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Stable associations between behavioral problems and language impairments across childhood – The importance of pragmatic language problems

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ABSTRACT

This study investigated language function associated with behavior problems, focusing on pragmatics. Scores on the Children's Communication Checklist Second Edition (CCC-2) in a group of 40 adolescents (12–15 years) identified with externalizing behavior problems (BP) in childhood was compared to the CCC-2 scores in a typically developing comparison group ($n = 37$). Behavioral, emotional and language problems were assessed by the Strengths and Difficulties Questionnaire (SDQ) and 4 language items, when the children in the BP group were 7–9 years (T1). They were then assessed with the SDQ and the CCC-2 when they were 12–15 years (T2). The BP group obtained poorer scores on 9/10 subscales on the CCC-2, and 70% showed language impairments in the clinical range. Language, emotional and peer problems at T1 were strongly correlated with pragmatic language impairments in adolescence. The findings indicate that assessment of language, especially pragmatics, is vital for follow-up and treatment of behavioral problems in children and adolescents.

1. Introduction

Language is an important tool for social interaction as well as a means to control one's own and other's emotions and behaviors. Children who are able to use language to regulate their emotions and behave in a socially appropriate way are more likely to develop good peer relations and form new friendships (Im-Bolter & Cohen, 2007). Three intersecting areas of language – form, content, and use – are all essential ingredients for communication, and impairments within any of these

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areas may cause problems. The form and content components characterize language structure, whereas the use component characterizes pragmatics (Bloom & Lahey, 1978; Spanoudis, Natsopoulos, & Panayiotou, 2007). A growing body of research points to an association between behavioral and language development, and several studies have reported a substantial degree of overlap between language impairments and behavioral problems (Cross, 2011; Hill & Coufal, 2005; Mackie & Law, 2010). Children with language impairments frequently experience behavioral problems, and conversely, many children with behavioral problems show language impairments (Gallagher, 1999; Hartas, 2012; Ketelaars, Cuperus, Jansonius, & Verhoeven, 2010). Although this relationship is well documented in the literature, it seems to be less recognized in practice, and there is good evidence that language impairments are substantially underreported in children with psychiatric diagnoses (Cohen, Farnia, & Im-Bolter, 2013; Im-Bolter & Cohen, 2007; Law & Garret, 2004). Hill and Coufal (2005) claim that although students with behavioral disorders experience language impairments, their problems in this domain may be left as an "invisible" or "marginal" handicap unless systematic assessment is carried out. Symptoms that may be caused by problems in understanding or producing language may be perceived by adults as non-compliance, social withdrawal, or inattentiveness (Cohen, 2001). Children with Attention-Deficit/Hyperactivity Disorder (ADHD) and Autism Spectrum Disorders (ASD) commonly present co-existing problems related to language. Previous research has shown that in a large population derived sample of 5672 children aged 7–9 years, almost 60% of the children identified with symptoms of ADHD ($n = 290$) also fulfilled the criteria for language impairments compared to 5.7% of the typically developing control group (Helland, Posserud, Helland, Heimann, & Lundervold, 2012). Furthermore, in a clinical sample of 6–15 year old children with Asperger syndrome and children with ADHD, 90.5% and 82.1%, respectively, presented with clinically significant language impairments (Helland, Biringer, Helland, Heiman, 2012).

In their review of studies of language skills in children identified with emotional and behavioral disorders, Benner, Nelson, & Epstein (2002) found that 71% experienced clinically significant language impairments. In their study of children aged 7–14 years referred to psychiatric services, Cohen, Menna and colleagues (1998) reported that children identified with language impairments showed more immature abilities with respect to resolving interpersonal conflicts than children without language impairments. Furthermore, parents often perceived these children as problematic and hard to manage compared to typically developing peers (Law & Garret, 2004).

Language impairments refer to a broad spectrum of difficulties including limited vocabulary, expressive deficits, phonological deficits, comprehension deficits, and pragmatic language deficits. All these problems have been reported in studies of children with behavioral disorders (Gallagher, 1999). According to Tannock and Schachar (1996), pragmatic difficulties are the most frequently reported language problem. Pragmatics refers to the appropriate use and interpretation of language in different social contexts (Bishop, 1997). Children with pragmatic language impairments may speak fluently and well-articulated, but they have problems adhering to the needs of the conversational partner; they may make incorrect inferences, give conversational responses that are socially inappropriate or tangential, and interpret language in an over literal manner (Fujiki & Brinton, 2009; Poletti, 2011). Pragmatic language deficits are clinically relevant because they may have detrimental effects on the development of successful peer relations and negatively impact the child's quality of life (Gibson, Adams, Lockton, & Green, 2013). Gilmour, Hill, Place, and Skuse (2004) found that two-thirds of their sample of children with conduct disorder had pragmatic language impairments. They also identified pragmatic language deficits in about two-thirds of a sample of children with antisocial behavior, and suggested that these deficits may underlie the antisocial behavior. In line with this, Donno, Parker, Gilmour, and Skuse (2010) argue that pragmatic language deficits should be considered a possible contributory factor to behavioral problems in primary school children. According to Leonard, Milich, and Lorch (2011), pragmatic skills provide a unique contribution in the estimate of the children's social skills above and beyond the contribution of both hyperactivity and inattention. Recently, Mackie and Law (2010) reported clinical significant language impairments (pragmatic-, structural- and word decoding difficulties) in 91% of referred children. These findings strongly indicate that language impairments of some kind very often accompany behavioral disorders.

Several explanations have been offered to account for the relationship between language- and behavioral problems (see Hartas, 2012); (1) language difficulties may lead to frustration and anger resulting in increased problems with social behavior and fewer opportunities to interact with peers, (2) behavioral problems, like inattention and hyperactivity, may contribute to language and literacy problems, (3) both language and behavioral difficulties co-exist and reciprocally influence each other, (4) the two conditions share an underlying deficit that may explain the association between language and behavioral problems (Hartas, 2012). All these explanations refer to the strong correlation between the two domains of problems. This is supported by the tendency that a wide range of problems seems to cluster within the same individual, and the high rates of comorbidity in child psychiatry (Posserud & Lundervold, 2013).

The Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations model (ESSENCE) has been put forward to describe the more overarching dysfunction generally encountered within child psychiatry (Gillberg, 2010), and genetic studies also support the existence of larger, less specific set-ups of genes that together form a heightened vulnerability to a wide range of problems from intellectual disability to anxiety and more subtle motor problems (Cross-Disorder Group of the Psychiatric Genomics Consortium, 2013; Lichtenstein, Carlström, Gillberg, & Anckarsäter, 2010). The ESSENCE model was conceptualized also because developmental problems seem to change over time, depending on external factors, where a child may present with language problems in early childhood and then develop more overt ADHD symptoms in early school age. Inspired by this model, the current study aim at studying language difficulties within a broader group defined as having behavioral problems.

The majority of studies investigating language impairments have been based on pre-and primary school children. There is mounting evidence that many of these children have enduring language problems that may negatively impact their long-term psychosocial and academic development (Cohen et al., 2013; Conti-Ramsden & Botting, 2008; Yew & Kearney, 2013). As children reach adolescence, demands on language competence increase and language skills become even more crucial for establishing and maintaining social relationships. Inadequate communication may cause misunderstandings, increase conflicts and deteriorate the quality of friendships, leaving children and adolescents at risk of stress, loneliness, and mental health problems (Durkin & Conti-Ramsden, 2010; Leonard et al., 2011). Adolescents with language impairments may see themselves as less socially accepted than their typically developing peers, and may also be perceived as withdrawn and unsociable by their peers as well as by their teachers (Im-Bolter, Cohen, & Farnia, 2013). In a recent study, Cohen and colleagues (2013) reported that clinic-referred youths aged 12–18 years were significantly impaired relative to a comparison group on measures of structural as well as higher order language function. Furthermore, their language impairments were associated with parent ratings of severity of externalizing psychopathology.

The present study aimed to investigate language function in a group of adolescents with behavioral problems (BP). Based on previous research we expected to find more language related problems in the BP group than in the general population in childhood (part A) and in an age matched control group in adolescence (part B). Due to the importance of pragmatic language ability in adolescence, we finally asked if a measure of this ability when the adolescent was 12–15 years old could be predicted from parent reports of behavioral- and language problems approximately five years earlier (part C).

2. Method

2.1. Participants and procedure

A group of children with behavioral problems (BP) were recruited among participants in the third phase of the first wave of the Bergen Child Study (BCS). The BCS is a longitudinal total population study of child mental health that started in 2002 with a screening questionnaire for all children attending 2nd to 4th grade in any school in the Bergen area ($n = 9430$). The response rate was high, with 97% of the teachers and 70% of the parents completing the BCS screening questionnaire including the Strengths and Difficulties Questionnaire (SDQ, Goodman, 1999), and four questions related to language function. From the first wave of the BCS, children were selected to a second and third phase according to screen status. The third phase ($n = 329$) consisted of a clinical assessment with the Wechsler's Intelligence Test for Children – third edition (WISC-III) (Wechsler, 2003) and the K-SADS-PL (Kaufmann et al., 1997; see Lundervold, Posserud, Ullebo, Sorensen, & Gillberg, 2011 for more details). The present study included children identified in this third phase (T1) with high symptom levels of an externalizing disorder according to the K-SADS-PL (defined by one or more definite symptoms of ADHD, Oppositional Deficit Disorder (ODD), or Conduct Disorder (CD)). These children were invited to a follow-up study when they were 12–15 years old (T2). The follow-up assessment included the K-SADS-PL and parent reports on the Children's Communication Checklist Second Edition (CCC-2; Bishop, 2003; Norwegian adaptation: Helland & Møllerhaug, 2006) and the SDQ. One child was excluded from the study because she was younger than the other children (11.11 years at T2), two children were excluded because of intellectual disability and seven children because the CCC-2 did not pass the consistency check (invalid). Thus at T2, the BP group consisted of 40 children (32 males, 8 females) in the age range 12–15 years ($M = 13.47$, $SD = 0.82$), see Fig. 1. The study was approved by the Data Inspectorate and the western Regional Committee for Medical and Health Research Ethics.

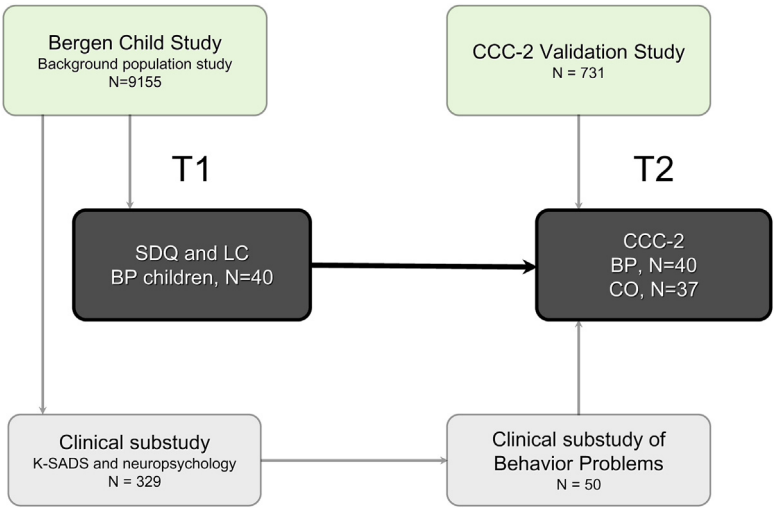

Fig. 1. Flowchart overview of the participant recruitment.

2.1.1. Comparison group at T2

At follow-up (T2), comparisons regarding language abilities were made between the BP group and a comparison group (CO) of typically developing children. Thirty-seven children (18 males, 19 females) with a mean age of 13.54 years (SD = 1.14) who had participated in the Norwegian standardization of the CCC-2 (Bishop, 2003; Norwegian adaptation: Helland & Møllerhaug, 2006) served as CO group. The reason for using this group as comparison rather than adolescents from the same background study as the BP group was that the CCC-2 was only administered in the BP substudy of the BCS. The CO group did not have any problems regarding language or communication as reported by their parents, nor did they have any known learning disabilities or special education needs. The CO group had a more equal distribution of males and females compared to the BP group in which the majority were males. However, no significant differences were found between males and females on the General Communication Composite of the CCC-2; $t(35) = 1.60$, $p = .11$, which supports the use of the CO group for comparison.

2.2. Assessment tools

2.2.1. Strengths and Difficulties Questionnaire (SDQ): BP group at T1 and T2

Parents completed the SDQ as part of the BCS-questionnaire, when the children were 7–9 years old (T1) and at follow-up (T2) when they were 12–15 years. The SDQ is a brief screening questionnaire for behavioral and emotional problems designed for children aged 4–16 years. The questionnaire has been extensively validated in various countries, and reported internal consistency values (Chronbach's alphas) for the various scales have a mean $\alpha = .70$ (Muris, Meesters, & van den Berg, 2003). Twenty-five items divided into five subscales (five items in each) are measuring emotional problems, conduct problems, hyperactivity–inattention problems, peer problems and prosocial behavior. A total difficulties score is computed by combining the first four subscales scores. Each item is scored on a three-point scale (0 = not true, 1 = somewhat true, and 2 = certainly true). On the first four scales a high score indicates problems, while a low score indicates problems on the last subscale (prosocial). The subscale scores are ranging from 0 to 10 and the total difficulty score is ranging from 0 to 40. Separate SDQ versions are available for parents, teachers and children, and in the present study data from the parent version are presented.

2.2.2. Language composite (LC): BP group at T1

A set of four items relating to different aspects of language (phonology, expressive language, receptive language, and pragmatics) was included in the BCS-questionnaire and was completed by the parents. The language items were as follows: (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. These items were scored on a three-point scale, and a language composite score with a possible range of 0–8 was included in the present study.

2.2.3. Children's Communication Checklist Second Edition (CCC-2): BP group and CO group at T2

The CCC-2 (Bishop, 2003; Norwegian adaptation: Helland & Møllerhaug, 2006) is a checklist designed to distinguish children with communication impairments from typically developing children and to identify pragmatic as well as structural language impairments in children aged 4–16 years. The checklist is to be completed by an adult who has regular contact with the child, in the present study it was completed by parents. A total of 70 items are grouped into 10 subscales (see Table 2) with seven items in each. The separate subscales assess speech, syntax, semantics, inappropriate initiation, stereotyped language, use of context, non-verbal communication, social interaction, and interests. The questionnaire is scored on a 4-point scale, indicating the frequency of the communicative behavior described, with a high raw score indicating poorer performance. An automatic scoring program that comes with the CCC-2 (Bishop, 2003) converts raw scores into scaled scores with a mean of 10 and a SD of 3. The first four scales measures structural aspects of language, the next four scales measure pragmatic aspects and the two last scales measure non-linguistic behavior. By summing the scaled scores of the first eight subscales, an overall measure of language abilities, the General Communication Composite (GCC), is derived. This composite is effective at discriminating children with communication impairments from typically developing children. In accordance with previous findings using the CCC-2 in a Norwegian sample, cut-off at or below 64-scaled scores on the GCC was selected for identifying children with language impairments (Helland, Biringer, Helland, & Heimann, 2009). An additional composite, the Social Interaction Deviance Composite (SIDC), is also computed to identify children with pragmatic impairments disproportionate to their structural language abilities. A negative SIDC implies that the child experiences difficulties with social interaction that are disproportionate to his/her general communication abilities. However, according to the manual (Bishop, 2003), this composite should only be interpreted if the GCC is below cut-off; an exception is scores of −15 or less, as such an extreme result is of clinical significance even with GCC within normal limits. Although not included as part of the CCC-2, a general pragmatic composite (PC) has been calculated in several studies (Bignell & Cain, 2007; Geurts & Embrechts, 2008; Helland, Helland, & Heimann, 2012). This is done by summing the scaled scores of the scales measuring coherence, inappropriate initiation, stereotyped language, use of context and, nonverbal communication (scales D–H). The PC was computed and used for analyses in part B of the present study. In the British standardization sample Bishop (2003) reported internal consistency values between .66 and .80 and inter-rater reliability between parents and teachers ranging from .16 to .79 for the CCC-2. The Norwegian version also presents with good internal consistency with alpha ranging from .73 to .89 and inter-rater reliability ranging from .44 to .76 (Helland et al., 2009).

2.3. Data analysis

All statistical analyses were run using SPSS, version 21.

Part A: One-sample *t*-tests were conducted on the SDQ and the LC to evaluate whether the means of the BP group were significantly different from the means of the total population-based sample in the BCS, from which the BP group was derived when they were 7–9 years (T1).

Part B: Students independent-samples *t*-tests were used to analyze differences between the BP and CO groups at T2 on a general measure of language abilities (GCC) and the subscales of the CCC-2. Bonferroni corrections were conducted due to multiple comparisons (alpha level of .005), and Cohen's *d* was computed to evaluate effect sizes. According to general guidelines, *d*'s of 0.20, 0.50 and 0.80 should be interpreted as small, medium, and large, respectively.

Part C: Longitudinal predictions for the BP group from 7–9 years (T1) to 12–15 years (T2) were investigated by running correlation analyses (Pearson product moment correlation) between SDQ and LC scores at T1 and the PC at T2, and a backward multiple regression analysis to evaluate whether SDQ and LC scores (T1) predicted pragmatic language abilities as measured by the PC at follow-up four years later (T2). See Table 5 for the sequence of variables included in the analysis. Additionally, correlation analyses were conducted to compare SDQ subscale scores at T1 and T2, and LC scores at T1 and T2.

3. Results

3.1. Part A: language abilities at 7–9 years (T1)

The BP group differed significantly (was more impaired) from the total sample on the total difficulties score and all subscale scores of the SDQ as well as on the LC at T1 (Table 1).

3.2. Part B: language abilities at 12–15 years (T2)

In the BP group altogether 70% (28 out of 40 children) obtained a GCC score in the clinical range. For the comparison group the corresponding number was 10.8% (four out of 37 children). On the SIDC, 13 out of the 28 children in the BP group identified with communication impairments obtained a score indicating pragmatic impairments that were disproportionate to structural language abilities. Additionally, one child scored in the clinical range (below −15) although his GCC was in the normal range. In the CO group three out of the four children identified with communication impairments showed disproportionate pragmatic impairments.

A comparison between the two groups on the GCC revealed that the scores for the children in the BP group were significantly lower than the scores for the CO group ($t(75) = 6.46$, $p < .001$). As shown in Table 2, significant differences were found on all but one subscale (i.e., scale A measuring speech). The effect sizes (Cohen's *d*) were moderate for speech (0.6) and high (ranging from 0.8 to 1.9) for all subsequent subscales.

3.3. Part C: predictions from 7–9 years (T1) to 12–15 years (T2)

At follow-up (T2), SDQ and LC data were available for 29 out of the 40 children in the BP group. Bivariate correlation analyses between SDQ data from T1 and T2 showed highly significant correlations, with Pearson r ranging from .56 (conduct) to .69 (hyperactivity) (Table 3). Bivariate correlation analyses between LC data from T1 and T2 were statistically significant, Pearson $r = .49$, $p < .01$.

Bivariate correlation analyses showed that the SDQ scales, measuring emotional problems, peer problems, total difficulties, and the LC at T1 correlated significantly with the PC reported at T2, see Table 4. To examine whether SDQ and LC (T1) could predict pragmatic language abilities in adolescence (T2), a backward multiple regression analysis included the

Table 1
Means and standard deviations for SDQ and the LC for the group with behavior problems (BP) and the initial BCS sample[a] (T1).

	Groups				*t*(39)	*p*
	BP (*n* = 40)		BCS (*n* = 6235)			
	M	SD	*M*	SD		
SDQ						
Emotion	2.80	2.33	1.30	1.71	4.07	0.000
Conduct	2.60	2.00	0.96	1.28	5.26	0.000
Hyperactivity/inattention	5.88	2.77	2.66	2.15	7.35	0.000
Peer-problems	2.85	2.88	0.96	1.54	4.15	0.000
Pros-social behavior	6.98	1.89	8.52	1.52	−5.18	0.000
Total difficulties	14.12	7.09	5.87	4.86	7.47	0.000
LC	1.80	1.73	0.31	0.94	5.46	0.000

SDQ, Strengths and Difficulties Questionnaire; LC, language composite; BCS, the Bergen Child Study.
[a] One-sample *t*-test.

Table 2
Means and standard deviations for CCC-2 scaled scores (a high score indicates better performance) for the BP group and the CO group[a] (T2).

	Groups				$t(75)$	Effect size d	p
	BP [n/gender (male/female) = 40 (32/8)]		CO [n/gender (male/female) = 37(18/19)]				
	M	SD	M	SD			
A. Speech	8.40	3.21	10.08	1.77	2.87	0.6	(ns)
B. Syntax	7.60	3.10	9.81	2.33	3.55	0.8	<.005
C. Semantics	5.88	3.97	9.86	2.67	5.21	1.4	<.001
D. Coherence	5.20	3.37	9.43	2.42	6.37	1.6	<.001
E. Inappropriate initiation	6.60	3.26	10.41	3.04	5.30	1.4	<.001
F. Stereotyped language	7.20	3.22	10.54	2.28	5.28	1.5	<.001
G. Use of context	5.28	4.26	10.68	2.80	6.62	1.6	<.001
H. Nonverbal communication	6.30	3.43	9.97	3.13	4.91	1.1	<.001
I. Social relations	4.90	3.23	10.22	2.42	8.21	1.9	<.001
J. Interests	6.95	3.76	11.03	3.16	5.17	1.2	<.001
General Communication Composite	52.45	22.60	80.46	14.93	6.46	1.5	<.001

CCC-2, Children's Communication Checklist Second Edition; BP, the group with behavior problems; CO, the comparison group.
[a] Student's independent sample t-test; Bonferroni corrected $p = .005$.

Table 3
Correlations (Pearson r) between SDQ at T1 and T2 and LC at T1 and T2 ($n = 29$).

	r
Emotional problems	.57*
Conduct problems	.56*
Hyperactivity problems	.69*
Peer problems	.59*
Prosocial behavior	.61*
Total difficulties	.69*
Language composite	.49*

SDQ, the Strength and Difficulties Questionnaire; LC, language composite.
* $p < .01$.

Table 4
Correlations (Pearson r) between SDQ scales, LC (T1) and PC (T2) ($n = 40$).

	PC
Emotional problems	−.40*
Conduct problems	−.24
Hyperactivity problems	−.27
Peer problems	−.48**
Prosocial behavior	.22
Total difficulties	−.50**
Language composite	−.52**

SDQ, the Strength and Difficulties Questionnaire; LC, language composite; PC, pragmatic composite.
* $p < .05$.
** $p < .01$.

SDQ subscales (emotional problems, conduct problems, hyperactivity problems, peer problems, pro-social behavior) and the LC score as predictors and the PC as the criterion variable. A significant regression equation was found $F(2, 37) = 10{,}56$, $p < 001$ (model 5), with an R^2 of .363. Thus, the predictors accounted for 36% of the variance in pragmatic abilities at T2. The SDQ scale measuring peer problems and the LC both had significant effects on the PC; with beta values of −0.34 and −0.39, respectively (Table 5). Tolerance tests and VIF (variable inflation factor) did not indicate multicollinearity. The analyses were repeated for the prediction of the overall GCC score, showing that only the LC score at T1 independently predicted GCC score at T2 (beta value of −0.49; $p = .001$).

4. Discussion

The present study followed a group of children with behavioral problems, investigating their language function in adolescence, and whether language function and mental health at 7–9 years predicted later pragmatic language impairment. The cross-sectional analyses of part A and B, exploring whether the children with behavioral problems at age 7–9 and 12–15

Table 5
Multiple regression analyses (backward) measuring the contribution of SDQ and LC to the prediction of PC score.

Model		*B*	SE	Beta	Sign
1	Emotion	−1.11	1.13	−.17	.33
	Conduct	−.33	1.23	−.04	.79
	Hyperactivity	−.01	.94	−.00	.99
	Peer problems	−1.23	.96	−.23	.21
	Prosocial	.43	1.23	.05	.73
	LC	−3.28	1.39	−.37	.03
2	Emotion	−1.17	1.07	−.17	.31
	Conduct	−.36	1.13	−.04	.77
	Peer problems	−1.23	.93	−.23	.19
	Prosocial	.43	1.21	.05	.73
	LC	−3.29	1.30	−.37	.02
3	Emotion	−1.21	1.01	−.18	.24
	Peer problems	−1.23	.92	−.23	.19
	Prosocial	.49	1.19	.06	.70
	LC	−3.32	1.27	−.37	.02
4	Emotion	−1.16	.98	−.18	.25
	Peer problems	−1.37	.83	−.26	.11
	LC	−3.33	1.26	−.38	.01
5	Peer problems	−1.79	.76	−.34	.02
	LC	−3.47	1.26	−.39	.01

years could be differentiated from a typically developing comparison group regarding their language profiles, showed that children with BP scored higher on parent reported language problems in the general population at 7–9 years of age, and also obtained poorer scores on 9 out of 10 subscales of the parent form of CCC-2 at 12–15 years. In the longitudinal analyses of part C, peer problems and language problems reported in the BP group at 7–9 years were shown to be significant predictors of pragmatic language abilities in adolescence, whereas the overall measure of language abilities (GCC) was only predicted by the parent report on the four questions regarding language problems.

As predicted, the group with behavioral problems scored significantly poorer than the comparison group on the GCC. Language impairments were far more common, with the vast majority (70%) scoring in the clinical range. Our findings confirm results reported by Benner and colleagues (2002) in their review of language impairments in children with emotional and behavioral disorders, as well as a report of language impairments (structural-, pragmatic-, decoding problems) in the majority of a sample of children with behavior causing concern at school (Mackie & Law, 2010). In our sample, the distribution of children with BP primarily displaying problems related to pragmatics (35%) and those displaying mainly structural language problems (35%) were quite equal. These findings are comparable to those of Donno and colleagues (2010) who identified pragmatic language deficits in 42% of their sample of disruptive children. Furthermore, they are in line with those reported by Gilmour and colleagues (2004) and Mackie and Law (2010), who found that two-thirds of their samples showed significant pragmatic language deficits. Our findings were somewhat more modest than in the last studies, which may be due to the fact that our BP group was identified as part of a population-based study. Still, the BP group differed significantly (more impaired) from the CO group on all the pragmatic subscales of the CCC-2, emphasizing that pragmatics is an area of language that is highly vulnerable in children with behavioral problems. These findings are in line with the results from a former study where children diagnosed with ADHD were found to differ significantly from typically developing children on the pragmatic subscales (Helland, Helland, et al., 2012).

The CCC-2 profile revealed that the group of children with behavioral problems was impaired relative to the comparison group regarding all aspects of language except on the scale measuring speech. Conflicting results have been reported regarding speech; Geurts and Embrechts (2008) and Helland, Helland, et al. (2012) reported unimpaired speech in studies of children with ADHD, whereas Helland, Biringer and colleagues (2012), in a study of children with Asperger syndrome (AS) and children with ADHD, found that these clinical groups showed impaired speech relative to controls. A possible explanation for the finding of unimpaired speech in the present study may be that when children reach adolescence they may have outgrown their speech problems, while difficulties related to semantics, pragmatics and social relations are more likely to persist. Alternatively, initial speech problems, although no longer present, may have contributed to pragmatic impairments becoming more pronounced in adolescence as social situations grow more demanding and complex. Although the children with behavioral problems were inseparable from the comparison group on the scale measuring speech, they demonstrated significant impairments on the other scales measuring language structure, indicating that their language difficulties were not restricted to pragmatics but did affect other aspects of language as well. The latter finding aligns well with the recent results reported for clinic – referred adolescents by Cohen and colleagues (2013) as well as with our former studies of language impairments in children with ADHD, AS and typically developing controls (Helland, Biringer, et al., 2012; Helland, Helland, et al., 2012). The observed differences between the two groups on the CCC-2 scales measuring interests and social relations may indicate that children with behavioral problems experience considerable problems as far as friendship

and peer acceptance are concerned, thus putting them at risk for increased levels of behavioral problems and mental health problems more generally.

Language problems at T1 were only reported by parents on four general language items targeting a wide and unspecific range of language problems that can affect children. Still, the composite score on these four items predicted language problems as assessed by the CCC-2 five years later, even after controlling for psychopathology in the group of children with BP. Such a relationship over such a long time-span is almost surprising, underscoring the need for taking parental concerns of their child's difficulties seriously and to follow up their worries with further assessment.

The significant prediction of pragmatic language abilities in adolescence from peer problems and language problems reported by parents in childhood, underline the close association between communicative abilities and social functioning The problems reported in childhood appear not to be transient; rather they seem to persist into adolescence, negatively affecting the development of successful social relationships, which may again lead to escalating behavioral problems.

4.1. Limitations

Some limitations should be considered when evaluating the findings of the present study. The diversity of diagnostic subgroups within the BP group, children with ADHD, and children with ODD/CD symptoms, might be considered a limitation as small sample sizes prevent us from reporting separately for the diagnostic groups. On the other hand, the strong association in this heterogenic group shows that language should be an area of great concern irrespective of the nature of the behavioral problems.

As only children in the BP substudy of the BCS performed the CCC-2, the comparison group at T2 was chosen from the sample of the Norwegian CCC-2 normative sample, where the gender distribution was different from the BP group. This could potentially have overstated the differences between the BP and the CO group; however, there were no gender differences in the CCC-2 scores in the CO group. The fact that language evaluations were solely based on parental reports is another limitation, and firm conclusions about the predictive value of early language problems awaits future large-scaled longitudinal studies.

Finally, although we have stated that peer problems in this study *predict* pragmatic language deficits, the reverse could also be true. Pragmatic language deficits most definitely cause peer problems, and so the relationship between social difficulties and pragmatic language deficits is likely to be bidirectional.

5. Conclusions

Bearing in mind that language is commonly not an area receiving great attention in children with behavioral problems, our findings have some important clinical implications. Firstly, language assessment should be an integral part of the assessment procedure when children and adolescents are referred to mental health services with behavioral problems. Secondly, as pragmatic language deficits contribute to difficulties resolving interpersonal conflicts with others, pragmatics abilities should be an area of special concern taken into consideration when interventions and therapy plans for adolescents with behavioral problems are developed. Furthermore, it is possible that the lack of overt speech problems in children with behavioral problems may mask severe communicative problems. As most therapies are strongly language-based, verbal input should be modified to match the language level of the adolescents, the use of non-literal language should be monitored, and the clinician should be aware that what may appear as non-compliance may in fact result from problems understanding.

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