Socio-Economic Status and Language Acquisition: Children's performance on the New Reynell Developmental Language Scales.

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Running Head: Socio-Economic Status and Language Acquisition

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Abstract

Background

Several studies in recent years have indicated a link between socio-economic status (SES) of families and children's language development, including studies that have measured children's language through formal standardised test procedures. High numbers of children with low performance have been found in lower socio-economic groups in some studies. This has proved a cause for concern for both clinicians and educationalists.

Aims

The study aimed to investigate the relationship between maternal education and postcode-related indicators of SES, and children's performance on the *New Reynell Developmental Scales (NRDLS)*.

Methods and Procedures

Participants were 1266 children aged between 2;00 and 7;06 years who were recruited for the standardisation of a new assessment procedure (NRDLS). Children were divided into four groups reflecting years of maternal education, and five groups reflecting SES Index of Multiple Deprivation (IMD) quintiles for the location of participating schools and nurseries. Groups were compared using ANCOVA, with age as a covariate, in order to identify which might be affected by the two SES variables. Where relationships were found between SES and performance on the Scales, individual children's standard scores were looked at to determine numbers potentially at risk for language delay.

Outcomes and Results

An effect of years of maternal education on performance was found such that children whose mothers had minimum years performed less well than other children in the study, this effect being stronger for younger children. Children attending schools or nurseries in IMD quintile 1 areas performed less well in language production. Higher than expected numbers with language delay were found for younger children whose mothers had minimum years of education, and for children in quintile 1 schools and nurseries; however numbers were not as high as noted in some other studies.

Conclusions and Implications

Characteristics of the participant sample and measures used for language and SES may explain these results and are important considerations when interpreting results of studies or developing policies for intervention. The usefulness of commonly used categories of language delay is questioned.

What this paper adds

What is known about this subject:

While some previous research has suggested a link between low SES and poor language development in children, other studies have not found this. The current study uses a large, recently collected database to further explore this issue. This is important because outcomes can influence policy decisions and service delivery priorities.

What do we know as a result of this study that we did not know before?

Influence of SES factors was not as great for this population as has been suggested by some previous studies, and only applied to certain ages or certain language skills (e.g. production rather than comprehension). Characteristics of the sample and measurement tools used are important.

Introduction

Recent years have seen a growing interest in potential links between language development and the social background of young children. Researchers have focussed on different aspects of language, for example vocabulary development, grammatical development, pragmatic skills, and have used a variety of methods to measure these in young children. An early example is the work of Hart and Risley (1995) who noted slower vocabulary growth in nursery-age children who came from disadvantaged backgrounds, compared to that of children of university faculty staff. In more recent studies, for example Locke, *et al.* (2002) and Law *et al.* (2011), researchers have used standardised tests which combine domains of language in various language tasks and are considered to measure more general language skills.

Interest in potential links between SES and language acquisition has been further stimulated with the recognition that children entering school with poor language skills are at risk for low educational attainment (see for example Snowling *et al.* 2001). Any influence of SES on early language development may then indirectly affect the child's life-long educational prospects.

Evidence for effects of SES on language development

Several studies in recent years point to links between SES and language development although as we will see, many have found an association between SES and vocabulary rather than language *per se*. Qi *et al* (2006) found that low SES African American children in the USA performed on average 1.5 SD below the expected mean based on national norms on the Peabody Picture Vocabulary Test (PPVT). Horton-Ikard and Weismer (2007) similarly found a difference in performance on receptive and expressive vocabulary tests for African American toddlers from low SES homes when compared with peers from mid-SES homes. Vasilyeva *et al.*(2008) collected

videotaped language samples of children at four month intervals between the ages of 1;10 and 3;06. The 45 participants were divided into three groups on the basis of educational level of their primary caregiver (high school diploma, college or postgraduate). The authors looked at syntax development and found that SES measured in this way appeared to have no effect on development of simple sentences, but a significant effect on both frequency and diversity of complex sentences.

A further study that found an effect of SES using a general measure of language development was that carried out by McIntosh *et al.* (2007) in Australia. Participants (n=72, mean age 5;02) attended preschools in either low or average SES areas. SES criteria were derived from census data collected by the Australian Bureau of Statistics. Children from the lower SES background performed significantly lower than those from average backgrounds, especially on more complex language tasks.

In a study in Sheffield, UK, (Locke *et al.* 2002) 223 children aged between 3;01 and 4;08 and attending nursery schools situated in areas of social and economic deprivation, as measured by free school meal uptake, were given a language test, the CELF-Preschool (CELF-P^{UK}: Peers *et al.* 2000), together with a test of their general cognitive abilities. The means for this group of children for receptive and expressive language were depressed, falling "on the boundary between normal and delayed language" (p. 8), with boys performing significantly lower than girls. General cognitive abilities, however, were found to fall within the average range. More recently, Law *et al.* (2011) carried out a number of standardised language, reading and cognitive assessments on a sample (n=138) of children aged 5-12 years. The children all attended the same primary school in Scotland where 96.9% of pupils were known to live in an area within the first quintile on the Scottish Index of Multiple Deprivation (a composite measure of social deprivation, similar to the English

measure used in the current study). Similar to Locke *et al.* (2002), Law *et al.* found mean scores on the CELF-IV UK Edition (version of CELF for children post six years: Semel *et al.* 2006) to be around 1SD below the national mean; interestingly, means for most of the other assessments, including those for receptive vocabulary and narrative abilities, were within normal limits (above -1SD). The exception here was performance on the *Children's Communication Checklist* (CCC: Bishop, 2003), an assessment of pragmatic functioning, which was also poor.

Both Locke *et al.* (2002) and Law *et al.* (2011) stress the high proportions of children in their respective samples who, using the test's criteria, might be diagnosed clinically as language delayed. The criteria are based on Wiig *et al's.* (1992) guidelines whereby children scoring -1 to -1.5 SD below the mean are considered to have a moderate language delay, those scoring -1.5 to -2 SD below the mean to have a moderate to severe language delay and those scoring more than 2 SD below the mean are considered to have a severe delay. Children with known language or cognitive impairments were excluded from the Locke *et al.* study, but nevertheless they report 55.6% of their sample to have some degree of language delay (as measured by a combined receptive and expressive language score on the CELF), this being severe for 9.4% of the sample. Comparable figures for the Law *et al.* study with older children are 39.9% with some degree of language delay, and again 9.4% of these being severe. Figures given in both studies are considerably higher than would be found in the more widely representative normally distributed standardisation sample of the test. Interestingly Law *et al.* did not exclude children with diagnosed language or cognitive impairments. Using conventional discrepancy criteria, 11.6% of children in their sample were identified as having specific language impairment. This was the same as the percentage of children in the sample who were receiving speech and

language therapy (SLT). However, these were not necessarily the same individuals, suggesting that criteria for selection for SLT intervention are not restricted to test performance.

While these findings are disturbing, other studies have failed to find a consistent link between language development and SES, underlining the difficulties in seeking associations between SES and language performance. Like Law *et al.* (2011) Black *et al.* (2008), in a study of 76 children in Edinburgh aged 4 to 11, failed to find an association between SES and receptive vocabulary as measured by the British Picture Vocabulary Scales-II. Pruitt and Oetting (2009) looked specifically at past tense marking in African American children living in poverty and found no effects for SES. In particular, children did not show variations in past tense marking that were in any way similar to those associated with specific language impairment. Reilly *et al.* (2009), reporting on a large cohort study of children (n=1911) at ages 1;00 and 2;00 years, list SES among potential predictors that are unlikely to be helpful in screening for language delay.

In this paper we report on associations between SES and language acquisition as measured by a recently standardised language test, the *New Reynell Developmental Language Scales* (NRDLS: Edwards, Letts & Sinka, 2011). Measures of SES used are years of maternal education and indices of deprivation derived from the postcode of the child's school or nursery. The study aims to address the following questions:

1. Is there an effect of maternal education on children's performance on the test?
2. Is there an effect of postcode-related indicators of SES on children's performance on the test?

3. Where there is evidence for effects on performance which relate to either SES measure, does this result in higher than expected numbers of children with clinical language delay?

Method

Participants

This study is based on data drawn from a large number of children who made up the standardisation sample for the NRDLS. The standardisation version of the test was administered to 1266 children aged between 2;00 and 7;06 years and living in North East England (n=638), Central South/South East of England (n=497) and the South West of England (n=101), with a small number (30) additionally from South Wales. Both scales were completed by 1258 of the children with the remainder completing one of the scales (*Comprehension* in all but one case). The sample consisted of 626 boys and 640 girls. Ethical approval for the study was obtained from the ethics committees of Newcastle University and the University of Reading, where the two data collection centres were based. Participants were recruited through schools, nurseries, playgroups and personal contacts. All the children were judged by the teacher (or other source of referral) to be developing normally, to have hearing within normal limits and to have English as their first language or as one of their first languages (i.e. exposure to English and another language from birth or during the first year of life). Informed consent was obtained from the children's parents or guardians prior to taking part in the study. Data were divided into 11 six-month age bands as in Table 1.

Insert table 1 here

Testing was carried out by speech and language therapy and psychology students, who were trained by the research team to be field workers. Investigators and research associates also collected some of the standardisation data.

Measurement of Language Development

The studies outlined in the introduction investigating the relationship between SES and language development in children have focused on a variety of linguistic levels and language-based skills. A number have focused solely on vocabulary, for example Qi *et al.* (2006) and Black *et al.* (2008). In these two studies a standardised test of vocabulary was used. Hart and Risley (1995) also measured vocabulary but did this by sampling spontaneous language. Other studies have set out to sample different components, selecting from a range of language skills that subsume vocabulary, grammar, narrative and pragmatic skills. For example Vasilyeva *et al.* (2008) looked specifically at emerging syntactic development, again using language sampling. As mentioned above, Locke *et al.* (2002) and Law *et al.* (2011), asked participants to complete standardised language tests, in this case age-appropriate versions of the *Clinical Evaluation of Language Fundamentals* (*CELF-Preschool UK*, Peers *et al.* 2000; *CELF IV*, Semel *et al.* 2006). The current study takes a similar approach, using a standardised language test, and we report on the performance of children aged between 2;00 and 7;06 on a new test of language comprehension and production (NRDLS).

This test contains a total of 72 items for *Comprehension*, divided into eight sections, and a total of 64 items for *Production* divided into seven sections. The scales are administered using objects, toy animals and a picture book. Most sections in the

Comprehension Scale have equivalent sections in the Production Scale and vice versa. Sections in both scales cover early vocabulary (nouns and verbs), relating two objects, simple sentences, grammatical inflections and complex sentences. Additionally the Comprehension Scale has sections on pronouns and inferencing, and the Production Scale includes a section testing grammaticality judgement.

Assessment procedures such as CELF and NRDLS have the advantage that a range of linguistic levels, or domains, can be tested and, depending on the standardisation process, the results should be valid and reliable. It is important to note, however, that the procedure chosen to measure language may be influenced by other skills the child needs to bring to the task, not all of which will directly reflect linguistic development. The tasks used in testing may involve extra-linguistic aspects such as executive functioning, reasoning, conceptual knowledge, attention and compliance, which can act as potential confounds.

Measurement of Socio-Economic Status (SES)

SES is a multidimensional construct. Coleman (1988) argues that three types of capital are important in child development. Firstly, financial capital provides the resources to cover basic needs such as food and clothes and can be measured by family income, home ownership, wealth or indirectly through occupational status. The second of Coleman's capitals, human capital, comprises nonmaterial influences. The main measure used here is parental education as indicated by the highest educational degree attained and/or the highest grade in school completed. Thirdly, social capital takes a broader view of SES, including the child's neighbourhood, social networks and relationships, taking into account the structure of the household and family and wider friendships.

Many ways of assessing SES have been suggested. Popular measures in current studies are parental education and occupational status of the parents or carers (e.g. Qi *et al.* 2006). Most studies, however, mix two or three SES-variables (e.g. Forget-Dubois, *et al.* 2009), while some apply complex assessment procedures of SES (e.g. Sarsour *et al.* 2010). SES-indices present a composite score of various SES-factors. One index which is available for the UK population is the Rank of Index of Multiple Deprivation (IMD) Score (Communities and Local Government, 2008) This is a composite measure of deprivation published by the Office for National Statistics and is based on information from seven domains (income; employment; health and disability; education, skills and training; housing and services; crime; and living environment). The IMD is based on the characteristics of the geographical area of residence (by postcode) rather than characteristics of the individual.

In this study, two measures indicative of SES are used: maternal education status and IMD score for the location of the child's school or nursery. These constitute measures from all three of Coleman's domains. Maternal education is clearly a reflection of human capital, while IMD measures of income and employment reflect financial capital. Social capital is reflected in IMD measures of housing and services, crime and living environment.

Information on years of maternal education was elicited by means of a parental questionnaire. Of the 1266 participants, 1092 returned questionnaires. Returns ranged from 85% - 94% across age bands. Participants were divided into groups as follows:

a) Statutory minimum number of years, leaving full-time education at age 16.

b) Further education, e.g. 'A' levels or diploma.

c) Higher education to degree level.

d) Post graduate qualifications.

See Table 2 for numbers in each group.

Insert Table 2 here

Information on socio-economic status (SES) was derived from postcode information, based on the postcode of the site (i.e. school/nursery) and analysed using the Rank of Index of Multiple Deprivation Score (IMD 2007). Schools were divided into five equal-sized bands (quintiles) based on IMD rank of their area of residence, ranging from the most to the least deprived fifth of the population, with quintile 1 being the most deprived.

Note that the quintiles are for the test sites, not individual families. In some areas, the SES of parents could be varied while in others it could be more homogenous. There is evidence that children in the lowest SES groups, though, tend to go to the school nearest to where they live (Burgess *et al.* 2009). These data were not available for all the children in the sample. Children recruited individually through personal contact were excluded, plus those attending a nursery in Newcastle situated in a deprived area but used mainly by professional parents and university employees because of its proximity to the city's two universities. It was also not possible to assign a quintile ranking to one school in South Wales, because such data are collected differently in Wales. In all, quintile information is available for 1161 of the 1266 children who completed the Comprehension Scale and 1156 children who completed the Production Scale. A perfect balance would have 232 in each quintile for Comprehension and 231 for Production. Numbers in each group are given in Table 3. The range of rankings is also given for each quintile.

Insert Table 3 here

The figures show that schools/nurseries from quintiles one (most deprived) and four are somewhat under- represented while those in the middle quintile (3) are somewhat over-represented. All quintile 1 schools/nurseries (9 in total) were located in the North-East of England.

Analysis of covariance (ANCOVA), with age as covariate, was used to compare children grouped according to maternal education and according to SES quintile. Analysis of variance (ANOVA) was used to check for interactions of either of these variables with age. Where there was evidence from these analyses of an effect of maternal education or SES quintile on children's scores, the performance of the children most affected was examined further for evidence of increased risk of clinical language delay.

Results

Maternal education

Results of the ANCOVA showed a significant effect of maternal education on scores for both Comprehension ($F(3,1087) – 3.90$; $p<0.01$), and Production ($F(3,1081)=5.354$, $p<0.005$), with scores higher where the number of years of maternal education were greater.

Maternal Education: Comprehension

Post hoc analysis for Comprehension revealed that the only significant difference between individual groups was between group 1 (minimum statutory years) and group 4 (postgraduate education), with a small to medium effect size (Cohen's d = 0.31). No differences were found between any other groups. See Figure 1, which gives mean raw scores on the Comprehension Scale, adjusted to take into account child's age, for each maternal education group:

Insert Figure 1 here

Moreover, it was noted that performance of children in the mothers with minimum years of education group varied across age bands. Participants were collapsed into two groups, those with minimum years of maternal education and those with mothers who had further, higher or postgraduate education. An ANOVA was carried out with age and maternal education as independent variables to see whether there was an interaction between maternal education and age, such that children's comprehension was differentially affected at different ages. For Comprehension this revealed a trend that approached significance ($F(10, 1070) = 1.816$; $p=0.054$).

Maternal Education: Production

Post hoc analysis of the ANCOVA for Production revealed significant differences between group 1 and all three other groups, with none of the other groups significantly different from each other. Effect sizes were again small to medium (Cohen's d group 1 with group 2, d = 0.33; group 1 with group 3, d = 0.28; group 1

with group 4, d = 0.35). See Figure 2, which gives mean raw scores on the Production Scale, adjusted to take into account child's age, for each maternal education group:

Insert Figure 2 here

Participants were again collapsed into two groups (i.e. minimum years and all others) as described above. Further analysis using ANOVA revealed a significant interaction of maternal education with age ($p< 0.02$) for Production. Interaction results for Production were:

Agebands: $F(10,1064) = 165.896$; $p<0.001$

Maternal education: $F(1,1064) = 22.806$; $p<0.001$

Interaction Agebands*Maternal education: $F(10,064) = 2.221$; $p<0.02$

There was a small effect size for this interaction (partial eta squared = 0.20). Children within the post-compulsory education groups score higher up to the age of 3;06. There is then a period when the lower maternal education group perform better, followed by a further lag at ages 4;06 - 5;06. These results need to be treated with caution, however, as the numbers of children within the youngest age bands are small.

The graph below illustrates the interaction between age and maternal education for Production:

Insert Figure 3 here

This picture is very similar to that obtained for comprehension scores, although as stated above, the age by maternal education interaction just failed to meet significance for comprehension. Figure 4 shows the pattern for comprehension.

Insert Figure 4 here

Standard scores

These results suggest that children below the age of about 3;06, and then again from age 4;06 to 5;06, who have mothers with minimum statutory education, tend to have proportionately lower scores on NRDLS. In order to address our third research question around numbers with a clinical language delay, the standardised scores for all children below age 5;06 (n=85) were looked at. Numbers of children with scores more than -1SD below the mean are given in Table 4, together with percentages; the table also shows the percentage expected to fall in these ranges for a normal distribution. Number with scores below -1 SD have been broken down further according to the Wiig *et al.* (1992) language delay categories.

Insert Table 4 here

Numbers of children scoring between -1 and -1.5 SDs were higher than would be expected for both Comprehension and for Production. Children scoring between -1.5 and -2 SDs were also somewhat higher than would be expected for Comprehension, but not for Production. Numbers scoring below -2 SD (and therefore expected to give rise to serious concern) were as expected.

SES Quintile of school/nursery

Analyses were carried out to see whether test scores varied by SES quintile. An ANCOVA was carried out with age in months as covariate. Results show that difference between quintiles approached significance for Comprehension and were significant for Production:

Comprehension: $F(4,1155) = 2.347$; $p=0.053$. Post hoc tests (Bonferroni) indicate no significant pairwise differences between quintile groups for comprehension.

Production: $F(4,1150) = 2.609$; $p<0.05$. Post hoc tests (Bonferroni) for Production revealed that the only significant difference was between quintile 1 and quintile 4, with all other comparisons non-significant. The effect size was small to moderate (Cohen's d = 0.30)

The following graph, showing mean raw scores on the Production Scale for each quintile group, illustrates this (see Figure 5):

Insert Figure 5 here

An ANOVA was carried out with age and quintile group as independent variables to check for any interaction between age and quintile for either Comprehension or Production. No significant interaction was found:

Age*Quintile: Comprehension: $F(38,1129)= 0.853$; $p=0.72$

Age*Quintile: Production: $F(38,1124)=1.05$; $p=0.39$

Standard scores for Production for quintile 1 children

As the above analyses showed significant effects of SES quintile for Production only, it was decided to look at Production standard scores for children in quintile 1 schools/nurseries (representing the most deprived fifth of the population), again to look for evidence of clinical language delay. In Table 5 the children are again grouped according to the Wiig *et al.* (1992) criteria conventions. Since the quintile 1 group is similar in terms of SES to the groups looked at in the Locke *et al.* (2002) and Law *et al.* (2011) studies, percentage figures from these studies are given for purposes of comparison, and also expected percentages for a normally distributed sample.

Insert Table 5 here

Note that the sample used by Locke *et al.* is truncated (children with diagnosed communication impairments were excluded), while that of Law, *et al.* is not.

Discussion

The results provide partial answers to the questions posed in the introduction. The performance of 1266 UK children used in the standardisation of the NRDLS provides modest support for the view that children from disadvantaged backgrounds are more likely to have lower language scores than their more advantaged peers. However, the relationship is not found to the same extent in Comprehension and Production scores nor is the relationship (in regard to maternal education) equal across age groups. Further, effect sizes are modest.

Studies reviewed in the introduction have illustrated how the association between SES and children's language performance is far from clear, with some

studies finding a clear link between the two and others not. Reported differences may reflect different communities or may arise because of fundamental differences in methodologies, including the definition of *language acquisition.* Studies vary in the domains of language tested, the tests used, sample size, recruitment procedures, age of children and ways in which social disadvantage is measured. The complexity of the SES construct itself may further explain why results from studies are contradictory, as the measurement instrument used may or may not feature aspects of SES that impact on language acquisition. Rather than direct effects, it is likely that there are factors that act as mediators between SES and language. As findings vary, interpretations of associations found between language performance and components of SES need careful interpretation. As Law *et al.* (2011) have cautioned, conclusions drawn from such studies have implications for scarce resource allocation

In this study, two indicators of disadvantage were used: years of maternal education and SES based on post codes. While an overall effect of years of maternal education was found, details that emerged from the analyses are important. Overall, an increase in children's scores on the NRDLS was associated with increase in the mothers' years in education but the relationship was clearest at the extremes. For the Comprehension Scale the difference was only found between children of mothers in the group with least (that is those mothers who left school after the statuary minimum years of education), and the group with the highest number of years in education (those mothers who had post-graduate qualifications). The difference had a small to medium effect size. There was no significant difference in performance on the Comprehension Scale between the children of mothers who had post-sixteen education (the further education group) and children whose mothers had graduate or post-graduate education.

A significant difference was found between the Production scores of children in the lowest group (least maternal education) and all three other groups. A small age effect was found for production such that the effect was seen up to the age of 5;06. So, although increase in language scores is associated with increase in years of maternal education, the effect is strongest in production and in the earliest years. By the time all the children are in full-time education, the effect appears to weaken.

It has been suggested that maternal education effects may result from the ways in which more highly educated mothers interact with their children, or be the result of the activities such mothers choose to do with their children. Hart and Risley (1995) looked at a number of features of the child's early communicative environment in their sample of 42 families, including, for example, giving the child choices, listening, and talking to be sociable. These were found to be much more commonly used in those families with relatively high SES especially in comparison to families living on welfare. Similar findings were noted by Hoff (2003) and Raviv *et al.* (2004). Rowe (2008), looking at 47 parent-child dyads found that the nature of child-directed speech (CDS) experienced by toddlers aged 2;06 predicts their vocabulary comprehension as measured by PPVT one year later, and also that relevant aspects of CDS relate to SES as measured by family income and maternal education. Rowe also found that parental knowledge about child development was a further mediating factor between SES and CDS. These factors go some way to explaining the results of the current study and also why the effects associated with maternal education levels appear to lessen as the child moves into pre-school and school environments outside the home.

Given the above association, results of the younger children whose mothers had the least amount of education were examined further. Children in the sample were assumed to have typically developing language (one of the selection criteria for the

standardisation sample of the NRDLS), therefore we would expect a normal distribution of scores. That is, we would expect some children to fall below -1SD (i.e. at or below the moderate 'language delay' category as defined by Wiig *et al.* 1992) and indeed that was the case. However, within the group of children whose mothers had the least amount of education and who were aged below 5;06 years, there were more children with scores below -1SD than would be expected had there been a normal distribution. However, numbers scoring below -2SD were as expected, so there is no evidence of over-representation of these children at the extreme lower end of the sample. Note that children with known speech, language and communication needs were excluded (as in Locke *et al.* 2002), so numbers falling at this lower end did not include children with diagnosed language impairments. Our results suggest that minimal education of mothers may be associated with lower language scores in more of the younger children than we would expect in a normally distributed sample. However, we cannot assume that children of mothers with the least years in education have inadequate linguistic backgrounds. Nor can we conclude that these children have or will have a language impairment: they are by definition at the lower end of the developmental norm, since they have not been identified as language impaired.

Confusingly though a larger than expected number of these children fall into a range that would be considered to have a 'moderate' or 'moderate to severe' delay according to Wiig *et al.* (1992). There is considerable variation in rate of language development in the early years as illustrated, for example, in the large data set from the MacArthur Communicative Developmental Inventories. These revealed 'substantial variation in the rate of development ... in child language' (Bates *et al.* 1995:101). A longitudinal study would be needed to explore whether young pre-school children with the lower language scores reported here are subsequently

identified as needing intervention. The interaction of maternal education with age suggests that this is unlikely.

Examination of the relationships between SES quintiles and language scores tells a similar story. Some associations were found between the SES (based on location) and the children's performances on the NRDLS. The relationship between SES quintiles and scores on the NRDLS Comprehension Scale was not significant, but did approach significance. Further, although overall there was a significant relationship between SES quintiles and scores on the Production Scales, post hoc tests showed the only difference was between the lowest and the fourth quintile. A significant difference was not found between the first and fifth quintile (between the most and least disadvantaged children). Hence our data reveal only a modest link between language performance and SES and any effect of SES is found in production rather than comprehension of language.

A study by Roulstone *et al.* (2011) may have a bearing on these results. They found a number of environmental factors that played a mediating role in early language acquisition: these included number of books available to the child, frequency of library visits, parental teaching activities and number of toys available to the child. Children were aged 1;03 to 2;00, and language acquisition was measured through a parental questionnaire incorporating aspects of language comprehension and production and covering vocabulary, grammatical inflections and word combinations. Interestingly, Roulstone *et al.* report that the environmental variables listed above are more strongly associated with early language development than are broader SES measures. This suggests that it is the communicative experiences of the child that are important here. In many cases it is those families with higher SES who are able to supply an optimum environment, but there is no direct link with SES per

se. This would be in line with the findings of the current study, where the factors reflected in the IMD may be more indirect than direct.

Table 5 suggests that the proportion of children in our quintile 1 group that we have identified with scores on the Production Scale below minus one standard deviation is lower than reported in two influential studies (Locke *et al.*, 2002 and Law *et al.* 2011). Considerably more quintile 1 children in the NRDLS study are scoring within normal limits. Nevertheless, the proportion of children with moderate to severe and severe language delay within quintile 1 is higher than expected in terms of the normal distribution curve. However, we are not comparing like with like here: the NRDLS sample excluded children with diagnosed language impairments, while the Law *et al.* study (2011) did not. The children in the latter study are older and the age range (5-12 years) wider than both in the Locke *et al.* study (2002) and NRDLS. The NRDLS sample covers the ages sampled by Locke, *et al.* (2002), but also includes younger and older children. There are also differences in how SES is measured: while Law *et al.* (2011) used a similar criterion to that used in the current study for 'disadvantage', i.e. deprivation indices for the area in which the school from which children were recruited was situated, in the Locke *et al.* (2002) study children were recruited from four schools in areas of high socio-economic deprivation, identified by the number of children having free school meals. Use of different classification of disadvantage, free school meals uptake or Office for National Statistics postcode allocation, may lead to a different proportion of disadvantaged children being identified. Numbers of children in quintile 1 in the current study (N=123) were lower than for the other two studies (Locke *et.al.* n=223, Law *et al.* n=138). Total children tested for the NRDLS standardisation came from a range of SES backgrounds

however which permitted direct comparison of quintile 1 children with those from other quintiles.

Finally of course the language assessment procedure, though a formal test in each case, is different. Both the studies discussed above report poor performance on the CELF as evidence of poor language ability in the children in their samples. An obvious difference between CELF and NRDLS is that the early sections of the NDRLS use toys and objects whereas the CELF uses pictures from the start of the test. It could be that the younger children in the current study respond better and feel more comfortable with real objects. It has long been recognised that young children from the lowest SES may be disadvantaged in subtle ways. Fazio *et al.* (1996) for example, observed that such children's language ability 'may not be fully revealed by performance on standardised tests' (p. 612). Further work would be needed to explore whether low SES children have more limited exposure to picture books than others and whether this influences performance on tests like CELF. As discussed above, the data in the current study suggest that as children mature the effect of one of our measures, level of maternal education, diminishes. When children are receiving daily input within an educational setting, there is a greater equality of experience and this may contribute to the loss of a significant association between low maternal education and low language scores in the older children. Once the materials and tasks become familiar, children are more able to demonstrate their true language skills.

There remains the issue of identification of language delay which is not straightforward. All three studies discussed here have identified larger proportions of disadvantaged children falling below the mean of the tests used than would be expected from a normal distribution of scores, and this is in line with other studies and anecdotal accounts from teachers. It is helpful to consider at which point a low score

should be seen as problematic as opposed to being at the lower end of the normal distribution. In the absence of any other identifying factor, scores between -1 and -1.5 SDs below the mean could be reasonably interpreted as at the lower end of a typical range rather than as indicating atypical development. Using the CELF classification, Table 5 indicates that scores falling within -1 to -1.5 SD below the mean are categorised as *moderate delay.* We suggest that this category *moderate delay* is over-inclusive. After all Law *et al.* (2011) report that although low scores were found on the CELF in their study, similar low scores were not found across all assessments, including other language tests. If language delay is identified only in those children falling below -1.5 SD then the differences between the NRDLS and the Locke *et al.* (2002) cohort lessens: 16% in the NRDLS study and 22.4% in the Locke *et al*. study. Not surprisingly, the proportion in the Law *et al.* study (2011) which included children with language and other developmental problems, remains high at 30.5%. The proportion of NRDLS children in the severe category is around half that identified in the two other studies.

Conclusions

These data, collected from a large representative UK sample, confirm a modest relationship between disadvantage and language performance in young children. In terms of planning intervention, it is important to note that variations in performance may differ according to the indicator of disadvantage used and across production and understanding of language. The poorer association between disadvantage and comprehension scores would suggest children have an intact language system but that this is not always apparent in verbal expression. This large sample revealed a smaller proportion of children lagging behind their peers than has been reported elsewhere

and, we suggest, fewer children who would be classified as severe. While a clinical referral model may be impractical (Law *et al.*, 2011) if all children falling below 1 SD are deemed to be in need of intervention, (and we suggest, unnecessarily so), speech and language therapists have the skills to deal directly with those children who fall below 2 SD and those who have specific language or phonological difficulties. 'Watchful waiting' alongside well informed classroom teachers coupled with appropriate classroom language enhancing activities could be successfully implemented for the other children in order to ascertain whether these children are slow developers who will 'catch up', or have atypical development and require specialist intervention.

Given these figures of language performance, we would suggest that claims that large proportions of disadvantaged children entering full-time education have difficulties with language may be over-stating the position and should be interpreted with caution. For example, the Communication Trust publication *Let's Talk About It* (The Communication Trust, 2011), targeted at newly qualified teachers, says that "Research has shown that in areas of social disadvantage, at least 50% of children have delayed language" (p. 8). We would urge researchers and practitioners to be aware of differences found between performance in different domains of language and in different samples of young children's language, and to be alert to the normal distribution of language performance in young children.

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Tables

Table 1: Number of children in each age band by gender

Age Band	Girls	Boys	Total
2;00-2;05	31	36	67
2;06-2;11	39	51	90
3;00-3;05	44	56	100
3;06-3;11	67	45	112
4;00-4;05	68	61	129
4;06-4;11	68	58	126
5;00-5;05	71	63	134
5;06-5;11	63	58	126
6;00-6;05	60	69	129
6;06-6;11	61	66	127
7;00-7;05	68	60	128
Total	**640**	**626**	**1266**

Table 2: Numbers in each group for maternal education

Scale	Comprehension	Production
Statutory years only	175	175
Further education	259	258
Higher education	285	283
Postgraduate qualifications	373	370
Total	1092	1086

Table 3: Numbers of children in each quintile (1 = low)

Scale	Comprehension	Production
Quintile 1: 1 - 6496 (most deprived)	123	123
Quintile 2: 6497 - 12993	266	266
Quintile 3: 12994 - 19489	334	332
Quintile 4: 19490 - 25985	191	191
Quintile 5: 25986 - 32482 (least deprived)	247	244
Total	1161	1156

Table 4: Children aged 2;00-5;06 with minimum years of maternal education scoring below -1SD

Comprehension	N	Percentage	Expected percentage
'Moderate delay' -1 to -1.5 SD	15	17.6	9.2
'Moderate to severe delay' -1.5 to -2 SD	6	7.1	4.4
'Severe delay' Below -2SD	2	2.4	2.3
Production			
'Moderate delay' -1 to -1.5 SD	17	19.0	9.2
'Moderate to severe delay' -1.5 to -2 SD	4	4.8	4.4
'Severe delay' Below -2SD	2	2.4	2.3

Table 5: Children from quintile 1 (all ages) scoring below -1SD for Production.

Delay	Current study n=125 NRDLS Production Scale		Locke et al. (2001), n=223 CELF Expressive Language	Law et al. (2011) n=138 CELF Expressive Language	Expected percentage
	n	%	%	%	
None	92	73.6%	51.6%	57.9%	84.1
Mild to moderate	13	10.4%	26%	11.6%	9.2
Moderate to severe	13	10.4%	13%	19.6%	4.4
Severe	7	5.6%	9.4%	10.9%	2.3
	125	100%	100%	100%	100

Figures:

Figure 1: Comprehension performance and maternal education.

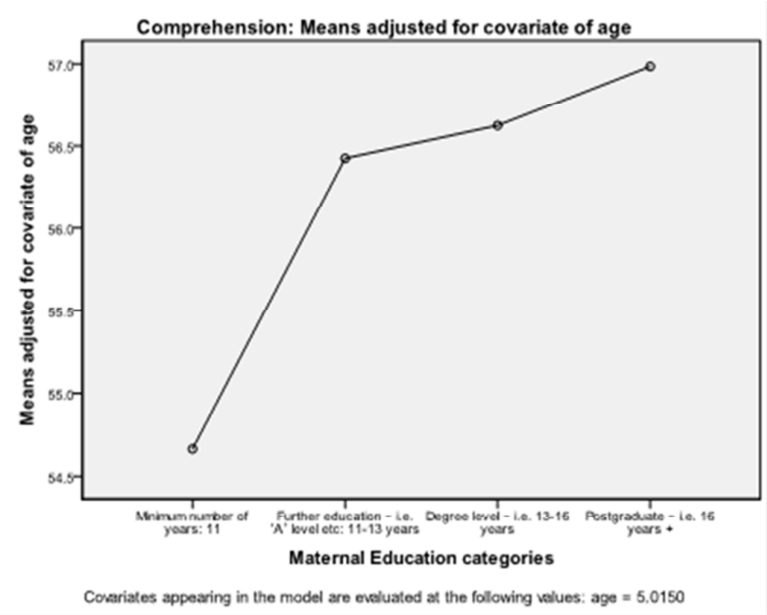

Figure 2: Production performance and maternal education

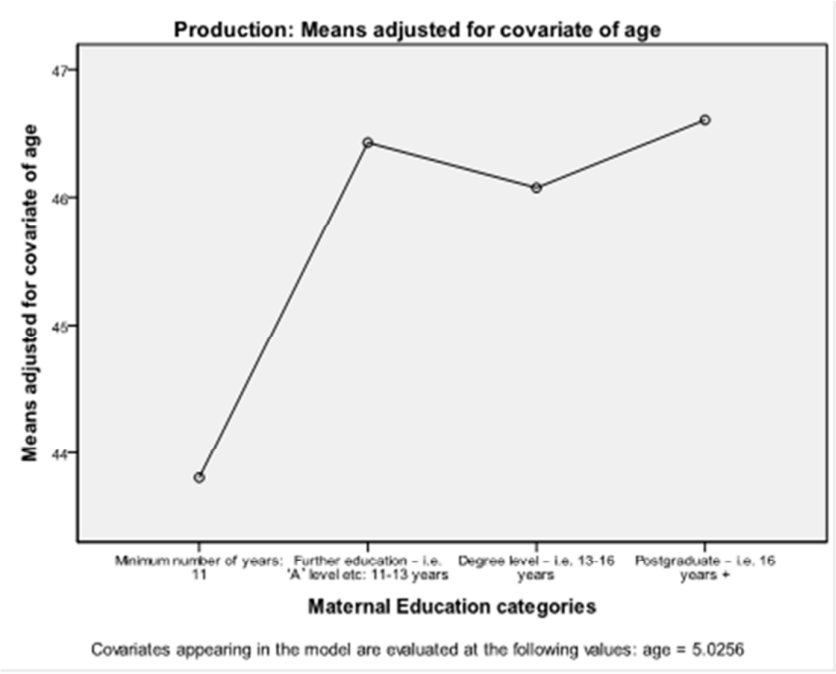

Figure 3: Interaction of maternal education with age for Production

Figure 4: Interaction of maternal education with age for Comprehension

Figure 5: Production performance and SES quintile