre- and primary schools. The design effect of both nestings on all measures of child attainment and behaviour between 6–11 years that are included in this analysis was estimated following Muthén and Muthén (2007) and using the



formula:  $Design\ Effect = 1 + (average\ cluster\ size - 1) * intracluster\ correlation$ . Again, the guidelines of Muthén and Muthén were followed stating that any obtained design effect greater than 2 necessitated accounting for via multilevel modelling. With an average cluster size of 20.26 children per preschool and 3.08 children per Year 2 primary school classroom, it was only nesting within preschools that produced design effects that exceeded the threshold value. This finding was unsurprising given that the original clustered sample of children recruited by the Effective Provision of Pre-School Education project (EPPE) was drawn from a population attending 141 preschools (Sylva et al., 2004) – though the 141 preschool attendees were in 767 primary schools by the end of primary school Year 1 (Sammons et al., 2004a). In response to these results, the SEM of Figure 1 was modified to take into account children’s nesting within preschools *only*. The standard errors of all statistical relationships were appropriately modified in a multilevel regression approach referred to as “aggregated modelling” (see Asparouhov, 2005). Thus, although this analysis does not control for pre-school quality *explicitly*, it does control for the clustering effects related to the individual preschool attended – an effect that includes influences of preschool quality (Sammons et al., 2004a).



The analysis of this paper accounted for potential non-normality in the distribution of variables through use of the robust maximum likelihood estimation procedure, while missing data were imputed using the reliable (Wiggins & Sacker, 2002) full information maximum likelihood method. By including pre-school as the Level 2 structure, we control for the effects of pre-school that are known to be significant from other analyses (e.g., in Hall et al., this issue) so that we can address solely primary school. All of the continuous variables that were used in the SEM were standardized beforehand to have a mean of 0 and a standard deviation of 1 (*z* scored) to facilitate comparisons and interpretations of the results.

## Results

### Descriptive statistics

Table 1 examines the 3,172 children originally recruited to take part in the EPPE research and compares those who were studied in this investigation (maximum  $n = 2,664$ ) against those who were not (maximum  $n = 508$ ). The inclusion criterion for this study was whether or not the EPPE project had a record of each child's academic attainment (in English and maths) at age 11 years (at the end of Key Stage 2). Table 1 compares these two groups of children (Included vs. Excluded) on the measures of disadvantage and child development that are here reported. These results indicate that although the children for whom both age 11 tests of English and maths were available experienced no fewer early disadvantages, they did have

Table 1. Sample description and comparison of age 11 participants vs. excluded.

Measure	Included (max $n = 2664$ ) <sup>a</sup>			Excluded ( $n = 508$ ) <sup>b</sup>		
	Mean $\pm$ SD	Mean $\pm$ SD (standardized; <i>z</i> scored)	( <i>n</i> )	Mean $\pm$ SD	( <i>n</i> )	<i>P</i> *
Index of Multiple (early) Disadvantage	1.82 $\pm$ 1.50	0 $\pm$ 1	(2448)	1.83 $\pm$ 1.58	(451)	0.853
Age 6 Reading	20.45 $\pm$ 6.74	0 $\pm$ 1	(2322)	19.26 $\pm$ 9.01	(372)	0.016
Age 6 Mathematics	18.97 $\pm$ 5.15	0 $\pm$ 1	(2317)	17.08 $\pm$ 7.20	(368)	<0.001
Age 6 Self-regulation	2.33 $\pm$ 0.51	0 $\pm$ 1	(2269)	2.14 $\pm$ 0.61	(359)	<0.001
Age 7 Reading	2.47 $\pm$ 0.66	0 $\pm$ 1	(2144)	2.15 $\pm$ 1.02	(293)	<0.001
Age 7 Writing	2.35 $\pm$ 0.60	0 $\pm$ 1	(2091)	1.97 $\pm$ 1.04	(283)	<0.001
Age 7 Mathematics	2.51 $\pm$ 0.57	0 $\pm$ 1	(2104)	2.26 $\pm$ 0.89	(288)	<0.001
Age 7 Self-regulation	2.39 $\pm$ 0.49	0 $\pm$ 1	(2046)	2.20 $\pm$ 0.58	(328)	<0.001
Age 11 English <sup>c</sup>	100.19 $\pm$ 14.87	0 $\pm$ 1	(2664)	81.19 $\pm$ 15.99	(27)	<0.001
Age 11 Mathematics <sup>c</sup>	100.22 $\pm$ 14.92	0 $\pm$ 1	(2664)	83.96 $\pm$ 12.08	(37)	<0.001
Age 11 Self-regulation	0.05 $\pm$ 0.97	0 $\pm$ 1	(2327)	-0.36 $\pm$ 1.10	(337)	<0.001
Primary School Academic Effectiveness in:						
English	2.93 $\pm$ 0.61	0 $\pm$ 1	(2174)	2.98 $\pm$ 0.67	(209)	0.284
Maths	2.91 $\pm$ 0.65	0 $\pm$ 1	(2174)	2.96 $\pm$ 0.65	(209)	0.330
Science	2.96 $\pm$ 0.71	0 $\pm$ 1	(2174)	2.91 $\pm$ 0.70	(209)	0.383

Notes: \*All results obtained from independent sample *t* tests. <sup>a</sup>The maximum data available on child outcomes. Values less than  $n = 2664$  indicate missing data for each individual measure. <sup>b</sup>The 508 excluded children. The  $n = 508$  are those children with age 11 outcome data subtracted from those 3,172 who were originally recruited by EPPSE. <sup>c</sup>Internally age standardized and normalised.

significantly greater academic skills and self-regulation since at least the end of Year 1 at primary school (at age 6 years).

### **Structural equation modelling**

#### *Descriptive results*

The SEM of Figure 1 was implemented in a two-stage procedure. First, all direct and indirect effects were estimated to the exclusion of statistical interaction terms, and this model strongly fitted the data (confirmatory fit index [CFI] = 0.998; root means square error approximation [RMSEA] = 0.022; Akaike information criterion [AIC] = 82,880.10; Bayesian information criterion [BIC] = 83,451.20). Second, the various statistical interaction terms (*effectiveness* × *disadvantage*; *effectiveness* × *development*) were then added to this model, and this prevented the estimation of the probability of the indirect effects. This second and more complicated model also prohibited the return of absolute indices of model fit ( $\chi^2$ , CFI, RMSEA). Nonetheless, the inclusion of the interaction terms that are illustrated in Figure 1 was found to make very little difference to the overall fit of the model according to the comparative fit indices. Both the AIC and BIC returned similar values when the statistical interaction terms were included in the statistical model (AIC = 84,133.05 (within 2%); BIC = 84,927.88 (within 2%)). This gives confidence that the final specified model (and thus the results obtained) are true to the measured data.

The latent measure of global primary school academic effectiveness that was specified as part of the analysed structural equation modelling was significantly reflected in all three of the contextualised value-added indicators of primary school academic effectiveness created by the EPPSE team. Academic effectiveness *in science* and *in maths* were both strongly (and similarly) reflective of the overall academic effectiveness of schools (standardized factor loadings of 0.83,  $p < 0.001$  and 0.81,  $p < 0.001$ , respectively). In comparison, academic effectiveness *in English* reflected overall academic effectiveness to a lesser extent (standardized factor loading of 0.59,  $p < 0.001$ ). Furthermore, this variation is also consistent with past studies in the EER tradition that have linked larger school effects with subjects that are primarily taught in school such as mathematics and science (Creemers & Kyriakides, 2008; Scheerens & Bosker, 1997; Teddlie & Reynolds, 2000).

Table 2 shows the statistical associations that were shared between measures of self-regulation and levels of children's attainment in maths and English over time (unstandardized beta effects, **B** between measures all  $z$  scored a priori). The strong statistical associations that can be observed between repeated assessments (reported in **bold**) reflect the high degree of auto-regression that is a common feature of repeated measurement (Thornton & Gilden, 2005). In turn, this high degree of auto-regression provides a means by which early disadvantage can have additional "indirect" effects on development. Because early developmental abilities so strongly predict developmental outcomes measured at later time points, the impacts of disadvantage on these early developmental abilities are likely to provide a means for the impacts of early disadvantage to continue over time and to be exacerbated. In other words, the impact of early disadvantage may become internalised and so continue to have long-term effects by altering the subsequent trajectory of development (though other mechanisms may also be in-play).

Table 2. Measures of development from 6–11 years: Relationships between self-regulation and academic attainment in mathematics and English (unstandardized beta effects, B between measures all  $z$  scored a priori).

	Age 7 years				Age 11 years		
	Self Regulation	Maths	Reading	Writing	Self Regulation	Maths	English
Age 6 years							
Self-regulation	<b>0.50***</b>	0.18***	0.22***	0.23***	0.13***	0.02	0.05*
Maths	0.18***	<b>0.49***</b>	0.34***	0.37***	0.11***	0.21***	0.06*
Reading	0.13***	0.20***	<b>0.36***</b>	0.25***	0.01	0.03	0.07**
Age 7 years							
Self-regulation					<b>0.30***</b>	0.15***	0.18***
Maths					0.07**	<b>0.37***</b>	0.00
Reading					0.18***	0.20***	<b>0.39***</b>
Writing					0.00	0.08*	0.14***

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

#### *Developmental impacts of multiple early disadvantages*

As mentioned above, early disadvantage may be hypothesised to impact developmental outcomes in two possible ways. As well as direct effects, early disadvantage may have additional *indirect* effects by becoming internalised within the child's development due to the high degree of association that is shared amongst developmental measures over time (see Table 2). The combination of the direct and the (sum total) indirect effects on any one outcome is commonly referred to as the "total" impact (e.g., Marsh & O'Mara, 2010). Figure 2 illustrates both types of impact that early disadvantage was found to have upon children's self-regulation and academic attainment between the ages of 6 to 11 years prior to consideration of any potentially protective effects (bearing in mind the two-stage SEM procedure that was used for the analyses in this paper).

Figure 2 shows that by age 7 years, there was no longer a significant direct effect of early disadvantage on children's self-regulation (unstandardized regression coefficient [B] between two variables  $z$  scored a priori =  $-0.01$  SDs,  $p > 0.05$ ), whereas such effects remained evident and statistically significant for attainment in both mathematics (B =  $-0.04$  SDs,  $p < 0.05$ ) and reading (B =  $-0.05$  SDs,  $p < 0.05$ ). Moreover, this disparity over the duration of the direct effects of early disadvantage on academic skills rather than self-regulatory behaviour even remained evident at age 11 years. Figure 2 shows that the direct impact of early disadvantage on both mathematics (B =  $-0.04$  SDs,  $p < 0.05$ ) and English measured at age 11 years remained significant (B =  $-0.04$  SDs,  $p < 0.05$ ), whereas the direct effect on self-regulation had disappeared (B =  $-0.00$  SDs). Together, these findings suggest that the developmental impacts of early disadvantage on self-regulation might have become internalised at an earlier age than are the equivalent impacts on children's attainment in either mathematics or English.

#### *Universal boosts from primary school academic effectiveness*

With direct and indirect estimates established for the developmental impacts of multiple disadvantage in the first stage of the SEM analysis, the second stage of the

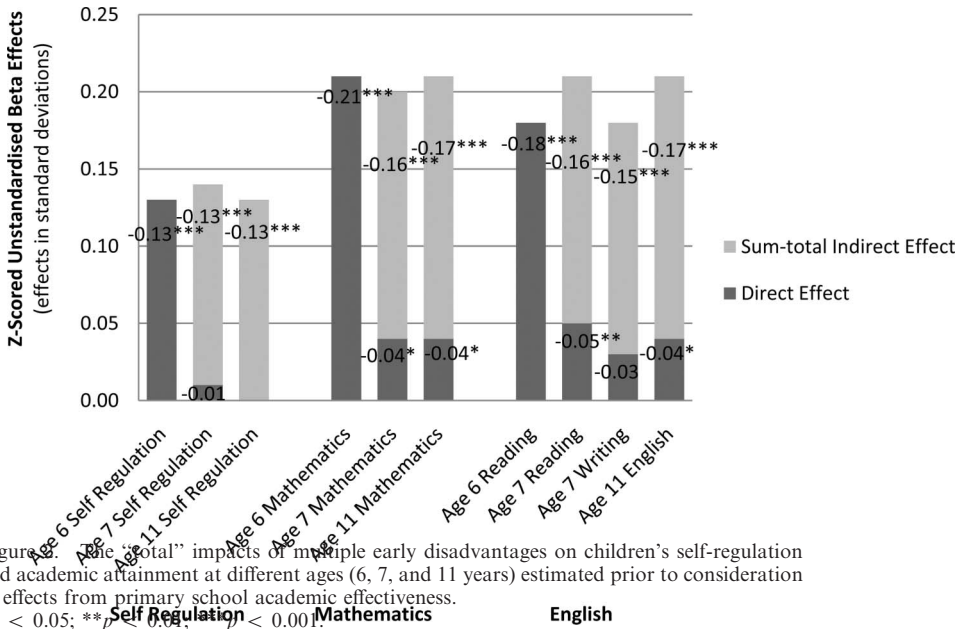


Figure 1. The “total” impacts of multiple early disadvantages on children’s self-regulation and academic attainment at different ages (6, 7, and 11 years) estimated prior to consideration of effects from primary school academic effectiveness.  
 \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

SEM procedure considered potentially protective effects linked to primary school academic effectiveness. Direct universal boosts (main effects) from attending a more academically effective primary school were found for all children’s outcomes measured at ages 6 and 11. At age 6 years, direct and statistically significant effects were found on the absolute levels of children’s self-regulation ( $B = 0.12$  SDs,  $p < 0.001$ ), mathematics ( $B = 0.11$  SDs,  $p < 0.05$ ), and reading ( $B = 0.18$  SDs,  $p < 0.001$ ). Furthermore, although no additional promotion was evidenced at the end of the next school year (age 7), universal academic boosts were again noted at age 11 in children’s attainment in maths ( $B = 0.13$  SDs,  $p < 0.001$ ) and English ( $B = 0.12$  SDs,  $p < 0.001$ ). These results suggest that attending a more academically effective primary school offers two types of universal promotion: first, an early boost at the end of the 1st year of school and which is evident on both academic skills and self-regulation; second, an additional later boost that is evident up to the end of primary school, but which is only statistically significant for attainment and not self-regulation (for more EPPSE results on the main effects of primary school academic effectiveness, see Anders et al., 2010; Sammons, Anders, Sylva, Melhuish, Siraj-Blatchford, Taggart, & Barreau, 2008). Table 3 presents both the statistically significant and non-significant direct impacts of primary school academic effectiveness upon measures of child attainment and self-regulation between the ages of 6 to 11 years in tabular form (results from implementing the SEM illustrated in Figure 1). When examining Table 3, it is useful to compare these effects to those between measures of development upon one another over time (Table 2) and the total, direct, and indirect impacts of multiple disadvantage (Figure 2).

Table 3. “Value-added” direct impacts of latent primary school academic effectiveness on measures of academic attainment (in English and maths) and self-regulation up to the end of primary school. Statistical effects (unstandardized Beta effects, B, between measures that were all *z* scored a priori) found over and above those from multiple disadvantage before age 5 years (Figure 2) and controlling for earlier levels of attainment and self-regulation (Table 2).

Outcome	Statistical Effect from Primary School Academic Effectiveness (unstandardized Beta effects, B, between measures <i>z</i> scored a priori)
Year 1 Math	0.11* Standard Deviations
Year 1 Reading	0.18***
Year 1 Self-regulation	0.12***
Year 2 Math	-0.02
Year 2 Reading	-0.02
Year 2 Writing	-0.02
Year 2 Self-regulation	-0.01
Year 6 Math	0.13***
Year 6 English	0.12***
Year 6 Self-regulation	0.01

\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

Table 4. Statistically significant interaction effects between latent primary school academic effectiveness and: (1) the direct impact of multiple disadvantage (implying direct protection); (2) the impacts from earlier measures of development (implying indirect protection).

Outcome	Statistical Impacts (Unstandardized Beta Effects, B):			
	from Primary School Academic Effectiveness (X)	from Multiple Disadvantage (Y <sub>1</sub> )	from an earlier measure of Child Development (Y <sub>2</sub> )	Statistical Interaction Term (either X.Y <sub>1</sub> or X.Y <sub>2</sub> )
<i>Statistically Significant Direct Protective Effects of Primary School Academic Effectiveness (Latent Effectiveness × Observed Multiple Disadvantage)</i>				
Year 1 Math	0.11*	-0.27***		-0.20*
Year 1 Reading	0.18***	-0.24***		-0.17*
Year 1 Self-regulation	0.12***	-0.19***		-0.17*
Year 6 Self-regulation	0.01	0.01		-0.05*
<i>Statistically Significant Indirect Protective Effects of Primary School Academic Effectiveness (Latent Effectiveness × Observed earlier measure of Child Development)</i>				
Year 2 Reading	-0.02		Year 1 Reading: 0.36***	-0.07**
Year 2 Writing	-0.02		Year 1 Reading: 0.28***	-0.08**
Year 6 Self-regulation	0.01		Year 2 Self-Regulation: 0.30***	-0.07*

Notes: All results come from the multilevel value-added structural equation model illustrated in Figure 1 (unstandardized beta effects, B, between measures that were all *z* scored a priori, numeric values are in standard deviations).

\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

*Direct protective effects of primary school academic effectiveness*

In addition to universal boosts to all children’s academic skills and self-regulation, more academically effective primary schools were found to offer four additional “protective” effects that went some way towards mitigating the impacts of early

Downloaded by [the Bodleian Libraries of the University of Oxford] at 10:06 11 March 2013

disadvantage: Three such effects were evident after the 1st year of school (at child age 6 years), and one was evident at the end of primary school.

By the end of the 1st year of school, attending a more academically effective primary school was found to significantly reduce the impacts of early disadvantage as a negative predictor of children's maths attainment (*disadvantage* × *effectiveness*:  $B = -0.20$  SDs,  $p < 0.05$ ), reading (*disadvantage* × *effectiveness*:  $B = -0.17$  SDs,  $p < 0.05$ ), and self-regulation (*disadvantage* × *effectiveness*:  $B = -0.17$  SDs,  $p < 0.05$ ). Although experiencing more disadvantages between 3–5 years was associated with significantly poorer maths, reading, and self-regulation at age 6 years, these negative relationships were diminished if children had attended a more academically effective primary school during their 1st year in primary school. Further, this partially protective effect still remained evident at exit from primary school (end of Key Stage 2) when children were age 11 years. Although experiencing a significantly greater number of disadvantages before school entry continued to negatively impact attainment and self-regulation for the whole sample (as would be expected from past research on educational disadvantage), the direct impact on children's English attainment was reduced for students who had attended a more academically effective primary school (*disadvantage* × *effectiveness*:  $B = -0.05$  SDs,  $p < 0.05$ ). Table 3 summarises these significant interaction effects and presents them alongside their component main effects.

#### *Indirect protective effects of primary school academic effectiveness*

In interpreting our results, we argue that reducing the strength of the association between developmental measures over time reflects a lessening of the long-term indirect impacts of early disadvantage on child development. This claim is based upon two sets of results so far reported: firstly, the strong association between measures of development assessed at 6 to 11 years (see Table 2) and, secondly, the significant impact of early disadvantage on age 6 academic skills and self-regulation (see Figure 2). Given this background of relationships, three significant indirect protective effects were also identified. First, the significant association between age 6 reading and age 7 reading ( $B = 0.36$ ,  $p < 0.001$ ) and writing ( $B = 0.28$ ,  $p < 0.001$ ) was reduced for children who had attended a more academically effective primary school over these 2 years (Year 2 reading:  $B = -0.07$ ,  $p < 0.01$ ; Year 2 writing:  $B = -0.08$ ,  $p < 0.01$ ). Second, the association between children's self-regulation measured at the end of Year 2 and again in Year 11 of primary school ( $B = 0.30$ ,  $p < 0.001$ ) was also significantly reduced for those children who had attended a more academically effective primary school ( $B = -0.07$ ,  $p < 0.05$ ). Taken together, these results suggest that the negative impact on their cognitive and social outcomes that might otherwise be expected of children with poorer early academic and self-regulatory skills can be ameliorated by attendance at a more academically effective primary school. Table 3 summarises these significant interaction effects and presents them alongside their component main effects.

## **Discussion**

### *Developmental impacts of early disadvantage*

We found that children who experienced multiple early disadvantages between birth and age 5 years were more likely to have significantly lower academic and self-regulatory skills throughout primary school (to age 11 years, see Figure 2).

However, in this study we also identified significant variations to the impacts of disadvantage on both academic skills and self-regulation. In particular, the *direct* impacts of experiencing early multiple disadvantages on self-regulation faded to insignificance at an earlier age than did the direct impacts on later academic attainment in English or maths. Conversely, however, the *indirect* effect (thereby also the *total* effect) of disadvantage on self-regulation remained constant at ages 7 and 11, while the academic effectiveness of primary schools offered no universal boosts nor direct protection to self-regulation at either of these ages. Thus, although experiencing multiple early disadvantages is likely to lead to longer term impacts on academic attainment in English and maths, it is the impact of disadvantage on self-regulation during Key Stage 1 which should be of particular concern as it may be harder for primary schools to lift these skills as children age (a difficulty consistent with results such as those of Hall et al., this issue).

#### ***Universal boosts from primary school academic effectiveness***

Nonetheless, more academically effective primary schools were found to offer universal boosts to the academic and self-regulatory skills of all children (on average) at two separate time points. By the end of the 1st year of primary school, more academically effective primary schools offered significant boosts to all children's attainment in reading and maths as well as to self-regulation. Five years later (at child age 11 years), more academically effective primary schools were found to offer further universal boosts over and above those initially offered at age 6 years. However, at age 11 these additional universal boosts were only noted for children's academic attainment in English and maths and not for self-regulation. When this lack of a long-term boost to self-regulation is considered alongside the persistent impacts of early disadvantage on self-regulation, the implication for practitioners and policy makers is that young children's self-regulation (during pre-school and the first years of primary school in England ages 5–6 years in Key Stage 1) should be supported and encouraged as strongly as possible.

#### ***Direct protective effects of primary school academic effectiveness***

Attending a more academically effective primary school throughout Year 1 was found to be of especial benefit to those children who had experienced a greater number of early disadvantages between birth and age 5 years (higher scores on the multiple disadvantage measure). Although early disadvantage was still linked to significantly lower academic skills and self-regulation at age 6 years, this association was significantly reduced for children who now attended a more academically effective primary school. In particular, the partial protection of self-regulation at age 6 years is especially important when considered alongside the lack of later additional universal boosts or direct protection for self-regulation – effects that can be found for academic attainment in English and maths upon exit from primary school at age 11 years. One implication of these results is that an early concentration by schools and teachers on fostering disadvantaged children's self-regulation is likely to support their later learning.

When we consider the implications of these findings in more detail, the comments of Mortimore and Whitty (2000) when summarising the results of *Fifteen Thousand Hours* (Rutter et al., 1979) provide a cautious starting point, “if all schools

performed as well as the best schools, the stratification of achievement by social class would be even more stark than it is now” (Mortimore & Whitty, 2000, p. 310). Later research has, however, questioned this claim by indicating that school effects tend to be larger (for good or ill) for disadvantaged groups (Sammons, Anders, et al., 2008; Scheerens & Bosker, 1997). Moreover, this notion that pushing for improvement in schools may worsen rather than lessen the divide between those who experienced greater rather than fewer early disadvantages assumes that there is no minimum *baseline* of academic attainment that all children should be supported in reaching. If one instead accepts that a central aim of education is for all children to reach a certain minimal level of academic attainment so as to facilitate life chances, then boosting the more able along with the disadvantaged can still constitute protection against disadvantage. Further, whether or not such effects may be said to infer protection is a debate also present within the field of risk and resilience research. For example, while Luthar (2006) does use the term “protection” for such effects, Sameroff, Gutman, and Peck (2003) instead refer to this as “promotion”. By contrast, in circumstances where the disadvantaged catch up to the advantaged, it is Sameroff et al. who now use the term “protection” while Luthar instead uses the term “protective-stabilization”. Greater clarity in conceptualising and using such terms and clearer links with theoretical models combined with explicit testing of such relationships in empirical research may help to further current understanding of these relationships and mechanisms.

### *Indirect protective effects of primary school academic effectiveness*

Our results demonstrate how the developmental impact of experiencing multiple early disadvantages may become internalised partly due to the strong association of earlier to later levels of development. Our results suggest that, by lessening such longitudinal associations, more academically effective primary schools are able to offer additional *indirect* protection to the English and self-regulatory skills of children who experienced more disadvantages before the age of 5 years. This indirect protection was evidenced by three sets of results. First, we found clear evidence that early disadvantage directly reduced average levels of reading, writing, and self-regulation before age 7 (Figure 2). Second, these (on average) disadvantage-reduced levels of academic and self-regulatory skills were then strongly predictive of the same future skills at exit from primary school at age 11 years (Table 2). Thirdly, primary schools that were identified as more academically effective were able to significantly lessen the extent to which these measures of development were associated with one another. Finally, this evidence of indirect protection was found alongside further effects of both direct partial protection and universal boosts.

This study extends current knowledge about the links between equity and effectiveness that are a long-standing focus of much EER. The results illustrate that attending an academically effective primary school has benefits for all students but may have especial importance in boosting outcomes for disadvantage groups (i.e., offers some protection against the adverse impacts of disadvantage experienced in the birth-preschool period). It also demonstrates the importance of both direct and indirect effects in shaping children’s developmental and academic trajectories across their primary school career (age 6–11).

The findings suggest that policy makers and practitioners should focus on promoting the academic effectiveness of primary schools for all children but



especially those serving disadvantaged communities. In addition, they suggest that teachers and parents should seek to promote young children's self-regulatory behaviour from an early age (through high-quality preschool and early home learning environments as well as in the first years of primary school).

### ***Strengths and limitations***

The major limitation of this paper is that no data were available for identifying the mediating processes and structures within the school and teaching environments that facilitate the significant relationships between primary school academic effectiveness and reductions in the negative impact of multiple disadvantage found in these analyses. In other words, although attending a more academically effective primary school was found to reduce the impact of experiencing multiple early disadvantages, it remains important to identify the intervening and possibly causal teacher, classroom, and teacher-pupil effects that may be responsible (as advocated in the dynamic model of EER outlined in Kyriakides & Creemers, 2008). The major contribution of this paper comes directly from its integration of EER and risk and resilience research. While EER has a long history of investigating which background factors are more important for educational attainment (Mortimore & Whitty, 2000; Sammons, 1999; Scheerens & Bosker, 1997), risk and resilience research has instead adopted an originally epidemiological approach to this matter – arguing that it is the *volume* of background factors that must be considered, not any one factor or set of factors in particular (i.e., cumulative risk indices; see Sameroff et al., 2003). Here, we brought across the notion of multiple disadvantage in terms of *cumulative risk* (though an equivalent notion can also be found in early EER on educational priority indices; e.g., Sammons et al., 1983) to our study of educational effectiveness. Elsewhere, we have made comparisons between the relative severity of different individual risk factors and links with special educational needs (Anders et al., 2010; Sammons, Sylva, Melhuish, Siraj-Blatchford, Taggart, & Hunt, 2008).

Another limitation to this study was that the impacts of early developmental risks need not only be carried over time via internalisation within a child's developmental abilities. A very real additional mechanism is that the impediment of early developmental outcomes may alter subsequent teachers' expectations of a child. A child who does less well early on may not be given the same tasks or encouraged to perform at the same level as children who initially performed better, due to teacher differentiation of work. However, the possibility and magnitude of such relationships will only truly be explored by teacher-child interaction research.

### ***Conclusions***

As Basil Bernstein noted 40 years ago, "Education cannot compensate for society" (Bernstein, 1970), and this is a sentiment that has since been carried forward within both the EER and risk and resilience research traditions. For example, this statement is echoed within comments about school effectiveness including that it is not a "... panacea for all educational ills" (Sammons, 1999, p. xi) and, "It is implausible that schools could eliminate all effects of family experiences during the preschool years ..." (Rutter & Maughan, 2002, p. 456). Nonetheless, what this paper has shown is that more academically effective primary schools can make a significant difference to the academic attainment and self-regulation of children who

experienced more disadvantages early on in life (before age 5 years). In particular, significant effects were noted on children's self-regulation and English, where the partially protective effects of attending a more academically effective primary school were found to be longest lasting. Thus, we can conclude that schools have the potential to ameliorate the impact of multiple early disadvantage and thus improve educational outcomes and potentially enhance later life chances for disadvantaged groups.

The research has methodological and theoretical implications because it provides support for the criterion of stability in measures of academic effectiveness (since these were derived from national linked data sets for three successive cohorts). The importance of testing theoretical models in EER has been highlighted by Creemers and Kyriakides (2008), Creemers et al. (2010), and Sammons and Luyten (2009). The SEM approaches used here have proved helpful in enabling the testing of hypotheses about potential relationships linking EER and risk and resilience constructs.

## References

- Anders, Y., Sammons, P., Taggart, B., Sylva, K., Melhuish, E., & Siraj-Blatchford, I. (2010). The influence of child, family, home factors and pre-school education on the identification of special educational needs at age 10. *British Educational Research Journal*, *37*, 421–441.
- Asparouhov, T. (2005). Sampling weights in latent variable modeling. *Structural Equation Modeling*, *12*, 411–434.
- Berliner, D. C. (2002). Educational research: The hardest science of all. *Educational Researcher*, *31*(8), 18–20.
- Bernstein, B. (1970). Education cannot compensate for society. *New Society*, *387*, 344–347.
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development – Research perspectives. *Developmental Psychology*, *22*, 723–742.
- Burchinal, M., Roberts, J. E., Hooper, S., & Zeisel, S. A. (2000). Cumulative risk and early cognitive development: A comparison of statistical risk Models. *Developmental Psychology*, *36*, 793–807.
- Cicchetti, D., & Curtis, W. J. (2007). Multilevel perspectives on pathways to resilient functioning. *Development and Psychopathology*, *19*, 627–629.
- Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., & York, R. L. (1966). *Equality of educational opportunity*. Washington, DC: U.S. Government Printing Office.
- Creemers, B. P. M., & Kyriakides, L. (2008). *The dynamics of educational effectiveness*. New York, NY: Routledge.
- Creemers, B. P. M., Kyriakides, L., & Sammons, P. (2010). Background to educational effectiveness research. In B. P. M. Creemers, L. Kyriakides, & P. Sammons (Eds.), *Methodological advances in educational effectiveness research* (pp. 3–18). New York, NY: Routledge.
- Elder, G. H. (1998). The life course and human development. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (5th ed., Vol. 1., pp. 939–991). New York, NY: Wiley.
- Feinstein, L. (2003). Inequality in the early cognitive development of British children in the 1970 cohort. *Economica*, *70*, 73–97.
- France, N. (1981). *Primary Reading Test* (Rev. ed.). Windsor, UK: NFER-NELSON.
- Goodman, A., & Sianesi, B. (2005). Early education and children's outcomes: How long do the impacts last? *Fiscal Studies*, *26*, 513–548.
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology & Psychiatry*, *38*, 581–586.
- Hagues, N., Caspall, L., Clayden, H., NFER-NELSON, & Patilla, P. (1997). *Mathematics 6*. Windsor, UK: NFER-NELSON.
- Hall, J. E., Sammons, P., Sylva, K., Melhuish, E., Taggart, B., Siraj-Blatchford, I., & Smees, R. (2010). Measuring the combined risk to young children's cognitive development: An alternative to cumulative indices. *British Journal of Developmental Psychology*, *28*, 219–238.

- Hayes, A. (2006). Maintaining the gains: Sustainability in prevention and early intervention. *Family Matters*, 75, 66–69.
- Heckman, J. J. (2008). Schools, skills, and synapses. *Economic Inquiry*, 46, 289–324.
- Jencks, C., Smith, M., Acland, H., Bane, M. J., Cohen, D., Gintis, H., . . . Michelson, S. (1972). *Inequality: A reassessment of the effect of family and schooling in America*. New York, NY: Basic Books.
- Kyriakides, L., & Creemers, B. P. M. (2008). A longitudinal study on the stability over time of school and teacher effects on student outcomes. *Oxford Review of Education*, 34, 521–545.
- Leonard, C., Bourke, S., & Schofield, N. (2004). Affecting the affective: Affective outcomes in the context of school effectiveness, school improvement and quality schools. *Issues In Educational Research*, 14, 1–28.
- Luthar, S. S. (2006). Resilience in development: A synthesis of research across five decades. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology: Risk, disorder, and adaptation* (2nd ed., pp. 739–795). New York, NY: Wiley.
- Luthar, S. S., & Brown, P. J. (2007). Maximizing resilience through diverse levels of inquiry: Prevailing paradigms, possibilities, and priorities for the future. *Development and Psychopathology*, 19, 931–955.
- Marsh, H. W., & O'Mara, A. (2010). Long-term total negative effects of school-average ability on diverse educational outcomes: Direct and indirect effects of the Big-Fish-Little-Pond effect *Zeitschrift für Pädagogische Psychologie*, 24, 51–72.
- Masten, A. S. (2007). Resilience in developing systems: Progress and promise as the fourth wave rises. *Development and Psychopathology*, 19, 921–930.
- Masten, A. S., & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments. *American Psychologist*, 53, 205–220.
- Melhuish, E. C., Phan, M. B., Sylva, K., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2008). Effects of the home learning environment and preschool center experience upon literacy and numeracy development in early primary school. *Journal of Social Issues*, 64, 95–114.
- Melhuish, E. C., Romaniuk, H., Sammons, P., Sylva, K., Siraj-Blatchford, I., & Taggart, B. (2006). *The effectiveness of primary schools in England in Key Stage 2 for 2002, 2003 and 2004. Full report*. London, UK: Institute of Education.
- Melhuish, E. C., Sylva, K., Sammons, P., Siraj-Blatchford, I., Taggart, B., Phan, M., & Malin, A. (2008). Preschool influences on mathematics achievement. *Science*, 321, 1161–1162.
- Mortimore, P. (1995). The positive effects of schooling. In M. Rutter (Ed.), *Psychosocial disturbances in young people: Challenges for prevention* (pp. 333–363). New York, NY: Cambridge University Press.
- Mortimore, P., & Whitty, G. (2000). Can school improvement overcome the effects of disadvantage. In T. Cox (Ed.), *Combating educational disadvantage. Meeting the needs of vulnerable children* (pp. 156–176). London, UK: Falmer Press.
- Muthén, L. K., & Muthén, B. O. (2007, December). *Multilevel analysis with latent variables using Mplus*. Handout from Mplus Short Course, Institute of Education, London, UK.
- National Assessment Agency. (2008). *Level setting*. Retrieved from [http://www.naa.org.uk/naa\\_18977.aspx](http://www.naa.org.uk/naa_18977.aspx)
- Power, C., & Matthews, S. (1997). Origins of health inequalities in a national population sample. *The Lancet*, 350, 1584–1589.
- Qualifications and Curriculum Authority. (2008). *Key stage 1 (ages 5-7)*. Retrieved from [http://www.qca.org.uk/qca\\_8825.aspx](http://www.qca.org.uk/qca_8825.aspx)
- Rutter, M., & Maughan, B. (2002). School effectiveness findings 1979–2002. *Journal of School Psychology*, 40, 451–475.
- Rutter, M., Maughan, B., Mortimore, P., & Ouston, J. (1979). *Fifteen thousand hours: Secondary schools and their effects on children*. Cambridge, MA: Harvard University Press.
- Rutter, M., & Sroufe, A. (2000). Developmental psychopathology: Concepts and challenges. *Development and Psychopathology*, 12, 265–296.
- Sacker, A., Schoon, I., & Bartley, M. (2002). Social inequality in educational achievement and psychosocial adjustment throughout childhood: Magnitude and mechanisms. *Social Science and Medicine*, 55, 863–880.
- Sameroff, A. J., Gutman, L. M., & Peck, S. C. (2003). Adaptation among youth facing multiple risks. In S. S. Luthar (Ed.), *Resilience and vulnerability: Adaptation in the context of childhood adversities* (pp. 364–391). Cambridge, UK: Cambridge University Press.

- Sammons, P. (1999). *School effectiveness: Coming of age in the twenty-first century*. Lisse, The Netherlands: Swets & Zeitlinger.
- Sammons, P., Anders, Y., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B., & Barreau, S. (2008). Children's cognitive attainment and progress in English primary schools during Key Stage 2: investigating the potential continuing influences of pre-school education. *Zeitschrift für Erziehungswissenschaft, Special Issue 11*, 179–198.
- Sammons, P., Kysel, F., & Mortimore, P. (1983). Educational priority indices: A new perspective. *British Educational Research Journal*, 9, 27–40.
- Sammons, P., & Luyten, H. (2009). Editorial article for special issue on alternative methods for assessing school effects and schooling effects. *School Effectiveness and School Improvement*, 20, 133–143.
- Sammons, P., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B., Barreau, S., & Grabbe, Y. (2008). *The influence of school and teaching quality on children's progress in primary school*. London, UK: DCSF/Institute of Education.
- Sammons, P., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B., Elliot, K., & Marsh, A. (2004a). *EPPE Technical Paper 9: Report on age 6 assessments*. London, UK: DfES/Institute of Education.
- Sammons, P., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B., Elliot, K., & Marsh, A. (2004b). *EPPE Technical Paper 11: The continuing effects of pre-school education at age 7 years*. London, UK: DfES/Institute of Education.
- Sammons, P., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B., & Hunt, S. (2008). *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, UK: DfES/Institute of Education.
- Scheerens, J., & Bosker, R. J. (1997). *The foundations of educational effectiveness*. Oxford, UK: Pergamon.
- Schoon, I. (2006). *Risk and resilience: Adaptations in changing times*. Cambridge, UK: Cambridge University Press.
- Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2004). *EPPE Technical Paper 12: Effective Provision of Pre-school Education, The final report*. London, UK: DfES/Institute of Education.
- Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2008). *Final report from the primary phase: Pre-school, school and family influences on children's development during Key Stage 2 (age 7-11)*. London, UK: DCSF/Institute of Education.
- Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (Eds.). (2010). *Early childhood matters: Evidence from the Effective Pre-school and Primary Education Project*. Oxford, UK: Routledge.
- Sylva, K., Sammons, P., Melhuish, E., Siraj-Blatchford, I., & Taggart, B. (1999). *EPPE Technical Paper 1: An introduction to the EPPE project*. London, UK: DfES/Institute of Education.
- Teddlie, C., & Reynolds, A. J. (2000). *The international handbook of school effectiveness research*. London, UK: Falmer.
- Thornton, T. L., & Gilden, D. L. (2005). Provenance of correlations in psychological data. *Psychonomic Bulletin and Review*, 12, 409–441.
- Vanderlinde, R., & Van Braak, J. (2010). The gap between educational research and practice: Views of teachers, school leaders, intermediaries and researchers. *British Educational Research Journal*, 36, 299–316.
- Wiggins, R. D., & Sacker, A. (2002). Strategies for handling missing data in SEM: A user's perspective. In G. A. Marcoulides & I. Moustaki (Eds.), *Latent variable and latent structure models* (pp. 105–121). Mahwah, NJ: Lawrence Erlbaum Associates.
- Yates, T. M., Egeland, B., & Sroufe, A. (2003). Rethinking resilience: A developmental process perspective. In S. S. Luthar (Ed.), *Resilience and vulnerability: Adaptation in the context of childhood adversity* (pp. 243–265). Cambridge, UK: Cambridge University Press.