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Increased Internalizing Problems in Children Aged 4 to 12 With Language Impairments

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Abstract

Objective: To evaluate the association between language impairments and behavioural-emotional problems in children aged 4 to 12 (N=186), referred for observation to three Child Psychiatry centres in the North of Italy.

Method: Children received a battery of tests assessing IQ, different linguistic skills and behavioural-emotional profiles. Comparisons were made between children with language impairments in at least one language test and children with unimpaired language development.

Results: Group-related differences emerge on all IQ measures, being higher in children with unimpaired language development. Linguistic impairments are evident on the tests assessing morphosyntactic comprehension and repetition skills. Children with language impairments evidence more internalizing problems than children with unimpaired language development according to CBCL results, especially on the *Withdrawn/Depressed scale*.

Conclusion: Screening instruments for behavioural-emotional problems should be used regularly during linguistic evaluation. Moreover, the influence of cognitive level on linguistic impairment effects should not be underestimated.

Keywords: Language impairments; Internalizing problems; Withdrawal

Introduction

The target of this study is to characterize the psychopathological profile of children with language impairments, aged 4 to 12, not diagnosed with SLI yet. Both control and experimental groups were chosen after a linguistic screening among children sent to clinical services for observation. Specific Language Impairments (SLI) are characterized by altered language acquisition. Afflicted children may start talking later than their peers and show different production and comprehension deficits according to their specific linguistic disturbance (i.e. phonetic, phonological, morphological, syntactic, semantic or pragmatic disturbance) [1-3].

Even though the classification of language impairment types varies according to different diagnostic procedures (International Classification of Diseases, 10th edition [4]; Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text Revision [5]), the affected children's intellectual development has to result in normal range with a non-verbal intelligence quotient higher than 70. Furthermore, the observed language difficulties must not be explained by neurological or sensorial deficits, psychiatric disorders or environmental deprivation. Nevertheless, several studies have shown that children with SLI take an increased risk of developing psychiatric disorders [6-10]. Cohen et al. [9] studied a large cohort of 380 children - aged 7 to 14 - referred to different Child Psychiatry centres and divided in three groups: children with normal language development, others with previously certified language impairments, and others with unsuspected language disorders revealed only by formal testing. The authors noted that children with previously certified language disorders had higher probability to get an ADHD (Attention-Deficit/Hyperactivity Disorder) additional diagnosis than other groups.

Noterdaeme and Amorosa [10] highlighted the need of using standardized questionnaires enquiring into potential comorbidity between language impairments and behavioural-emotional problems. In this context, many authors have focused on the association between language impairments and behavioural-emotional problems in children population, mostly composed by boys. Behavioural symptoms of children (about 6 as mean age) with speech and language disorders were investigated administering behavioural questionnaires to their parents and teachers [11]: results from factor analyses revealed that "Hyperactivity/Conduct" and "Affect" were in line with "Aggression" and "Withdrawal" factors reported in other studies [12,13]. Moreover, over the period from kindergarten to fourth grade elementary school, children with lower language skills had more externalizing problems and were more frequently rejected by peers than children with better language skills [14].

The *Child Behaviour Checklist* (CBCL) [15,16] shows a well-established predictive effectiveness [17]. Authors, investigating the linguistic development and behavioural-emotional profile of 18-35 months aged children, reached different results [18,19], but they agree that since such age the *Withdrawn scale* differentiates children with language delay from their peers with normal language development (with higher scores for the first group). The available literature concerning preschool children reports externalizing problems, such as aggressive behaviours, in association with language impairments [20,21], as well as somatic complaints, and attention and thought problems [22,23], whilst Stanton-Chapman et al. [24] rely only on

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internalizing problems. As children with SLI grow older, aggressive behaviours tend to disappear [25].

The present study focused on children with language impairments, aged 4 to 12. Relying on the objectives of other studies conducted to date [26], we aimed to investigate whether:

- there were more behavioural-emotional problems in children with language impairments than in their referred peers with unimpaired language development;
- language impairments were associated with more internalizing than externalizing problems and what kind of problems there were;
- the association between language and behavioural-emotional problems were influenced by the children's cognitive levels, gender or age at evaluation time.

Method

Participants

A sample of 186 children (Girls=43), aged 4 to 12, was selected for the present research. They came under observation to three Child Psychiatry centres of the "*E. Medea*" Scientific Institute in the North of Italy (Pasian di Prato and San Vito al Tagliamento in Friuli Venezia Giulia region and Conegliano in Veneto region) between 2003 and 2010. Information about sender was available for 84.9% of participants. 27.8% of families themselves asked for evaluation; in the other cases the evaluation was suggested also by teachers (46.2%), specialists (24.1%) or other people outside the household (6.3%). Accessing to clinical services reasons were known for 93.0% of participants with one or more difficulties: behavioural-emotional (50.9%), language or communication (31.2%), school (28.3%), and attentive problems (21.4%).

Their parents' educational level was available for 89.8% of participants: both parents with a medium-low educational level (primary and lower secondary school; 42.5%), at least one parent with a high school diploma (45.5%), and at least one parent with a degree (12.0%). Mothers' education (mean=10.8 years; SD=3.07) was very similar to fathers' (mean=10.3 years; SD=3.08). All children spoke Italian as first language and did not have hearing loss, intellectual delay, post-traumatic neuropsychological deficit or neurological diseases. After the assessment of their linguistic skills, the participants were subdivided in two groups: an experimental group and a control one. The experimental group consisted of 84 children (Girls=18; median age=7.95 years, age range=5.02-11.88 years) whose performance on standardized linguistic testing was below the cut-off (2 Standard Deviations, SD) on at least one of the linguistic tests, whilst the control group was made of 102 children without language impairments (Girls=25; median age=8.05 years, age range=4.45-12.95 years).

There were no significant differences between groups with regards to the senders (all χ^2-tests with $p>.05$). However, in the group with language impairments we observed a slightly higher percentage, although not statistically significant ($p=.066$), of teacher-senders (54.2% in the experimental group versus 39.5% in the control group). There were no significant differences between groups in the access reasons ($p>.05$). The language or communication difficulties were listed with similar frequency as reason for access to clinical services in the two groups (33.3% in the experimental group versus 29.5% in the control group).

The two groups were not statistically different on mothers' and fathers' educational level ($p>.05$). However, excluding fathers with a degree, who were few (n=4 in each group), there were more fathers without a high school diploma in the experimental group compared with the control group, χ^2 (1, N=151)=4.25, $p=.039$. There were no significant differences between groups with regard to parents' education in years (all *t*-tests with $p>.05$).

Procedure

Intellectual assessment

The cognitive level was assessed with the Italian versions of Wechsler's intelligence scales (WPPSI, WISC-R, WISC-III) [27-29], depending on age: verbal and performance IQ were taken into consideration. Children with a full-scale or a performance IQ ≤ 70 were excluded from sample.

Linguistic assessment

The children's linguistic skills were assessed by administering some of the tests that form the *Linguistic assessment in children from 4 to 12 years* (Esame del linguaggio in bambini dai 4 ai 12 anni) [30], the Italian adaptation of the *Batterie d'évaluation du langage oral de l'enfant aphasique* [31]. Overall, this assessment tool evaluates several aspects of oral language production, comprehension and repetition in children aged 4 to 12.

The linguistic skills assessed were:

- Semantic Comprehension evaluated by the Italian version of the *British Picture Vocabulary Scale* (BPVS). Children had to choose pictures corresponding to target words (32) uttered by the examiner, discriminating them among the distracters (semantic, phonological and non-related meaning);
- Morphosyntactic/Syntactic Comprehension assessed by the *Test of Grammatical Comprehension for Children* (Test di Comprensione Grammaticale per Bambini, TCGB) [32]. Children had to choose pictures corresponding to target sentences (76) uttered by the examiner, discriminating them among the morphological-morphosyntactical distracters. In this test each item has been designed to tap a specific kind of sentence (declarative, relative, negative, passive, etc.);
- Production skills assessed by the *Naming Task* [31], which required children to name 36 pictures representing different objects (animals, common tools, body-parts, etc.);
- Repetition skills assessed by the *Word Repetition* and *Non-Word Repetition tests* [31], useful to tap children's abilities in reproducing words and sequences of phonemes not forming real words. The latter is thought to tap phonological working memory skills [33,34], frequently impaired in children with SLI [35]. Real-word repetition is easier than non-word repetition and involves lexical abilities [36,37]. Such tests were not used as diagnostic criteria to select children with language difficulties.

Behavioural assessment

In order to obtain the children's behaviour profile, parents or tutors were asked to fill out one of the CBCL questionnaires [15,16]. The CBCL/4-18 [15] was administered to 14 parents (n=7 in the experimental group and n=7 in the control group), whilst the CBCL/6-18 [16] was given to the others 172. The two groups (old versus new version) did not differ in their distribution for the presence of language impairments, χ^2 (1, N=186)=0.14, $p=.705$. No difference between groups emerged for age, t (184)=-1.59, $p=.114$, Full Scale-IQ, t (184)<0.01,

p=.994, Verbal-IQ, *t* (184)=0.87, *p*=.387, and Performance-IQ, *t* (184)=-1.17, *p*=.243. For this reason we included the 14 questionnaires in the CBCL data.

The questionnaire consists of 118 items grouped to form eight empirically based syndromic scales and three broad-band scales (i.e. *Internalizing*, *Externalizing* and *Total Problems* scales). The *Internalizing scale* is obtained by the *Anxious/Depressed, Withdrawn/Depressed*, and *Somatic Complaints* scales; the *Externalizing scale* is formed by the *Rule-Breaking Behaviour (Delinquent Behaviour* in the CBCL/4-18) and *Aggressive Behaviour* scales. The questionnaire also investigates social, thought and attention problems, corresponding to the relative scales. Finally, the *Total Problems scale* takes into account all responses to questionnaire. CBCL is part of an assessment tools collection, that is the Achenbach System of Empirically Based Assessment (ASEBA) [16]; other forms are available for self-evaluation and teachers.

After administering the questionnaire we obtained both profiles of scores on empirically based syndromes and scores on *Internalizing*, *Externalizing*, and *Total Problems* scales.

Statistical analyses

To identify different linguistic groups, children were considered as having a language impairment if their standardized scores were below a cut-off for normal variation (z-score≤-2 SD) in at least one of five linguistic tests administered. Characteristics of the study population are described using means ± standard deviation or median and range for continuous variables and percentages for categorical variables. Data were tested for normal distribution using the Shapiro-Wilk test. The *t*-test or Mann-Whitney test, as appropriate, was performed to compare continuous variables. Cross-tabulations were generated for categorical variables, and a Chi-Square or Fisher Exact test was used to compare distributions.

Furthermore, ANalyses of COVAriance (ANCOVAs) were performed to take into account the potential confounding effects of Full Scale-IQ and gender. ANCOVAs were used in presence of homoscedasticity, based on Levene's test results, otherwise non parametric techniques were applied. Effect sizes (partial eta squared, η_p^2) were reported together with the significance level for statistically significant univariate group-factor effects. Scores on the three CBCL total scales were not available for one child with language impairments because of a data-entry error. Another child in the same group had not any score on the *Aggressive Behaviour scale*, due to omissions in the compilation of the questionnaire. Listwise deletion was adopted in analyses of covariance for these participants.

A conventional significance level was used throughout the analyses (α=.05). Bonferroni's correction was adopted in ANCOVAs to maintain significance in multiple independent comparisons (with: $p \leq .017$, for single comparisons on the three CBCL total scales; $p \leq .006$, on eight CBCL syndromic scales). If results did not survive to correction, they were considered only close to statistical significance. All statistical analyses were performed using SPSS for Windows, version 15.0 [38]. Figures were made using R, version 2.15.0 [39].

Results

Intellectual assessment

Table 1 shows comparisons between children with language impairments and children with unimpaired language development, according to gender, age at evaluation, and performances on Wechsler's intelligence scales and linguistic tests. The two groups do not differ in gender distribution, χ^2 (1, *N*=186)=0.25, *p*=.620. Group-related differences emerge for Full Scale-IQ, *t* (184) =4.45, *p*<.001, Verbal-IQ, *t* (184)=3.05, *p*=.003, and Performance-IQ, *U*=2730.0, *p*<.001, being higher in children with unimpaired language development, but not for age, *U*=3981.0, *p*=.407.

Linguistic assessment

Figure 1 summarizes the linguistic features of the experimental group (n=84). Figure 1a shows frequencies and percentages of participants with impaired performance on just one linguistic test (n=57). Frequent impairments are evident on those tests assessing morphosyntactic comprehension (nearly 51%) and word repetition skills (nearly 32%). Similar results are found in children with impaired performance on more linguistic tests (n=27), too. This group presents two, three and even four linguistic impairments at the same time for a total of 63 impairments. As shown in Figure 1b, impaired performances are more frequent on Word Repetition (nearly 40%), Morphosyntactic Comprehension (27%), and Non-Word Repetition (nearly 24%) tests.

Behavioural assessment: between-groups analyses

CBCL scores were used to identify children with behavioural-emotional problems, as reported by parents. Table 2 shows frequencies and percentages of children positioned above subclinical cut-off for each scale (T-score≥60 for total scales; T-score≥65 for syndromic scales).

	Children with unimpaired language development (N=102)		**Children with linguistic impairments (N=84)**			
Number of girls (%)	25 (24.5%)		18 (21.4%)		χ^2 (1, *N*=186)=0.25	.620
	Mean ± SD	Median (min, Max)	Mean ± SD	Median (min, Max)	Statistic	*p*
Age	8.4 ± 1.88	8.05 (4.45, 12.95)	8.0 ± 1.40	7.95 (5.02, 11.88)	*U*=3981.0	.407
FS-IQ	107.5 ± 13.17	108 (79, 142)	98.3 ± 14.89	96 (73, 139)	*t* (184)=4.45	*<.001
V-IQ	104.0 ± 12.76	102.5 (78, 131)	97.9 ± 14.50	96.5 (67, 139)	*t* (184)=3.05	* .003
P-IQ	109.6 ± 15.38	109 (79, 151)	99.7 ± 15.36	98 (71, 147)	U=2730.0	*<.001
	Mean ± SD		Mean ± SD	Impairments (%)[1]		
Morphosintactic Comprehension	-0.1 ± 0.87		-2.2 ± 2.65	46 (54.8%)		
Word Repetition	0.3 ± 0.41		-2.2 ± 3.43	43 (51.2%)		
Non-Word Repetition	0.8 ± 0.78		-0.7 ± 2.45	21 (25.0%)		
Naming Task	0.3 ± 0.87		-0.5 ± 1.31	9 (10.7%)		
Semantic Comprehension	1.0 ± 1.03		0.0 ± 0.96	1 (1.2%)		

FS=Full Scale; IQ=Intelligence Quotient; Max=Maximum observed value; min=minimum observed value; P=Performance; SD=Standard Deviation; V=Verbal. *: *p*<.05.

[1]: performances ≤ -2 SD.

Table 1: Comparisons between groups according to gender, age at evaluation, scores on Wechsler's intelligence scales and standardized scores on the linguistic tests.

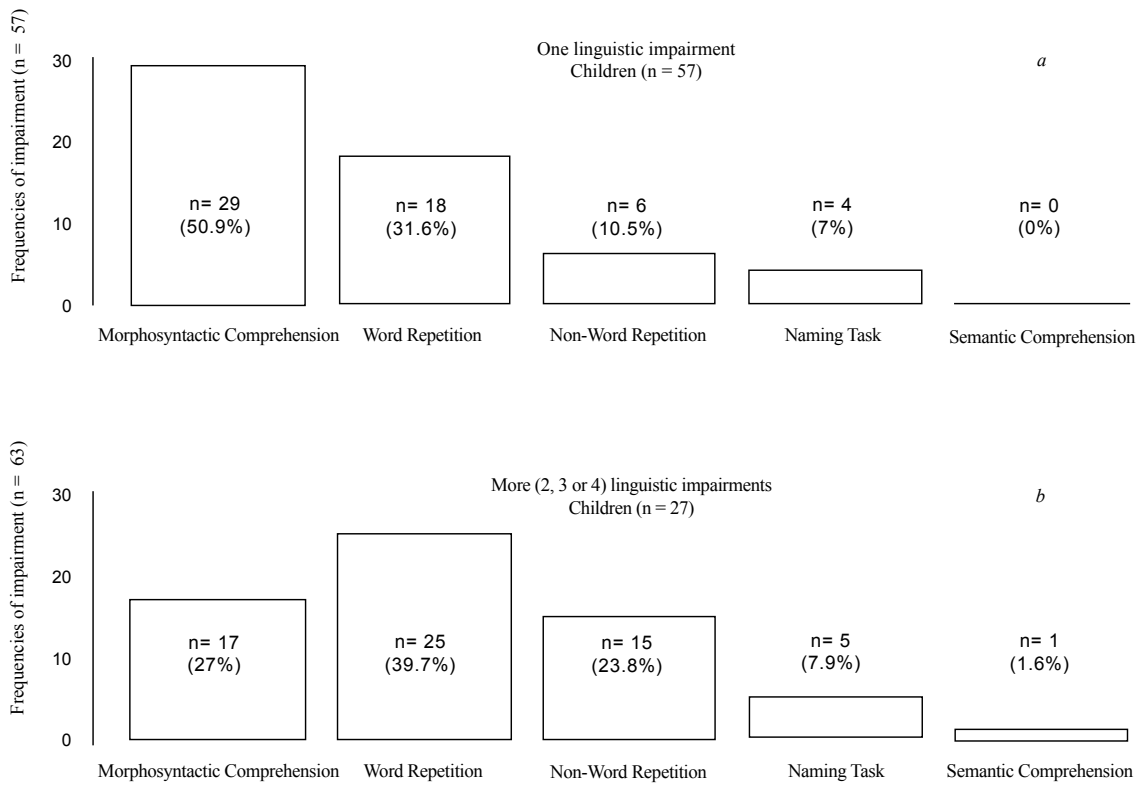


Figure 1: Linguistic features of the experimental group: a) Frequencies and percentages of children with impairments in one linguistic test (number of children and number of impairments are the same); b) Frequencies and percentages of impairments in more linguistic tests (27 children presented two, three or four linguistic impairments at the same time for a total of 63 impairments).

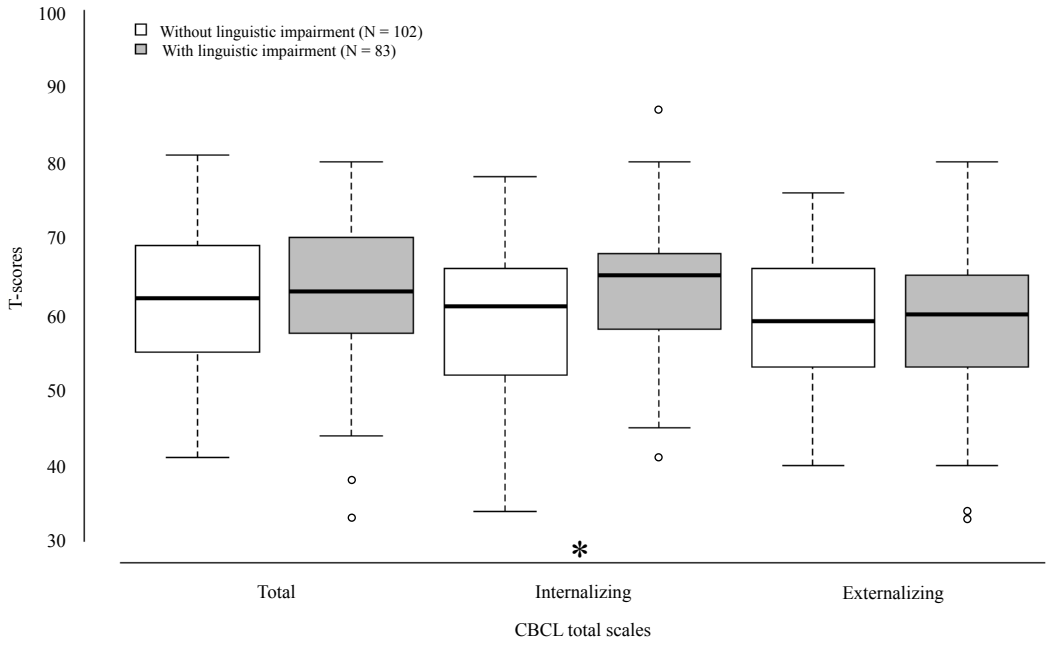
	Children with unimpaired language development (N=102)			**Children with language impairments (N=84)**				
	Mean ± SD	Median (min, Max)	(Sub-)Clinic (%)	Mean ± SD	Median (min, Max)	(Sub-)Clinic (%)	χ^2 (1, *N*=186)	*p*
TOT [n]	61.4 ± 8.58	62 (41, 81)	60 (58.8 %)	62.9 ± 9.15	63 (33, 80)	55 (66.2 %)	1.08	.299
INT [n]	59.8 ± 8.67	61 (34, 78)	55 (53.9 %)	63.2 ± 8.90	65 (41, 87)	59 (71.1 %)	5.70	* .017
EXT [n]	58.9 ± 9.45	59 (40, 76)	50 (49.0 %)	59.1 ± 9.41	60 (33, 80)	42 (50.6 %)	0.05	.830
ANX	61.1 ± 8.28	62 (50, 88)	33 (32.3 %)	63.3 ± 8.40	64 (50, 84)	38 (45.2 %)	3.24	.072
WIT	59.6 ± 7.99	58 (50, 89)	30 (29.4 %)	63.4 ± 10.10	63 (50, 88)	40 (47.6 %)	6.51	* .011
SOM	55.4 ± 5.97	53 (50, 74)	10 (9.8 %)	57.5 ± 7.11	56 (50, 78)	10 (11.9 %)	0.21	.645
SOC	62.2 ± 7.33	60 (50, 85)	33 (32.3 %)	63.4 ± 7.45	62 (51, 88)	36 (42.8 %)	2.18	.140
THO	57.4 ± 7.15	54 (50, 79)	15 (14.7 %)	59.0 ± 7.61	58 (50, 83)	16 (19.0 %)	0.63	.429
ATT	65.1 ± 9.27	66 (51, 93)	55 (53.9 %)	66.4 ± 10.52	65 (50, 93)	42 (50.0 %)	0.28	.594
RUL	57.7 ± 6.69	57 (50, 76)	14 (13.7 %)	57.9 ± 6.70	57 (50, 73)	16 (19.0 %)	0.97	.326
AGG [n]	60.5 ± 8.90	59 (50, 83)	29 (28.4 %)	60.3 ± 8.45	59 (50, 87)	24 (28.9 %)	0.01	.942

AGG=*Aggressive Behaviour scale*; ANX=*Anxious/Depressed scale*; ATT=*Attention Problems scale*; EXT=*Externalizing Problems scale*; INT=*Internalizing Problems scale*; Max=Maximum observed value; min=minimum observed value; RUL=*Rule-Breaking Behaviour scale*; SD=Standard Deviation; SOC=*Social Problems scale*; SOM=*Somatic Complaints scale*; THO=*Thought Problems scale*; TOT=*Total Problems scale*; WIT=*Withdrawn/Depressed scale*. [n]: percentages for these scales were calculated on the 83 available participants in group with language impairments; Chi-Square tests were performed on the 185 available participants. *: $p<.05$.

Table 2: Group differences (with frequencies and percentages) on behavioural assessment.

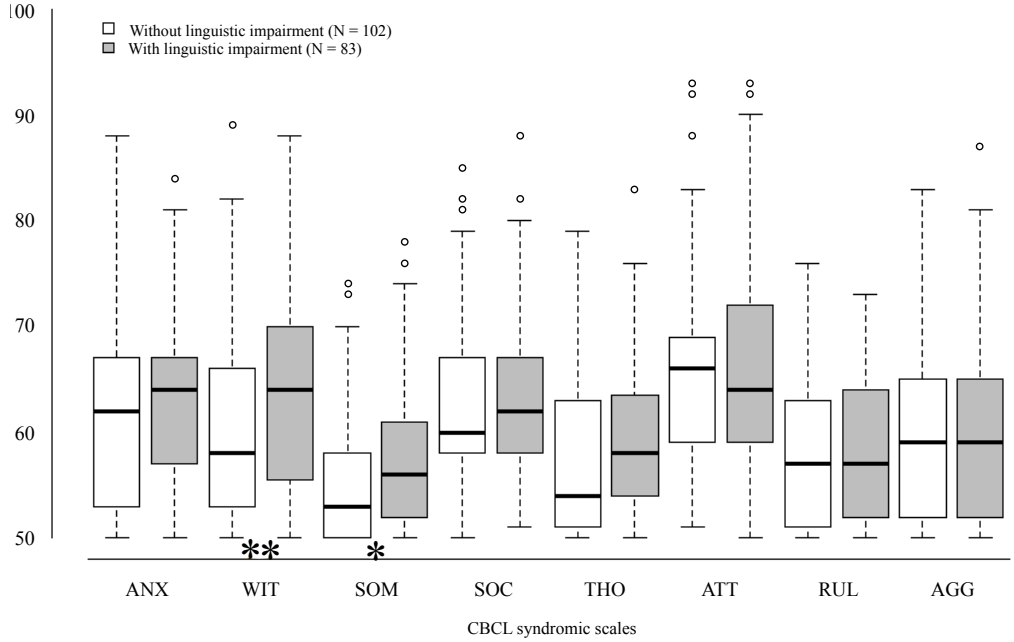
There is a statistically significant difference in frequency distribution between groups on the *Internalizing Problems*, χ^2 (1, *N*=185)=5.70, *p*=.017, and *Withdrawn/Depressed* scales, χ^2 (1, *N*=186)=6.51, *p*=.011, showing a positive association of language impairments with internalizing problems, especially about withdrawal.

One-way between-groups ANCOVAs, with *group* as two-levels factor (children with and without language impairments) and *Full Scale-IQ (FS-IQ)* and *gender* as covariates, were performed for mean T-scores on CBCL total scales. *Age* was not included as covariate because no group-related difference was found for this variable and result from Levene's test was significant. In all other cases, the results from Levene's test do not indicate violations of homoschedasticity assumption. *FS-IQ* and *gender* do not show any statistically significant effect on CBCL total scales. Univariate results, as displayed in Figure 2, show statistically significant between-groups differences on the *Internalizing Problems scale*, F (1, 181)=8.36, *p*=.004, statistically significant after Bonferroni's correction, η_p^2=.044. As a consequence, children with language impairments evidence more internalizing problems than children with unimpaired language development.



CBCL=*Child Behaviour Checklist*; N=Number of available participants. *: $p<.05$ in univariate ANCOVA after correction for multiple comparisons.

Figure 2: Comparisons between groups on *Internalizing, Externalizing* and *Total Problems* scales.



AGG=*Aggressive Behaviour scale*; ANX=*Anxious/Depressed scale*; ATT=*Attention Problems scale*; CBCL=*Child Behaviour Checklist*; N=Number of available participants; RUL=*Rule-Breaking Behaviour scale*; SOC=*Social Problems scale*; SOM=*Somatic Complaints scale*; THO=*Thought Problems scale*; WIT=*Withdrawn/Depressed scale*; *: $p<.05$ in univariate ANCOVA only without correction for multiple comparisons. **: $p<.05$ in univariate ANCOVA after correction for multiple comparisons.

Figure 3: Comparisons between groups on the eight empirically based syndromic scales.

Similar ANCOVAs were performed using the results on syndromic scales as dependent variables (considering eight independent comparisons in the subsequent univariate analyses). The results from Levene's test do not indicate violations of homoschedasticity assumption. In univariate analyses, *gender* does not show any statistically significant effect on CBCL syndromic scales, whereas *FS-IQ* is close to significance for the *Thought Problems*, $F(1, 181)=4.08$, $p=.045$, and *Attention Problems* scales, $F(1, 181)=4.68$, $p=.032$. As shown in Figure 3, there is also a statistically significant group-related difference on the *Withdrawn/Depressed scale*, $F(1, 181)=9.14$, $p=.003$, statistically

significant after Bonferroni's correction, η_p^2=.048. Furthermore, results are close to significance for the *Somatic Complaints scale*, *F* (1, 181)=5.86, *p*=.016, but they do not survive to corrections for multiple comparisons.

In order to investigate whether different behavioural/emotional problems were present for different age groups, the sample was divided into two groups (n=93 in the 'young' group and n=93 in the 'old' group), based on median age (7.9 years) at evaluation time. The two groups are homogeneous with regards to presence of language impairments, χ^2 (1, N=186)=0.09, *p*=.768, and gender, χ^2 (1, N=186)=0.76, *p*=.385. There are significant differences between groups on FS-IQ, *t* (184)=-2.73, *p*=.007, and V-IQ, *t* (184)=-2.78, *p*=.006, being higher for 'young' children, but not on P-IQ, *t* (184)=-1.95, *p*=.053. After controlling the homoschedasticity assumption for dependent variables, we included *age group* as a factor in ANCOVAs, as well as *gender*, *group* (children with or without language impairments) and *FS-IQ*. There are significant differences between groups (children with and without language impairments) on *Internalizing Problems*, *F* (1, 180)=6.91, *p*=.009, η_p^2=.037, and *Withdrawn/Depressed* scales, *F* (1, 180)=8.72, *p*=.004, η_p^2=.046, statistically significant after Bonferroni's correction. Results are close to significance for the *Somatic Complaints scale,* F (1, 180)=4.95, *p*=.027, but they do not survive to corrections for multiple comparisons. *Age group, FS-IQ* and *gender* do not show any statistically significant effect on CBCL scales.

Discussion

In this study, cognitive levels, linguistic performances, and behavioural-emotional profiles were evaluated in a representative sample of children 4 to 12 years old. Differently from previous studies, we focused cross-sectionally on a wide age range taking into account children from infant school to puberty. We noted significant IQ differences between children with language impairments and children with typical language development and included them in our analysis, using Full Scale-IQ as a covariate element.

Language impairments were assessed administering a series of tests about lexical and grammatical comprehension, naming, and word and non-word repetitions. The results indicate that frequent impairments are evident on those tests assessing morphosyntactic comprehension and repetition skills. These results are similar to those found with the same test by Marini et al. [3] in a study focused on children with SLI. They also assessed linguistic performance on a narrative task elicited by a cartoon story (the Nest Story) [40], showing severe deficits on all measures aimed at assessing the morphosyntax and syntax domains.

Even without any specific linguistic diagnosis, we found that the presence of one deficit in linguistic tests was enough to show some associated internalizing problems. The behavioural assessment confirmed the association between internalizing problems and language impairments reported in other studies [24-26,41], for withdrawal and somatic complaints. However, withdrawal probably represents the main emotional marker in children with language impairments.

Limited communication skills may influence the self-esteem and social roles perceived by children with language impairments [42]. Peer interactions take a risk of being reduced or characterized by inappropriate initiation attempts [43]. In addition, communicative skills contribute to establish peer acceptance [44], that is, children with speech and/or language impairments may result unpopular among peers and feel a sense of inadequateness. In this regards, preschool children with SLI have shown lower social skills than their peers without any language impairments [45]. According to a longitudinal perspective, Durkin and Conti-Ramsden [46] investigated the quality of friendships in adolescents with a SLI story (n=120) and their peers with a typical development (n=118). The authors reported that the adolescents with SLI were at risk of developing poorer friendships than the typically developing participants. Receptive language problems at the age of 7 were recognized as significant predictors for poorer friendship quality at 16.

In general, children with language impairments tend to be rated as more withdrawn and less socially equipped than children without such disturbances. According to a contextualist approach, Vigotsky's theory [47] is centred on the dynamic relation between language and thought. Getting older, children involve in more internalizing dialogues which are important for problem solving and self-control. Cohen et al. [9] hypothesized an interference between language disorders and children's creation of internal representations of their social contexts and behaviours.

Carpenter and Drabick [21] proposed an interesting model to explain the co-occurrence of language impairments and behavioural problems in early childhood and preschool children. They suggested that difficult temperament and deficits in working memory contribute initially to account for the comorbidity between language and behaviour problems. Factors depending on children (type of language impairment, level of adaptive communication and emotion regulation skills) and on context (quality of parent-child interactions and level of expressive language used at home) may increase or decrease the risk of developing this comorbidity. In this context, some children from our experimental group failed non-word repetition task, that mainly tests the phonological working memory ability [33,34]. Difficulties in this task are frequent, but not universal, in children with SLI [48]. Therefore, in partial accordance to Carpenter and Drabick [21], phonological working memory deficits might be considered as a risk factor for language impairments in childhood. All in all, our results show that children with failures in one or more linguistic tests tend to have more internalizing problems than control children. Therefore, in patients with linguistic problems not only linguistic rehabilitation but also social and emotional interventions should be considered.

Limits

We had no previous specific diagnoses of SLI according to the main manuals of disorders classification (i.e. ICD-10 or DSM-IV-TR). However, we used a screening linguistic instrument evaluating phonological, lexical and syntactic skills and consisting of tests investigating production, comprehension and repetition. Moreover, a well-established predictive instrument (CBCL) assessed behavioural-emotional profiles.

The comorbidity between attentional and linguistic difficulties has been widely investigated [9,49,50-57]. Our study failed to corroborate this association but, as shown in Table 2, the mean T-scores relative to children with and without language impairments are positioned above subclinical cut-off (T-score=65) on *Attention Problems scale*. In addition, on the *Total Problems scale* both groups score above subclinical cut-off (T-score=60). As attentional and total problems were strongly represented in our sample, comparisons were performed between groups with high scores of attentional and total problems.

Conclusions

Our results confirm the association between language impairments and internalizing problems found in other studies, but focus on a sample of children characterized by a wide age range. Therefore it is necessary to consider the psychiatric symptoms associated with

language impairments: screening instruments for behavioural-emotional problems should be used regularly during linguistic evaluation. According to our results, also the influence of cognitive level on linguistic impairment effects should not be underestimated. Future longitudinal studies might be useful to detect how behavioural-emotional problems and language impairments evolve and which are the distinct qualitative characteristics over the time. The identification of specific development parameters, depending on children/adolescents age, might have important implications for clinicians and educators, who could direct their interventions not only on language abilities but also on behaviour and emotions.

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