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## Emotional and behavioural function in children with language problems- a longitudinal, population- based study

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### ABSTRACT

This longitudinal, population-based study investigated associations between language problems (LP) and emotional and behavioural difficulties (EBD). Parents and teachers gave information about LP and EBD when the children were 7–9 (T1) and 11–13 years old (T2). Self-reports of EBD were included at T2. In line with findings from clinically referred samples, children with LP scored higher than controls on all measures of EBD at both time-points. A subgroup with persistent LP showed more severe EBD than a subgroup with transient LP. Hyperactivity and peer problems at T1 were significantly associated with the risk of persistent LP. Boys in the persistent subgroup had more severe behaviour problems as reported by all informants, whereas self-reports revealed more severe emotional problems in girls with LP. The profound and consistent reports across informants of EBD in children with LP emphasise the importance of providing both mental health and language support in childhood as well as in adolescence. Addressing symptoms associated with Attention Deficit Hyperactivity Disorder and social problems may be of especial importance to improve LP outcome. The complexity of problems encountered underlines the need for a combined expertise and multidisciplinary approach to language impairment in youth.

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Language is vital for interacting with others, for regulating emotions, behaviours, and for academic function. Children with language problems (LP) are thus prone to face challenges in several aspects of their lives (Durkin et al. 2017; Wadman, Durkin, and Conti-Ramsden 2011), with a particular high risk for emotional and behavioural difficulties (EBD) (Curtis et al. 2018; Botting et al. 2016a). Assessment and remediation of childhood LP should therefore be prioritised. Studies and clinical work are, however, challenged by the lack of agreement about how to define childhood LP and what terminology to use (Bishop et al. 2017; Botting, Bean-Ellawadi, and Williams 2016). Terms commonly used include language impairment, specific language impairment, developmental language disorder and language difficulties. In the present study, we use LP as a general term to cover different types and severity levels of impairments affecting language function.

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LP is estimated to affect approximately 7% of the child population worldwide (Hollund-Møllerhaug 2010; Norbury et al. 2016; Tomblin et al. 1997) and is most commonly identified in preschool. At least 50% of childhood cases have a persistent course (Botting et al. 2016b; Clegg et al. 2005; Leonard 2014), and several studies have documented that LP is associated with emotional, behavioural and peer problems in older age (Beitchman and Brownlie 2005–2010; Conti-Ramsden et al. 2013; Helland et al. 2014; Mok et al. 2014; Valera-Pozo et al. 2020; Yew and Kearney 2013). Lindsay and Dockrell (2012), using the Strengths and Difficulties Questionnaire (SDQ; Goodman 1999) to assess EBD, found that while emotional problems and hyperactivity decreased into adolescence, the severity level of peer problems and conduct problems increased. Other studies have supported an age-related increase in peer problems (e.g. St Clair et al. 2011) and behavioural problems (Puglisi et al. 2016), and the importance of hyperactivity has been emphasised in studies of both children and adolescents with LP (Helland, Helland, and Heiman 2014; Pickles et al. 2016). Various explanations have been suggested to account for associations between LP and EBD. LP may impair childrens' abilities to regulate their emotions leading to frustration and anger negatively affecting interaction with peers; inattention and hyperactivity may contribute to LPs; the two conditions coexist and influence each other, and EBD and LP may share an underlying deficit that may explain their links (Gillberg 2010; Haratas 2012). Others have pointed to common risk factors for LP and EBD, e.g. neurological diseases (Caplan 2019) and migration (Bhugra 2004). Finally, various combinations of these explanations are both possible and likely, due to the dynamical interactions between LP and EBD in the individual child.

Methodological differences challenge comparisons between results from different studies of LP and EBD, including the already mentioned lack of consensus about terminology and definitions of childhood LP (Bishop et al. 2017; Botting, Bean-Ellawadi, and Williams 2016). Furthermore, for both LP and EBD, the choice of informant has a profound effect on results due to contextual and perceptual factors (Aebi et al. 2017; De Los Reyes, Kudney, and Wang 2011). The importance of including more than one informant was illustrated by Sargisson, Stanley, and Hayword (2016), showing that self-reports were more valid for emotional problems than teacher and parent reports, and that self-reports overall were more in line with reports from parents than teachers. The inclusion of gender imbalanced samples may represent another challenge, in that several studies have shown that boys tend to be reported with more externalising symptoms than girls, who tend to be reported with more severe internalising symptoms (Bøe et al. 2016; Capron, Theron, and Duyme 2007; Conti-Ramsden and Durkin 2016; Muris, Meesters, and van den Berg 2003; Redmond 2016; Rescorla et al. 2007; Rytioja, Lappalainen, and Savolainen 2019; Rønning et al. 2004; Sargisson, Stanley, and Hayword 2016). Yet another source of bias in LP research comes from the use of clinical samples, providing results that are more valid for the most severe cases than the heterogeneous group of individuals with LP. Finally, most studies apply a cross-sectional design, even though longitudinal studies are necessary to reveal more complex relationships between LP and EBD.

Taken together, the challenges referred to above motivated the present longitudinal study to investigate LP and EBD in a population based and gender balanced sample. In the present study the term LP refers to children with problems affecting different aspects of language function. LP and EBD were defined from parent and teacher reports when the children were 7–9 years (T1) and 11–13 years (T2) old, and information from self-reports of

EBD was added at T2. The longitudinal pathway of childhood LP was defined as either persistent or transient. Finally, we explore the impact of gender, informant and different aspects of EBD on the persistent vs. transient LP pathways.

## Method

### *Participants and procedures*

Data in the present study were derived from the Bergen Child Study (BCS). The BCS is a longitudinal population-based study of child mental health and development. In the first wave of the BCS a broad range of mental health problems were assessed through a screening questionnaire, including the SDQ (Goodman 1999) and four language-related items, completed by parents and teachers of 9430 children aged 7–9 years. The same questionnaire was administered in the second wave four years later, when the children were 11–13 years old, including parent, teacher and self-report forms. The present study included all children with corresponding parent and teacher reports in both waves ( $n = 3618$ ). Questionnaires missing any of the language items and children having Norwegian as a second language were excluded ( $n = 108$ ), giving a final sample of 3510 children (1664 boys). The study was approved by the Western Regional Committee for Medical and Health Research Ethics, University of Bergen. For more information, see <http://uni.no/en/bergen-child-study> and e.g. (Stormark et al. 2008).

### *Study measures*

#### *Definition of language problems (LP)*

LP was defined from parent and teacher reports on the following four items assessing different aspects of language function (phonology, expressive language, receptive language, and pragmatics) in a given child: 1. *cannot pronounce certain words or sounds*; 2. *cannot elaborate, explain, or express himself or herself*; 3. *has difficulties understanding things that are being said*, and 4. *has difficulties having a conversation with others*. The items were scored on a three-point scale (0 = not true, 1 = somewhat true, 2 = certainly true) and both parents, who observe their child across different settings, and teachers, who are expected to detect language problems interfering with the child's academic success, are expected to be reliable informants. Parents' and teachers' reports were summed, and a child was defined as having LP if he/she obtained a sum score of 2 or higher on this language composite score. This corresponds to 'partly true' on at least two items and 'certainly true' on at least one item. By this, the definition includes both children with a severe language problem within one and children with a somewhat less severe problem within at least two aspect of language function.

#### *Definition of EBD*

Emotional and behavioural difficulties were defined from the SDQ completed by parents and teachers at T1 and T2. Self-reported information from the youth was included at T2. SDQ is a brief screening questionnaire for emotional and behavioural problems covering the age range of 4–16 years. The questionnaire is extensively validated in various countries, including Norway (Muris, Meesters, and van den Berg 2003; Obel et al. 2004).

Psychometric properties for the various scales are shown to be satisfactory, with mean internal consistency values of 0.70 (Cronbach's alphas) and test-retest stability showing intraclass correlation coefficients of 0.70 or higher (Muris, Meesters, and van den Berg 2003). A previous study from the BCS reports Chronbach's alphas ranging from 0.61 to 0.75 (Sanne et al. 2009). In the present sample Chronbach's alphas for the separate subscales were as follows: emotional problems .66, conduct problems .54, hyperactivity/inattention .73, peer problems .59 and pro-social behaviour .64. Separate versions for parents, teachers and self-reports for children/youth are available. The questionnaire contains 25 items, each scored on a three-point scale (0 = not true, 1 = somewhat true, 2 = definitely true). SDQ is divided into five subscales with five items in each subscale. Problems related to emotions, conduct, hyperactivity/inattention and peers are assessed by the first four scales, while prosocial behaviour is assessed by the fifth scale. A total difficulties score (the total SDQ score) is calculated as the sum of the first four problem subscales and has a range from 0–40. Higher scores indicate more severe problems on all subscales, except for the prosocial behaviour subscale, which is inverted.

### Statistical analyses

Group differences were analysed using Student's independent samples *t*-test (two tailed) with an alpha level of 0.05. Effect sizes (Cohen's *d*) were evaluated according to the guideline where a *d* of 0.20 is considered to be small, 0.50 moderate and 0.80 large. Correlations between informants were calculated according to the Pearson *r* formula. A paired sample *t*-test was run to explore the stability of EBD over time (from T1 to T2), added by a logistic regression analysis to investigate the total and relative contributions (derived from the statistical model) from gender and the SDQ problem subscales on the likelihood of youth preserving the LP status from T1 to T2.

## Results

### Language function at T1 and T2

Results from the first wave (T1) were used to define a group with LP ( $n = 311$ ; 214 boys) and a control group (CO) without LP ( $n = 3199$ ; 1450 boys). The LP group scored significantly higher (more impaired) than the CO group on the language composite score at both time points (Table 1). At T2, two LP subgroups were defined, one showing persistent LP ( $n = 149$ ; 98 males) (LP both at T1 and at T2) and a second group showing transient LP ( $n = 162$ ; 116 males) (LP at T1 but not at T2). The language composite score at

**Table 1.** Means and standard deviations for the Language composite at both time points.

	LP-group ( $n = 311$ )	CO-group ( $n = 3199$ )	<i>p</i>
	M (SD)	M (SD)	
Language composite (T1)	3.68 (2.33)	0.09 (0.29)	*
Language composite (T2)	2.33 (2.69)	0.20 (0.70)	*

LP = language problems, CO = Control group, \* =  $p < .001$  Student's independent samples *t*-test

T2 ranged between 2–15 in the persistent group and between 0–1 in the transient group (57 children scored 1).

**Emotional and behavioural difficulties in children with LP – cross-sectional**

Significant group differences were evident for all SDQ subscales, with the LP group being impaired relative to the CO group (Table 2) both as reported by parents and by teachers. Effect sizes at T1 were large for the total SDQ score and for the hyperactivity/inattention subscale and moderate for the emotional, conduct, and peer problems subscales (all *p*'s < .001, Table 2). The correlation between the parents and teachers on the total SDQ score was statistically significant in the total sample (*r* = .47, *p* < .001).

The effect sizes for the total SDQ score at T2 were large both as reported by parents and teachers and medium as reported by youth, whereas effect sizes were small for the prosocial behaviour subscale across all three informants.

**EBD stability over time**

Table 3 shows the SDQ ratings at the two time-points. Parents reported significantly lower total SDQ score at T2 than at T1 in both the LP and the control group (CO), while teachers only reported lower score at T2 than T1 in the LP group.

When inspecting the SDQ subscales in the LP group, both informants showed that emotional problems, peer problems and prosocial skills remained stable, while the scores

**Table 2.** Means and standard deviations for SDQ scales for the LP group (n = 311) and the CO group (n = 3199) for parents (T1 & T2), teachers (T1 & T2) and youth self – reports (T2) (higher scores indicate impairment except for the pro-social scale which is inverted).

	T1			T2		
	LP group	CO group	<i>d</i>	LP group	CO group	<i>d</i>
	M (SD)	M(SD)		M(SD)	M(SD)	
<b>Parents</b>						
Emotional	2.12 (2.26)	1.06 (1.47) *	0.56	1.91 (2.05)	1.01 (1.53) *	0.50
Conduct	1.54 (1.76)	0.74 (1.05) *	0.55	1.29(1.50)	0.67 (0.99) *	0.49
Hyperactivity/inattention	4.33 (2.70)	2.25 (1.82) *	0.90	3.85 (2.55)	1.96 (1.79) *	0.86
Peer problems	1.98 (2.10)	0.64 (1.78) *	0.60	2.04 (2.30)	0.78 (1.34) *	0.67
Prosocial behaviour	8.03 (1.72)	8.64 (1.42) *	-0.39	7.95 (1.93)	8.74 (1.39) *	-0.47
Total SDQ score	9.97 (6.67)	4.68 (3.75) *	0.98	9.08 (6.38)	4.42 (3.89) *	0.88
<b>Teachers</b>						
Emotional	1.41 (1.85)	0.47 (1.12) *	0.61	1.45 (2.05)	0.53 (1.24) *	0.54
Conduct	1.20 (1.66)	0.42 (0.96) *	0.58	0.90 (1.45)	0.39 (0.96) *	0.41
Hyperactivity/inattention	4.04 (2.95)	1.67 (1.92) *	0.95	3.43 (2.76)	1.58 (2.03) *	0.76
Peer problems	1.62 (2.23)	0.51 (1.10) *	0.63	1.72 (0.60)	0.60 (1.25) *	1.14
Prosocial behaviour	7.54 (2.40)	8.74 (1.76) *	-0.57	7.80 (2.19)	8.73 (1.78) *	-0.47
Total SDQ score	8.27 (6.42)	3.07 (3.47) *	1.01	7.51 (6.33)	3.11 (3.93) *	0.84
<b>Youth self-reports</b>						
Emotional				2.34 (2.03)	1.47 (1.66) *	0.47
Conduct				1.51 (1.43)	0.94 (1.56) *	0.38
Hyperactivity/inattention				3.63 (2.29)	2.34 (1.94) *	0.61
Peer problems				2.01 (1.87)	0.92 (1.31) *	0.68
Prosocial behaviour				7.98 (1.77)	8.55 (1.46) *	-0.35
Total SDQ score				9.50 (5.61)	5.55 (4.92) *	0.73

SDQ = Strengths and Difficulties Questionnaire; LP = language problems; CO = control

\**p* < 0.001; Student's independent samples t-test

**Table 3.** Change in SDQ scores from T1 to T2 reported by parents and teachers in the LP group (n = 311) and in the CO group (n = 3199) LP group CO group.

	Rater	LP group							CO group						
		T1		T2		t	df	p	T1		T2		t	df	p
		M	SD	M	SD				M	SD	M	SD			
Emotional	P	2.12	2.26	1.91	2.05	1.86	310	.064	1.06	1.47	1.01	1.53	1.66	3197	.970
	T	1.40	1.85	1.45	2.05	-.41	309	.684	0.47	1.11	0.53	1.24	-2.38	3197	.018
Conduct	P	1.54	1.76	1.29	1.50	2.98	310	.003	0.74	1.05	0.67	0.99	3.49	3196	.000
	T	1.21	1.66	0.90	1.46	3.60	309	.000	0.42	0.96	0.39	0.96	1.46	3198	.145
Hyperactivity/ inattention	P	4.33	2.70	3.85	2.55	4.02	310	.000	2.25	1.83	1.96	1.79	9.57	3138	.000
	T	4.04	2.95	3.43	2.80	4.09	310	.000	1.67	1.92	1.58	2.03	2.56	3196	.011
Peer problems	P	1.98	2.19	2.04	2.30	-.50	310	.618	0.64	1.18	0.78	1.34	-5.40	3195	.000
	T	1.63	2.23	1.72	2.26	-.69	309	.493	0.51	1.20	0.60	1.25	-3.68	3198	.000
Prosocial	P	8.03	1.72	7.96	1.93	.78	310	.437	8.64	1.42	8.74	1.39	-3.93	3198	.000
	T	7.53	2.40	7.81	2.19	-1.81	309	.072	8.74	1.75	8.73	1.78	-.51	3197	.611
Total SDQ score	P	9.97	6.67	9.08	6.38	3.11	310	.002	4.68	3.75	4.42	3.89	4.13	3193	.000
	T	8.28	6.43	7.51	6.33	2.28	309	.023	3.07	3.47	3.11	3.93	-.51	3195	.611

P = parent; T = teacher; SDQ = Strengths and Difficulties Questionnaire; LP = language problems; CO = control, Paired sample t-test; higher scores indicate impairment except for the pro-social scale which is inverted.

on the conduct problems and hyperactivity/inattention subscales were lower at T2 than at T1. A more diverse picture was evident in the CO group. While parents and teachers reported lower scores at T2 on the hyperactivity/inattention subscale and higher scores on the peer problems subscale, ratings of emotional problems, conduct problems and prosocial behaviour differed among the informants (Table 3).

For the total SDQ score, the correlation between parents and youth were  $r = .62$ , between parents and teachers  $r = .52$  and between teachers and youth  $r = .45$ . All these correlations were statistically significant ( $p = <.001$ ).

### Persistent and transient LP

Among the 311 children identified with LP at T1, 149 (47.9%) showed persistent LP at T2 (Table 4). All three informants reported the group with persistent LP as significantly impaired relative to the group with transient LP on all SDQ subscales, except for the prosocial behaviour subscale, where no significant difference was evident according to youth self-reports.

For parents and teachers, effect sizes ranged from small (conduct problems, prosocial behaviour) to large (total SDQ score) and for youth from small (all subscales) to medium (total SDQ score).

Logistic regression analyses were conducted separately for teacher and parent reports. In both analyses, the persistent/transient LP status was included as the outcome variable. Gender was included as an independent variable in a first step, followed by the scores on the four SDQ subscales reported at T1: emotional problems, conduct problems, hyperactivity/inattention, and peer problems. The analysis of parent reports showed that the model including all independent variables was statistically significant ( $\chi^2(5) = 23.87$ ;  $p < .001$ ). When the independent variables were evaluated separately, only two variables made a statistically significant model derived unique contribution: parent reported hyperactivity/inattention and peer problems. See Table 5.

**Table 4.** Means and standard deviations for SDQ scales at T2 for parent, teacher and youth self-reports for the persistent LP and the transient LP groups.

		Persistent LP (n = 149)		Transient LP (n = 162)	
		51 girls/98 boys		46 girls/116boys	
		M (SD)	M (SD)		d
<b>Parents</b>	Emotional	2.49 (2.29)	1.37 (1.64) ***		0.56
	Conduct	1.64 (1.58)	0.96 (1.35) ***		0.46
	Hyperactivity/inattention	4.66 (2.70)	3.10 (2.16) ***		0.64
	Peer problems	2.98 (2.55)	1.17 (1.61) ***		0.85
	Prosocial behaviour	7.50 (2.14)	8.36 (1.60) ***		-0.46
	Total SDQ score	11.78 (6.67)	6.60 (4.46) ***		0.92
<b>Teachers</b>	Emotional	2.12 (2.17)	0.83 (1.71) ***		0.66
	Conduct	1.10 (1.70)	0.71 (1.19) *		0.27
	Hyperactivity/inattention	4.28 (2.73)	2.65 (2.55) ***		0.69
	Peer problems	2.48 (2.53)	1.01 (1.70) ***		0.68
	Prosocial behaviour	7.39 (2.47)	8.19 (1.83) **		-0.36
	Total SDQ score	9.98 (6.42)	5.22 (5.33) ***		0.81
<b>Youth</b>	Emotional	2.69 (2.10)	2.02 (1.19) **		0.39
	Conduct	1.72 (1.47)	1.32 (1.37) *		0.28
	Hyperactivity/inattention	4.15 (2.14)	3.15 (2.32) ***		0.45
	Peer problems	2.46 (1.98)	1.60 (1.66) ***		0.47
	Prosocial behaviour	7.81 (1.88)	8.13 (1.65)		-0.18
	Total SDQ score	11.03 (5.47)	8.07 (5.38) ***		0.55

SDQ = Strengths and Difficulties Questionnaire; LP = language problems

\*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ ; Student's independent samples t-test; higher scores indicate impairment except for the pro-social scale which is inverted.

**Table 5.** Logistic regression analysis predicting the contribution of gender and SDQ scales on the likelihood of adolescents preserving the LP status from T1 to T2.

	B	S.E.	Wald	df	Sign.	Exp(B)	95% C.I for Exp(B)	
							Lower	Upper
Gender	-.34	.26	1.71	1	.19	.72	.43	1.18
Emotion	.09	.26	2.16	1	.14	1.10	.97	1.24
Conduct	-.12	.06	2.22	1	.14	.88	.75	1.04
Hyperactivity/inattention	.13	.08	5.72	1	.02	1.14	1.02	1.27
Peer problems	.13	.06	4.20	1	.04	1.14	1.01	1.30

SDQ = Strengths and Difficulties Questionnaire; LP = language problems

The model as a whole explained 9.9% (Nagelkerke  $R^2$ ) of the variance in the outcome variable. According to teacher reports, none of the predictors made a statistically significant model derived unique contribution to explain the classification into a persistent or transient subgroup.

### Gender differences

Parents reported no significant gender differences on any of the SDQ subscales in the LP group at T1 whereas teachers reported boys with significantly higher scores than girls on the conduct problems and hyperactivity/inattention subscales and lower scores on the prosocial behaviour subscale. At T2 parents and teachers reported boys in the LP group as significantly more impaired than girls on the prosocial behaviour subscale, and teachers rated boys significantly more impaired than girls on the hyperactivity/inattention subscale. Looking into the LP subgroups (persistent/transient) at T2, both parents and

teachers rated boys with persistent LP as more impaired than the girls on the hyperactivity/inattention subscale (parents  $t(147) = -2.26$ ;  $p < .05$ ; teachers  $t(147) = -2.27$ ;  $p < .05$ ). Additionally, teachers' ratings showed close to significant differences between the LP subgroups (persistent/transient) on the conduct problems and prosocial behaviour subscales ( $p = .05$  for both scales), with boys being more impaired than girls. In the group with transient LP, boys were rated by teachers as more impaired than girls only on the prosocial behaviour subscale,  $t(159) = 2.0$ ;  $p < .01$ . According to self-reports, boys with persistent LP scored themselves as more impaired than girls on the conduct problems subscale ( $t(146) = -2.09$ ,  $p < .05$ ) and on the prosocial behaviour subscale ( $t(146) = 3.09$ ;  $p < .01$ ). Girls scored themselves as more impaired than boys on the emotional problems subscale both in the persistent ( $t(145) = 2.83$ ;  $p < .01$ ) and transient LP group ( $t(157) = 3.01$ ;  $p < .01$ ). No other significant gender difference was reported in the transient LP group.

## Discussion

Children with language problems (LP) were significantly impaired relative to their peers without LP (the CO group) both at age 7–9 years (T1) and at age 11–13 years (T2) on all selected measures of emotional and behavioural difficulties (EBD). Furthermore, children with persistent LP were reported to have more severe EBD than children with transient LP. Logistic regression analysis showed that parent reports of hyperactivity/inattention and peer problems at T1 increased the risk of persistent LP from T1 to T2. Gender differences were reported on behavioural problems measures for the persistent LP subgroup, with more severe problems in boys as reported by all informants, whereas self-reports revealed more severe emotional problems in girls than in boys in both groups. The correlations between parents and teachers were moderate, and stronger between parents and youth than between teachers and youth.

Consistent with findings reported by Conti-Ramsden et al. (2013), the youth in our LP group reported problems across a wide range of areas known to affect mental health. The close relation between LP and EBD was emphasised by being reported both by parents, teachers as well as by the youth themselves and is consistent with findings in previous studies (Charman et al. 2015; Puglisi et al. 2016). Overall, the results support that EBD is not restricted to family or school settings, and that emotional and behavioural difficulties (EBD) are identified by the youth as well as by their parents and teachers.

The longitudinal design of the present study offered data showing the significance of the relation between LP and EBD over time. Parent reported hyperactivity/inattention and peer problems assessed by the SDQ subscales at T1 predicted persisting LP four years later. Although the results are not sufficient to claim causal relationship between EBD and persistent LP, our findings align well with studies reporting associations between language impairment and hyperactivity/inattention problems (Beitchman and Brownlie 2005–2010; Helland; Helland, , and Heiman 2014; Redmond 2016) and indicates that symptoms associated with Attention Deficit Hyperactivity Disorder (ADHD) should be assessed and addressed when detecting early childhood LP. Assessing social difficulties is also important, as indicated by the prediction of persistent LP by parent reported peer problems. It would for example be important to identify the subgroup with LP and comorbid autism spectrum disorders (ASD) or traits, in that those children are expected

to show the most persistent and severe problems (Hagberg, Miniscalco, and Gillberg 2010; Helland 2014; Tager-Flusberg 2006).

Parent reports furthermore suggested that both the LP and the CO group experienced significant decrease in overall problem severity from childhood to adolescence. This finding was partly consistent with the results reported by St Clair et al. (2011), who found non-significant decrease in overall problems from age 7 to age 16 years in a follow up study of individuals with a history of language impairment. While findings of decreased level of hyperactivity and conduct problems were consistent with findings in this and the Lindsay and Dockrell (2012) study, emotional problems from childhood to adolescence in our LP group were more stable over time. We assume that these conflicting results may reflect sample differences. Our LP group was part of a population-based sample, characterised by lower problem severity than the samples in the aforementioned study. Furthermore, the stable peer problems from childhood into adolescence in our LP group contrasted previous findings. We speculate if an older age of participants in previous studies may reflect an age-related increase in demands regarding peer relations in later adolescence. It should, however, be emphasised that peer problems were still prominent at T2 and that adolescents with LP were significantly more impaired than controls in the present study. Taken together, our study thus supports that peer relations are vulnerable in youth with LP.

The difference between participants with a persistent and transient LP is another important contribution of our longitudinal study. All three informants reported that the persistent LP group was significantly more impaired than the transient LP group on all the assessed features of EBD, with one exception. Prosocial behaviour was at the same level in both groups, in accordance with findings presented by Wadman, Durkin, and Conti-Ramsden (2011). They showed that the majority of youth with language impairment perceive themselves as having as good social skills as their peers. Furthermore, as pointed out in two recent studies (Helland and Helland 2017; Toseeb et al. 2017), pro-sociality may be considered as a strength of individuals with LP.

According to parents, EBD was not significantly different between boys and girls within the LP group at T1. Both parents and teachers did however report that boys were significantly more impaired on the hyperactivity/inattention subscale in the persistent LP subgroup at T2. Furthermore, teachers rated boys in the persistent LP subgroup to be more impaired on the conduct problems and prosocial behaviour subscales than girls. In the transient LP group, gender differences were only reported on the prosocial behaviour subscale, again with boys being more impaired than girls. Previous research has indicated a consistent gender-related bias, especially in teacher reports (Collishaw et al. 2009), where mental health problems in girls tend to be overlooked. Studies have shown that both parents and teachers tend to systematically underestimate behaviour problems in girls (Meyer, Stewenson, and Songua-Barke 2020). Girls may thus face a gender barrier towards receiving appropriate help for externalising problems at all levels but are especially at risk for not receiving help when relaying uniquely on teachers as informants (Posserud and Lundervold 2013). The higher teacher ratings for boys on conduct problems at T2 could hence likely represent an informant bias. Previous studies have also found the same pattern across informants as in the present study, with teachers rating boys higher on externalising problems and girls higher on emotional problems, with the lowest gender differences in self-reports (Collishaw et al. 2009).

The inclusion of self-reports at T2 added another interesting finding. Boys with persistent LI reported more conduct problems and less prosocial behaviour than girls, while girls evaluated themselves with more emotional problems than boys, in accordance with findings presented in previous studies (Conti-Ramsden and Durkin 2016; Rescorla et al. 2007; Yew and Kearney 2013). The fact that parents or teachers did not identify gender differences regarding emotional problems, points to the importance of including self-reports in the assessment of EBD.

### *Strengths and limitations*

The population-based, large gender balanced sample and the longitudinal design are main strengths of the present study, followed by inclusion of multiple informants and sound definitions of LP and EBD. Limitations include the identification of the LP group based solely on a combination of parent and teacher reports on four general language items. A more comprehensive assessment including objective measures of LP obtained by standardised tests may have yielded somewhat different results. However, the composite score based on the included four language items is also reported in former studies (Helland, Lundervold et al. 2014, 2016) and has been found to significantly differentiate children with language problems from typically developing peers. In the Helland, Lundervold et al. (2014) study, the same four language items were used at T1, with results that aligned well with the results on the Children's Communication Checklist –2 at T2. Furthermore, parents' concerns have been found to align well with results on language tests (Glascoe 1997) and parent reports are considered reliable measures of children's language abilities (O'Neill 2007). Likewise, as professionals, teachers are close to how children perform and progress and should thus be considered as reliable informants of language problems among their students. The use of self-reports in youth with LP have been questioned. Self-reports on the SDQ have, however, been shown to be informative in clinical samples with language impairment (Conti-Ramsden et al. 2013) and provided new information in the present study on emotional difficulties in girls. The inclusion of self-reports in the present study may therefore rather be considered as a strength. Finally, different teachers may have rated the children at T1 and at T2, which represent a challenge in a longitudinal study. The considerable level of agreement between teachers and parents, who represent continuity over time, suggest that the effect of different teachers probably was of minor importance.

### *Conclusions and clinical implications*

In line with findings from clinically referred samples, this longitudinal population-based study showed that childhood language problems (LP) are associated with present and future emotional and behavioural difficulties (EBD). The profound and consistent reports across informants of EBD in children with LP emphasise the importance of providing both mental health and language support in childhood as well as in adolescence. Addressing ADHD symptoms and social problems may be of especial importance to improve LP outcome. The complexity of problems encountered underlines the need for a combined expertise and multidisciplinary approach to language impairment in youth.

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## Disclosure statement

The authors declare that they have no conflict of interests.

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