The Identification of Speech and Language Problems in Elementary School: Diagnosis and Co-occurring needs

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Acknowledgements

We would like to acknowledge the invaluable help of Sofia Ioakeimidi who compiled the original data set and conducted preliminary analyses. We would also like to thank the Institute of Education, UCL for providing finances to cover Sofia's time.

Funding sources.

This project was supported by funding from the Institute of Education, UCL.

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Abstract

Background

Oral language skills are the foundation for success at school and in employment. A significant minority of children experience difficulties in the acquisition of oral language resulting in speech and language needs (SLN). There are disjunctures between clinical studies using standardised assessment and educational studies. The current study examines teacher reported SLN alongside assessments of language and cognitive skills to explore children's profiles of needs, developmental trajectories and risk factors.

Procedure

Data from the UK Millennium Cohort Study were used to examine teacher identification of SLN at seven (*n* = 8658) and 11 years (*n* =7275).

Results

There were high levels of co-occurrence between SLN and other special educational needs at seven and 11 years, with SLN being less common at 11. Vocabulary levels and parental concerns at five and educational attainment at seven were highly predictive of SLN at seven and 11. Gender and disadvantage were also predictive of SLN but were mediated by the cognitive and behavioural variables.

Implications

These results the raise questions about whether children's language needs at age 11 are recognised in schools. The extent of co-occurrence challenges the practicality of diagnostic categories and supports the value of dimensional approaches to special needs.

what this paper adds

To date the needs of children with speech and language problems in elementary school have been ill defined and the importance of teacher identification has been overshadowed by clinical diagnostic approaches. This is problematic since the majority of children with speech

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and language needs (SLN) are in mainstream classrooms and teacher identification of these difficulties is demonstrated to have an important role in determining access to additional support and is likely to shape teacher practice to their pupils with SLN more generally. Drawing on a national cohort study the cognitive, parental and demographic factors associated with teacher identification of SLN at seven and 11 are examined. The findings suggest that children's vocabulary and their parent's judgement of their speech and language needs at age five were highly predictive of their special needs status at age 11. However, the data raise questions about the extent to which teachers' recognised language needs at age 11. By age 11 children with earlier identified speech and language needs tended to be re-classified as having another special educational need and SLN is less frequently identified. In addition, there was evidence of high levels of co-occurrence with other types of special educational need. By corollary speech and language problems are often reported to co-occur when other developmental disabilities had been diagnosed. The extent of co-occurrence challenges the practicality of researching interventions for 'pure' diagnostic categories and supports the value of dimensional approaches to special needs.

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1. Introduction

Traditionally medical and psychological approaches to developmental disorders have promoted the use of discrete categories. The validity of diagnostic approaches for specific developmental disorders (Dyck, Piek, & Patrick, 2011) and its appropriateness for educational settings (Lindsay, 2011) has been questioned. Using data from a population sample the identification and changing need of children with developmental language disorders was examined.

Capturing patterns of problems that identify language disorders and the lack of consistent terminology to describe these problems raises significant challenges for researchers and practitioners (Bishop, 2014; Reilly et al., 2014). Practitioners can use up to nine different terms to identify children with the same patterns of problems (Dockrell, Lindsay, Letchford, & Mackie, 2006) and substantially more combinations (> 600) can be found in searches of the research literature (Bishop, 2014). Arguably these challenges have resulted in fewer studies of the children's needs relative to other, lower incidence, developmental disabilities (Bishop, 2010). Recently these concerns addressed for both research and clinical practice (Bishop, Snowling, Thompson, Greenhalgh, & Consortium, 2016; Bishop, Snowling, Thompson, Greenhalgh, & Consortium, 2017), but little is known about the ways in which the needs of children are identified within the education system (Dockrell, Howell, Leung, & Furgad, 2017). For developmental disorders where there is no clear boundary between disorder and normality, different patterns of identification within clinical samples and across educational provision occurs (Lindsay, 2011). This is of concern both theoretically and for practice. Focusing solely on clinical populations using diagnostic criteria limits the generalisability of results to children with language disorders more widely (Law, McBean, & Rush, 2011) and acts as a barrier to understanding profiles of needs and changes in developmental trajectories. By corollary, the majority of children with language disorders are

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found in mainstream schools but will not necessarily have received a clinical diagnosis and their needs will be met in these settings (Dockrell, Lindsay, Roulstone, & Law, 2014). In these settings, both the curriculum and access to additional resources will be determined by professionals working within the educational services, in collaboration with other professionals (Dockrell *et al.* 2013). Drawing on data from the millennium cohort study, we explore the language performance and the profile of the needs of children identified with speech and language needs (SLN) by their teachers. Implications for understanding patterns of need in school settings are considered.

1.1 Who are the children with language difficulties?

Language disorders are neurodevelopmental disorders defined by children's performance on a relevant set of standardised language measures. Children with *Language Disorders* experience problems with the structural dimensions of language, including grammar and vocabulary. Persistent difficulties in the acquisition and use of language have variously been referred to as Specific Language Impairment (SLI), language learning disabilities and language disorder (Bishop, 2014; Reilly et al., 2014) in the research literature and within the UK educational system Speech Language and Communication Needs (SLCN) or speech and language difficulties[1]. There is, however, no gold standard for diagnosis; tests vary markedly in their ability to discriminate between children with significant language learning needs. Children identified with language difficulties by parents or professionals are not necessarily the same children identified by language tests (Law et al., 2011; Tomblin et al., 1997). Although combining parental report with test results is particularly effective in predicting the existence of significant language impairments; parental report performs as well or better than conventional psychometric measures (Bishop & McDonald, 2009).

[1] When describing research the terms used in the relevant studies are used.

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These unexplained difficulties in language comprehension or production are common in development (Law, Boyle, Harris, Harkness, & Nye, 2000). Many children enter school with poor language skills (Norbury et al., 2016). Between seven to 16 per cent of children are reported to have poor language development unexplained by other developmental challenges, more than 1.5 SD below the mean on norm-referenced tests (Reilly et al., 2010). A further 2.3 per cent experiencing language problems as part of another neurodevelopmental disorder (Norbury et al., 2016). Establishing the prevalence of language disorders in younger children (under five) is problematic due to different, and often unexplained developmental trajectories (Reilly et al., 2010) and, the fact that there are no unequivocal language behaviours that allow the identification of language problems in a reliable and valid way. More consistency exists in the prevalence data for children of elementary school age, and boys are more affected than girls (Law et al., 2000; Tomblin et al., 1997). Language difficulties still evident at school entry tend not to resolve (Beitchman et al., 2008; Law, Tomblin, & Zhang, 2008; Tomblin, Zhang, Buckwalter, & O'Brien, 2003), and at this point in development can be considered a developmental disability. Indeed, when predicting language abilities at age seven, the best predictor is language at age four and the addition of other factors does not improve prediction (McKean et al., 2017) and non-verbal ability and behaviour problems do not impact on stability of language performance (Bornstein, Hahn, & Putnick, 2016). Thus, by the age of five, language abilities are much more stable and school-aged children with language difficulties are at high risk of persistent language disorder and other academic difficulties.

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1.2 Co-occurring and changing need

As with other developmental disabilities, pure language problems do not reflect clinical or educational reality and indeed are rare (Kaplan, Dewey, Crawford, & Wilson, 2001). Language difficulties co-occur with a range of other developmental disabilities including Autism (Kjelgaard & Tager-Flusberg, 2001), Attention Deficit, Hyperactivity disorder

(ADHD) (DuPaul, Gormley, & Laracy, 2013), Developmental Co-ordination Disorder (Flapper & Schoemaker, 2013) Dyslexia (Fraser, Goswami, & Conti-Ramsden, 2010) and Social, Emotional and Behavioural difficulties (Lindsay & Dockrell, 2012; St Clair, Pickles, Durkin, & Conti-Ramsden, 2011). Moreover, children with co-occurring difficulties are more likely to receive services than children with only language difficulties (Redmond, 2016). Not surprisingly children with language difficulties tend to have poorer educational outcomes (Durkin, Simkin, Knox, & Conti-Ramsden, 2009), with reported high risks of difficulties in literacy (Snowling & Hayiou-Thomas, 2006), numeracy (Cowan, Donlan, Newton, & Llyod, 2005; Donlan, Cowan, Newton, & Lloyd, 2007) and in producing written text (Dockrell, Lindsay, & Connelly, 2009).

In contrast to the purported stability of language difficulties for school age children in the clinical literature, within education systems children's needs appear to change (Dockrell et al., 2014). For example, drawing on a national dataset of children in the US the proportion of students labelled as having speech language impairment declined from kindergarten to Grade 5 whereas the proportion of students labelled as having learning disabilities increased in almost perfectly inverse relationship (Mashburn & Myers, 2010). This signals an apparent inconsistency between clinical studies demonstrating stability in language performance and studies from education indicating changing needs, with significant reductions of children identified as experiencing a SLCN (Lindsay & Strand, 2016). However, while clinical studies rely on objective test measures within education the data are typically teacher report of need (see for example Dockrell et al., 2014).

1.3 Risk

There is consistent evidence that children from lower socio-economic backgrounds (SES) are exposed to less high quality language both at home (for example Vanormelingen & Gillis,

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2016) and in school (Wright & Neuman, 2014) and that, this leads to poorer vocabulary, grammar and language processing (Schwab & Lew-Williams, 2016). Prevalence of language difficulties is typically higher in disadvantaged populations, but rates of identification in these settings are often low (King et al., 2005). Although disadvantaged populations in England receive greater levels of service from SLTs, there are still large inequalities in provision among socially deprived groups (Pring, 2016). Whether these inequalities in service provision arise because of limited resources or failing to be sensitive to the children's likely needs is not known. It is not clear whether these disproportionate levels of language problems are evident in teachers' identification of language problems.

The relationship between language difficulties and ethnicity or race is less well researched but Strand and Lindsay (2009) reported that children of Chinese, Bangladeshi, Black African, Black Caribbean and Black other backgrounds were over-represented in samples of children with reported language difficulties. Similarly, children whose first language is not English (EAL) are overrepresented in samples of children with reported language difficulties compared to monolingual English speakers (Dockrell et al., 2014). However, the disproportionate number of children with EAL who have language difficulties in the community is not reflected in speech language therapy service statistics (Hambly, Wren, McLeod, & Roulstone, 2013). In sum, certain population characteristics are associated with language difficulties but the absence of data from large population samples including both the recording of the child's needs from schools and objective measures of performance limits understanding of these patterns.

1.4 Identifying needs in schools

Drawing on data from the Millennium cohorts three research questions were examined to capture factors associated with teachers' identification of children's speech language needs at

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the age of seven and 11. We first examined the prevalence of SLN relative to the total population and recorded levels of special educational need (SEN) and the extent to which teacher identified SLN was consistent with the children's performance on language and cognitive measures at age five and parental reports of problems. Secondly, teacher reported co-occurrence of other difficulties was examined both concurrently and over time. Finally, we examined the factors that predicted identification of SLN at seven and 11 and whether additional support was provided for the children. To our knowledge, this is the first study to use a national database using categorical criteria and objective test measures to examine profiles of need in children with language and communication difficulties as they progress through elementary school.

2. Methods

2.1 Sample and design

This analysis includes the second, third, fourth and fifth waves of data from the UK MCS. The MCS is a longitudinal study of 18,819 children born into 18,533 families in 2000–01 (Plewis, 2007). Data on children was first collected when they were aged between nine and 11 months and followed up at ages three years (Sweep 2), five years (Sweep 3), seven years (Sweep 4) and eleven years (Sweep 5). Data were first gathered from teachers at Sweep 4 (UK wide, n = 8658 children, response rate 70%) and then at Sweep 5 (England only, n =7275 children, response rate 77%) but where both sweeps are included in the same analysis teacher data is available on SEN variables for n = 4400. Teachers reported on the presence or the absence of Special Educational Need (SEN), the nature of the children's SEN and the support provided for SENs. Our analyses have focused on these two sweeps although explanatory variables (demographics, cognitive assessments and reported behavioural difficulties) from earlier sweeps were used.

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2.2 Measures

2.2.1 Demographic variables

Measures of poverty and maternal education as indicators of socioeconomic status:

Poverty was measured at each sweep of the MCS using a conventional relative poverty measure, where households with a net income below 60% of the UK median were defined poor (1) and the rest not poor (0). Banded income data were collected at each sweep of the MCS, recording households' total income from all sources after deductions but before housing costs. Income values were created by assigning households the mean value of the income band thresholds (Dex and Joshi, 2005).

Maternal education was the dichotomised measure of qualification at NVQ levels 4 and 5 (university educated = 1) or NVQ levels 3 or less, including no qualifications (not university educated = 0). Thirty-three percent of MCS mothers were university educated (Dex and Joshi, 2005).

Ethnicity was dichotomised into whether or not the mother or main carer regarded the MCS child as ethnically white (=1) or not ethnically white (=0). Eighty three percent of the sample were classified ethnically white.

Gender of cohort members was coded male = 1, female = 2.

2.2.2 Cognitive and educational achievement variables

The British Ability Scales II (BAS II) is a widely used battery of twelve core sub-tests of cognitive ability and educational achievement (Elliott *et al.*, 1996) covering children aged from two to seventeen years. It has demonstrated construct validity as a measure of cognitive ability (Elliott, 1997; Elliott *et al.*, 1997; Hill, 2005) and good test-retest reliability (Elliott *et al.*, 1997). The following sub-test (T scores (M = 50, SD = 10) were used:

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Naming Vocabulary, used at Sweeps 2 and 3 (NV2 and NV3), assesses children's expressive vocabulary by asking them to name pictures of everyday items (test retest reliability = .89, validity = .68 with Wechsler Preschool Primary Scale of Intelligence Scale (WPPSI-R), Verbal (Elliott *et al.*, 1997)).

Pattern Construction, used at Sweep 3, assesses spatial problem solving by asking children to replicate designs using patterned squares (test retest reliability = .73 and validity = .68 with WPPSI-R Performance (Elliott *et al.*, 1997)).

Picture Similarities, used at Sweep 3, assesses non-verbal reasoning by asking children to select a picture congruent to four other pictures (test retest reliability = .73 and validity = .47 with WPPSI Performance scale (Elliott *et al.*, 1997)).

Verbal Similarities, used at Sweep 5 (VS5), assesses acquired verbal knowledge and verbal reasoning by asking children to explain the similarities between three words (test retest reliability = .91, validity = .60 with Wechsler Intelligence Scale for Children (WISC III) (Elliott *et al.*, 1997)).

Word Reading (Standard Score), used at Sweep 4 (WR4), assesses children's ability to read a list of words of increasing difficulty picture (test retest reliability = .98 and validity = .71 with Wechsler Objective Reading Dimensions (WORD) (Elliott *et al.*, 1997).

In addition to the BAS sub-tests, a shortened version of the National Foundation for Education Research *Progress in Maths* test was used at Sweep 4 (Maths4). Children complete a variety of mathematical problems covering numbers, shape, space, measures and data handling. The raw score, which had a range of 0 to 15, was transformed into an internally referenced T-score. Data on reliability and validity are not available.

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The Spatial Working Memory, used at Sweep 5 and part of the Cambridge Neuropsychological Test Automated Battery (CANTAB), (Robbins et al., 1994), is a computerised measure of executive-loaded working memory. Children finds tokens hidden among squares. Each square can only be used once and if the child returns to a square that has already held a target this is an error. Task difficulty ranged from four-item to eight-item. Test-retest reliability on the adult sample is satisfactory (.70 for errors, .63 for strategy use) (Cambridge Cognition Ltd, 2006) but data are unavailable for children.

2.2.3 Teacher reported SEN and SEN support

At Sweep 4 teachers of cohort children were asked if the child had ever been recognised as having Special Educational Needs (SEN). If yes, to record specific problems: speech or language; dyslexia; learning difficulties; ADHD; autism, Asperger's or autistic spectrum disorder; behavioural problems/hyperactivity; other difficulties with reading writing, spelling or maths; gifted or talented; problems with sight, hearing or other physical disability. At Sweep 5 teacher in England only were asked 'Does this child have a Special Educational Needs (SEN)?' and, if yes, reason(s) for the child's SEN, using the list from Sweep 4 but excluding 'other difficulties with reading writing, spelling or maths'. Note that at both sweeps teachers reported on as many problems that applied. At Sweep 5 teachers were also asked whether or not the target child was getting support.

Teachers at Sweeps 4 and 5 completed the 25 item Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) as a measure of their child's behaviour in terms of emotional symptoms, conduct problems, hyperactivity/inattention, peer problems and prosocial behaviour (five items per subscale). In a large sample of British children (Goodman, 2001) internal consistency = .73 Cronbach's alpha, retest stability after 4 to 6 months = .62) and

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SDQ scores above the 90th percentile predicted a substantially raised probability of independently diagnosed psychiatric disorders (odds ratio 15.2 for teacher scales).

2.2.4 Parental reports of child's SEN

On the second and third sweep the main respondent was asked if they had concerns about the child's speech/language' (excluding learning English as a second language), and if so, to select one or more reasons: language developing slowly; does not seem to understand people; pronounces words poorly; does not hear well; stutters. At Sweeps 3 and 4 they were also asked if their child had ever received a diagnosis of ADHD or autism/Asperger's syndrome from a medical professional.

3 Results

Table 1 presents the reported prevalence of SENs at Sweeps 4 and 5 alongside figures for English state funded primary schools for the same period (DfE, 2011). Whilst the MCS data allows teachers to identify multiple needs, the figures of type of need for England are only available for primary SEN and for children in the more severe categories of need (School Action plus and statements of Special Educational Need, DfE, 2011). In Table 1 the percentage of type of need for England is extrapolated to all children identified as SEN. As the table shows, SLN is one of the most prevalent reported needs at seven and the third most reported need at 11.

Table 1. Special Educational Need identified by teacher: MCS Sweeps 4 and 5 and SEN England 2011

	Sweep 4 (N=8658) Age 7	Sweep 5 (N=7275) Age 11	SEN England 2011: % state funded primary pupils* (N=4,137,755)
SEN identified	1950 (22.53%)	1455 (20.00%)	19.3%

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Any type of SEN			
SLN	559 (6.46%)	299 (4.11%)	5.38%
ADHD	80 (0.92%)	112 (1.54%)	-
BESD	333 (3.85%)	254 (3.49)	BESD 3.59%
ASD	115 (1.33%)	144(2.00%)	1.33%
Learning Difficulties	312 (3.60%)	524 (7.02%)	MLD + SLD 4.78%
Dyslexia	121 (1.40%)	303 (4.16%)	1.89%
Other reading difficulties	1409 (16.28%)	-	-

*DfE (2011), extrapolated from data on School Action, School Action Plus or Statement of SEN and primary type of need.

SLN: speech and language needs; ADHD: attention deficit/hyperactive disorder; ASD; autistic spectrum disorder; BESD: behavioural, emotional and social difficulties, which includes ADHD, conduct disorder, depression and anxiety. MLD: mild learning difficulties. SLD: severe learning difficulties.

3.1 Agreement between categorical identification of SEN and language assessments

At Sweep 3, 13.4% of parents (n=2029) reported having some concern about their child's speech and language and these children scored significantly lower on NV3 than those without parental concern (parental concern M = 48.7, SD = 11.9, no parental concern M = 54.9, SD = 11.0; t (14899) = 21.57, p<.001, d = 0.52). However, of the 576 children scoring two standard deviations (*SDs*) or more below the mean on NV3, less than half their parents (244, 42%) reported having any concerns regarding their speech and language.

At Sweeps 4 and 5 there was no standardised assessment of language. However, children whom teachers identified as having SLN at Sweep 4 scored significantly lower on NV3 than children not identified with problems (SLN NV n = 479, M = 44.9, SD = 11.4, No SLN average n = 7292, M = 55.8, SD = 10.6; t(7869), 21.67, p<.001, d = 0.99). Children identified as having SLN at Sweep 5 also scored significantly lower on NV3 compared to those without problems (SLN M = 43.0, SD = 12.3; No SLN M = 55.1, SD = 10.7; t(6545) = 16.84, p<.001, d = 1.05). Of the 210 children scoring two *SD*s or more below the mean on

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NV3 for whom teacher data were available, 34% were identified at Sweep 4 as having SLN, compared with only 5% identified as having SLN who scored above that level on the NV3. At Sweep 5, 23% of children two *SD*s or more below the mean were identified by teachers as having SLN, compared with only 3% as having SLN above that level on the NV3.

Parents were asked about SLN at Sweeps 4 and 5 but were asked if their child's school had informed them that their child had SENs. At Sweep 4, of the 1946 children identified by their teacher as having SEN only 30% of parents reported being so informed by the school. At Sweep 5, of the 1406 children identified by their teacher as having SEN 43% of parents reported being so informed by the school.

3 Overlap in categories of children's SEN identified by teachers

3.2.1 Concurrently

As shown in Table 2 children identified as SLN were at significantly greater risk of being identified with other SENs concurrently, both at Sweep 4 and Sweep 5, particularly learning difficulties and other reading difficulties. This overlap is more striking if considered from the perspective of the other SENs, particularly at Sweep 4 where language difficulties are likely in 30-50% of children identified with other specific needs. Of the 599 children with SLN only 94 (17%) were identified as solely SLN, the other 505 (83%) had at least one co-occurring problem. At Sweep 5 the overlaps with SLN were reduced but still significant (50% had at least one co-occurring problem), particularly with learning difficulties and ASD.

Table 2. SLN identified by teacher by other identified needs, concurrently: Child at 7 and 11 years.

Percentages use the row N as the base but rows can sum to more than 100% because children can appear in more than one SEN category.

	SLN	ADHD	Behavioural problems	ASD	Learning Difficulties	Dyslexia	Other reading difficulties

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Sweep 4 (7 years)							
SLN N=559		5%	21%	10%	29%	6%	75%
ADHD N=80	36%		76%	23%	26%	8%	66%
Behaviour problems N=333	35%	18%		14%	23%	6%	71%
ASD N=115	50%	16%	41%		35%	4%	44%
Learning difficulties N=312	52%	7%	25%	10%		10%	84%
Dyslexia N=121	29%	5%	16%	3%	26%		69%
Other reading difficulties N=1409	30%	4%	21%	4%	19%	6%	
Sweep 5 (11 years)							
SLN identified N=299		6%	16%	14%	45%	14%	na
ADHD N=112	16%		63%	29%	32%	16%	na
Behavioural problems N=254	19%	28%		15%	32%	11%	na
ASD N=144	29%	22%	27%		31%	7%	na
Learning difficulties N=524	26%	7%	16%	9%		18%	na
Dyslexia N=303	14%	6%	9%	3%	31%		na

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3.2.2 Over time

Two thirds (66%) of children with SLN at Sweep 4 continued to have a reported SEN at Sweep 5 but less than half of those (31%) were still classified as SLN (Table 3). Of the 277 children with SLN at Sweep 4 for whom data were available at Sweep 5, classifications were: 94 no SEN (34%), 8 only SLN (3%); 78 classified as SLN with an additional need (28%); 97

(35%) were no longer classified SLN but identified with one or more of the following SEN, learning difficulties (*n* = 49), behaviour problems (*n* = 22), dyslexia, (*n* = 16), ASD (*n* = 16), ADHD (*n* = 13). Those with co-occurring SLN and another SEN at Sweep 4 (*n* = 222) were more likely to be classified SEN at Sweep 5 (*n* = 171, 77% of the co-occurrence group) than those with SLN alone at Sweep 4 (*n* = 55), of whom *n* = 12 (22% of the SLN only group) were classified SEN at Sweep 5.

Table 3. SLN identified by teacher at Sweep 4 followed up at Sweep 5.

The base for percentages is the N for the SEN type at Sweep 4.

SEN type at Sweep 4	SEN 5	SLN 5	ADHD 5	Behaviour problems 5	ASD 5	Learn diffs 5	Dyslexia 5
SLN 4 N=277	66%	31%	8%	14%	11%	34%	9%
ADHD 4 N=38	84%	16%	47%	45%	29%	26%	14%
Behaviour Problems 4 N=151	67%	18%	19%	32%	13%	20%	9%
ASD 4 N=54	89%	24%	22%	24%	70%	30%	4%
Learning diffs.4 N=137	83%	22%	12%	20%	13%	50%	13%
Dyslexia 4 N=60	78%	10%	2%	10%	2%	32%	32%
Other reading problems 4 N=662	62%	15%	5%	10%	5%	29%	13%

3.3 What predicts classification as SLN?

A logistic regression was conducted with teacher identified SLN at Sweep 4 as the dependent variable, controlling for the over-representation of areas of poverty and ethnic minority in the

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MCS sample (Table 4). Parent classification and cognitive measures at Sweep 2 and parental reports of ADHD, ASD and BAS Picture Similarity, Pattern Construction at Sweep 3 did not explain any variance in the models once the variables from Sweeps 3, 4 and 5 were added. As a result and because of collinearity with variables in later sweeps these measures were excluded from the regression models.

The final model of predictors of teacher identified SLN at Sweep 4 explained 38% of the variance (Nagelkerke R^2) (Table 4). All the variables in the final model were predictive except the demographic variables of poverty, maternal education, gender and being ethnically white/non-white. White versus non-white ethnicity was not statistically significant in any of the models. In bivariate analyses being white was significantly associated with lower levels of teacher identified SLN4 (white ethnicity SLN = 5.9%, non-white ethnicity = 7,7%; chi-square (1) = 4.95, p<.026), with higher NV3 scores (white ethnicity *M* = 55.7, *SD* = 10.3; non-white ethnicity *M* = 45.4, *SD* = 12.0; *t*(13507) = -40.81, p<.001, *d* = 0.97) but, in the opposite direction, with higher percentages of language problems reported by parents (white ethnicity parental reports of language concerns = 13.4%, non-white ethnicity = 11.0%; chi-square (1) = 8.61, p<.003). Poverty and maternal education ceased to be predictive when the contemporaneous cognitive and behavioural measures were introduced (see Table 4). Prior to the introduction of these variables, having a less well-educated mother and being poor predicted identification as SLN. As expected boys were more likely to be identified as SLN than girls but no longer remained significant once child's behaviour (SDQ) was added to the model. Parent reported diagnoses of ADHD or ASD no longer remained significant once Sweep 4 educational achievement variables were included. Parental identification of children's language problems and NV at five years old explained the majority of the overall variance (24%) and both were independently significant in the final model. Word reading

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(WR4) and Maths (Maths4) at seven years were both independently predictive, explaining a further 6.5% of variance and reported behavioural problems explained 2% of variance.

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Table 4 Factors predicting SLN identified by teacher at Sweep 4: Logistic regression (N=7354)

	Model 1				Model 2				Model 3				Model 4				Model 5			
	b	*SE*	*p*	*OR*	*b*	*SE*	*p*	*OR*	*b*	*SE*	*p*	*OR*	*b*	*SE*	*p*	*OR*	*b*	*SE*	*p*	*OR*
Poverty	0.90	.12	.001	2.45	0.63	.13	.001	1.88	0.61	.13	.001	1.84	0.29	.14	.036	1.34	0.25	.14	.077	1.28
Mat_Ed	-0.67	.17	.001	0.51	-0.35	.18	.058	0.71					-.112	.91	.558	0.89	-0.09	.19	.629	0.91
Gender	-0.79	.11	.001	0.45	-0.49	.12	.001	0.61	-0.46	.12	.001	0.63	-0.31	.13	.018	0.74	-0.21	.13	.120	0.81
Ethn_White	0.01	.20	.965	0.99	0.40	.23	.084	1.49	0.39	.23	.094	1.47	0.08	.24	.743	1.08	0.01	.24	.958	1.01
Lang3(p)					2.26	.12	.001	9.54	2.21	.12	.001	9.15	2.06	.13	.001	7.88	2.06	.13	.001	7.88
NV3					-0.08	.01	.001	0.93	-0.08	.01	.001	0.93	-0.05	.01	.001	0.95	-0.05	.01	.001	0.95
ADHD4(p)									0.76	.33	.023	2.14	0.39	.36	.288	1.47	-0.02	.37	.944	0.97
ASD4(p)									0.34	.35	.327	1.41	0.30	.37	.427	1.35	-0.01	.37	.999	1.00
WR4													-0.04	.01	.001	0.96	-0.04	.01	.001	0.96
Maths4													-0.07	.02	.003	0.93	-0.05	.02	.042	0.95
SDQ4(t)																	0.07	.01	.001	1.07
Nagelkerke R^2	.066				.301				.304				.366				.384			
Class. SEN	0%				11.9%				12.5%				23.1%				23.9%			

Mat_Ed=maternal education; Ethn_White; Lang3(p)=parental concerns over child's speech/language Sweep 3; NV3=naming vocabulary Sweep 3; ADHD4(p)=parental report of diagnosis of ADHD Sweep 4; ASD(p)=parental report of diagnosis of ASD Sweep 4; WR4=word reading Sweep 4; Maths4=maths test Sweep 4; SDQ4(t)=SDQ teachers Sweep 4.

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At Sweep 5 a similar logistic regression was conducted to explore variables predicting teacher identification of SLN with the addition of the measures of verbal similarities (VS5) and working memory assessed at Sweep 5 and teacher identification of SLN at Sweep 4 (Table 5).

The final model of predictors of teacher identified SLN at Sweep 5 explained 32% of the variance. As at Sweep 4, none of the demographic variables predicted SLN once other variables were included. Parental concerns about language and NV at Sweep 3 continued to independently predict SLN at Sweep 5, explaining 11% of the variance, though NV ceased to be significant once the concurrent cognitive measures (WR4, Maths4, VS5, SWM5) were included. WR4 and SWM5 explained an additional 10% of the variance but neither VS5 nor Maths4 were statistically significant predictors of SLN. Teacher identification of SLN at Sweep 4 improved the explanatory model slightly (2% of variance). Teacher SDQ no longer predicted any variance. The failure of VS5 to emerge as a significant predictor of SLN at 11 was investigated. In bivariate analyses it was significantly related to teacher identified SLN at 11 (no SLN $M = 59.28$, $SD = 9.5$; SLN $M = 50.0$, $SD = 13.2$; $t(7178) = 15.63$, $p<.001$, $d = 0.93$), however, it was also moderately correlated with NV3 (r (12040) = .391, p = .001) and with WR4 (r (12693) = .349, p = .001) and these two variables were predictive of SLN.

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Table 5. Factors predicting SLN identified by teacher at Sweep 5: Logistic regression (N=3757)

	Model 1				Model 2				Model 3				Model 4				Model 5				Model 6			
	b	*SE*	*p*	*OR*	*B*	*SE*	*p*	*OR*	*B*	*SE*	*p*	*OR*	*B*	*SE*	*p*	*OR*	*B*	*SE*	*p*	*OR*	*B*	*SE*	*p*	*OR*
Poverty	0.79	.24	.001	2.21	0.43	.26	.091	1.54	0.42	.26	.106	1.52	0.04	.27	.889	1.04	0.13	.30	.654	1.14	0.20	.30	.516	1.22
Mat_Ed	-0.80	.35	.022	0.45	-0.44	.36	.217	0.64	-0.40	.36	.261	0.67	0.03	.38	.945	1.03	0.06	.38	.869	1.06	0.14	.38	.720	1.15
Gender	-0.87	.23	.001	0.42	-0.66	.24	.006	0.52	-0.57	.24	.020	0.57	-0.34	.25	.178	0.71	-0.26	.26	.304	0.77	-0.20	.26	.438	0.82
Ethn_White	-0.06	.37	.876	0.94	0.29	.40	.469	1.34	0.28	.40	.483	1.33	-0.06	.44	.888	0.94	-.014	.45	.760	0.87	-0.11	.45	.815	0.90
Lang3(p)					1.52	.23	.001	4.55	1.42	.24	.000	4.13	1.27	.25	.000	3.56	1.24	.25	.001	3.45	0.93	.28	.001	2.53
NV3					-0.06	.01	.001	0.94	-0.06	.01	.000	0.94	-0.02	.01	.161	0.98	-0.02	.01	.144	.98	-0.01	.01	.343	0.99
ADHD4(p)									1.16	.53	.029	3.18	0.47	.57	.412	1.60	.036	.57	.527	1.43	0.29	.58	.611	1.34
ASD4(p)									1.00	.60	.097	2.72	0.98	.60	.103	2.67	0.76	.61	.212	2.14	0.76	.64	.233	2.13
WR4													-0.04	.01	.000	0.96	-0.04	.01	.001	0.96	-0.04	.01	.001	0.96
Maths4													-0.09	.045	.067	0.92	-9.09	.05	.069	0.92	-0.08	.05	.098	0.93
VS5													0.02	.01	.002	1.02	-0.01	.01	.237	.99	-0.01	.01	.491	.99
SWM5													-0.02	.01	.131	0.98	0.02	.01	.006	1.02	.02	.01	.007	1.02
SDQ5(t)																	0.04	.02	.053	1.04	.04	.02	.072	1.04
SEN4(t)																					1.53	.30	.001	3.06
Nagelkerke R^2	.073				.185				.196				.296				.300				.317			
Class. SEN	0%				1.1%				4.4%				9.9%				9.9%				11.0%			

Mat_Ed=maternal education; Ethn_White; Lang3(p)=parental concerns over child's speech/language at Sweep 3; NV3=naming vocabulary Sweep 3; ADHD4(p)=parental report of diagnosis of ADHD Sweep 4; ASD(p)=parental report of diagnosis of ASD Sweep 4; SEN4(t)=SEN identified by teacher Sweep 4; WR4=word reading Sweep 4; Maths4=maths test Sweep 4; SWM5=spatial working memory Sweep 5; VS5=verbal similarities Sweep 5; SDQ5(t)=SDQ teachers Sweep 5; SLN4(t)=teacher identification of SLN Sweep 4.

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3.4 Teacher identification of SLN and additional SEN teaching support

At Sweep 5 teachers reported that 21.8% (1537) of all the pupils from England for whom data were available (7058) received additional SEN support. Eighty-four percent of the pupils identified with SLN received additional support (247 of 294) rising to 90% if they had an additional SEN. This compares with 71% (1000) of all SEN pupils (1418) who received additional support.

4 Discussion

Using a longitudinal birth cohort study the identification of SLN by teachers at ages seven and 11 was examined. Prevalence rates were consistent with those reported for England nationally as were overall levels of identified SEN. Rates at age seven were similar to smaller clinical studies, however, by age 11 this number had significantly reduced, with over 60 per cent of children identified at seven with SLN being categorised with a different special educational need. This is consistent with data from the national pupil database, where the highest rates are at school entry and decrease throughout elementary school (Dockrell et al., 2014), but contrasts markedly with the clinical research literature where language difficulties are reported to be stable from this point. Children's language difficulties may be less evident in educational settings for a number of reasons. Firstly, there are there are limited reliable and valid measures to benchmark children's language development at this point, making it difficult to distinguish typical from atypical performance (Schmitt, Logan, Tambyraja, Farquharson, & Justice, 2017). Moreover, by this point in a child's development educational systems do not prioritise oracy skills (Mercer, Warwick, & Ahmed, 2017). Indeed, teachers report being less confident about what constitutes oracy skills in comparison with literacy skills, noting they do have the skills necessary to assess oral language. Finally, difficulties may become less visible because, although relative language trajectories remain the same,

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raw scores necessarily change. These absolute changes in language ability may detract from identification of language problems, leading these difficulties to be of less concern and overshadowed by other developmental difficulties.

Reporting that children only experienced an SLN was infrequent at seven (17%) though somewhat more common at 11 (50%). However, co-occurrence with other special needs was common with the majority of seven year olds with SLN experiencing difficulties with reading and a significant minority with learning difficulties. By 11 years, the reduced co-occurrence of SLN was consistent with significantly fewer children being identified with SLN, the largest co-occurring need reported to be learning difficulties. This adds weight to the argument that using categorical models to manage the education of children with SLN is problematic.

The shift between seven and 11 to other areas of need is also of significance. It is well established that children with language difficulties experience problems with literacy, mathematics and learning generally. This is not surpising given the key role oral language skills play in learning and social engagement. For example, the relationship between reading and language is clearly articulated in the Simple Model of Reading (Gough, 1996), which proposes that reading comprehension, is a combination of word reading efficiency and language comprehension. The role of vocabulary is also an important feature in intervention for older children with reading difficulties (Clarke, Snowling, Truelove & Hulme, 2010; Oakhill, Cain & Elbro, 2014). These other educational challenges may detract from teachers' awareness of the role than oral language plays in learning and the value of prioritising oral language in the classroom.

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Regression models revealed that children's language at five years, both as reported by parents and as measured by cognitive assessment of vocabulary, were the most powerful predictors of teacher identified SLN at seven and 11, followed by measures of reading and maths at seven. At age 11, vocabulary levels at five years failed to explain any unique variance once reading was accounted for, as would be predicted given the intertwined relationship between language and reading. Consistent with previous research (Dockrell, Ricketts, & Lindsay, 2012; Law, Rush, King, Westrupp & Reilly, 2017), being socially disadvantaged predicted the identification of SLN, as did gender. However, these demographic variables were mediated by cognitive and behavioural factors as neither at seven or 11 years were they significant once these factors were accounted for. At seven years teacher rated behaviour problems accounted for the effects of disadvantage and gender. At 11 years disadvantage was not a significant predictor of SLN once language at five years included. So disadvantage was important but the more proximal measures of language were more important. The impact of ethnicity (white versus non-white) further highlights the important role ethnicity can play in SENs (Strand & Lindsay, 2009). Being of non-white ethnicity significantly predicted both lower vocabulary scores at five and teacher identification of SLN at seven. However, once poverty and maternal education were accounted for ethnicity was no longer a significant predictor of SLN. In contrast to the cognitive tests and teacher judgement, parents of non-white ethnicity reported significantly fewer concerns about their children's language than white ethnicity parents. This may be due to differences in parental reference groups for what constitutes problematic language development. The failure of VS5 to emerge as a significant predictor of SLN at 11 was surprising given its purported claim to measure 'verbal knowledge and verbal reasoning'. It was significantly associated with SLN at 11, but not once vocabulary at five and reading at seven were accounted for.

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The prevalence of parents with concerns about their child's speech and language development is substantial, with estimates of about one fifth of parents in the U.K. (Hall & Elliman, 2003). Yet, many parents report that professionals were dismissive about their concerns (Lindsay & Dockrell, 2004; Rannard, Lyons, & Glenn, 2004). The current regression analyses demonstrate that, on the whole, parents are indeed accurate assessors of their children's language learning needs, confirming their important role in identification of the children's needs. However for a significant proportion, despite very low language skills, parents did not report any concern and whilst the reasons behind this are unclear the issue of reference groups may be important. The accuracy of parental reports is likely to be improved by applying criterion referenced questions of language competencies (Bishop & MacDonald, 2009).

Schools need to be knowledgeable about these possibilities and responsive to these changes so that appropriate resources are accessed. A high proportion of children identified with SLN were receiving additional help, signalling the importance of identification for the resource allocation. However, the nature of that support is unknown. Flexible systems reflect the reality of children's development but raise challenges for commissioning of services and supporting learning in schools. To do this accurately it is important to consider identification, intervention, and the impact of language learning needs. This paper raises the question of whether teachers observe language difficulties in older children and the absence of a measure of language in the MCS at 11 may reflect a perception that children grow out of language difficulties. Difficulties with speech language and communication are not solely a concern for young children. They are of considerable importance as young people, particularly the most vulnerable, seek to enter the adult world. For example, SLCNs are apparent in 60-90% of young people in youth offending institutions (Hughes, Williams, Chitsabean, Davies & Mounce, (2012).

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4.1 Limitations

Results need to be considered within the context of the study limitations. The MCS had no measure of language available beyond the age of five years. Measures beyond this point would have allowed a more detailed analysis of pattern of need. The measure of parental concern at five years was limited; details of specific language competencies would have improved the measure. The classification of ethnicity did not allow more nuanced analyses of pattern of need. Finally, given the large population sample, the analysis strategy adopted was to make maximum use of available data resulting to analyses having differing sample sizes.

4.2 Conclusion

Teachers need to be able to identify children's current language levels relative to expected levels. Poor language skills put children at risk of academic failure (Beitchman, et al., 1996), social emotional difficulties (Lindsay & Dockrell, 2012), unemployment (Law, Rush, Schoon, & Parsons, 2009) and poorer mental health in adulthood (Schoon, Parsons, Rush, & Law, 2010). The current data suggests that teachers are less sensitive to language problems in late elementary school and co-occurrence of SLN with other special needs is commonplace. Language problems at five were predictive of language, literacy and learning problems in late elementary school and should be assessed as routine practice. .

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