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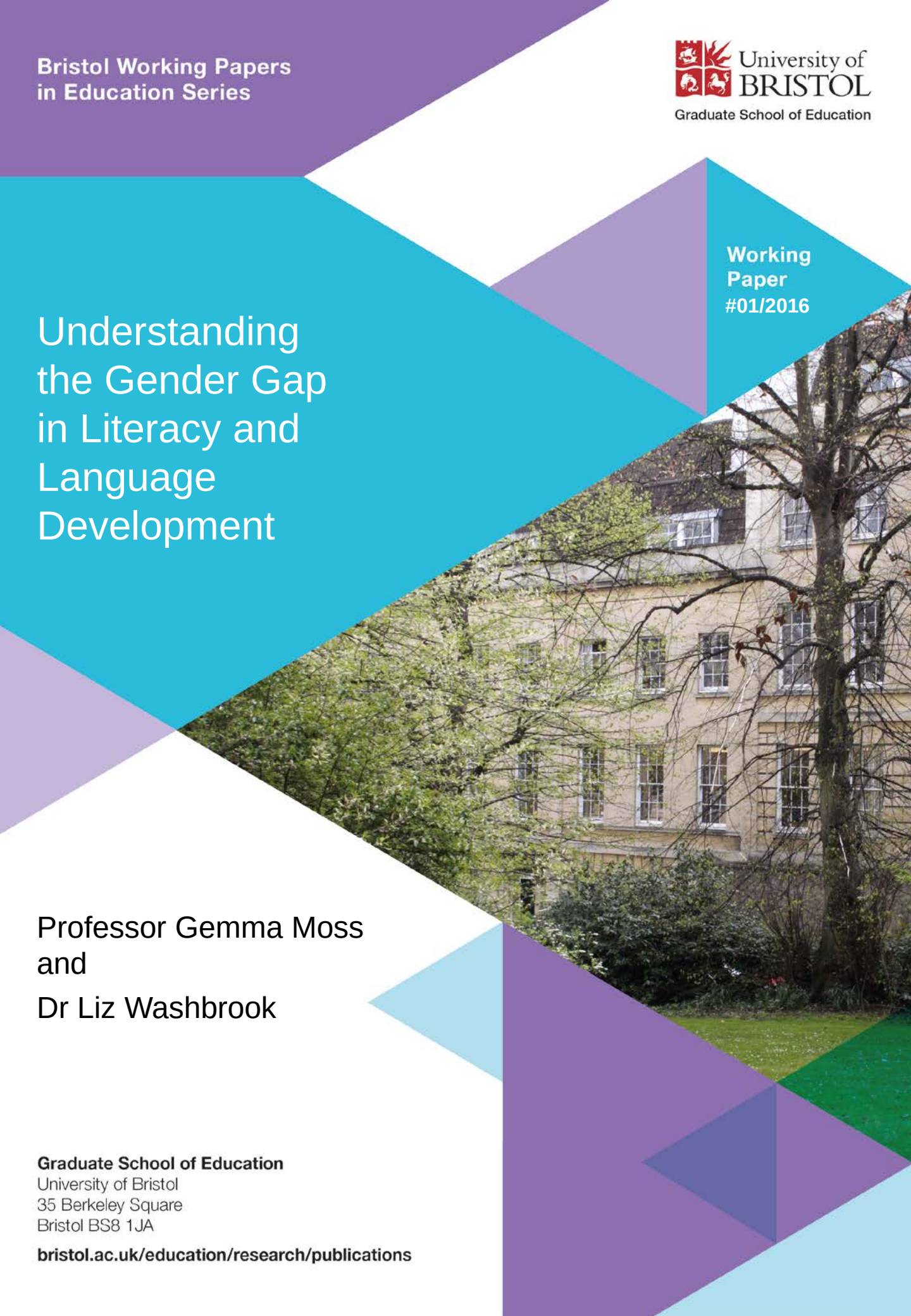
#01/2016

Understanding the Gender Gap in Literacy and Language Development



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Understanding the Gender Gap in Literacy and Language Development

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18th July 2016

Funder: Save the Children

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We gratefully acknowledge access to the Millennium Cohort Study data, provided by University of London. Institute of Education. Centre for Longitudinal Studies, *Millennium Cohort Study* [computer files]. Colchester, Essex: UK Data Archive [distributor], April 2015. SN: 7712, 7414, 4683, 5350, 5795, 6847, 6411, 6848, 7464.

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Executive Summary

Save the Children Fund (STC) commissioned a research team based at the University of Bristol to answer these questions:

1. To what extent does gender influence children's reading skills at age 11?
2. To what extent does gender influence children's language development at age 5?
3. To the extent that it does, what are the most likely explanations?

To address these questions, the study used a combination of research strategies:

- a narrative review of the literature on gender, literacy and language development
- statistical analyses of the Millennium Cohort Study (MCS)
- and a rapid evidence assessment (REA) of interventions relevant to the UK context and focused on the pre-school age group.

This report identifies the scale of the gender gap, how it can best be explained, and what might make most difference to the gap in the early years (age 3-5), enabling boys and girls to read well by the end of primary schooling (age 11).

Findings

Our statistical analyses find:

1. Gender affects literacy attainment and language development independently of social class.

To identify the extent of any gender differences, we compared the % of boys attaining below the expected standard in language development at age 5 and reading at ages 7 and 11 with the % of girls. At each assessment point, between 12% and 6 % points more boys than girls are attaining below standard. The gender gap remains relatively constant across all social class groups. In comparison, the initial gender gap in maths attainment is much smaller and becomes insignificant from age 7 onwards.

Whilst recognising that gender differences in literacy attainment and language development are smaller than social class differences(Strand, 2014), the fact that they are stable and constant across all social classes requires further explanation (Connolly, 2006).

2. Poorer performance in literacy at 11 is strongly predicted by early language and (to a lesser extent) attention skills.

More boys than girls at age 5 are recorded as having poor early language skills and attention. Poorer language and attention skills at age 5 are equally consequential for both boys and girls, but because boys are more likely to fall into this group, this impacts on the gender gap in attainment at age 11. Two thirds of the gender gap in achieving Key Stage Level 4 in Reading at 11 is attributable to the fact that boys have lower levels of language and attention at age 5.

Interventions targeting early language and attention have potential for improving outcomes for all children. Boys in particular will benefit from such interventions because they are more likely to have these problems to begin with.

3. Poorer language skills at age 5 affect later school enjoyment, confidence (answering in class), motivation (trying hard) and reading for pleasure.

The 'discouraging' effect of poor early language applies equally to boys and girls, but the impact on reading for pleasure is significantly larger for boys.

4. Among those children with the same levels of language skills and attention at 5, boys and girls who read more for pleasure and who display motivation in school at 7 are less likely to fall below standard at 11.

Irrespective of early language skills, girls at age 7 report much more positive attitudes to school and read more for pleasure than boys. Interventions that encourage children with lower levels of language and attention to engage positively with the reading curriculum may therefore be able to mitigate the effects of a poor start in language.

5. Parental engagement in literacy activities in preschool protects children against the risks of poor language and attention at 5.

Parents do not report reading to girls more frequently than boys at age 3. However, there are small but systematic differences in a range of other types of parental interaction associated with gender. Gender differences that will see boys, on average, scoring less well on a range of measures by the age of 5 become apparent in our dataset in the records parents make in the first year of life: even before they learn to talk parents record boys' and girls' interactions with the world in slightly different ways. We cannot tell from the data whether these differences result from different behaviours in the child or different patterns of interaction initiated by the adult.

Recommendations

To address the main findings that:

- *more boys than girls have poor early language skills and attention at age 5*
- *poor early language skills and attention at age 5 impacts on children's progress in literacy*

this report emphasises the importance of the quality of social interactions that children experience in the early years. High quality social interaction with significant others supports children's language development and can shape and sustain their interest in pre-literacy activities. These are important factors in laying the building blocks for success in schooling.

The finding that fewer boys with poor early language skills report reading for pleasure at age 7 underlines how important it is that schools encourage reading engagement as well as reading proficiency in the early years. This report adds to the weight of evidence underlining the importance of reading for pleasure as a key means of developing children's cognition and language (Guthrie, 2004; Sullivan & Brown, 2013).

This report recommends that:

1. All children are supported in accessing a rich language and literacy environment, whether at home or in preschool settings

Research shows that in a rich language and literacy environment children's verbal interactions with adults are extensive; adults engage boys' and girls' attention equally in a wide range of pre-literacy activities; and through the quality of the interactions, foster their capacity to develop as resilient and self-motivated learners (Sylva, Melhuish, & Sammons, 2008).

This research finds that:

- High quality preschool provision has the best protective effect for boys at most risk of lower attainment in language and literacy (low SES).

- High quality in the home learning environment can substitute for high quality in the preschool environment, and vice versa.
- Both can serve to reduce the risks of boys *attaining below the expected standards in language and literacy*

2. High quality teaching in the early years should remain a priority area for investment
High quality social interaction in pre-school settings is crucial to the language development of both boys and girls at risk of lower attainment(Siraj-Blatchford et al., 2013).

3. Interventions designed to address poor language and pre-literacy skills in the pre-school years should ensure boys as well as girls gain access to rich language and literacy learning environments
Whilst there are a number of effective programmes designed to improve the quality of the pre-school learning environment, whether at home or in organised provision, *very few such programmes report explicitly on variance in impact by gender*. The diverse theories of change they employ to enrich the home learning environment or modify parents' practice, and the difficulty of isolating which particular aspects of individual programmes have most effect, make it hard to assess which are likely to be particularly beneficial for boys.

This research finds that such programmes would benefit from:

- tracking any variance in impact by gender
- building into their theories of change ways of challenging gender-stereotypes about children's development that may lead to lower expectations of boys' involvement in and pleasure from a range of pre-literacy and language-based activities.

Methods

1. To establish which explanations for gender differences in language development and literacy attainment are best supported by the evidence, *a narrative review of the literature* was conducted, identifying the main hypotheses used to explain gender gaps in language and literacy attainment and assessing the quality and strength of the evidence supporting them. This included a systematic search for studies exploring gender differences in language development and literacy attainment and based on statistical analysis of nationally representative datasets collected in the UK.

2. To explore the extent to which gender influences language development at age 5 and reading skills at age 11, and identify those factors that most robustly explain any gender gaps in language and literacy development in the early years, *statistical analyses of the Millennium Cohort Studies* were undertaken. These built on statistical analyses of the National Pupil Database conducted by Education Datalab.

3. To identify interventions which could successfully address any significant gender gaps in literacy attainment at age 5, a *rapid evidence assessment* of interventions that have been implemented in the UK was undertaken identifying: their effectiveness, the theories of change they employed, their application in pre-school settings, and their fit with the most credible explanations for any gender differences in language and literacy development identified through the narrative review and the statistical analysis.

Chp 1 Explaining the gender gap in literacy and language development: Narrative Review

1. The scope of the review in context

The narrative review set out to identify the range of explanations for the gender gap in literacy and language de*ve*lopment that might have most relevance in pre-school settings, using a variety of search strategies (See appendices). We weighted our searches to reviews of reviews. In considering this literature, we assessed the strength of the evidence base that studies drew on as they formulated, tested or confirmed different hypotheses.

1.1. Exclusions and inclusions.

This narrative review has excluded a large literature on girls' underachievement in literacy in developing countries where gendered patterns of school attendance mean that boys are more likely to be enrolled in school for longer than girls, and benefit most from this greater exposure. Instead, searches have focused on the gender gap in literacy and language attainment in the UK, alongside other English-speaking countries in the developed world.

The search has prioritised English- speaking countries as they share a common language and orthography, and the literacy curriculum is embedded in and relates to a broadly similar textual economy (the kinds of texts and literacy practices that children experience).

In these countries, the available data show that, on average, boys do less well in reading and in writing than girls, they spend less time on their reading and they enjoy reading less (OECD, 2009).

1.2. The context for studies of gender and literacy.

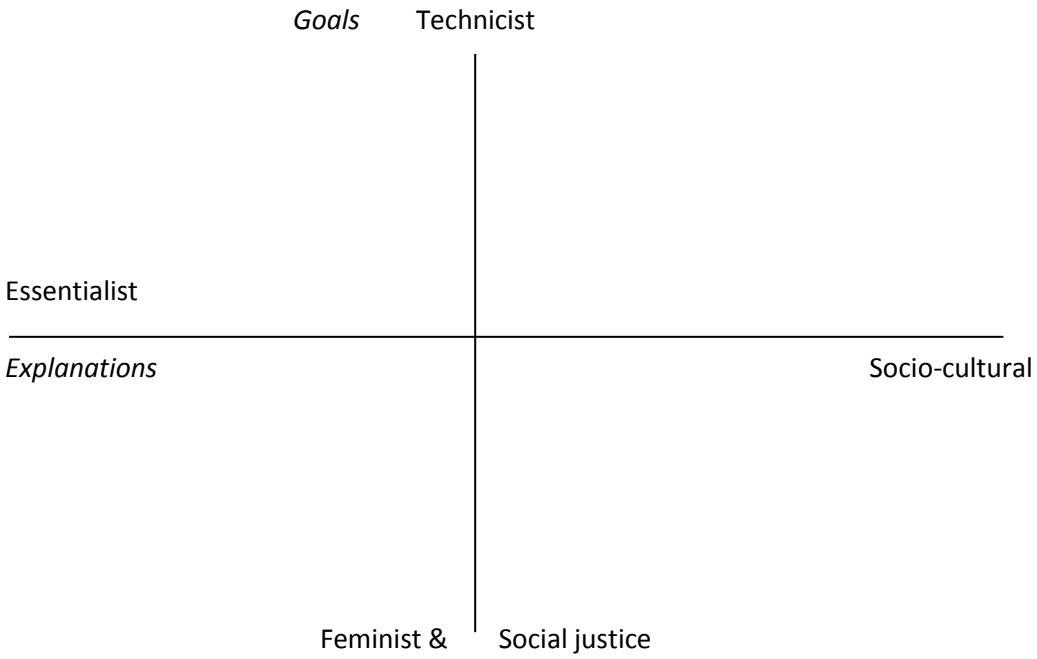
It is worth remarking at the outset that much of the literature reviewed arises and has been developed in contexts where school performance data are routinely collected and analysed, either as a product of national education systems, or through large-scale international and comparative testing regimes. Such data are treated as outputs from the school system, which can then be used for the purposes of system management to identify and ameliorate any disparities.

Discussion of gender gaps emerges in this context alongside discussion of gaps in attainment by ethnicity and social class. Different national education systems give more or less weight to one gap rather than another, and only sometimes attempt to account for their interaction (Strand, 2011). We have paid attention to how policy discussions of the performance data vary, borrowing from different explanatory frameworks and sometimes drawing on commonplace beliefs rather than substantial bodies of research evidence to ground their initial starting points. We have also noted how different research traditions operate with different ways of evaluating gender differences. Some are explicitly committed to supporting greater gender equality, and directly incorporate this goal into their programmes of research. Others do not.

To try and capture these distinctions we have developed an analytic matrix with four quadrants. This enables us to contrast *Goals* in research, ranging from Feminist and social justice perspectives that seek to create greater social equality to Technicist perspectives, seeking greater uniformity in system outcomes. And *Explanations* in research, that range along a spectrum from Essentialist

explanations, which consider gender differences to be hard-wired and immutable, to Social-constructivist perspectives that consider gender differences to be socially-constructed and therefore capable of change.

1.3.1 Analytic matrix.



The studies we reviewed were arranged on the quadrant, taking into account the kinds of explanations they drew on and how they defined their goals. These can be distinguished as follows.

1.3.2 Explanations

Essentialist – gender differences are regarded as the product of essential and unchangeable characteristics of boys and girls that are defined largely by biology (nature), and considered at the level of the group. Differences within the single category, "boys", are treated as much less significant than differences between the general categories "boys" and "girls". Gendered characteristics and behaviours are seen to be determined by biological sex and regarded as fixed and stable. Changing gender differences in performance outcomes depends upon schools recognising and then responding to these innate differences

Socio-cultural – gender differences are regarded as defined by cultural and social norms that change over time. How children understand the salient characteristics associated with being a girl or boy depends upon the attitudes and beliefs that prevail in the social contexts in which individuals live. Once recognised and understood, these social norms can in turn be adjusted, thus providing a mechanism for change (nurture). Gender differences in educational attainment are considered as the outcome of a range of social factors including material and cultural resources that influence learning. Some studies explore the interaction between gender, social class and ethnicity as part of the focus of research.

1.3.3 Goals

Feminist – consider that gender differences are socially and culturally defined, and can be changed, but also assume that imbalances in power between the two groups "boys" and "girls" work to maintain the dominant position of the former and will actively act against or marginalise the interests of the latter. Such imbalances require wider political redress, looking beyond the school system, if the goal of greater equality and social justice is to be achieved.
Social justice perspectives pursue similar goals, looking across the spectrum of social disadvantage. They pay particular attention to the influence of material poverty, structural inequalities, and how these are represented discursively and then interact back on social understandings of their causes.

Technicist – prioritise achieving better outcomes from the school system in the interests of (economic) efficiency, with better returns from the monies spent on schooling demonstrated by reducing unevenness in performance. In pursuit of these goals the analysis in some, but not all, countries is "gender blind", with the primary aim being to produce more uniformly high quality outputs from the school system that will contribute to greater social cohesion through wider economic participation ((Department for Education and Skills, 2007)). From this perspective the focus is primarily on changing aspects of the school system or support given to families that could lead most directly to fairer system outcomes, rather than bringing about broader political change.

1.4.1 Using the matrix.

Differences in these approaches were used to identify trends in the literature, assess different kinds of explanatory hypotheses for gender gaps in literacy attainment and language development, and analyse how these shaped different kinds of interventions, and their theories of change. (See also (Francis & Skelton, 2005; Skelton, Francis, & Valkanova, 2007)

1.4.2 Looking across the range of studies.

Where studies line up on the quadrant varies by country. For instance in the UK, more of the relevant studies fall into the upper right quadrant, technicist to socio-cultural; whereas in Canada and Australia, more studies fall into the bottom left quadrant, essentialist to feminist and social justice, with these two positions pitted against each other. In the US, studies are more likely to fall into the bottom right quadrant, partly reflecting a greater concern with the politics of race and social justice in the US, .

Differences in the numbers of academic studies taking one or other approach seem closely linked to the comparative visibility of boys' attainment as a named policy problem in different countries. (See also 2.2 and 2.3 below). Where policy adopts a more essentialist perspective, more academic work from a feminist and social justice perspective develops to directly contest these assumptions. Where policy adopts a more technicist approach, work on gender and literacy may be more diverse in its exploration of the quantitative data and less directly oppositional.

2. Taking sides. Assessing the weight of the evidence

The narrative review considered the causal explanations for gender differences in literacy attainment, looking across the full range of perspectives outlined in our analytic matrix. In practice these perspectives are not always mutually exclusive and often draw on similar explanations for the gender gap, even though how they weigh and interpret that evidence varies. This section sets out some of the key factors that have influenced their different starting points and the research studies they lead to.

2.1 Interpreting the evidence from an essentialist perspective.

Most of the reviews mention essentialist perspectives as part of the taxonomies they create, but there is very little high quality and relevant research arguing that biology on its own determines gendered behaviours (Hawke et al, 2006). Indeed, epi-geneticists and neuroscientists readily take into account the influence of the environment on development, not just biology (See Petersson et al, 2009; Skelton et al, 2007).

We can distinguish between essentialist arguments based on gender norms (See Martino and Kehler, 2007 for a critical review of the limited definitions of masculinity such studies rest on), and a more dedicated research literature concerned with the biology of cognitive impairment and its impact on reading development. In the latter group, studies consistently report that more boys than girls are affected by a reading disability. A comprehensive review of four independent epidemiological studies examined claims that the increased rate of reading disability in boys was a consequence of referral bias (Rutter et al., 2004). Rutter and colleagues found that "In all four studies, there was a statistically significant excess of boys with reading disabilities." (Ibid, p2), whether reading disability was defined without reference to IQ ("those children whose reading test scores placed them in the lowest 15% of the reading test score distribution") ; or with reference to IQ ("more than 1 standard deviation below the score predicted on the basis of performance IQ", Ibid p 8).

They concluded from their review:

> the epidemiological findings should now be sufficient for a firm statement that reading disability is truly more frequent in boys than girls. There now needs to be research to determine the causal influences that underlie the gender difference, because their elucidation could well throw light on the processes leading to reading disability in both sexes. (Ibid, p 13)

In this light, follow up studies using statistical analyses of nationally representative datasets have explored:

> The correlation between a higher incidence of challenging or externalising behaviour in boys and their reading difficulties (Limbrick, Wheldall, & Madelaine, 2008; Matthews, Kizzie, Rowley, & Cortina, 2010; McIntosh, Reinke, Kelm, & Sadler, 2012)

- The causal direction between the two or whether they are really independent of each other
- The correlation between learning related skills ("task persistence, learning independence, flexible thinking, organization, and attention control" (Matthews et al., 2010), and faster literacy learning.
- Whether higher levels of prosocial behaviours, self-regulation and self-confidence act as protective factors that promote literacy learning.(Adlof, Catts, & Lee, 2010; Hawke et al, 2009;)

All of these studies explore the processes through which boys and girls come to adopt these behaviours and attributes as social phenomena. The most promising explanatory factors we will consider in our own statistical analyses are the relationships between literacy attainment, gender, prosocial, externalising behaviours and learning-related skills.(See Chapter 2)

There is a more specialised literature that examines how different teaching approaches might minimise the impact of more severe cognitive impairments on progress in learning to read (Adlof et al, 2016), which we have not reviewed, as such studies place the main emphasis on the specific condition, and not on the gender of the child.

2.2. Interpreting the evidence from a technicist perspective.

Reviews of literature on gender, literacy attainment and language development, written from a technicist perspective, steer by the system level performance data which frames the analysis and the recommendations. In the UK, the social class dimension to inequalities in education has stood out in the performance data from a policymakers' perspective. A comprehensive review of the performance data on gender and education, published by the Department for Education and Skills (DfES) during the New Labour administration, and which considered a wide range of explanations for any gaps, concluded.

> "2.9 Assessing the Gender Gap
>
> - The gender gap arises mainly because of differences between boys and girls in language and literacy skills, reflected in differences in performance in English and other subjects which are literacy based. The gender gap is small or negligible for Maths and Science. These trends are apparent both from historical data from English exam records going back 60 years and from international data.
> - While gender does independently predict attainment, the social class gap has greater explanatory power and for some groups, ethnicity is also a more important factor than gender.
> - A focus on boys' underachievement can shift attention away from the fact that large numbers of girls are also low attainers. Tackling the scale of these numbers is arguably of greater priority and importance to policy makers than the proportionate difference between boys' and girls' attainment.."
>
> DfES (2007) *Gender and education: the evidence on pupils in England.* p5

From a policy perspective, the greatest priority in the UK has been to invest in high quality teaching that can lift all children's literacy performance. This has involved channelling most resource to schools operating in areas of highest social deprivation and disadvantage (Sharples, Slavin, Chambers, & Sharp, 2011), on the understanding that high quality teaching will have the best impact on the "learning, motivation, involvement and attainment of underperforming boys and girls" (DCSF, 2009).

In other countries, the policy discussion on gender and attainment has been framed rather differently, based on fears about changing labour markets and the sharp reduction in the employment prospects for unskilled male labour (Australian Parliamentary Committee, 2002), with the relatively recent improvement in girls' educational attainment cast as a threat. Indeed, some argue that girls' improved educational performance has been gained at the expense of boys' through actions schools took in pursuit of gender equality, and that schools need to readjust what they do to create a more level playing field within the school, tipping the curriculum and forms of assessment back towards a previous settlement that produced better results for boys.

The weight of research evidence demonstrates that this is a misreading of the causal mechanisms that have led to the improvements in girls' education performance. These have not coincided with any major change in the numbers of women employed in teaching, or in how school subject content is routinely taught. Instead the most robust reviews of the evidence suggest that improvements in girls' performance have been largely influenced by a variety of different factors: new opportunities in the labour market for women; recognition of the necessity of a double waged household; better access for girls to higher level qualification tracks in more school systems; and the expansion of places in HE (Arnot, David, & Weiner, 1999; Machin & McNally, 2005).

In addition, successive in-depth research reports have found little evidence to support the efficacy of "boy-friendly" pedagogies, such as: single sex teaching groups; hiring more male teachers; switching to forms of assessment presumed to favour boys, such as multiple choice or final exams; or changing the curriculum to more closely match what are perceived to be boys' interests. (Carrington & McPhee, 2008; DCSF, 2009; Younger, Warrington, & McLellan, 2005). Instead, policy in the UK has placed the emphasis on closing gender gaps in literacy attainment by ensuring all children have access to high quality literacy pedagogy. This consensus is reflected in a systematic search of the literature conducted by Sharples et al (2011) on what works in "closing the gap in educational achievement for children and young people living in poverty, including white working-class boys",(Sharples et al., 2011) which concluded that high quality pedagogy, defined without reference to gender, has the most impact.

2.3 Interpreting the evidence from a feminist and social justice perspective.

Reviews of the literature on gender, literacy attainment and language development written from a feminist perspective are shaped by and respond to the policy environment which has made boys' underperformance in schooling in general, and in literacy in particular, politically salient. One of the questions this literature poses is whether the shift in public discourse, from a focus on girls' underachievement in schools to boys', is warranted and how such a shift should be read. In particular, does a narrow focus on performance outcomes from schooling ignore or reframe larger questions of social justice. Researchers are alert to the potential of a policy focus on boys to create a feminist backlash in which those who oppose greater gender equality take away the gains girls have made in education by suggesting they have been bought at the price of boys' failure. Many of the reviews are critical of the assessment of the scale and significance of any gender gaps. and seek to contextualise the data in relation to ethnicity and social class (Hansen and Jones, 2011; Strand, 2011). Instead of treating boys as a homogenous group, such studies look for explanations which can account for the fact that not all boys fail, and not all girls succeed (White, 2007) .

In exploring which boys and which girls do well or underachieve, much of this literature focuses on the interaction between gender, social class and ethnicity, and how children use these resources to construct their identities. Studies consider whether schools challenge or reinforce relatively narrow gender stereotypes that in turn may hinder pupils from engaging productively with the literacy curriculum (Martino, 2001; Skelton, Francis and Valkanova, 2007). Designing pedagogic strategies that can engage and support pupils in developing as readers and writers is regarded as important (Cremin, Mottram, Collins, Powell, & Safford, 2009) as is challenging gendered expectations that may limit pupils' interests (Lingard et al,2002; Skelton, Francis and Valkanova, 2007).

From a social justice perspective, studies have examined whether structural features of schooling, including how schools assess learners' proficiency in literacy on and after entry, impact negatively on children from the most disadvantaged backgrounds especially those who begin school with poorer language and literacy levels. A social justice analysis suggests that social segregation in school catchment areas and low expectations of pupils with the weakest literacy skills may create conditions under which those who need most high quality support actually receive least. (Goodman & Burton, 2012; Lupton & Hempel-Jorgensen, 2012). This can have the effect of compounding rather than alleviating uneven starting points leading to the gender and social class gaps seen in the data (McFadden & Munns, 2002; Moss, 2007).

2.4 Interpreting the evidence from a socio-cultural perspective.

Reviews of the socio-cultural literature on gender, literacy attainment and language development focus on gender differences in children's participation in a range of activities that support language and literacy development in home, pre-school and school settings; and how children acquire individual attributes such as motivation, self-regulation, confidence and engagement that may help or hinder them in getting to grips with the task of learning to read and write.

Studies examining home and pre-school literacy environments and the literacy resources they give children access to consider whether such settings give equal encouragement to boys and girls to participate and engage in a range of pre-literacy and literacy practices, including through play. (Marsh, 2004b; Millard & Bhojwani, 2012). From studying older age groups, the amount of time that children commit to reading for pleasure is known to be an important factor in reading attainment (Baker and Wigfall, 1999; Krashen, 2004; Wigfall and Guthrie, 1997; Sullivan and Brown, 2015). The strong correlation in the statistical data between willingness to read and reading attainment also has a clear gender dimension (Brozo et al, 2007; OECD, 2009;). Boys, on average, report lower levels of engagement in reading, spend less time reading and, on average, show lower levels of attainment. These correlations are of long standing and have been consistently reported in a range of quantitative studies (Oakhill and Petrides,2007; OECD, 2009). Considerable attention has been given to exploring whether competence determines frequency and engagement in reading, or frequency and engagement promotes competence? PISA data have been used extensively to explore these issues, and indeed the dataset was set up with this aim in mind (OECD, 2009, 2015a, 2015b).

The PISA dataset facilitates analysis of gender differences in terms of willingness to read, and its association with higher attainment using measures of time spent reading, readers' interests in different text types, levels of commitment to schooling and readers' confidence in their own abilities. Studies using the dataset conclude that increasing boys' engagement in reading would help narrow the gap in literacy attainment (Brozo et al, 2007; OECD, 2009).

Within the psychological literature, this has led to more nuanced discussion of the differences between motivation to read and reading engagement, with an increasing number of studies distinguishing between intrinsic (done for its own sake) and extrinsic (done in the expectation of receiving an external reward) motivation. Recent studies suggest that higher levels of intrinsic motivation may have more impact on attainment than extrinsic motivation, with exploration of gender differences in intrinsic and extrinsic motivation now part of the research agenda (McGeown, 2015; Schaffner and Schiefele, 2016). This continues to be an important area for further research , as some of the interventions designed to promote children's reading for pleasure have failed to take this distinction into account and may be operating with inappropriate models of motivation and engagement that limit their effectiveness (Guthrie, 2013).

There is a smaller literature which considers early acquisition of fluent literacy skills, particularly in decoding, to be the key to wider reading, and therefore runs the causal logic the other way round, seeing higher attainment as a precursor of greater engagement. Statistical studies seek to unpack these relationships to determine which matters most in explaining the differential progress girls and boys make The consensus is that strategies that help raise boys' attainment also raise girls' – high quality literacy pedagogy matters to all - but the relative weight that should be given in the literacy classroom to the skill or the will to read is still debated, as is the question of how these interrelate

particularly in the case of the lowest achievers who need to make most progress (Cremin et al., 2009; Moss, 2007).

A final strand in the socio-cultural research explores the interaction between home and school literacy cultures, the extent to which they overlap, or value different aspects of literacy, and the way in which this shapes children's progress as literacy learners in school. Studies consider whether girls and boys take up a different stance towards literacy practices as they create their own gender identities, and whether this leads to gendered perspectives that can hamper the further acquisition of literacy skills (Davies & Saltmarsh, 2007; Lingard, Martino, Mills, & Bahr, 2002; Marsh, 2004; Millard, 2002).

2.5. Summary

The studies consulted for this review link gender differences in language development and literacy attainment in the early years to:

i) variation in boys' and girls' acquisition of specific attributes and behaviours that will facilitate learning to read in formal school settings (p9);
ii) variation in boys' and girls' exposure to and participation in a range of social interactions with significant others in the early years that extend their language and develop their interest in learning to read (p12);
iii) variation in boys' and girls' motivation to read and a willingness to persist with the task, shaped by differences in the support they are offered to develop their skills in the light of their interests (p 12);
iv) social expectations about gender appropriate identities, behaviours and norms that lead fewer boys than girls to actively think of themselves as readers and writers (p11)
v) variation in boys' and girls' experience of school pedagogy and the formal literacy curriculum that impacts negatively on the higher numbers of boys who initially struggle with reading (p10, p11)

The studies we consulted range from those that consider social factors wholly account for such differences and those that consider such differences to be generated by a combination of innate and social factors (Galsworthy et al, 2000). Most studies consider that gender differences are shaped by the interaction between gendered expectations in the adult population and gendered expectations that children internalise and also construct independently with their peers.

3. Which are the most useful explanations for gender differences in literacy attainment and language development in the early years?

Our statistical analyses show that poorer language and attention skills at age 5 are significant predictors of lower literacy attainment at age 11, and that more boys than girls are reported by teachers to fall into this category. This has focused our review of relevant explanations that might account for gender differences in literacy attainment

In considering the weight of the research evidence, instead of treating boys as a homogenous group, we looked for explanations that could account for *within gender* as well as *between gender* variations in literacy attainment and language development. In particular, we have prioritised

explanations that might be most relevant to understanding why more boys than girls have poorer language and attention skills at age 5.

3.2 Limitations to the study

Relatively few studies of the interaction between gender and literacy attainment have a dedicated focus on pre-school age children. There are also very few statistical studies in the UK using the NPD, or other nationally representative datasets that explore gender and literacy as a topic in its own right. (For some examples see Hansen, & Jones, 2016; Hartas, 2011; Mensah & Kiernan, 2010; Sullivan & Brown, 2015). Instead most of the statistical literature focuses on between school differences with gender as a variable of interest but not central to the analysis, and with literacy most often used as a proxy for general educational attainment.

3.3 Making a difference to gender differences in literacy attainment and language development

We have identified three key focus areas in the literature that help explain gender gaps in literacy attainment and that are relevant to understanding how to address them in the early years: *factors in school, in the home and community, and in peer culture*.

We have grouped explanations under these headings and set them out in the form of questions. The groupings can be taken to imply a level of responsibility that schools, family and community or peer cultures hold for the way things are, and this can be read as a matter of blame and deficiency. By contrast, our own approach is to consider where the most effective levers for change might lie and how the resources of each group – school, home and peer cultures - could be most effectively mobilised together to minimise gender differences in literacy attainment.

3.4. Factors in school that may influence boys' and girls' development in literacy

i. **Values and ethos:** Whether the school culture and ethos actively seek to create conditions where both boys and girls recognise the value of doing well in literacy and are encouraged to develop resilience in the face of any difficulties? (Lingard et al., 2002; Moss, 2000)

ii. Whether schools provide learning opportunities that encourage both boys and girls to participate in and actively reflect on their reading and writing strategies (Sharples et al., 2011)?

iii. Whether schools seek to actively engage parents in reading with their children, and reading for pleasure as well as reading to practice skills, especially if parents are "disengaged, under-confident and reluctant to participate" (Lupton & Hempel-Jorgensen, 2012)?

iv. Whether teachers understand and incorporate into their curriculum literacy practices that some boys and girls have already developed at home using forms of text, languages and digital literacy practices that may differ from those in use in school (Dyson, 1997; Marsh, 2004b; Smith, M and Wilhem, 2010)?

v. **Quality:** Whether the quality of literacy teaching is sufficiently high to enable all pupils from whatever starting point to engage purposefully in literacy learning? There are suggestions in the literature that the quality of provision may be a more crucial factor in boys' educational progress than in girls'. (Daly, 2002; Machin & McNally, 2005; Siraj-Blatchford et al., 2013)

vi. Whether schools use data to monitor progress in reading and writing and find ways of successfully addressing the performance of pupils who are falling behind (Sharples et al., 2011)?

vii. Whether schools actively promote reading in ways that encourage as many boys as girls to both acquire the necessary skills and develop the habit of reading widely outside school for their own pleasure? (All Party Parliamentary Literacy Group, 2012; Cremin et al., 2009)

viii. Whether teachers have sufficient knowledge of children's texts and reading preferences to adequately support boys' and girls' development as independent readers? (Cremin et al., 2009)

ix. **Assessment**: whether teachers' perceptions of pupils' (gendered) attitudes and behaviours affect their assessment of their literacy abilities (Daly, 2002; S Jones & Myhill, 2007; Susan Jones & Myhill, 2010; Skelton et al., 2007)?

x. Whether boys' and girls' performance is influenced by the text types they are asked to read and respond to as part of assessed tasks or on the literacy curriculum (Department for Education and Skills, 2007; Estyn, 2008; S Jones & Myhill, 2007; Twist & Sainsbury, 2009)?

xi. **Policy:** Whether an emphasis on high stakes testing of literacy attainment encourages teaching to the test and a narrow focus on too small a skill set in reading and writing, leaving little scope for a more productive and creative literacy curriculum that could engage low attainers more constructively (All Party Parliamentary Literacy Group and National Literacy Trust, 2012; Lupton & Hempel-Jorgensen, 2012)?

xii. Whether the young age at which children start formal schooling in the UK and England in particular may mean that "boys whose motor skills are less developed may experience early frustration with writing that looks, and is, less proficient than girls'." (Daly, 2002)?

3.5. Factors in the family and community environment that may influence boys' and girls' development as readers and writers

i. **Gendered expectations:** Whether parental roles and social interactions in the home lead to fewer boys than girls developing the appropriate levels of language, pre-reading and social skills before starting school (Mensah & Kiernan, 2010; Sullivan & Brown, 2013)?

ii. Whether parental or community expectations, family background and parental reading habits encourage girls and boys to value literacy practices differently so that more girls than boys see themselves as readers and writers(Lingard et al., 2002; Marsh, 2004a; Millard & Bhojwani, 2012; Sullivan & Brown, 2013)?

iii. Whether the organisation of family leisure time and activities in the community inhibit rather than help more boys than girls from finding time to participate in literacy-based activities (All Party Parliamentary Literacy Group and National Literacy Trust, 2012)?

iv. **Resources for literacy learning:** Whether families have access to high quality pre-school provision that enables children to develop the necessary competencies and resilience to transition successfully into learning to read and write in more formal school settings. This may be particularly important for those boys from the most disadvantaged backgrounds.

v. Whether low levels of resources for reading in some homes and communities have a more significant impact for boys than girls on whether they develop an intrinsic motivation to read for themselves (Hicks, 2002; S. McGeown, Goodwin, Henderson, & Wright, 2012; S. P. McGeown, Norgate, & Warhurst, 2012)

3.6 Factors in peer culture that impact on pupils' construction of (gendered) identities and their relationship to literacy in school

i. **Gendered peer relations:** Whether the salience in peer culture of a binary opposition between different forms of masculinity and femininity may lead some boys to reject aspects of the curriculum they associate with girls (Martino & Kehler, 2007; Martino, 2001)?

ii. Whether more girls than boys incorporate literacy activities into their play, using their play to develop sustained narratives incorporating more vocabulary into this activity, which in turn helps develop their pre-reading skills(Millard & Bhojwani, 2012; Qualifications and Curriculum Authority, 1998)?

iii. The extent to which boys' and girls' social networks act to resource and promote different forms of literacy practices independently of the school or their families (Moss, 2000; Rowan, Knobel, Bigum, & Lankshear, 2002)

iv. The extent to which any literacy practices that boys develop in their own time are seen as distinct from, and therefore treated by boys as oppositional to, literacy practices in school (Rowan et al., 2002; Sanford & Madill, 2006; Smith, M and Wilhem, 2010).

v. **Gendered resources for learning:** The extent to which boys' and girls' intrinsic motivation to read is influenced by their self-efficacy (confidence that they have the ability to do the task)(Logan & Medford, 2011; McGeown et al, 2012; Moss, 2007). Boys labelled as low attaining in literacy in school may react to that label in ways that make engaging purposefully with the literacy curriculum harder (Solsken, 1993).

vi. The extent to which boys arrive at school with fewer pro-social and learning-related skills. More boys than girls may show "externalizing behaviours" in the classroom, that is poor behaviour which may bring them to the attention of teachers (Limbrick et al, 2012; Matthews et al, 2010). This may limit their capacity to learn in interaction with others (Matthews et al, 2010).

4. Conclusions

In assessing the relevance of the explanations tendered above for any gender differences in language and literacy development, we have focused on explanations which:

1. Can take account of within gender as well as between gender differences
2. Seem most relevant to the pre-school age group, taking into account the less strong impact that peer culture may exert on (gendered) behaviours independently of home, family and school between the ages of 3-5
3. Help explain why more boys than girls have poorer language and attention skills at age 5

4. Can lead to interventions that could transfer well into pre-school settings, taking into account the relationships between staff, pupils and parents that such settings are in a position to influence.

The depth of the evidence has led us to identify the following factors as being particularly important in addressing gender inequalities in literacy attainment in the early years:

In pre-school settings

- T here is strong evidence for the importance of quality early years provision in supporting boys' and girls' language development and pre-literacy skills. Key features of such provision are the depth of learning opportunities they provide to scaffold and promote learning related and emergent literacy skills through extensive interaction between adults and children.
- There is strong evidence for the benefits of ensuring that both boys and girls participate equally in emergent literacy and other play-related activities that enrich their language and sustain their engagement in literacy-related activities.

In family and community settings

There is strong evidence for the importance of parents and other significant figures in children's family networks actively developing boys' and girls' language and learning-related skills through play and storybook reading.

- There is strong evidence for the importance of families having access to sufficient resources to engage young children in reading for pleasure in the home, including opportunities to listen and respond to story reading from the earliest age

For both pre-school and family/ community settings

- More evidence is needed on how home and school environments can encourage boys as well as girls to develop intrinsic motivation in tackling tasks they may not be immediately drawn to or find initially difficult
- More evidence is needed on whether challenging gender-stereotypes about children's development may lead to higher expectations of boys' involvement in and pleasure from a range of pre-literacy and language-based activities in ways that impact on literacy attainment

In peer culture

- There is promising evidence supporting the importance of encouraging boys and girls to share their interests in literacy-related activities and build them into their social networks through play

Chapter 2. How significant is the gender gap in literacy and language development: Statistical study

The analysis in this study uses data from the Millennium Cohort Study (MCS), a longitudinal study of a nationally representative cohort of children born in 2000/2001. The MCS data has been linked to the National Pupil Database (NPD), which contains records on children's achievement in Key Stage 1 (age 7) and Key Stage 2 (age 11) assessments, taken by all children in English state schools. The main analysis therefore focuses on children in England only due to availability of the NPD data.

Chapter summary

1. **Gender differences in academic achievement from 5 to 11**
2. **Variations in the gender gap across groups**

- Our analyses of the MCS database confirm that gender affects literacy attainment and language development independently of social class (Connolly, 2006). To identify the extent of any gender differences, we compared the % of boys attaining below the expected standard in language development at age 5 and in reading at ages 7 and 11 with the % of girls. At each assessment point, more boys than girls are attaining below standard. The gender gap remains relatively constant across all social class groups. In comparison, the gender gap in maths attainment becomes small and insignificant from age 7 onwards
- Whilst recognising that gender differences in literacy attainment and language development are smaller than social class differences (Strand, 2011), the fact that they are stable and constant across all social classes requires further explanation.

3. Early language and behavioural development and literacy at 11

In exploring the gender gaps in language development and literacy attainment that we identified in the MCS dataset, we found that

- Early language and (to a lesser extent) attention skills strongly predict literacy at 11. In contrast, peer relationships, prosocial behaviours and emotional wellbeing do not predict later literacy.
- More boys than girls have poorer early language skills and attention at age 5, and this accounts in large part for why they are behind girls at 11. Interventions targeting early language and attention have potential for improving outcomes for all children, but particularly boys because they have more problems to begin with.

4. Development in the first years of primary school

- Poor language skills at 5 affect later school enjoyment, confidence (answering in class) and motivation (trying hard) equally for boys and girls. However, the effect of poor language skills on reading for pleasure is much stronger for boys than girls: the 'discouraging' effect of poor early language on reading for pleasure is significantly larger for boys than for girls.
- Irrespective of early language skills, girls at age 7 report much more positive attitudes to school and read more for pleasure than boys. Children who read more for pleasure and who display motivation in school at 7 are less likely to fall below standard at 11 compared to other children with the same levels of language and attention skills at 5. Interventions that impact on these factors may therefore be able to mitigate the effects of a poor start in language.

5. Predictors of language and attention outcomes at age 5

- Parental engagement in literacy activities in preschool protects children against the risks of poor language and attention at 5. Although parents do not report reading to girls more frequently than boys at age 3, there are small but systematic differences in a range of other types of parental interaction associated with gender.
- Significant gender gaps are already apparent in language and behavioural outcomes at age 3, and the magnitude of the gaps generally remains very stable between ages 3 and 5. The large gender differences in language and attention at age 5 that appear so consequential for later literacy development are already established at age 3. The roots of the gender gaps can therefore be traced back to developmental processes in the first years of life.
- Even as early as 9 months, mothers' reports of boys' and girls' developmental progress and temperament differ. We cannot tell from these data whether these early differences are the result of biological or social processes. It is not clear if early differences provoke different behavioural responses in parents and carers, that then strengthen gendered behaviour patterns; or if differently gendered expectations on the part of parents create different responses to the world from their children.

1. Gender differences in academic achievement from 5 to 11

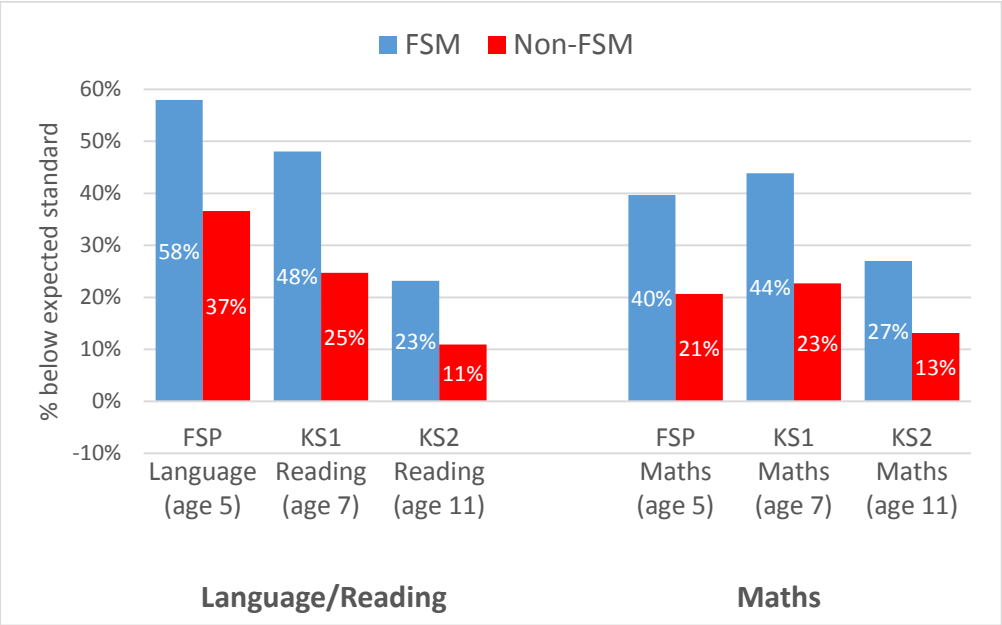
We begin this section with an overview of gender differences in problems with reading and maths skills for the entire national cohort from which the MCS sample is drawn (using data taken from the full National Pupil Database).

- While it is relatively common for children to struggle with language at age 5, most children are nevertheless able to acquire a reasonable standard of reading by age 11. Overall 40% of children had language skills below the expected standard a**t** age 5. By age 7, the percentage below the expected standard in reading (Key Stage Level 2B) was considerably lower at 28%, and by age 11 only 13% of children (just over 1-in-8) failed to meet the expected standard in reading (Key Stage Level 4).
- The picture for maths skills is rather different. More children were able to meet the expected standard at age 5 in maths than in language (with 24% below standard rather than 40%), but we also see less improvement in overall standards over time, with 26% still below the expected level at 7 and 16% below expectation at 11.

Figures 1 and 2 show how the percentages of children's meeting the expected standards vary, firstly with free school meals (FSM) eligibility and secondly with gender.

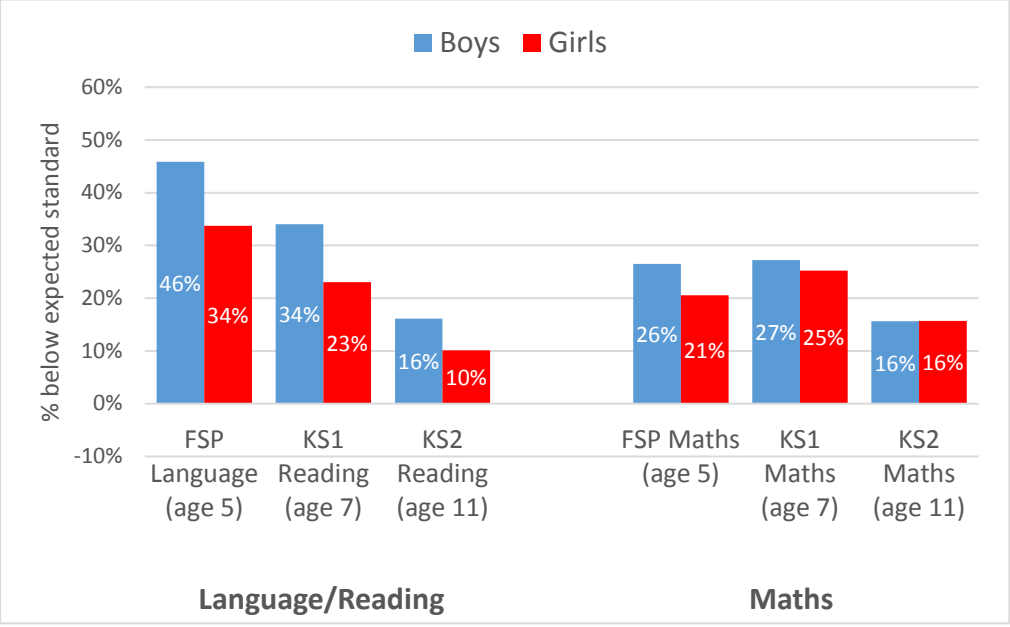
- Figure 1 documents the very large differences in educational attainment by socio-economic background that have been a focus of the research and policy literature. In many assessments children from disadvantaged backgrounds are of the order of half as likely as more advantaged children to meet the expected academic standards.
- Figure 2 shows that gender gaps tend to smaller than FSM gaps, but in terms of literacy and language in particular they are still considerable.
- A gender differential in language and literacy skills was apparent at all ages. At age 5, 46% of boys were below standard in language, compared with 34% of girls, a gap of 12 percentage points (pp). The equivalent gap in reading at 7 was similar at 11 pp. By age 11, the gap was only 6 pp, although given the relatively low rate of children failing to meet the standard overall at this age, this still represents a considerable female advantage, with roughly two girls for every three boys falling into the below standard group (or around 1-in-6 of all boys and 1-in-10 of all girls).
- The sizable gender differences in literacy are not found in maths skills, at least after age 5. Girls do outperform boys in maths at age 5 by 5 percentage points, but boys tend to catch up with girls in maths at they get older, so that by age 11 boys are essentially on a par with girls (at least in terms of meeting the expected standard).

Figure 1. Percentages of FSM and non-FSM pupils with attainment below the expected standard, cohort born 2001 (NPD data)



Notes: Data are taken from the full National Pupil Database, and are based on results for around 500,000 children. The data are taken from the national cohort from which the MCS sample is drawn, i.e. children taking Key Stage 1 in 2008 and Key Stage 2 in 2012. MCS children were assessed in the Foundation Stage Profile (FSP) in 2006. However, FSP data plotted here are for the 2007 cohort, the first cohort for which they are available at the national level. For the FSP Language measure, children are at the expected level if they are deemed to be 'working securely' on both the Language for Communication and Thinking (LCT) and Linking Sounds and Letters (LSL) sub-scales (scores of 6-9). The FSP Maths expected level is 'working securely' on the three combined mathematics scales (an overall score of 18-27). Expected levels are Level 2B at Key Stage 1 and Level 4 at Key Stage 2. FSM pupils make up 16%, 17% and 18% of the cohort respectively at the three time points.

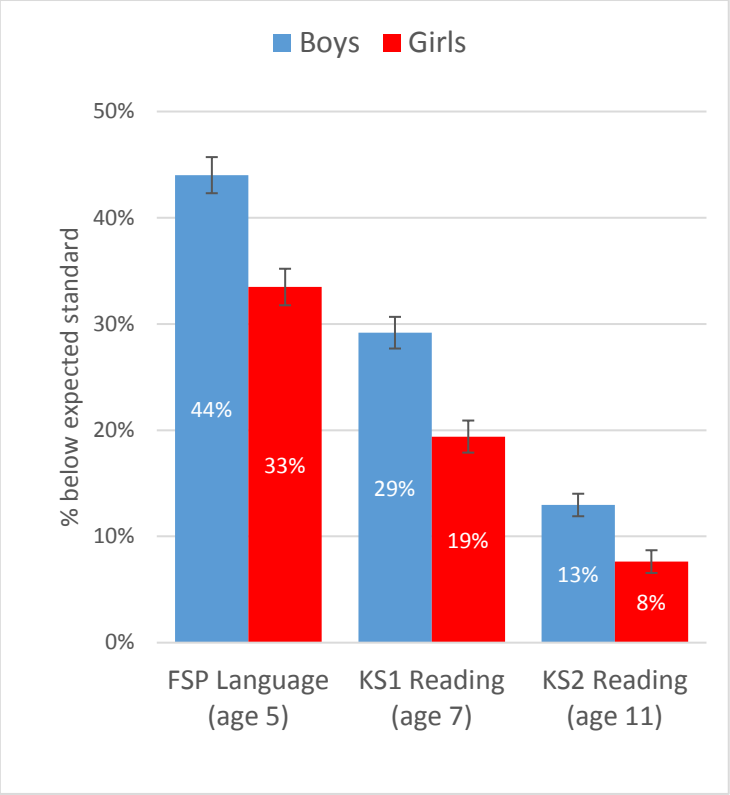
Figure 2. Percentages of boys and girls with attainment below the expected standard, cohort born 2001 (NPD data)



See note to Figure 1.

The full NPD data used in Figures 1 and 2 is invaluable for documenting national trends in the most accurate way possible. The drawback of the NPD, however, is that it contains relatively little information on the sorts of child- and family-level factors that might explain individual differences in academic achievement. To obtain a deeper understanding of the processes underlying the gender differentials in language and literacy shown in Figure 2, we must move to the smaller MCS sample of children, whose lives have been followed in detail since they were 9 months old.

Figure 3. Gender differences in the percentage of children with below-standard language/literacy attainment in the MCS sample



Notes: Error bars indicate 95% confidence intervals. N=6189. Weighted estimates. For the FSP Language measure, children are at the expected level if they are deemed to be 'working securely' on both the Language for Communication and Thinking (LCT) and Linking Sounds and Letters (LSL) sub-scales (scores of 6-9). For the Key Stage measures, a child is classed as below standard at 7 if they did reach Level 2B at Key Stage 1, and below standard at 11 if they did not reach Level 4 at Key Stage 2.

- Rates of children failing to meet the expected standards in language/reading in the MCS sample align relatively well with those from the full NPD, though failure rates tend to be slightly lower in the MCS (39% vs 40% at age 5; 24% vs 28% at age 7; 10% vs 13% at age 11). This evidence of positive selection in the MCS sample suggests that families that did not give permission to match data to the NPD, or where a match was unsuccessful, tended to have slightly poorer outcomes than those with a match, and that these differences are not fully accounted via the survey weights provided.
- Nevertheless, the key point for our purposes is that, as in Figure 2, Figure 3 shows the persistence of large and significant gender differences in literacy skills as children age. The similarity with the patterns in the national data helps give confidence that the conclusions we draw from the MCS sample will generalize to the whole population.

Box 1. Error bars

Estimates constructed from a random sample of children have some inherent uncertainty associated with chance differences in the children who happened to be included (unlike the estimates in Figures 1 and 2 which are calculated using information on all children in the population). For this reason, results from the MCS sample are presented with error bars around the estimates (e.g. of the percentages of children with below standard attainment) to give an indication of the extent of this uncertainty. Intuitively, they give the range of different estimates we might expect to see in different samples simply due to this random source of error. All differences in the ranges indicated might therefore be considered plausible. Error bars also give a visual indication of statistical significance. **If an error bar does not contain zero within its interval, we can infer that the estimates is statistically significant from zero at the 5% level. And, when comparing two estimates, if the error bars do not overlap, we know for sure that the difference between the two estimates must be significant (as in the gender comparisons in Figure 3).** However, even when error bars do overlap, the difference may still be significant – this depends on the degree of overlap.

2. Variations in the gender gap across groups

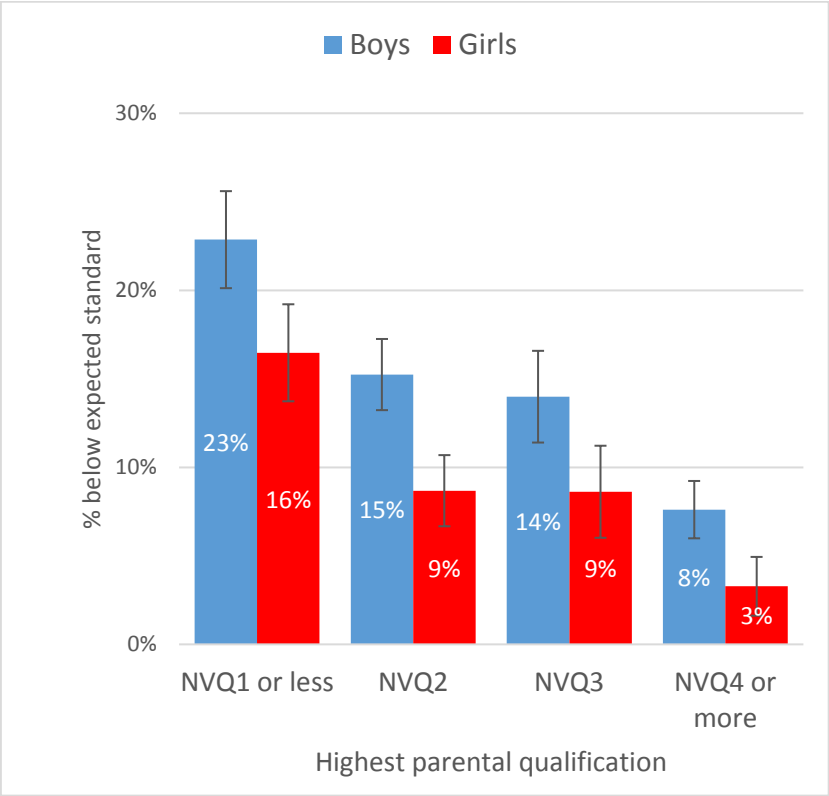
It is clear that there are large and significant gender differences, on average, in literacy skills at the end of primary schooling. But is it the gender gap concentrated among children from certain kinds of families? It may be the case that only certain sub-groups of boys are particularly disadvantaged relative to girls, while other boys – perhaps those who are more socially advantaged, for example – are better able to keep pace with their female peers.

Figure 4 breaks down the full sample of children according to the highest level of education of the child's parents[1]. Parental education has advantages as an overall measure of socio-economic background because it is defined in households in which no parents are in work (unlike occupational status) and it distinguishes between moderately and more highly advantaged children (unlike a measure of poverty status such as free school meals which distinguishes only the most disadvantaged). Here we define four groups according to highest parental qualification: NVQ1 or less, consisting of the least advantaged 15% of children; NVQ2 (27% of children); NVQ3 (17% of children); and NVQ4 or above, consisting of the most advantaged 42% of children.

- Figure 4 again illustrates the well-known social gradient in academic achievement in primary school. Boys from the least educated backgrounds are three times as likely as boys from the most educated backgrounds to fall below Key Stage Level 4 in Reading at 11, and girls from the least educated backgrounds are five times more likely in the equivalent comparison.
- Significant gender differentials in favour of girls exist in all social groups, from the least to the most advantaged. It is definitely *not* the case, for example, that only boys from relatively deprived backgrounds fall behind in literacy relative to their female peers, while those from better off backgrounds are able to keep pace.

[1] We use the highest educational qualification achieved by a parent who is resident with the child, measured at the time of entry to the survey. Qualifications are converted to their equivalent National Vocational Qualification (NVQ) level to enable ranking. Parents with overseas qualifications are grouped with NVQ1 or less.

Figure 4. Gender and parental educational background differences in the percentage of children with below Key Stage Level 4 Reading at age 11 in the MCS sample



Notes: Error bars indicate 95% confidence intervals. N=6189. Weighted estimates.

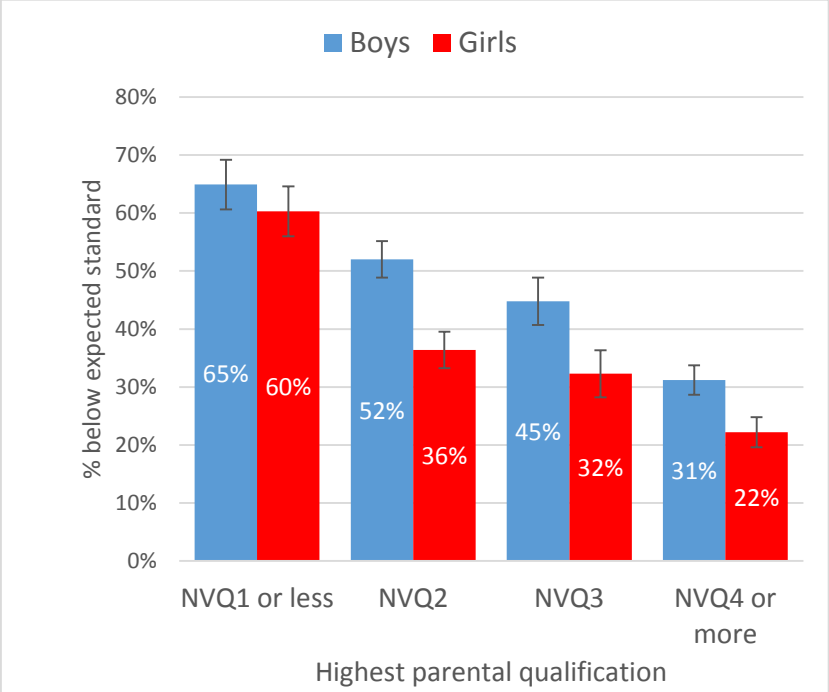
- Across the parental education groups, boys are between 5 and 7 percentage points more likely than girls from the same social background to fall below Key Stage Level 4 in Reading at 11. Formal statistical tests reveal that we cannot reject the hypothesis that the gender gap at 11 is the same regardless of social group.

In Figure 5, we explore the gender gaps among different social groups in language at age 5, rather than reading at age 11.

- For the majority of children – those in the three higher social groups – the pattern is similar to that at age 11, with a strong social gradient overall, and similar gender gaps within each social group.
- The most deprived group had extremely high levels of children failing to meet the standard at age 5, but the gender difference at this age was much more muted (65% of boys and 60% of girls in the lowest educational group below standard). Uniquely among social groups, girls from the most disadvantaged backgrounds are not significantly outperforming their male peers in language at age 5. However, as we saw in Figure 4, by age 11, the female advantage seen in all other social groups has emerged even in this most disadvantaged group. Girls with the lowest socioeconomic status, therefore, do not appear to share in the factors that boost the language skills of other girls above boys early in life, but they 'catch up' to some extent during the school years by making more progress than similarly disadvantaged boys.
- The distinct patterns found early in life among the minority of children from backgrounds with very low levels of parental education (weighted N is 916 of 6189 children) should not distract us from the fact that, by age 11, the effects of gender and socio-economic status on literacy are

entirely independent. Boys do worse than their female peers regardless of their social background, and disadvantaged children do worse than advantaged children, regardless of their gender. In addition, for all but the most disadvantaged children the gender gaps we see at 11 are already present at age 5.

Figure 5. Gender and parental educational background differences in the percentage of children with below standard language skills at age 5 in the MCS sample



Notes: Error bars indicate 95% confidence intervals. N=6189. Weighted estimates

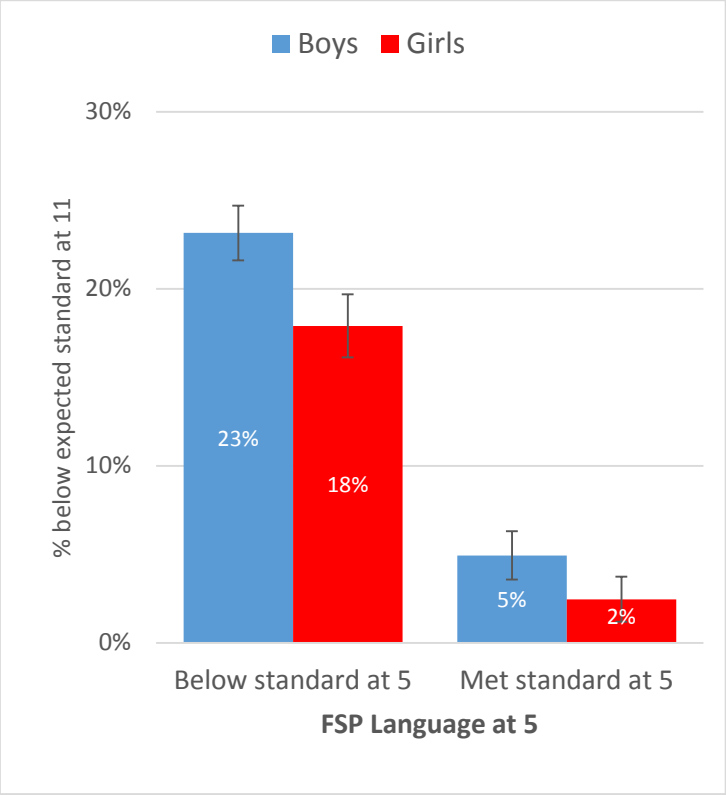
In further analyses, we explored whether levels of, and gender gaps in, reading attainment at 11 differed across ethnic groups.

- In general we found no significant difference in the percent of children failing to reach Key Stage Level 4 Reading between white and non-white children.
- The gender differential in literacy at 11 is not restricted to only specific ethnic groups. Although the gender gap appears slightly larger among white children, the difference is not significant.
- The data do not support the idea that the gender gap differs with ethnicity. However, sample sizes of non-white groups are small (they comprise just 12% of the sample overall), which may affect our ability to detect differences.

3. Early language and behavioural development and literacy at 11

We have seen that boys tend to begin school with poorer language skills than girls, and that they remain behind girls in literacy at 11. To what extent can differences in early language skills account for the differential at the end of primary school? Figure 6 presents some initial evidence from the raw data on the strength of the association between early language and later literacy.

Figure 6. The association of early language skills with below Key Stage Level 4 Reading at age 11 in the MCS sample, by gender



Notes: Error bars indicate 95% confidence intervals. N=6189. Weighted estimates.

- Early language is strongly associated with literacy at 11. Children who are below standard at age 5 are over 4 times more likely to have below Level 4 Reading at 11 than those who met the standard at 5 (over 4 times for boys, over 7 times for girls).
- The majority of children who were below standard at 5 do go on to attain at least Level 4 Reading by 11 (77% of boys, 82% of girls). Poor language skills at age 5 are by no means irreversible.
- Among the children who met the standard in language at 5, however, poor standards of literacy at age 11 are much rarer (5% of boys, 2% of girls). This raises the possibility that ensuring all children reach that standard at 5 could have a dramatic effect on literacy at age 11.
- Poor early language skills are equally as consequential for girls as boys – the penalty at age 11 associated with a poor start in language is the same regardless of gender. Failing to meet the expected standard at 5 is associated with an increase in the probability a boy will have below Level 4 Reading at 11 by 18 percentage points, compared with 15 percentage points for girls, a difference that is not statistically significant.

- However, it is important to recall from Figure 3 that many more boys than girls *have* poor early language skills in the first place. This difference potentially plays an important role in accounting for why more boys than girls end up with poor literacy, on average, at 11.
- Differences in early language skills are unlikely, however, to be the sole explanation for why boys perform more poorly than girls in literacy at 11, because a gender differential remains even among children whose language skills are at or above the expected standard.

The patterns in Figure 6 are suggestive, but they do not isolate the impact of early language skills on later literacy, as separate from other factors. Children who were below the standard at 5 differ from other children a variety of ways – they tend to be from more disadvantaged backgrounds, for example – and the influence of these characteristics will also be reflected in their attainment at 11. In addition, the use of a threshold measure of attainment at 5 (simply above or below standard) does not make use of the full range of the scale available in the language data. How far children were below or above the standard is also likely to matter for their subsequent progress. Before we go on to incorporate these factors into our statistical analysis, however, we consider another dimension of children's early development that may also have consequences for their literacy at 11 – their behavioural development.

Children's capacity to learn and progress during primary school depends not only on their early academic skills, but also only on social and emotional ones. Here we document whether girls and boys tend to differ in these aspects of development as well as in their early language skills. We consider five aspects of behaviour, measured using the Strengths and Difficulties Questionnaire (SDQ) at age 5. Each scale is composed as the sum of responses to five items, capturing whether the child exhibits a particular behaviour Certainly true (scored 2), Somewhat true (scored 1), or Not true (scored 0). The dimensions are:

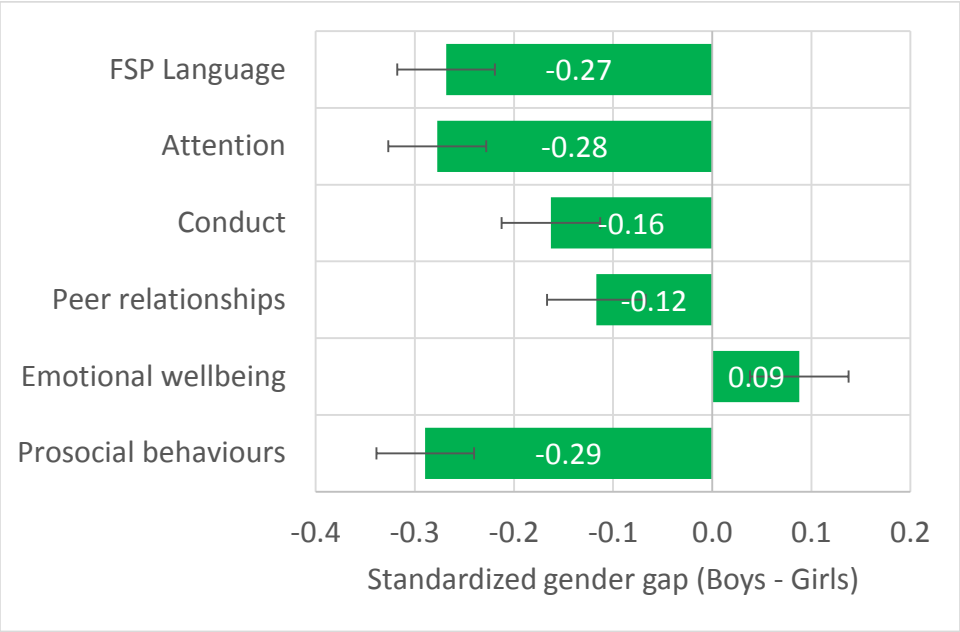
- Attention (e.g. whether the child sees tasks through to the end and has a good attention span)
- Conduct (e.g. whether the child often fights with other children or bullies them)
- Peer relationships (e.g. whether the child has at least one good friend)
- Emotional wellbeing (e.g. whether the child often seems worried)
- Prosocial behaviours (e.g. whether the child volunteers to help others)[2]

All measures are converted to standardized scores (see Box 2) so that the magnitudes of their differences can be compared directly.

Figure 7 documents the gender gaps in children's developmental outcomes at ages 5. Gaps less than zero indicate that boys, on average, have poorer outcomes than girls, and gaps greater than zero indicate that boys have better outcomes. The error bars again capture uncertainty in the estimates. An error bar that contains zero within its range indicates that the gap is not statistically significant. The figure also presents gaps in standardized language skills at 5 alongside the behaviour scales for comparison, derived from the sum of the full range of scores on the two FSP components.

[2] The five scales correspond respectively to the SDQ subscales: Hyperactivity/inattention; Conduct problems; Peer problems; Emotional symptoms; and Prosocial behaviours. We prefer to use the terms listed above because, for ease of comparison, we have adjusted the coding so that higher scores indicate more *positive* behaviours on all sub-scales. See Appendix Table A1 for full details of the SDQ items.

Figure 7. Average gender gaps in standardized language and behavioural outcomes at 5 in the MCS sample



Notes: Error bars indicate 95% confidence intervals. N=6189. Gaps show the effect size of the difference between average scores of boys and average scores of girls. Weighted estimates.

Box 2. Standardized scores

Outcomes in much of our analysis are expressed in terms of standardized scores. These transform the units of the original variables into a standard metric that allows meaningful comparisons to be made between factors originally measured on different scales. A standardized score is constructed such that zero corresponds to the outcome of the average child in the sample. Positive scores therefore relate to children above the average and negative scores to children below the average. One unit on a standardized score corresponds to one standard deviation of the underlying measure. This can be considered a large difference, as in usual cases six standard deviation units are expected to cover the range of outcomes in the whole population.

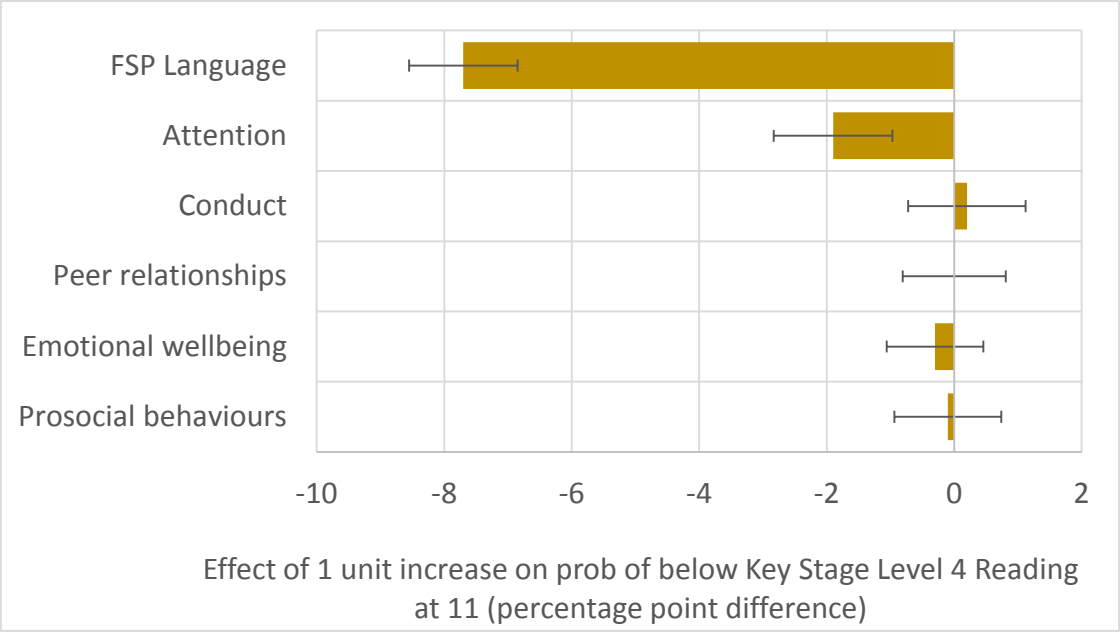
Standardized scores have the advantage that one unit of the language score can, for example, be considered equivalent to one unit of the attention score, or on the emotional wellbeing score. Differences in standardized scores associated with a change in a predictor are known as effect sizes, and again can be directly compared to evaluate the relative strength of the associations. A convention often used in social research is that an effect size of 0.1 is considered as 'small', 0.3 as 'medium', and 0.5 as 'large', although interpretations must also depend on the application in hand.

- The largest gender gaps in behavioural outcomes at 5, which are similar in size, are found in two particular dimensions: attention and prosocial behaviours. Girls on average have significantly better average outcomes than boys of between a quarter and a third of a standard deviation on these measures, differences that are equivalent to the size of the gaps language at the same age.
- Smaller but still significant differences in favour of girls are also found in conduct and peer relationships.

- The only dimension of behaviour on which girls, on average, have poorer outcomes than boys is emotional wellbeing but the difference is relatively small.
- Boys, therefore, do not only have poorer language skills on average than girls at the start of primary school, but also have lower levels of social adjustment along a range of dimensions. These factors may also play a role in hindering the development of children's literacy through to age 11. If they do then the gaps shown in Figure 7 imply that more boys than girls are vulnerable to their influence.

Next we address the question of which of the range of skills at 5 considered in Figure 7 are ultimately consequential for literacy at age 11. Our analysis is based on a logistic regression model with an indicator for having below Key Stage Level 4 Reading at age 11 as the dependent variable or outcome. The model includes the six developmental measures at age 5, as well as controls for a range of family background characteristics that may be systematically associated with both early skills and later literacy. To present the results, we calculate the average over all children of the effect of a one standard unit increase in each predictor on the percentage chance of having below Key Stage Level 4 at 11, holding the other predictors constant. The effect of all predictors on reading at 11 in the model was allowed to differ freely between boys and girls.

Figure 8. Effects of 1 standard unit increases in language and behavioural scores at age 5 on the percentage chance of below Key Stage Level 4 Reading at 11



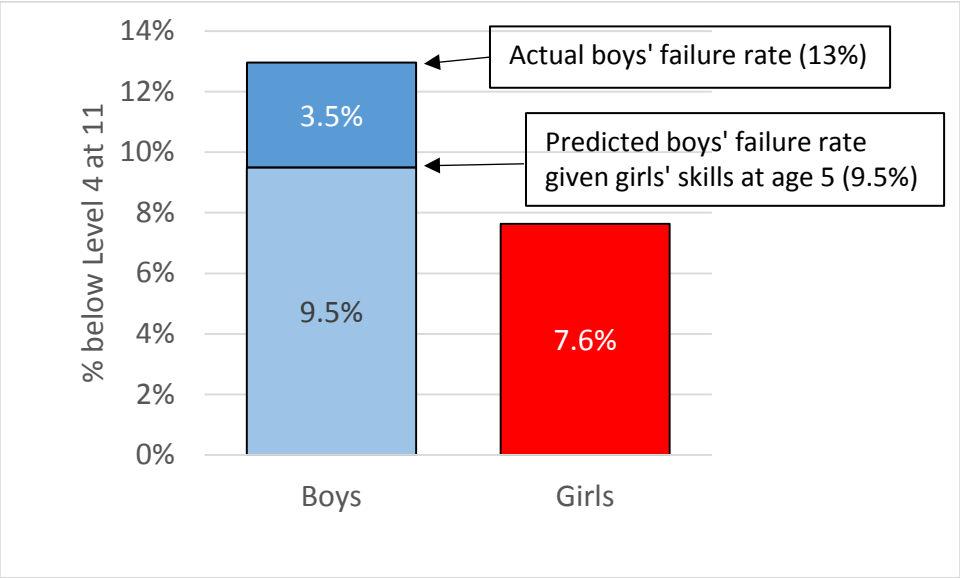
Notes: Error bars indicate 95% confidence intervals. N=6189. Estimates are average marginal effects constructed from a logistic regression model that includes the following additional set of controls: ethnicity; highest parental qualification; household poverty, housing tenure, family structure and number of siblings (all measured at age 5); mother's age at birth and child's season of birth. All predictors were interacted with gender in the analytical model.

- Only language/literacy and (to a lesser extent) attention significantly predict literacy at 11 when other background factors and correlated skills are held constant.
- A one standard unit increase in language skills at 5 is associated with nearly an 8 percentage point reduction in the chance a child has below Key Stage Level 4 Reading at 11. The effect of a standard unit increase in attention is about a quarter of the size, at 2 percentage points, but still

significant. To put these effects in context, the average chance that a child has below average Key Stage Level 4 Reading at 11 is 10% (13% for boys, 8% for girls).

- We found no evidence that the effects of any of the skills considered differed between boys and girls. For this reason, Figure 8 presents average effects that apply equally to both genders. Increases in language and attention at age 5 are predicted to benefit a boy and a girl by the same amount. Or put another way, poor early language and attention skills are equally as consequential for girls as boys.
- Although early language and attention skills are equally consequential for boys and girls, we have seen that more boys than girls are affected by problems in these areas (Figures 3 and 7). Differences in the early prevalences of these problems play an important role in explaining why more than boys than girls fall below standard in literacy at 11
- We can combine the estimates from Figures 7 and 8 to help quantify how much of the gender gap in reading 11 can be attributed to gender differences already apparent at age 5. We ask the question: if boys had the same distributions of language and social skills as girls at 5 (i.e. higher levels on average, but also fewer children with very poor scores and more children with very high skills), how many boys do we predict would fail to meet the standard in reading at age 11? We can compare this predicted failure rate at 11 with boys' actual failure rate of 13% to get a sense of the magnitude of the consequences of the gender gaps at school entry.
- The result of the calculation is that if boys are assigned the same distribution of language and social skills as girls at age 5, their predicted failure rate at 11 falls from 13.0% to 9.5% (Figure 9). The difference amounts to a switch from failing the standard to meeting it at 11 for 3.5% of all boys. Since the NPD shows that just under 300,000 boys took Key Stage 2 in 2015, 3.5% of this number corresponds to somewhere around 10,000 fewer boys failing to reach the Level 4 standard every year.
- Thinking about this in terms of the gender gap, the observed gender gap at 11 is 5.4 points (the difference between 13.0% of boys failing and 7.6% of girls). When boys are assigned the skills of girls at 5, this gap falls to just one-third of the size at 1.9 points (the difference between 9.5% of boys failing and 7.6% of girls). On this basis we can say that two-thirds of the total gender gap at 11 can be explained by the fact that boys begin school with lower levels of language and attention skills than girls.
- It is important to be clear about the interpretation of these simulated failure rates for boys. We *cannot* say that if gender differences in language and attention at age 5 were eliminated, holding all else equal, this would lead to 10,000 more boys reaching the Level 4 standard at age 11. Estimates constructed from observational data like the MCS reflect associations only, and not necessarily causal relationships. There may be unmeasured factors that tend to co-occur with low levels of language and attention in boys that would continue to hinder their development even if language and attention themselves were boosted. The point of these estimates is rather to quantify the importance of gender differences in fundamental skills at age 5 in accounting for, or explaining, later gender gaps in reading ability at the end of primary school.
- The results suggest that the poorer early development of boys in the domains of language and attention is a major factor in accounting for why they are falling behind girls at age 11, but it is not the only explanation. About one-third of the gap at 11 is related to gender differences in factors that are independent of early language and attention.

Figure 9. Percent of children with below Key Stage Level 4 Reading at 11, actual rates and predicted rates if all children had girls' distribution of skills at age 5



Notes: Actual and predicted rates for girls are the same because they are benchmarked with the same distributions of predictor variables. Predicted failure rates for boys are derived by applying the boys' coefficients from the logistic regression model summarized in Figure 8 to the predictor variables from the girls' sub-sample, and then calculating the average percent chance that a child fails to achieve Level 4 Reading.

4. Development in the first years of primary school

We have identified that good language and attention skills at school entry are key factors that protect children from the risk of poor literacy at the end of primary school. But how does their influence operate? In this section we consider a range of measures of children's skills and attitudes at age 7, two years into the schooling process. First we explore how gender and initial language and attention skills interact to shape outcomes at age 7. Then we look to see which of these intermediate outcomes serve to protect children from the risk of poor literacy at 11. The results so far suggest that promoting language and attention skills in the preschool period could potentially be extremely beneficial. But what of the children (who are disproportionately boys) who do begin school with problems in these areas? Here our analysis helps to identify factors that might usefully be the target of interventions *after* children begin school, in order to mitigate the impact of these early disadvantages.

We consider six learning-related outcomes at age 7

- Reading skills (KS1 reading points score)
- Attention (parent-reported SDQ scale)
- Reading for pleasure (parent's response to question 'How often would you say <child> reads for enjoyment (not schoolwork) on his/her own?')
- Tries best at school (child's response to question 'How often do you try your best at school?')
- Likes answering in class (child's response to question 'How much do you like answering questions in class?')

- Enjoyment of school (combined responses of parents to two questions: 'Does <child> enjoy going to school?' and 'How often, if at all, is <child> upset or reluctant to go to school?')

Since all the outcomes were rated on different scales, we convert them all to standardized scores for ease of comparison (see Box 2). We estimated a separate linear regression for each of the age 7 learning-related outcomes, with standardized scores at age 5 as predictors (language, attention, conduct, peer relationships, emotional wellbeing and prosocial behaviours) as well as a set of family background characteristics. The key results are presented in Table 1.

Table 1. Effects of gender and standardized language and reading skills at age 5 on standardized learning-related outcomes at age 7

	KS1 reading score	Attention	Reading for pleasure	Tries best at school	Likes answering in class	Enjoyment of school
Level for a child with average language and attention at 5						
Boys	-0.03	-0.07	-0.17	-0.12	-0.05	-0.05
Girls	0.07	0.06	0.25	0.12	0.06	0.08
Diff (B-G)	-0.10 **	-0.12 **	-0.41 **	-0.23 **	-0.12 **	-0.13 **
Effect of reducing language skills at 5 by 1 unit						
Boys	-0.55 **	-0.07 **	-0.26 **	-0.06 **	-0.07 **	-0.09 **
Girls	-0.53 **	-0.08 **	-0.15 **	-0.07 **	-0.10 **	-0.10 **
Diff (B-G)	-0.02	0.01	-0.11 **	0.02	0.03	0.01
Effect of reducing attention skills at 5 by 1 unit						
Boys	-0.10 **	-0.57 **	-0.11 **	-0.02	-0.03	-0.05 **
Girls	-0.11 **	-0.57 **	-0.04 **	-0.08 **	-0.01	-0.04
Diff (B-G)	0.02	0.00	-0.06 *	0.06 *	-0.02	-0.02
N	6189	6189	6184	5889	5892	6188

Notes: ** and * indicate significance at the 1% and 5% levels respectively. Estimates in each column constructed from a separate regression model that include the following additional set of controls: ethnicity; highest parental qualification; household poverty, housing tenure, family structure and number of siblings (all measured at age 5); mother's age at birth, child's season of birth, and the age 5 conduct, peer relationships, emotional wellbeing and prosocial behaviour standardized scores. All predictors are interacted with gender.

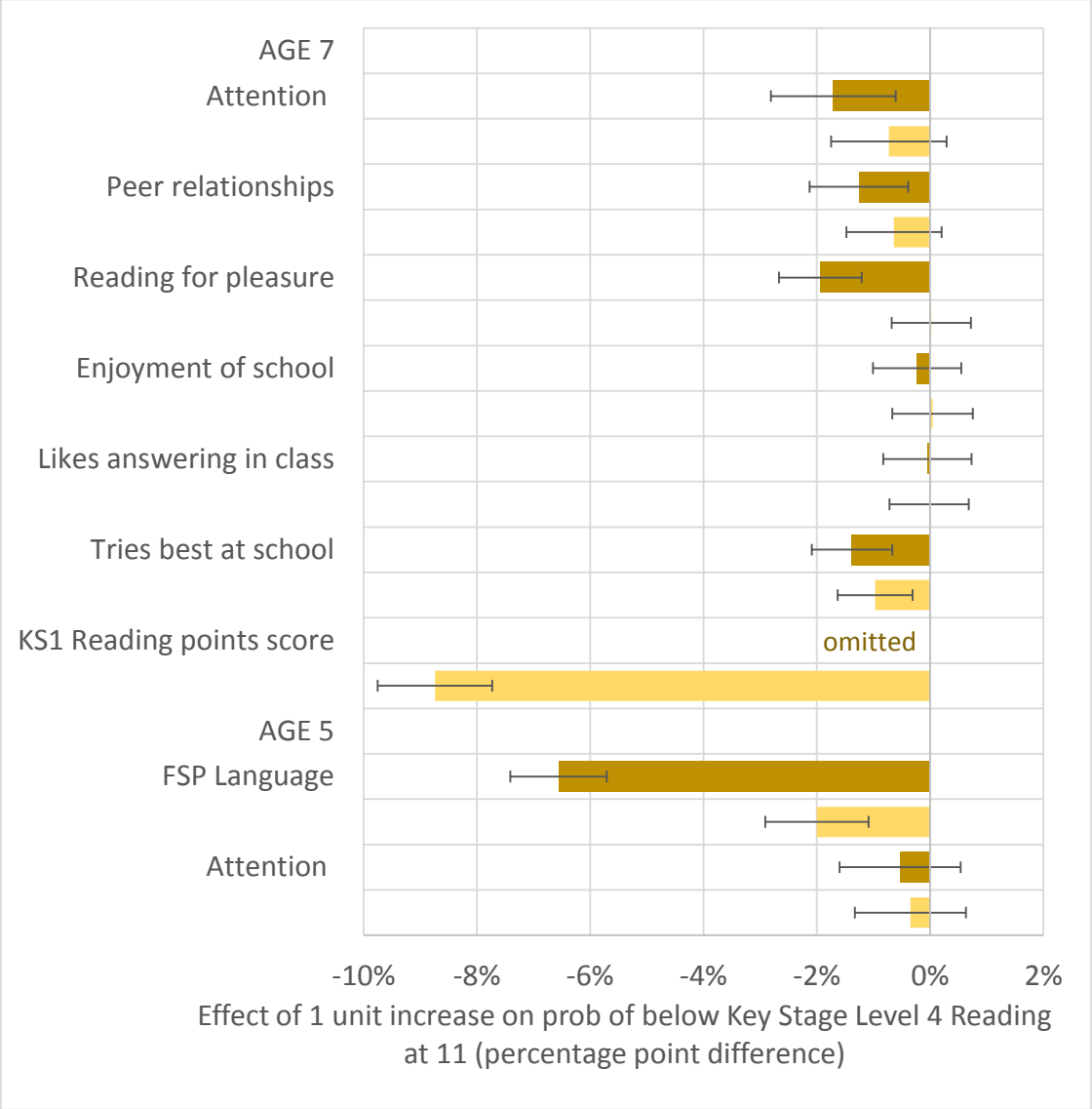
- The first rows in Table 1 compare the predicted learning outcomes at age 7 of boys and girls who had identical average levels of language and attention skills at age 5. We see that, even for children who had equal abilities at school entry, boys have tended to develop significantly poorer learning-related outcomes at 7 than girls on all six measures. The largest gender difference by quite a long way is in terms of reading for pleasure, followed by motivation (trying one's best in school), enjoyment of school, confidence (answering questions in class) and attention. Boys have also tended to progress slightly less quickly in reading skills by age 7 than girls who began with same levels of language and attention.
- Hence irrespective of early language and attention skills, girls report more positive attitudes to school and read more for pleasure than boys at 7 in general.

- The middle rows in Table 1 consider the effects of poor language skills at age 5 on learning-related outcomes at 7. Children with poorer early language skills at 5 perform much less well in reading at 7 than children with better early language skills. They also have poorer attention, read less often for pleasure, enjoy school less, report that they like answering in class less and try less hard at school than other children. This is the case even after controlling for family background factors correlated with children's literacy.
- In general poor language skills at 5 affect learning outcomes at 7 equally for boys and girls. However, the 'discouraging' effect of poor language skills on reading for pleasure is significantly stronger for boys than girls (an effect size of 0.26 compared with 0.15).
- The bottom rows of Table 1 explore whether poor levels of attention at age 5 affect children's learning-related development over the subsequent two years. Attention skills are strongly persistent over time for both boys and girls. Poor attention at 5 is also independently associated with lower reading skills, less reading for pleasure and less enjoyment of school at 7 among both boys and girls, with a greater deleterious effect on boys' reading for pleasure than girls. Lower levels of attention at school entry are also associated with less motivation (trying hard in school) among girls at 7, but not among boys.

It seems possible that the patterns in learning-related outcomes at age 7 shown in Table 1 can help to account for why boys, and children with poor initial language and attention skills, are at higher risk of poor literacy outcomes at 11. To explore this further, we added measures of learning-related outcomes to our prediction model for below Level 4 Reading at 11 from the previous section. The results are presented in Figure 10. As in the previous section, we found no evidence that any of the age 7 outcomes were more consequential for boys or girls in terms of their effects on age 11 literacy, so again we present average effects that apply to all children.

- The dark bars in Figure 10 (the upper bar of each pair) reveal which factors are predictive in general of below Level 4 reading attainment at 11. They show that attention skills at 7, peer relationships at 7, reading for pleasure and motivation (trying hard in school) at 7 are all independently significant predictors of attainment at 11. Children with better attention and relationship skills, and those who read more for pleasure and who display more motivation in school at 7 are less likely to fall below standard at 11 compared to other children with the same levels of language and social skills at age 5.
- The light bars in Figure 10 (the lower bar of each pair) show estimates from a model that adds a control for Key Stage 1 reading tests to the previous model, so that the estimates now represent effects among children with the same reading ability at 7, rather than just the same language at 5. Of the factors highlighted above, only the measure of motivation (trying hard at school) remains a significant predictor of the outcome at 11, indicating that the beneficial effects of attention, peer relationships and reading for pleasure at 7 are already reflected in better reading ability at the age of 7.
- It is also notable that poor language at age 5 continues to be associated with literacy at 11, even among children with identical learning-related skills at 7. The adverse effects of a poor start, therefore, influence literacy via other channels in addition to the ones we are able to measure at age 7. This emphasizes again the importance of promoting language at the earliest opportunity. Problems present at school entry impact on children's development in a myriad of ways that are difficult to identify, let alone reverse.

Figure 10. Effects of 1 standard unit increases in learning-related measures at ages 5 and 7 on the percentage chance of below Key Stage Level 4 Reading at 11, with and without adjustment for reading ability at age 7

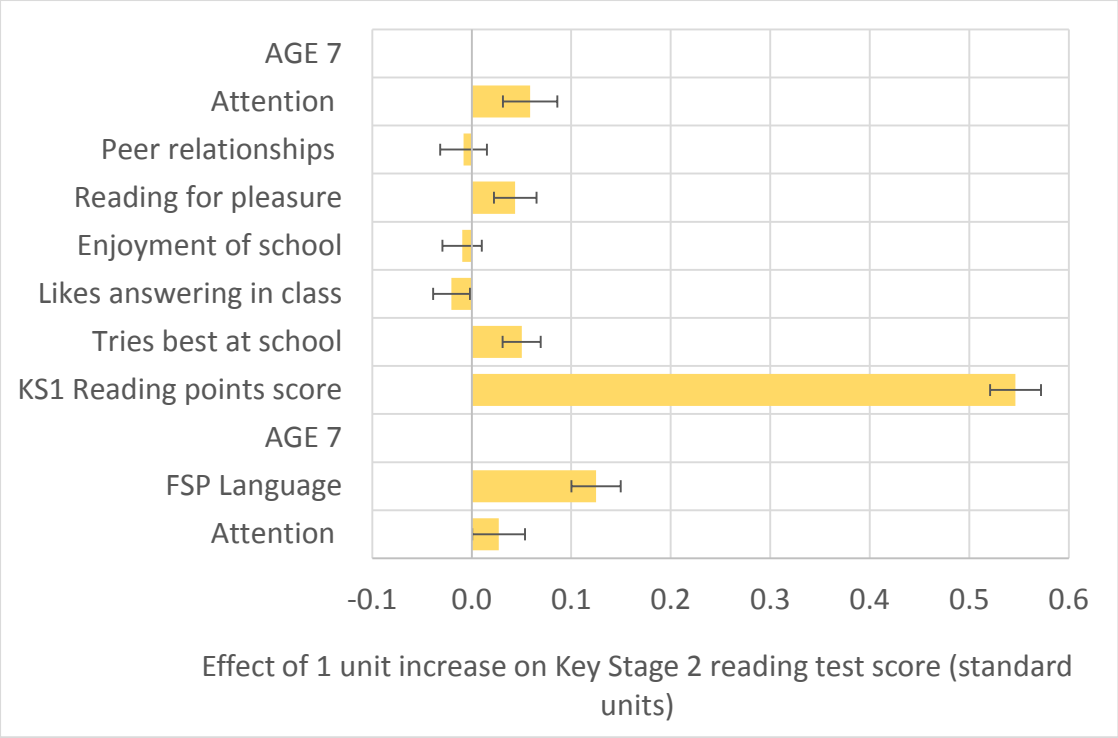


Notes: Darker bars show effects from a model excluding the control for Key Stage 1 reading score at 7, while the lighter bars show effects from a model including this control. Error bars indicate 95% confidence intervals. N=5866. Estimates are average marginal effects constructed from logistic regression models that both include the following additional set of controls: ethnicity; highest parental qualification; household poverty, housing tenure, family structure and number of siblings (all measured at age 5); mother's age at birth; child's season of birth; conduct, peer relationships, emotional wellbeing and prosocial behaviour standardized scores at both ages 5 and 7. All predictors are interacted with gender.

A potential issue with the results in Figure 10 is that the dependent variable – a dichotomous indicator for failing to reach Level 4 – distinguishes only the 10% of children with the very poorest reading skills at age 11. Factors that impact on reading ability above this relatively low threshold will not be reflected. Figure 11, therefore, replaces the dichotomous outcome variable with a continuous scale measure of the child's marks on the Key Stage 2 reading test (standardized as the other variables). The underlying linear regression includes the control for Key Stage 1 reading score, so the

estimates now capture the effects of the predictors on a child's *progress* between ages 7 and 11, whatever their starting point. Note that as we are now predicting higher test scores rather than the probability of failure the effects, as expected, reverse direction.

Figure 11. Effects of 1 standard unit increases in learning-related measures at ages 5 and 7 on standardized Key Stage 2 Reading test score at 11



Notes: Error bars indicate 95% confidence intervals. N=5866. Estimates are average marginal effects constructed from a linear regression model that includes the following additional set of controls: ethnicity; highest parental qualification; household poverty, housing tenure, family structure and number of siblings (all measured at age 5); mother's age at birth; child's season of birth; conduct, peer relationships, emotional wellbeing and prosocial behaviour standardized scores at both ages 5 and 7. All predictors are interacted with gender.

- We see that reading for pleasure and attention skills at 7 *are* significantly associated with faster progress for children in general, even though the results in Figure 10 indicate they may not be able to lift children with the greatest reading problems at 7 above the Level 4 threshold by age 11.
- The results in this section raise the possibility that interventions that help bolster reading for pleasure and, in particular, that boost motivation can help raise the attainment by age 11 of children who are struggling with language and literacy early on in their schooling (and who as we have seen are disproportionately boys).

5. Predictors of language and attention outcomes at age 5

The importance of language and attention skills at school entry for children's development in literacy are very clear. But which factors in the preschool period help to protect children from poor outcomes in these areas? Is there are any evidence that some factors are more or less protective for boys or girls?

To explore this, we estimate linear regression models with language and attention standardized scores as the dependent (outcome) variables. We consider the effects of a range of family background characteristics, but also a set of measures of parental activities and behaviours when the child was age 3. Collectively many of these measures are often combined into single 'home learning environment' (HLE) index, as in the EPPE studies for example. Here we examine the separate influence of each of the elements, which allows to explore whether different kinds of parent/child interaction are associated differently with gender. Parents completed scales that captured the frequency of different types of interaction, but the nature of these scales differed between items. To facilitate comparison, we again convert the parental interaction variables to mean zero, unit standard deviation standardized scores. The exception is the measure of whether anyone at home helps the child learn a sport, dance or physical activity, which has a simple yes/no answer. The results are presented in Table 2. The top line of the table shows the overall means of boys and girls in the sample respectively. The effects of the predictors listed underneath can then thought of as adding to, or subtracting from, these average levels.

- A number of parental activities at age 3 are significantly associated with both higher standardized language scores and attention scores at 5 (i.e. 2 years later): reading to the child; taking the child to a library; drawing/painting with the child and singing songs/poems/rhymes to the child
- Teaching the child letters/the alphabet (but interestingly not teaching numbers/counting) is associated with gains in language only
- More TV watching and participation in a sport are negatively associated with attention only among girls. The protective effects of most kinds of parental interaction at 3, however, do not differ significantly by gender of the child, i.e. they benefit boys and girls equally
- Background factors that heighten risks of both poor language and poor attention are: Pakistani/Bangladeshi origin; lower levels of parental education; residence in social housing at 5; being in a step-family at 5; and younger maternal age at birth. Season of both is very strongly linked to language development (with being born in winter, spring or summer each progressively worse than being born in autumn), while effects on attention are present but noticeably smaller
- Differences in the association of parental education with the language skills of boys and girls at 5 reiterate the pattern shown in Figure 5. The penalty associated with dropping from the second to the lowest level of parental education is greater for girls than boys because this group of girls alone seem to lose the significant advantage over their male peers that is found in all other social groups.
- Household poverty and residence in private rented accommodation are associated with poorer language but not attention, while the reverse is true for single parenthood.
- Children with more siblings tend to have poorer language skills but, on the other hand, are rated by parents as having better attention skills at 5.
- Very few background factors can be considered to raise risks by more for one gender than the other.

Table 2. Predictors of standardized language and attention scores at age 5

	Language at 5			Attention at 5		
	Boys	Girls	Diff?	Boys	Girls	Diff?
Overall mean	-0.140	0.145	**	-0.142	0.146	**
Predictors:						
Parental activities at age 3 (Standardized scores)						
Reads to child	0.102**	0.101**		0.081**	0.101**	
Takes to library	0.062**	0.049**		0.088**	0.062**	
Songs/poems/rhymes with child	0.048**	0.034		0.037*	-0.032	*
Draws & paints with child	-0.004	0.036*		0.051**	0.031	
Teaches child letters	0.063**	0.079**		0.020	0.037	
Teaches child numbers	0.023	-0.006		0.003	-0.001	
Amount of TV watched	0.028	-0.020	*	0.002	-0.048**	*
Takes part in sporting activity (Y)	0.032	-0.048		0.082	-0.085*	**
Ethnicity (Reference = White)						
Mixed	0.125	-0.091		0.058	0.021	
Indian	-0.016	-0.180		0.045	-0.059	
Pakistani/Bangladeshi	-0.227*	-0.281**		-0.037	-0.225*	
Black	0.120	0.039		0.069	0.226*	
Other ethnicity	0.011	0.017		0.166	0.064	
Parental education (Reference = NVQ1 or less)						
NVQ2	0.058	0.229**	*	0.143*	0.169**	
NVQ3	0.146*	0.269**		0.191**	0.254**	
NVQ4 or more	0.362**	0.372**		0.277**	0.300**	
Household poverty	-0.143**	-0.119**		-0.072	0.032	
Housing tenure (Reference = Owner-occupier)						
Private rented	-0.072	-0.114*		-0.104	-0.091	
Social rented	-0.250**	-0.278**		-0.064	-0.195**	
Family structure (Reference = 2 natural parents)						
Single parent	-0.095	-0.059		-0.124*	-0.131*	
1 natural & 1 step parent	-0.196**	-0.312**		-0.251**	-0.173*	
Other family type	-0.182	0.104		0.032	-0.456	

Continued overleaf

Table 1 continued

	Language			Attention		
	Boys	Girls	Diff?	Boys	Girls	Diff?
Number of siblings (Reference = None)						
1	-0.032	-0.111*		0.079	0.055	
2	-0.180**	-0.196**		0.065	0.120*	
3 or more	-0.285**	-0.197**		0.202**	0.207**	
Mother's age at birth (Reference = Under 20)						
20-24	0.121	0.122		-0.166*	-0.012	
25-29	0.150*	0.143*		0.107	0.093	
30-34	0.221**	0.156*		0.122	0.139	
35+	0.202**	0.123		0.183*	0.208*	
Season of birth (Reference = Autumn)						
Winter	-0.198**	-0.305**		-0.009	0.011	
Spring	-0.439**	-0.437**		-0.111*	0.035	**
Summer	-0.658**	-0.692**		-0.067	-0.108*	

Notes: ** and * indicate significance at the 1% and 5% levels respectively. The Diff column shows the results of a test that the effect for boys is significantly different from the effect for girls. N=6460. Weighted linear regression estimates.

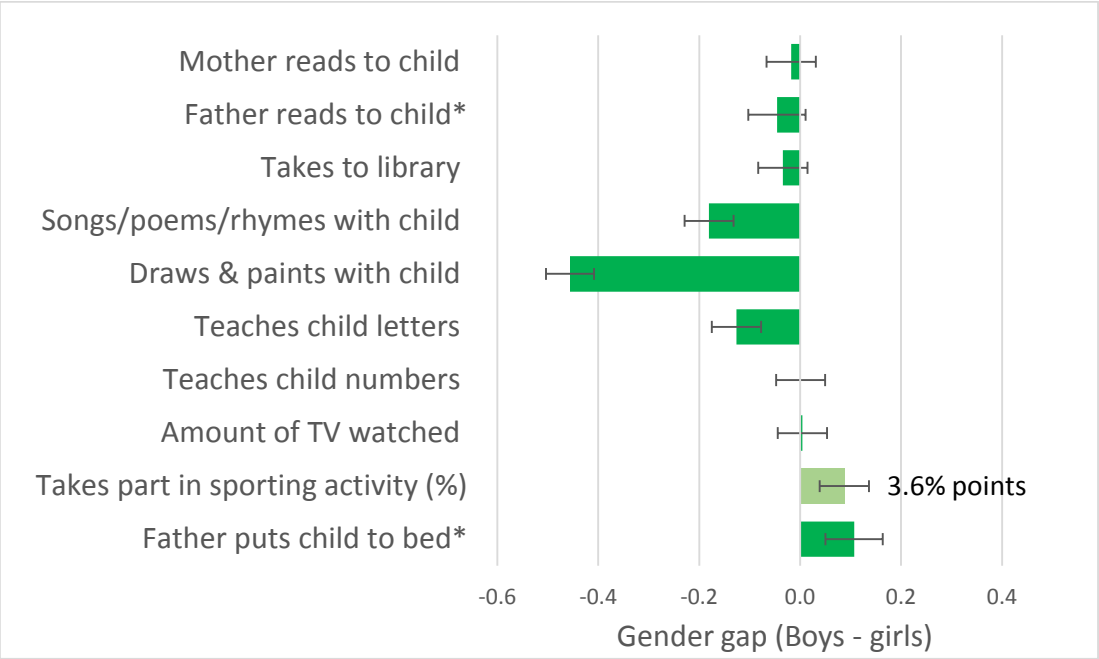
In additional analyses of two-parent families only at age 3, we explored whether the frequency the father reads to a child has similar effects to reading by the mother.

- We found that paternal reading is equally as beneficial as maternal reading for children's language in these families, although it was not significantly associated with attention. The frequency the father reported putting the child to bed (which may capture other types of father-child interactions) was not significantly associated with either outcome.
- We found no evidence that the effect of reading by either parent on language differs with the gender of the child. Maternal reading supports boys' language as much as girls', and paternal reading supports girls' language as much as boys'.

We have seen that a number of types of parent/child interaction at age 3 can help to protect children poor development in language and attention. But are there systematic differences in the types of interactions boys and girls receive from the parents? If so, can these differences explain why boys begin school so far behind girls in terms of language and development?

Figure 12 presents the gender gaps in the standardized parental interaction scores at age 3.

Figure 12. Average gender gaps in standardized measures of parental interactions at age 3 in the MCS sample



Notes: Error bars indicate 95% confidence intervals. N=6460. Gaps show the effect size of the difference between average scores of boys and average scores of girls. *Estimates for fathers' activities use the sample of two parent families only (N=4739). Weighted estimates.

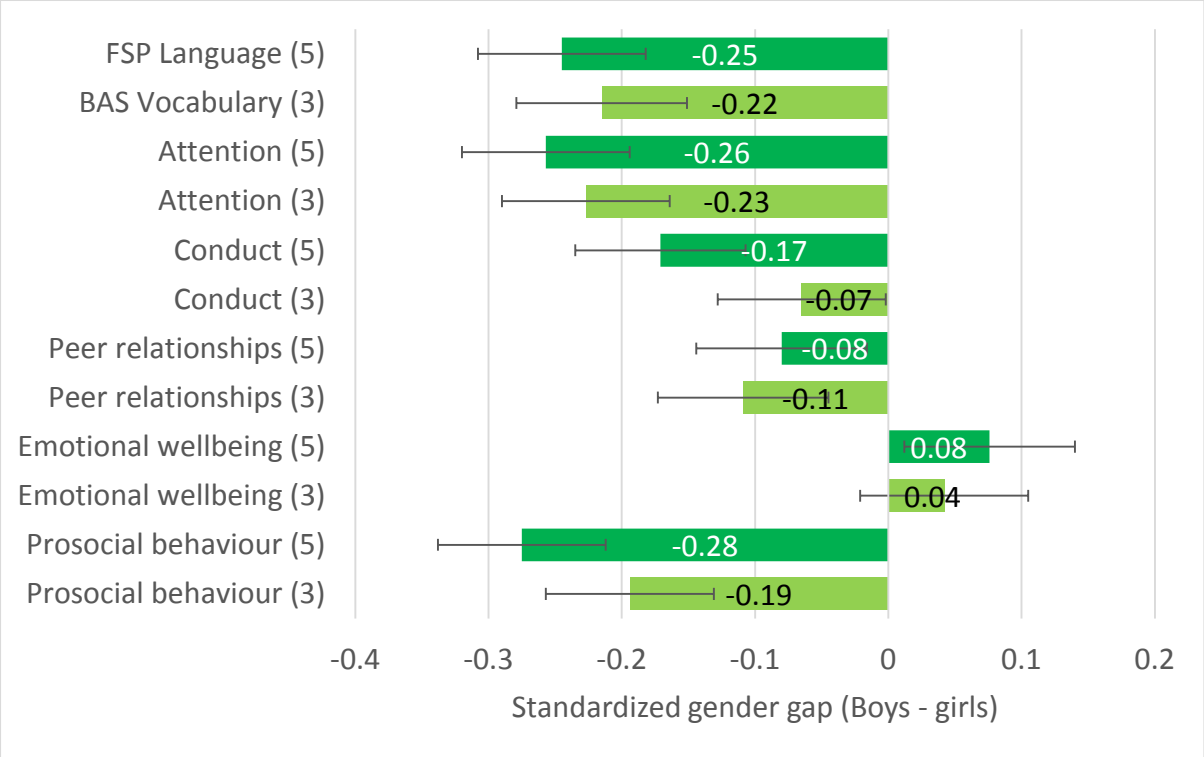
- There are no significant differences in the frequency mothers or fathers read to boys and girls at age 3, nor in how often children are taken to the library
- Mothers teach boys letters/the alphabet less frequently than girls (significantly so) but, interestingly, there is no gender difference in teaching numbers/counting
- Boys are more likely to do sports activities at 3 than girls, while girls spend more time with mothers drawing/painting and singing songs/rhymes/poems than boys.
- We find no gender differences in TV watching. Fathers in two-parent families report putting boys to bed more frequently than girls.
- The patterns shown in Figure 12 suggest that there are some differences in the types of interactions parents have with sons and daughters that are consistent with gender stereotyping
- However, two of the key predictors of development in language and attention – parental reading and library visits – do not vary with the gender of the child. For this reason, the extent to which gender differences in parental interactions can explain *why* boys have lower language and attention scores than girls at age 5 is limited. We calculate that gender differences in all the factors considered in this section can account for only 10% of the gender gap in language at 5, and 8% of the gender gap in attention.

The patterns in some types of interaction in Figure 12 are suggestive of gender stereotyping in adult interactions with 3-year olds. But another possibility is that, by the age of 3, boys and girls already display different types of behaviour and aptitude, and parental behaviour is partly responding to these differences. To what extent are the gender differences we see at 5 already present at age 3, before most children begin preschool education? And pushing back further, are any gender differences apparent even in the first year of life?

We look briefly at these questions using data from the MCS waves when the children were 9 months and 3 years of age, but unfortunately we have complete data only for a sub-sample of 3789 children. The gender gaps shown below in Figures 13 and 14 standardize the outcomes for this sub-sample so that while gaps are comparable within these two figures, they are not strictly comparable with the results for larger samples from our previous analyses.

Figure 13 compares the standardized gender gaps in language and behavioural outcomes for a common sample of children at ages 3 and 5.

Figure 13. Average gender gaps in standardized language and behavioural outcomes at ages 3 and 5 in a common MCS sub-sample



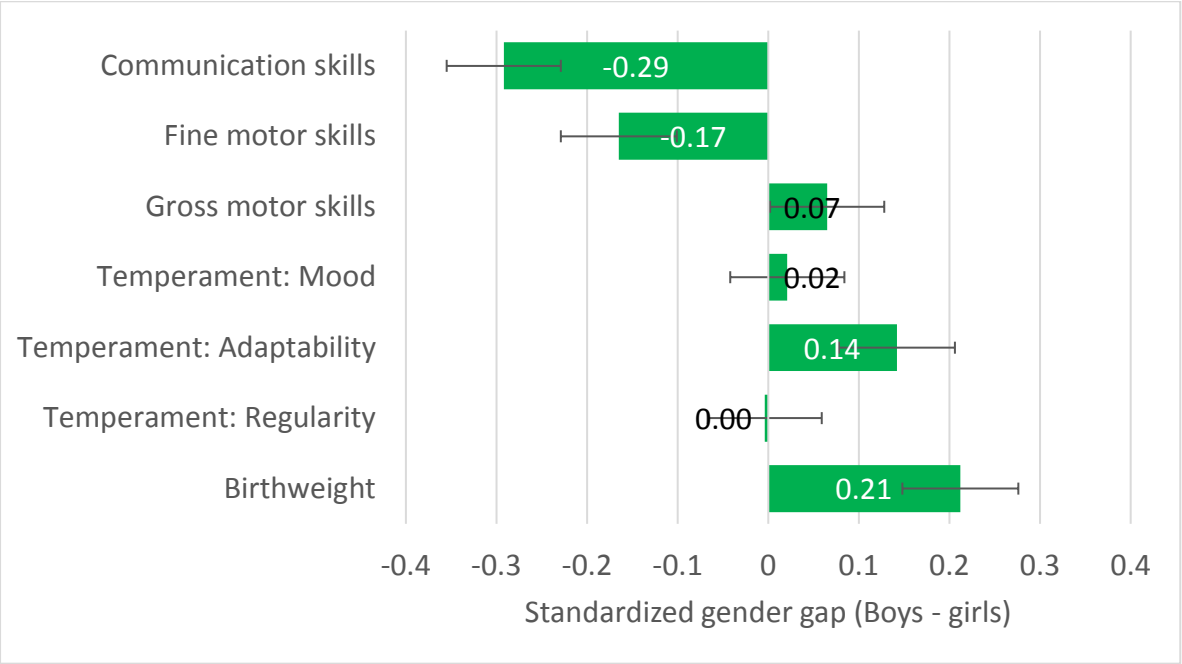
Notes: Darker bars correspond to age 5 outcomes, lighter bars to age 3 outcomes. Error bars indicate 95% confidence intervals. N=3789. Gaps show the effect size of the difference between average scores of boys and average scores of girls. Weighted estimates.

- Significant gender gaps are apparent in language and behavioural outcomes at age 3, and the magnitude of the gaps generally remains very stable between ages 3 and 5
- It is important to remember that these numbers represent averages – there are many examples of boys with strong language and attention skills at age 3, and of girls who score relatively poorly.
- The second from top bar shows a gap of 0.22 standardized units in favour of girls in language skills at age 3, as measured by the BAS Naming Vocabulary test (a direct assessment in which children are shown pictures and asked to name the items). Although this measure is rather different from the global teacher's assessment of language and communication skills in the Foundation Stage Profile, it is noticeable that the magnitude by which girls outscore boys is virtually the same, at 0.26 standardized units, two years later.

- Parent-reported SDQ measures of behaviour also show very similar gender gaps at the two ages, although with some suggestion that boys fall slightly further behind girls in conduct and prosocial behaviour between 3 and 5.
- The patterns in Figure 13 suggest that the large gender differences in language and attention at age 5 that appear so consequential for later literacy development are already established at age 3. The roots of the gender gaps can therefore be traced back to developmental processes in the first years of life.
- Boys entering preschool at age 3 will already, on average, have poorer language and attention skills than their female peers. An important goal of preschools, therefore, could be to help close these gaps and bring boys up the standard of girls, on average, by the time they begin school.

Children have, of course, already experienced considerable socialization within the family by the age of 3, and the causes of gender differences in language and social skills at that age are far from clear. As a last piece of evidence, Figure 14 shows the gender gaps in a range of developmental outcomes very early in life, when the children were just 9 months old. With the exception of birthweight, the scales in Figure 14 were derived from a series of questions answered by the mother about aspects of their baby's behaviour, and all outcomes are standardized as before on the sub-sample of children used in Figure 13.

Figure 14. Average gender gaps in standardized developmental outcomes at age 9 months in the MCS sub-sample



Notes: Error bars indicate 95% confidence intervals. N=3789. Gaps show the effect size of the difference between average scores of boys and average scores of girls. Weighted estimates.

- Figure 14 shows that, even as early as 9 months, girls appear more advanced than boys in terms of communication skills[3] and fine motor skills[4]. Boys were heavier than girls at birth, on average, though, and slightly more advanced in terms of gross motor skills like sitting, standing and moving around at 9 months.

[3] Smiling, waving, nodding, extending arms and passing objects.
[4] Putting hands together and manipulating toys.

- In terms of the baby's temperament, mothers report no differences between boys and girls, on average, in mood (remaining happy pleasant and calm when being cared for) or regularity (sleeping and eating at regular times). However, boys are slightly more adaptable than girls (less wary of strangers and upset by changes to routines).
- We cannot tell from these data whether these early differences are the result of biological or social processes. It is clear that even before they learn to talk parents record boys' and girls' interactions with the world in slightly different ways. It is not clear if early differences provoke different behavioural responses in parents and carers, that then strengthen gendered behaviour patterns; or if differently gendered expectations on the part of parents create different response to the world from their children. What is clear is that gender differences that will see boys on average scoring less well on a range of measures by the age of 5 are apparent from the first year of life.

Appendix Table A1. The Strengths and Difficulties Questionnaire (SDQ)

Responses scored: Certainly true (2), somewhat true (1), Not true (0), reversed if necessary such that the direction is consistent.

Scale	Items: In last 6 months…
Hyperactivity (Attention)	Child has been restless, overactive and cannot stay still for long. Child is constantly fidgeting or squirming. Child is easily distracted, concentration wandered. Child thinks things out before acting. Child sees tasks through to the end and has good attention span.
Conduct problems	Child has often had temper tantrums or hot tempers. Child is generally obedient, usually has done what adults request. Child often fights with other children or bullies them. Child often lies or cheats. Child steals from home school or elsewhere.
Emotional symptoms	Child has often complained of headaches, stomach aches or sickness. Child has many worries and often seemed worried. Child is often unhappy, downhearted or tearful. Child is nervous or clingy in new situations and easily loses confidence. Child has many fears and is easily scared.
Peer problems	Child is rather solitary, tends to play alone. Child has at least one good friend. Child is generally liked by other children. Child is picked on or bullied by other children. Child gets on better with adults than with other children.
Pro-social behaviour	The child has been considerate of other people's feelings. Child has shared readily with other children. Child is helpful if someone hurt, upset or feeling ill. Child is kind to younger children. Child often volunteers to help others.

Chapter 3 Addressing gender differences in literacy and language development: Rapid Evidence Assessment of Interventions and Theories of Change

1. The scope of the review in context

Building on the findings from both the narrative review (Chp 1) and the statistical analyses (chp 2) we conducted a rapid evidence assessment of the range of interventions available in the UK to identify those that might be most effective in addressing gender differences in language and literacy development in the early years and have most potential to minimise gender differences in literacy attainment at age 11. To make this assessment we considered the depth of evidence supporting their use and the relevance of their theories of change to the factors we have identified as most important in understanding differences in literacy and language development in the early years.

Given the time frame in which the team were working, we searched for and made extensive use of reviews of reviews conducted in the UK that

- used a systematic approach to identifying interventions with a well-established evidence base,
- were explicit about the criteria they used for including or excluding studies, and
- made their search processes transparent.

Several organisations have commissioned and published systematic, in depth and evidence-based reviews of interventions targeted at supporting children's development in the early years, whether focused on delivery within pre-school settings or at home (Axford et al, 2015; Grayson, 2013; Mathers, et al, 2014; Springate et al, 2008; Sosu and Ellis, 2014). (See **appendix** 1 for a full list of those consulted.) Pre-school interventions have been an important area of investment for government and other agencies including third-sector organisations, so such reviews have been frequently updated. We searched within the reviews for interventions promoting language and communication skills, learning-related skills, and emergent literacy.

We followed up the best attested interventions that the evidence suggested had had a positive impact on pre-school children's language, emergent literacy and communication skills, triangulating the findings across the different reviews. We looked for any evidence of continued impact that might last through the primary school phase as well as at evidence of shorter term gains and identified whether evaluations looked for and reported on variance in gains by gender.

1.1. Exclusions and inclusions

We excluded:

- interventions that targeted pre-language interactions between caregivers and babies and infants
- interventions designed to be delivered as school-based formal literacy instruction and targeted at school-age rather than pre-school age children
- interventions primarily designed to foster attachment and parental sensitivity
- selective interventions targeted at meeting the emotional and social needs of hard to reach families facing high levels of multiple deprivation
- studies that focused on the structural issues involved in creating best practice in the co-ordination of the delivery of services across a range of agencies

- studies that had no evaluation of impact

Only studies with a control were included in the final analysis

1.2 Setting our findings in context

Many of the reviews we have consulted synthesise and consolidate the available evidence on effective practice in promoting language and communication skills, learning-related skills, and emergent literacy in the early years in order to provide clear guidance to policymakers and practitioners. Such reviews have also been influenced by a UK policy context which has placed a high priority on providing most support in the early years for those children growing up in poverty in socially disadvantaged households and who are therefore considered to be on trajectories towards lower educational achievement.

Closing the social class gap in educational attainment remains an important policy objective. Interventions in the early years designed to address this gap through support for language and literacy development (whether, like Sure Start Centres, by bringing quality pre-school services into the most disadvantaged areas: or like Bookstart, REAL and PEEP initiatives, by actively promoting language and literacy development in the home) have often been backed by funding, and where this is the case are also most likely to have been fully evaluated.

In reviewing interventions designed to promote language and literacy development, we have distinguished between those that are designed to be of general benefit (universal) and those that have been tailored to meet the needs of specific sub-groups of the population deemed at particular risk (targeted) (Axford et al 2015, p19) e.g. children experiencing severe language delay associated with cognitive impairment (Gross, 2011); or families suffering from multiple risk factors - mental health, domestic violence, chronic ill-health, poverty, crime, drug-abuse and long-term unemployment – that have a detrimental effect on their communications skills and family relationships (Axford et al, 2015). In the case of this review, interventions designed to be of general benefit have proved most relevant for our purposes.

We identified very few interventions to support language and literacy development in the early years that were targeted specifically at boys. None of those we found used a control group to evaluate impact. Indeed, weaknesses in the evaluation designs and the theories of change the interventions relied on meant none of these studies were included in the final review.

Of the group of interventions that met our inclusion criteria (n42), only 5 documented and commented on variance in gains by gender, so we do not know in the majority of cases whether they had proved particularly effective for boys as compared to girls. This is an omission which the research community could usefully rectify.

2. Findings

Interventions aimed at supporting children's language and literacy development in the pre-school years, and whose positive impact has been most robustly evaluated, share a common set of characteristics that have been identified in very similar terms across the reviews of reviews we consulted for this study. They also directly address many of the issues we identified through the narrative review and the statistical analyses of the MCS as being most important to narrowing gender differences in literacy attainment.

Our analysis of the MCS finds that, regardless of social class, boys are more likely than girls to begin school with poorer language skills and lower levels of attention and concentration, even though we find little difference in their exposure to emergent literacy activities in the home. In addition, whilst we find that the impact that poor language skills at 5 have on later school enjoyment, confidence (answering in class) and motivation (trying hard) is the same for boys and girls, the negative effect of poor language skills on reading for pleasure at age 7 is much stronger for boys than girls. This matters in the light of the evidence that reading for pleasure positively impacts on literacy attainment at age 7, and has substantial longer term beneficial effects (See Sullivan & Brown, 2015; OECD, 2015c)).

In the light of the theory of change outlined above we reviewed the available evidence to see if intervening in the early years could help to mitigate the effects of poor early language skills, in ways that might have particular benefits for boys. We thought it likely that interventions designed to help children aged 3-5 transition successfully into formal schooling by boosting their language, learning related and emergent literacy skills and actively engaging them in reading for pleasure, might well be very important in terms of narrowing gender differences in literacy attainment through schooling. Some caution must be exercised over the conclusions drawn, however, given so few studies report on gender effects as part of their measures of programme effectiveness.

The studies we review in detail fall into two main groups: those focused on the quality of pre-school settings; and those promoting language development, learning related skills, emergent literacy and reading engagement in the home, whether designed for delivery in association with or independently of pre-school settings.

2.1 The quality of pre-school settings:

There is a general consensus in the reviews of reviews that *high quality* pre-school provision has a significant effect on children's language and literacy development(Axford et al, 2015; Lloyd and Potter, 2014; Springate et al., 2008). The Effective Provision of Pre-School Education project (EPPE), and its companion project, the Effective Pre-School, Primary and Secondary Education (EPPSE), have provided valuable evidence on what characterises high quality pre-school provision (Sylva et al, 2004; Taggart et al, 2015). Unusually for studies included in this review, they have also explored the protective effects of high quality pre-school provision for boys.

The EPPE study concluded that in high quality pre-school provision:

- staff took a more active role in children's learning, spending less time monitoring children and more time scaffolding their play
- children were offered more free choice and more cognitively enriching activities such as creative play, language or science activities
- children spent more time actively involved in sustained shared thinking with staff
- children engaged more frequently in activities involving examining, exploring and investigating
- direct teaching and learning took place in the context of small groups where children had more frequent access to informal teaching
- children engaged more with their peers (Kathy Sylva et al., 2007)

The characteristics they identify as being important markers of quality have become widely adopted in the field. Although the EPPE report concluded that, in general, girls attending pre-school "make

greater gains in pre-reading, early number concepts and non-verbal reasoning than boys over the pre-school period.**" (**Sylva et al, 2004, p24), they were also able to establish that "Children from low socio-economic status backgrounds and boys were found to benefit particularly from higher quality provision as measured by (the ECERS-E scale)" (Sylva et al, 2004, p52)**.** In the extension study, EPPSE continued to track the educational progress children studied in pre-school made through to secondary school, and were able to identify benefits of high quality preschool provision and its enduring effects more clearly. In particular they found that "At age 11 having attended a high quality pre-school was especially beneficial for boys, pupils with special educational needs (SEN) and those from disadvantaged backgrounds for most social-behavioural outcomes." In a subsequent reanalysis exploring more carefully the interaction between home-learning environment (HLE) and the quality of pre-school provision they concluded that:

> pre-school education can help to alleviate the effects of social disadvantage and can provide children with a better start to school, particularly when pre-school settings are highly effective and of high quality. In our small subsample the effect of high vs. low quality pre-school settings seemed particularly important for low SES boys. First of all, these boys were more likely to have been enrolled in a low quality pre-school than boys from high SES families, but also than girls from equally disadvantaged backgrounds. Secondly, when boys from disadvantaged families did find themselves in an excellent preschool setting they seemed to experience long-term benefits as all these boys went on to succeed against the odds.(Siraj-Blatchford et al., 2013, p10)

The evidence on the importance of the quality of pre-school provision and the need to achieve more uniformly high standards in the sector has led to calls to invest in the educational qualifications of preschool staff, and develop appropriate staff training materials that could impact on quality. Discussion is on-going about whether or how key characteristics of high quality provision can be disaggregated and then successfully disseminated through training materials (Nutbrown, Hannon, & Morgan, 2005).

2.2 Characteristics of effective interventions to support language and literacy development in the home

Research demonstrating that the home learning environment (HLE) has a substantial influence on children's language and literacy development is of long standing. Indicators of the quality of the home learning environment commonly include: the frequency of being read to, going to the library, playing with numbers, painting and drawing, being taught letters, being taught numbers, songs/poems/rhyme (Melhuish et al., 2008) and ownership of and access to a range of reading materials(Roulstone et al, 2011). A more detailed framework for auditing and also supporting literacy activities in the home was developed by the REAL project using the acronym ORIM

> **O**pportunities for literacy development
> **R**ecognition of achievements – caregivers valuing and encouraging children's literacy related activities
> **I**nteraction – caregivers supporting, explaining and challenging children to draw on what they know about literacy to develop further
> **M**odels- caregivers showing children the many purposes, pleasures and uses that literacy can have (Nutbrown et al., 2005).

Effective interventions designed to improve the quality of home literacy environments seek to:

- boost children's access to books and other material resources that encourage reading and

communicative interaction between children and their caregivers (Bookstart Corner)
- encourage caregivers' use of such resources in an open and responsive way (REAL, PEEP)
- extend parents' and children's communicative repertoires, including through "dialogic reading", reading that encourages discussion and reflection on the content of what is being read (Hargrave & Sénéchal, 2000) (Reach out and Read; SPOKES)
- foster responsive interactions between children and caregivers as they engage in play, talk and learning related activities together (PALS – Playing and Learning Strategies; Talk Matters; Every Child a Talker).

Effective interventions designed to support language and communication skills may also take a more wide-ranging approach focused on increasing parents' knowledge of child development, and promoting a range of positive parenting practices that can enhance children's social and emotional development and impact on their behaviour (Incredible Years; Triple P Positive Parenting).

Although in their different ways these programmes make the quality of the communicative interaction between caregivers and children central and are individually well supported by research, their priorities in implementation can be quite diverse (Axford et al, 2015; Mathers,2014; Springate, 2008). Even when promoting the same activities (story book reading or use of nursery rhymes), they may judge their importance in different terms, adopting quite different strategies in order to engage parents in the interventions, or sustain their involvement over time. Whilst this does not inhibit the evaluation of individual studies, this can make conducting meta analyses quite difficult, when there is some uncertainty about which elements of the programme create the most effect, which outcome measures are most appropriate to use, and whether the features thought most important can also impact on those parents who are hardest to reach (Axford et al, 2015; Beckett, et al, 2014; Van Steensel et al, 2010).

Many of the evaluation studies do not record impact by gender, nor attempt to disaggregate aspects of these programmes that may be most effective for boys. This hampers the capacity of this review to identify which interventions may be most effective in supporting boys' literacy and language development . This conclusion is in line with other studies. Lloyd and Potter (2014) in a detailed review of the literature on early childhood education and poverty have drawn attention to the need for more evidence on the gender effects that follow literacy interventions, in the face of contradictory findings:

> The role of gender in these three projects' outcomes was the subject of a number of contradictory analyses. Anderson (2008) concluded that the positive effects on cognitive outcomes and academic and other school-related outcomes were only valid for girls, but were non-existent for boys. In contrast, Kelchen et al (2011) came to the conclusion that gender made no difference to such outcomes in a meta-analysis of the three major longitudinal studies complemented by those from other ECEC impact studies. Overall, these studies suggest that paying attention to possible gender effects is an important component of measuring programme effectiveness. P43(Lloyd, Eva and Potter, 2014)

In addition, it is unclear whether programmes designed to enrich the home literacy environment set out to challenge social expectations about how boys' language and literacy develop that may limit parental support for boys. Yet the narrative review and the available evidence from some of the literature the REA covered suggest this may be an important issue. Again more research is needed to explore contradictory findings. Thus whilst we found no evidence in the MCS database that parents read less often with boys, the EPPE project did record gender differences in the quality of

home learning environments that boys recruited to the project experienced in the early years. They report that

> The quality of the HLE was scored from 0 to a possible maximum of 45 points. … while 37.9 per cent of boys experienced an early HLE that scored below 20 (less than half of the possible maximum score), only 26.5 per cent of the girls were found to be disadvantaged in this way. Even more importantly, the number of boys experiencing an HLE scoring under 13 was nearly twice that experienced by girls. (Siraj-Blatchford and Siraj-Blatchford, 2009)

The EPPE team have commented more fully on the gender-differentiated expectations that lead to this difference elsewhere:

> In asserting their masculinity, white working class boys might choose gross-motor construction activities over reading or pre-reading activities. Similarly, some girls may identify more strongly with home-corner play and favour nurturing activities over construction choices. Class, gender and ethnicity are all complicit here and although the permutations are not simple they do exist and do lead to underachievement. *The answer is to avoid stereotyping children's identities and for educators to take an active role in planning for, supporting and developing individual children's identities as masterful learners of a broad and balanced curriculum* (Siraj-Blatchford and Clarke 2000). (my italics)

Other studies that we found that did directly reflect on gender differences make similar points. For instance, evaluators of the Early Words Together intervention commented on the gap between the positive impact of the intervention on girls with the substantially lower impact on boys:

> Behavioural expectations of boys may be different than those of girls, resulting in a more permissive atmosphere for boys who could have been allowed to disengage from activities in the sessions more readily or generally be more boisterous ('Boys will be boys') – this was noted by some of the evaluators who attended sessions. (Wood, Vardy, & Tarczynski-Bowles, 2015)

Whilst evaluators of the Young Children's Voice Network noted that such gendered expectations may influence pre-school staff's interactions with children too ((Blades & Kumari, 2011)p24. If so it would be important for those designing interventions to tackle such expectations directly and find ways of challenging them. Few of the studies consulted record having explicitly built this into their programmes. This is clearly an area requiring more investigation.

The clearest evidence we have found of what works in addressing boys' poorer language and literacy development remain the findings from the EPPE study that show that boys at risk can be protected by high quality pre-school provision in ways that have enduring effects on educational outcomes. This is in line with the consensus reported in much of the literature consulted for the narrative review, such as Younger and Warrington's study of schools where boys succeed ((Younger et al., 2005). The best available evidence from the REA suggests that high quality pedagogies have the most impact on supporting boys' learning by helping them to engage in a range of experiences they may not be immediately attracted to but which produce benefits for them over the longer term.

3. Limitations of the rapid evidence assessment conducted as part of this study.

3.1 Limitations to the study. The search strategy for this part of the study prioritised reviews of reviews commissioned by government and by third sector organisations active in the UK. Whilst we

are confident that these reviews have reliably identified effective programmes, the interventions themselves reflect current priorities and preoccupations in the UK policy context. Thus, many of the interventions focus on targeting hard to reach parents and finding new ways to sustain their willingness to participate in appropriate programmes. This provides the context for some of the variation in the programmes – more or less didactic approaches to engaging with caregivers, for instance. By concentrating our search on reviews produced by those engaged in policy we may have ignored other evidence that could be more relevant to supporting boys' literacy and language development but that accords less well with the current policy agenda – interventions focused on supporting peer-play for instance, in ways that build positive and confident engagement between children in pre-school settings(Nicolopoulou et al, 2015).

We are also aware that few evaluations of interventions in the area of education explicitly consider a programme's applicability and transferability from one context to another (Wang, Moss, & Hiller, 2006).

If time had allowed we could usefully have included in the review interventions targeted at the infant and primary school ages, and focused on reading engagement, but have not been able to do so.

3.2 Gaps in the evidence. We have uncovered significant gaps in the evidence base – in particular the little sustained attention that has been given to gender variance when evaluating the impact of interventions designed to promote language and literacy development in the early years. This is an omission which should be rectified. Further evidence from interventions designed to enrich the home learning environment in particular could help refine our understanding of the factors that lead to more boys than girls experiencing poor language development. They would also allow us to test more thoroughly the causal relationships between those factors our statistical analyses suggested might have most influence on subsequent literacy development, and give clearer advice on how they can be remedied.
We are struck by the differences in motivation to read for pleasure that boys and girls with similar low levels of language show by the age of 7. This may suggest a need to re-focus attention from the home learning environment to a closer focus on how gender, attainment and engagement interact in the early years of schooling. We think this is rich ground for future research.

4. Conclusion

4.1 The main emphasis in this study has been on identifying the extent of any gender differences in language and literacy development and how any such differences can be explained. In the Rapid Evidence Assessment we have determined study quality through the absence or presence of a control group, and an assessment of the sample size. But we have not been able to set out detailed guidance on which interventions might most usefully be used to narrow gender gaps, as in many instances the necessary evidence to make such an assessment is not there. We are also aware that many of these interventions do not make it part of their aim to tackle gendered expectations of boys' and girls' engagement in literacy-based activities, even though this issue was highlighted in the narrative review as potentially of considerable importance.

In the absence of other sources, we have found the detailed exploration of gender effects and their interaction with home and pre-school learning environments on the reports published from the longitudinal EPPE and EPPSE projects most useful. We find their evidence for a protective effect from high quality pre-school provision for boys who may not have experienced a high quality home learning environment compelling.

We have been unable to fully assess how the theories of change that underpin individual interventions fit with the potential causal factors that our statistical studies suggest may explain the gender gap. These include poorer early language; lower motivation, confidence and attention shown in school; and how these potentially interact with

- resourcing for emergent literacy in the home; and
- developing the habit of reading independently for pleasure in primary school.

4.2 In summary

In reviewing the range of credible explanations for gender differences in language and literacy development in the research literature, and the depth and strength of the evidence for interventions that might impact on such differences, we found that

- High quality preschool provision has been shown by research to have the best protective effect for boys at most risk of lower attainment in language and literacy (low SES).
- Longitudinal research based on cohort studies concludes that a high quality home learning environment can substitute for a high quality preschool environment, and vice versa. Both can serve to weaken the risks of boys *attaining below the expected standards in language and literacy*
- The evidence on interventions designed to improve the quality of the home learning environment is more mixed. Whilst there are a number of effective programmes designed to improve the quality of the home learning environment, *very few report explicitly on variance in impact by gender*. The diverse theories of change they employ to modify parents' practice and enrich the home learning environment, and the difficulty of isolating which particular aspects of individual programmes have most effect, coupled with the under-reporting of effects by gender, make it hard to assess which are likely to be particularly beneficial for boys. Such programmes would benefit from tracking any variance in impact by gender.
- The evidence base on gender and literacy would be strengthened if interventions in pre-school and home-based literacy programmes built into their theories of change ways of challenging gendered expectations of children's development and their preferences in play. Research could then test whether any such changes led to more boys directly participating in and gaining pleasure from a range of emergent literacy activities designed to enrich their language and hold their attention. Our hypothesis is that making such emergent literacy activities equally available to boys and girls would lead to more gender equitable outcomes in the literacy curriculum.

References

Adlof, S. M., Catts, H. W., & Lee, J. (2010). Kindergarten Predictors of Speech vs. Eighth Grade Reading Comprehension Impairments. Journal of Learning Disabilities, 43(4), 332–345. http://doi.org/10.1177/0022219410369067.

Adlof, S. M., Klusek, J., Shinkareva, S. V, Robinson, M. L., & Roberts, E. (2016). Phonological Awareness and Reading in Boys with Fragile X Syndrome. *J Child Psychol Psychiatry.*, *56*(1), 30–39. http://doi.org/10.1111/jcpp.12267.

Adlof, S. M., Catts, H. W., & Lee, J. (2010). Kindergarten Predictors of Speech vs. Eighth Grade Reading Comprehension Impairments. *Journal of Learning Disabilities*, *43*(4), 332–345. http://doi.org/10.1177/0022219410369067.Kindergarten

All Party Parliamentary Literacy Group. (2012). Boys' Reading Commission | National Literacy Trust. Retrieved February 12, 2016, from http://www.literacytrust.org.uk/policy/boys_reading_commission

All Party Parliamentary Literacy Group and National Literacy Trust. (2012). Boys' Reading Commission. *The National Literacy Trust*. Retrieved from http://www.literacytrust.org.uk/assets/0001/4056/Boys_Commission_Report.pdf

Arnot, M., David, M., & Weiner, G. (1999). Closing the Gender Gap Post-War Education and Social Change. Retrieved from http://philpapers.org/rec/ARNCTG

Australian Parliamentary Committee, R. S. (2002). Getting it right for the boys. *October*, (October).

Axford N., Sonthalia, S., Wrigley, Z., Goodwin, A., Ohlsen, C., Bjornstad, G., Barlow, J., Schrader-Mcmillan A., Coad, J. &Toft, A. (2015). *The Best Start At Home: What Works To Improve the Quality of Parent-Child Interactions From Conception to Age 5 Years?* Retrieved from http://dartington.org.uk/inc/uploads/The_Best_Start_at_Home_(2015).pdf

Blades, R., & Kumari, V. (2011). *Putting listening practice at the heart of early years practice. An evaluation of the Young Children's Voices Network*. National Children's Bureau.

Carrington, B., & McPhee, A. (2008). Boys''underachievement'and the feminization of teaching. *Journal of Education for Teaching*. Retrieved from http://www.tandfonline.com/doi/abs/10.1080/02607470801979558

Connolly, P. (2006). The effects of social class and ethnicity on gender differences in GCSE attainment: a secondary analysis of the Youth Cohort Study of England and Wales 1997–2001. *British Educational Research Journal*, *32*(1), 3–21. http://doi.org/10.1080/01411920500401963

Cremin, T., Mottram, M., Collins, F., Powell, S., & Safford, K. (2009). Teachers as readers: building communities of readers. *Literacy*. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1741-4369.2009.00515.x/full

Daly, C. (2002). Literature search on improving boys' writing. Retrieved from http://dera.ioe.ac.uk/id/eprint/4781

Davies, B., & Saltmarsh, S. (2007). Gender Economies: Literacy and the Gendered Production of Neoliberal Subjectivities. *Gender and Education*, *19*(1), 1–20. http://doi.org/10.1080/09540250601087710\r(null)

DCSF. (2009). The Gender Agenda Final Report - June 2009, (June). Retrieved from https://www.education.gov.uk/publications/standard/publicationDetail/Page1/DCSF-00165-2010

Department for Education and Skills. (2007). Gender and education: the evidence on pupils in England. *Gender and Education: The Evidence on Pupils in England*, 134. Retrieved

from http://search.proquest.com/professional/docview/772129010?accountid=27115\nhttp://sfxhosted.exlibrisgroup.com/Ioe?genre=article&sid=ProQ:&atitle=Gender and education: the evidence on pupils in England&title=Gender and education: the evidence o

Dyson, A. (1997). *Writing superheroes: Contemporary childhood, popular culture, and classroom literacy*. Retrieved from http://books.google.co.uk/books?hl=en&lr=&id=FNnKSon2U7MC&oi=fnd&pg=PP10&dq=boys+literacy+writing&ots=5JtIziQH-o&sig=699RNXaWvtwv_PkLNJjlz1_L6kg

Estyn. (2008). *Closing the Gap between Boys' and Girls' Attainment in Schools*. Retrieved from http://dera.ioe.ac.uk/7498/1/Gender_Gap_Report_March_2008.pdf

Francis, B., & Skelton, C. (2005). *Reassessing gender and achievement: Questioning contemporary key debates*. Retrieved from http://books.google.co.uk/books?hl=en&lr=&id=PmX2x9RezrgC&oi=fnd&pg=PP1&dq=francis+and+skelton+2005&ots=9XM7FZf60b&sig=aIAGGDGnvw1eIhrVCkkuGwUVdsg

Goodman, R., & Burton, D. (2012). What Is the Nature of the Achievement Gap, Why Does It Persist and Are Government Goals Sufficient to Create Social Justice in the Education System? *Education 3-13*, *40*(5), 500–514. http://doi.org/10.1080/03004279.2010.550586

Grayson, H. (2013). *Rapid Review of Parental Engagement and Narrowing the Gap in Attainment for Disadvantaged Children*.

Guthrie, J. (2004). Teaching for literacy engagement. *Journal of Literacy Research*, *36*(1), 1–30. Retrieved from http://jlr.sagepub.com/content/36/1/1.short

Hansen, K., Jones, E. M., Hansen, K., & Jones, E. M. (2016). Ethnicity and gender gaps in early childhood Ethnicity and gender gaps in early, *1926*(April). http://doi.org/10.1080/01411926.2010.515018

Hargrave, A. C., & Sénéchal, M. (2000). A book reading intervention with preschool children who have limited vocabularies: the benefits of regular reading and dialogic reading. *Early Childhood Research Quarterly*, *15*(1), 75–90. http://doi.org/10.1016/S0885-2006(99)00038-1

Hartas, D. (2011). Children ' s language and behavioural , social and emotional difficulties and prosocial behaviour during the toddler years and at school entry, 83–91. http://doi.org/10.1111/j.1467-8578.2011.00507.x

Hicks, D. (2002). *Reading Lives: Working-Class Children and Literacy Learning. Language and Literacy Series.* Retrieved from http://eric.ed.gov/?id=ED459284

Jones, S., & Myhill, D. (2007). Discourses of difference? Examining gender differences in linguistic characteristics of writing. *Canadian Journal of Education/Revue Canadienne de L …*. Retrieved from http://www.jstor.org/stable/20466646

Jones, S., & Myhill, D. (2010). "Troublesome boys" and "compliant girls": gender identity and perceptions of achievement and underachievement. *British Journal of Sociology of Education*. Retrieved from http://www.tandfonline.com/doi/abs/10.1080/0142569042000252044

Limbrick, L., Wheldall, K., & Madelaine, A. (2008). Gender ratios for reading disability: Are there really more boys than girls who are low-progress readers? *Australian Journal of Learning Difficulties*, *13*(2), 161–179. http://doi.org/10.1080/19404150802415781

Lingard, B., Martino, W., Mills, M., & Bahr, M. (2002). Addressing the educational needs of boys. Report to the Department of Education, Science and Training, (November).

Lloyd, Eva and Potter, S. (2014). *Early childhood education and care and poverty, Full report*. UEL and JRF. Retrieved from http://ci.nii.ac.jp/ncid/BA52527640

Logan, S., & Medford, E. (2011). Gender differences in the strength of association between motivation, competency beliefs and reading skill. *Educational Research*, *53*(930966425), 85–94. http://doi.org/10.1080/00131881.2011.552242

Lupton, R., & Hempel-Jorgensen, A. (2012). The importance of teaching: pedagogical constraints and possibilities in working-class schools. *Journal of Education Policy*, *27*(5), 601–620. http://doi.org/10.1080/02680939.2012.710016

Machin, S., & McNally, S. (2005). Gender and student achievement in English schools. *Oxford Review of Economic Policy*. Retrieved from http://oxrep.oxfordjournals.org/content/21/3/357.short

Marsh, J. (2004a). Ritual, performance and identity construction. In *Popular Culture, New Media and Digital Literacy in Early Childhood* (Vol. 4, p. 264). Routledge. Retrieved from https://books.google.com/books?hl=en&lr=&id=Ptx-AgAAQBAJ&pgis=1

Marsh, J. (2004b). The techno-literacy practices of young children. *Journal of Early Childhood Research*. Retrieved from http://ecr.sagepub.com/content/2/1/51.short

Martino, W. (2001). Boys and reading: Investigating the impact of masculinities on boys' reading preferences and involvement in literacy. Retrieved from http://search.informit.com.au/documentSummary;dn=204816176085010;res=IELAPA

Martino, W., & Kehler, M. (2007). Gender-based literacy reform: A question of challenging or recuperating gender binaries. *Canadian Journal of Education/Revue Canadienne de …*. Retrieved from http://www.jstor.org/stable/20466644

Mathers, S., Eisenstadt, N., Sylva, K., Soukakou, E., & Ereky-Stevens, K. (2014). *A Review of the Research Evidence on Quality of Early Childhood Education and Care for Children Under Three. Implications for Policy and Practice*. Sutton Trust.

Matthews, J. S., Kizzie, K. T., Rowley, S. J., & Cortina, K. (2010). African Americans and boys: Understanding the literacy gap, tracing academic trajectories, and evaluating the role of learning-related skills. *Journal of Educational Psychology*, *102*(3), 757–771. http://doi.org/10.1037/a0019616

McFadden, M., & Munns, G. (2002). Student Engagement and the Social Relations of Pedagogy. *British Journal of Sociology of Education*, *23*(3), 357–366. http://doi.org/10.1080/0142569022000015409

McGeown, S., Goodwin, H., Henderson, N., & Wright, P. (2012). Gender differences in reading motivation: does sex or gender identity provide a better account? *Journal of Research in Reading*, *35*(3), 328–336. http://doi.org/10.1111/j.1467-9817.2010.01481.x

McGeown, S. P., Norgate, R., & Warhurst, A. (2012). Exploring intrinsic and extrinsic reading motivation among very good and very poor readers. *Educational Research*, *54*(3), 309–322. http://doi.org/10.1080/00131881.2012.710089

McIntosh, K., Reinke, W. M., Kelm, J. L., & Sadler, C. a. (2012). Gender Differences in Reading Skill and Problem Behavior in Elementary School. *Journal of Positive Behavior Interventions*, *15*(1), 51–60. http://doi.org/10.1177/1098300712459080

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*(1), 95–114. http://doi.org/10.1111/j.1540-4560.2008.00550.x

Mensah, F. K. F., & Kiernan, K. K. E. (2010). Gender differences in educational attainment: influences of the family environment. *British Educational Research Journal*, *36*(2), 239–

260. http://doi.org/10.1080/01411920902802198

Mensah, F. K., & Kiernan, K. E. (2010). Gender differences in educational attainment: influences of the family environment. *British Educational Research Journal*, *36*(2), 239–260. http://doi.org/10.1080/01411920902802198

Millard, E. (2002). *Differently literate: Boys, girls and the schooling of literacy*. Retrieved from http://books.google.co.uk/books?hl=en&lr=&id=cdmQAgAAQBAJ&oi=fnd&pg=PP1&dq=Millard+elaine+gender+literacy+handbook+early+years&ots=_hKAQ_t8QW&sig=bRWrTt_hO4zaDoq21Fxtuz75Oxg

Millard, E., & Bhojwani, P. (2012). Gender and early childhood literacy. … *Handbook of Early Childhood Literacy*. Retrieved from http://books.google.co.uk/books?hl=en&lr=&id=iOuGAwAAQBAJ&oi=fnd&pg=PA35&dq=Millard+elaine+gender+literacy+handbook+early+years&ots=vd3vWMjODg&sig=NEhFCJNu2rReurpWGSrRtjfrP8c

Moss, G. (2000). Raising boys' attainment in reading: Some principles for intervention. *Reading*. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/1467-9345.00143/abstract

Moss, G. (2007). *Literacy and gender: Researching texts, contexts and readers*. Retrieved from http://books.google.co.uk/books?hl=en&lr=&id=vduAAgAAQBAJ&oi=fnd&pg=PP1&dq=GEmma+Moss&ots=qBa8vLnfV2&sig=t-QugLSvF1o7rwTNEubs6TJsPj8

Nicolopoulou, A., Cortina, K. S., Ilgaz, H., Cates, C. B., & de Sá, A. B. (2015). Using a narrative- and play-based activity to promote low-income preschoolers' oral language, emergent literacy, and social competence. *Early Childhood Research Quarterly*, *31*, 147–162. http://doi.org/10.1016/j.ecresq.2015.01.006

Nutbrown, C., Hannon, P., & Morgan, A. (2005). *Early Literacy Work with Families: Policy, Practice and Research*. SAGE Publications. Retrieved from https://books.google.com/books?hl=en&lr=&id=obq9AwAAQBAJ&pgis=1

OECD. (2009). *Equally prepared for life? How 15 year old girls and boys perform in school*. *Pisa*. http://doi.org/10.1787/9789264064072-en

OECD. (2015a). *The ABC of Gender Equality in Education*. *OECD Publishing* (Vol. PISA). http://doi.org/10.1787/9789264229945-en

OECD. (2015b). What Lies Behind Gender Inequality in Education? *PISA in Focus*, *49*, 4. Retrieved from /content/workingpaper/5js4xffhhc30-en

OECD. (2015c, March 1). What Lies Behind Gender Inequality in Education? OECD Publishing. http://doi.org/10.1787/5js4xffhhc30-en

Qualifications and Curriculum Authority. (1998). Can do better : raising boys' achievement in English. Retrieved February 12, 2016, from http://ioe.sirsidynix.net.uk/uhtbin/cgisirsi/?ps=VXrcDMxb51/SIRSI/240820062/88

Roulstone, S., Law, J., Rush, R., Clegg, J., & Peters, T. (2011). *The role of language in children's early educational outcomes*. *Research Brief. DFE-RB*. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/193516/DFE-RB134.pdf

Rowan, L., Knobel, M., Bigum, C., & Lankshear, C. (2002). *Boys, literacies, and schooling: The dangerous territories of gender-based literacy reform*. Retrieved from http://acquire.cqu.edu.au:8080/vital/access/manager/Repository/cqu:8629

Rutter, M., Caspi, A., Fergusson, D., Horwood, L. J., Goodman, R., Maughan, B., … Carroll, J.

(2004). Sex Differences in Developmental Reading Disability. *Jama*, *291*(16), 2007. http://doi.org/10.1001/jama.291.16.2007

Sanford, K., & Madill, L. (2006). Resistance through video game play: It's a boy thing. *Canadian Journal of Education/Revue Canadienne de L …*. Retrieved from http://www.jstor.org/stable/20054157

Sharples, J., Slavin, R., Chambers, B., & Sharp, C. (2011). Effective classroom strategies for closing the gap in educational achievement for children and young people living in poverty , including. *Schools and Communities Research Review*, *4*. Retrieved from www.c4eo.org.uk/.../classroomstrategies/.../classroom_strategies_research_review.pdf

Siraj-Blatchford, I., Taggart, B., Mayo, A., Sammons, P., Melhuish, E., & Sylva, K. (2013). The learning life course of at "risk" children aged 3-16: Perceptions of students and parents about "succeeding against the odds". *Scottish Educational Review*, *45*(2), 5–17. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bri&AN=91994924&authtype=shib&site=ehost-live

Skelton, C., Francis, B., & Valkanova, Y. (2007). Breaking down the stereotypes: Gender and achievement in schools. Retrieved from http://dera.ioe.ac.uk/6547/1/WP59_Breaking_down_the_stereotypes.pdf%3Fpage%3D20654

Smith, M and Wilhem, J. (2010). *"Boys and literacy;Complexity and multiplicity" in Handbook of Adolescent Literacy Research*. Guilford Press. Retrieved from https://books.google.com/books?hl=en&lr=&id=bDkCj7THGN4C&pgis=1

Springate, I., Atkinson, M., Straw, S., & Lamont, E. (2008). *Narrowing the Gap in outcomes : Early Years (0 – 5 years)*. NFER.

Strand, S. (2014). School effects and ethnic, gender and socio-economic gaps in educational achievement at age 11. *Oxford Review of Education*, *40*(2), 223–245. http://doi.org/10.1080/03054985.2014.891980

Sullivan, A., & Brown, M. (2013). Social inequalities in cognitive scores at age 16: The role of reading. *CLS Working Papers*. Retrieved from http://discovery.ucl.ac.uk/1473708/

Sullivan, A., & Brown, M. (2015). Reading for pleasure and progress in vocabulary and mathematics. *British Educational Research Journal*, *41*(6), 971–991. http://doi.org/10.1002/berj.3180

Sylva, K., Melhuish, E., & Sammons, P. (2008). Final report from the primary phase: Pre-school, school and family influences on children's development during Key Stage 2 (7-11). Retrieved from http://ro.uow.edu.au/sspapers/1807/

Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2004). *November 2004*. *The Effective Provision of Pre-School Education [EPPE] Project* (Vol. 12). DfES. http://doi.org/10.1007/s00520-004-0736-9

Sylva, K., Taggart, B., Siraj-Blatchford, I., Totsika, V., Ereky-Stevens, K., Gilden, R., & Bell, D. (2007). Curricular quality and day-to-day learning activities in pre-school. *International Journal of Early Years Education*, *15*(1), 49–65. http://doi.org/10.1080/09669760601106968

Taggart, B., Sylva, K., Melhuish, E., & Sammons, P. (2015). Effective pre-school, primary and secondary education project (EPPSE 3-16+), (June), 1–50.

Twist, L., & Sainsbury, M. (2009). Girl friendly? Investigating the gender gap in national reading tests at age 11. *Educational Research*. Retrieved from

http://www.tandfonline.com/doi/abs/10.1080/00131880902892089
White, B. (2007). Are girls better readers than boys? Which boys? Which girls? *Canadian Journal of Education*, *30*(2), 554–581. Retrieved from http://www.jstor.org/stable/20466650
Wood, C., Vardy, E., & Tarczynski-Bowles, L. (2015). Final Report: Early Words Together--Impact on Families and Children. *National Literacy Trust*. Retrieved from http://eric.ed.gov/?id=ED560649
Younger, M., Warrington, M., & McLellan, R. (2005). *Raising boys' achievement in secondary schools: Issues, dilemmas and opportunities*. Retrieved from http://books.google.co.uk/books?hl=en&lr=&id=KKzgryl-lewC&oi=fnd&pg=PP1&dq=younger+an+warrington+raising+boys+achievement&ots=1djtDHH6tr&sig=85Qpsvyz9M8A9OIskNKJ4ZNNLJQ

Appendix 1: Research Review Methods

1.1 This study used a Rapid Evidence Assessment methodology (Khangura et al, 2012; Speirs et al, 2015)to systematically search for literature relevant to this enquiry, and which might throw light on the research questions posed:

i. What is the scale of the gender gap in the UK in literacy and language attainment between the ages of 5-11?
ii. What are the best attested explanations for the gender gaps in literacy and language attainment between the ages of 5- 11 and which might best explain any emerging differences in the pre-school years?
iii. Which interventions targeted at the pre-school years might most effectively address any gender gaps in literacy and language development?

1.2 Parameters to the review were set by the UK context, on the understanding that gender gaps in literacy attainment vary by country and may be determined by the nature and the extent of the access that girls and boys have to education in different forms at different ages.

In our first sweep of the literature, we prioritised retrieving studies that might add depth to the statistical analyses of the Millennium Cohort Study, and link our findings to other studies of the gender gap in literacy attainment undertaken using nationally representative datasets, such as the National Pupil Database. We focused our search on studies that were relevant to understanding the scale of the gender gap in literacy and language attainment in the target population of 3-11 year olds.

In our review of potential explanations, we searched the literature on gender and literacy more broadly, including studies that examined the gender gap in secondary schools in English-speaking countries with broadly similar education systems, drawing out which explanations might be most relevant for the younger age group (3-5 year olds) as we synthesised the studies.

The funder's priority was to support a campaign for high quality pre-school provision, and this influenced the searches for interventions that might impact on narrowing the gender gap, where we focused exclusively on pre-school provision.

All searches focused on studies published between 2005-2016.

2. Literature search procedures

2.1 Our search strategy for adjacent statistical studies on the gender gap in literacy attainment and language development amongst 5-11 year olds, relevant to this research, focused on research undertaken using nationally representative datasets available in the UK/ Ireland (the National Pupil Database; the Millennium Cohort Study; Growing up in Scotland; Young Life and Times Survey; and Growing Up in Ireland). To locate these we used google scholar and the search terms: "the named dataset" and: gender or gender gap and literacy attainment or literacy achievement or language development.

We included in the review only those studies that included gender in the title (Many statistical studies included gender as a variable, but not as the focus of the analysis and subsequent discussion.) When the number of studies returned in google scholar was very high we limited the review to the first 300 studies. Hand checking suggested this was adequate to identify those studies where the gender gap in literacy attainment and language development in the appropriate age group was the primary focus of the analysis.

2.2. Our search strategy to identify the main hypotheses used in the broader literature to explain gender gaps in language and literacy attainment used the following datasets: British Education Index; Child Development and Adolescent Studies; ERIC; Teacher Reference Centre; EconLit; Educational Administration Abstracts; Anthopology Plus; Psych Info; Scopus.

Search terms were trialled and adjusted using each database's thesaurus to most efficiently identify relevant studies, in line with the research parameters set out in 1.2 above. Typical search terms were:

Language development in children AND Gender
Language development in children AND Boys
Literacy development in early childhood
Literacy development in early childhood AND gender
Literacy development in early childhood AND boys
Literacy development in children
Literacy development in children AND gender
Literacy development in children AND boys
Literacy development in the early years
Literacy development in the early years AND gender
Literacy development in the early years AND boys
Phonological awareness
phonological awareness in preschool
phonological awareness and reading
Reading readiness
Vocabulary development
Vocabulary development AND gender
Vocabulary development AND boys

In addition, we identified major studies in the area, and used their citations to update and cross-reference with studies found in our database sweeps, and understand how the research evidence in different areas was developing over time.

2.3 Our search to identify and assess the efficacy of interventions designed to support language and literacy development in the early years prioritised reviews of reviews from a hand search of websites of government and a range of other organisations, networks and experts known to be active in this area. Key organisations included: the Department for Education, England; the Scottish government; the Welsh government; Department of Education, Northern Ireland Executive; the Education Endowment Foundation; Sutton Trust; C4EO; IEE; NFER; Joseph Rowntree Foundation; Esmée Fairbairn Foundation; Nuffield Foundation; Early Intervention Foundation; Dartington Social Research Unit; the Communication Trust; National Children's Bureau; Save the Children. Key experts identified included e.g. Hannon and Nutbrown (family literacy) and Sylva and Siraj-Blatchford (the quality of pre-school provision).

Key studies identified in the reviews consulted were retrieved, and citations to them followed.

3. Inclusion Criteria

The research parameters listed in 1.2 above were used to include or exclude studies at the point of retrieval. The exclusion and inclusion criteria based on the quality of the research studies were developed using quality assessment tools (Thomas, Newman, & Oliver, 2013) and tailored to meet the purposes of the different searches.

3.1 In practice, the search for adjacent statistical studies found very few studies directly exploring gender gaps in literacy attainment and language development. Those studies included were based on nationally representative databases but were not formally synthesised for the purposes of this research.

3.2 Studies retrieved for the narrative review of explanations for the gender gap in literacy attainment and language development were screened for their methodological quality using size and representativeness of sample for quantitative studies, and in the case of qualitative studies, the rationale for the research design, choice of sample, rigour of data analysis and explicit discussion of the credibility of the findings.

3.3. Studies retrieved for the rapid evidence assessment were included if they met the following criteria:

i. They were designed to enhance children's learning in the 3-5 age group
ii. They would work in the context of pre-school provision

Studies that met these criteria were coded using the following questions

- Whether the intervention had been evaluated?
- Whether the evaluation used quantitative, qualitative or mixed methods?
- Whether the evaluation included a control group, and if so if it was randomised?
- Whether the evaluation reported on evidence of impact on narrowing the gender gap?
- Whether the evaluation reported on impact of the intervention on literacy attainment at EYFS, KS1 and or KS2?
- If the focus of the intervention was on: language; literacy; behaviour; play (P); other (O)
- Whether the intervention reported a positive impact?

Studies that had not been evaluated, or whose sample size was insufficient for the methods applied (RCTs with very small sample sizes: n <16) were excluded

In each case the reviews led to thematic summaries, with assessments of the robustness of the studies based on the criteria outlined above guiding the conclusions drawn.