

Speech and Language Development, Cognitive Ability and Literacy Skills in Children Identified with Learning Disabilities: A Comparative Study.

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Abstract

The purpose of this study is to explore the links between speech & language development, cognitive ability and literacy skills (reading and written language) of students identified with Learning Disabilities (dyslexia). A group of 30 children with Learning Disabilities, aged 8-12 years, with a history of Speech and Language Difficulties (delay/impairments) (SLD) were compared on measures of Word Reading, Reading Comprehension and Writing skills with a group of 30 children with Learning Disabilities but with no history of Speech and Language Difficulties (delay/impairments) (nSLD). Results indicated that the mean standard scores of the SLD group were lower than the nSLD group across the test measures of Verbal IQ, Performance IQ, Global IQ and Word reading. The t-test showed significant differences between the two groups on the PIQ & GIQ ($p < 0.05$). No significant difference was seen between the two groups on the measures of word reading, reading comprehension and writing skills. These findings have valuable implications for planning intervention programs for children with speech and language difficulties and learning disabilities.

Keywords: Academic achievement, Word reading, Reading comprehension, Written language

Abbreviations: Learning Disabilities (LD), group with Speech and Language Difficulties (delays/impairments) (SLD), group with no Speech and Language Difficulties (delays/impairments) (nSLD), Reading Disabilities (RD), Verbal Intelligence Quotient (VIQ), Performance Intelligence Quotient (PIQ), Global Intelligence Quotient (GIQ)

Exposure to language begins right from birth. Thereafter, it becomes one of the chief means of communication. Successful language development aids adequate communication and literacy development. Language may be thus viewed as a tool necessary for successful academic and social/behavioural achievement. It is considered vital to the development of children's social skills, cognitive abilities, and academic outcomes (Bishop, 1997). This notion would indicate that young children with poor language skills would be at risk for later learning and social problems. (Tomblin, Zhang, Buckwalter & Catts, 2000). There is evidence that language difficulties and learning difficulties have a significant negative impact on children's education (Hay, Elias, Fielding-Barnsley, Homel & Frieberg, 2007).

In their review of children's acquisition of reading, Whitehurst & Lonigan (1988) proposed a developmental continuum between young children's language skills and their later reading and comprehension skills. Children's early

language development is considered to be a developmental precursor and a good predictor of children's early reading development as well as their meta-linguistic awareness, alphabet, and book concepts (Saada-Robert, 2004).

Links between language development and literacy are also evident in retrospective studies of children with diagnoses of developmental dyslexia. It is well established from epidemiological studies that delays and difficulties are more common in children with dyslexia than in control samples of children without reading difficulties (Snowling, Bishop & Stothard, 2000). Studies focusing on the precursors of dyslexia in the preschool years point to delays in the acquisition of oral language skills including vocabulary and grammatical expression as well as phonological deficits. From the perspective of a language disability, studies of children with speech-language difficulties frequently report a high incidence of reading difficulties (Gallagher, Frith & Snowling, 2000). Children who have problems in both oral language

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and phonological processing are at the greatest risk of failure (Catts, Fey, Zhang, & Tomblin, 1999).

Catts, Fey, Tomblin & Zhang (2002) have indicated that the majority of children with speech and language delays suffer a double reading disorder, i.e. the operation of both their reading development pathways (phonological & semantic) is compromised. It is thus expected that children with weak semantic skills would encounter difficulties in word recognition, especially difficulties in reading and spelling irregular words, as well as reading comprehension. When faced with more written vocabulary in the later years, these children encounter greater difficulties than the normally developing readers as they do not have the resources that allow them to proceed to adult fluency (Scarborough & Dobrich, 1990). "The critical age hypothesis", i.e. 'children whose early language impairments resolve between 5 and 6 years of age or by the time they begin to receive formal reading instruction are not at risk' proposed by Bishop & Adams (1990) would also play a role in the reading outcome and long term literacy outcome for children with language delays and impairment.

Stothard, Snowling, Bishop, Chipchase & Kaplan (1998) reported significant differences in nonverbal and verbal ability between children with developmental speech-language difficulties and controls. Snowling, Bishop & Stothard (2000) reported that the group with speech-language impairments performed worse than the control group on tests of spelling and reading comprehension and that the literacy outcomes were poor for those with PIQ less than 100.

Purpose of the study

This study aims to explore the relationship between speech and language development, cognitive functioning & literacy skills (reading & writing) of two samples of students, both identified with language based learning disabilities. One sample of students has a history of Speech and Language Difficulties (delay/impairment) (SLD), whereas the other has no history of Speech and Language Difficulties (delay/ impairment) (nSLD).

Method

Research sample

Demographic data and data from standardized evaluations were studied for this total sample of 60 students identified with Learning Disabilities. Of these, one group of 30 students had a history of speech and language difficulties (delays/ impairment) (SLD). The other group of 30

students had no history of speech and language difficulties (delays/ impairment) (nSLD).

The children had been earlier identified with Learning Disabilities on the basis of the following operational criteria: History of poor academic performance (below 40% aggregate) or failure across past 1-2 academic years, assessed intelligence quotient in the average-above average range, assessed reading and/or writing achievement which is 1 year or more below age level, deficits in information processing skills (auditory processing, visual processing, memory).

In the total sample, there were 50 males and 10 females. In the sample group with speech and language difficulties (SLD), there were 24 males and 6 females, while in the group with no history of speech and language difficulties (nSLD) there were 26 males and 4 females.

The age range extended from 8.0-12.0 years. The grade placement extended from grade 2-7 (as some of the children had either started schooling late due to speech and language difficulties or had repeated one or more academic year). All the children were from an urban population. These children were referred to the center for assessment by parents or other referral sources i.e. the treating speech and language pathologist/ pediatrician/ neurologist or the school system. They were mainly referred for low academic achievement or specific difficulties in coping with the academic curriculum.

None of the children in the research sample had presence of Hearing impairment, neurological difficulties or Autistic spectrum Disorder. These issues had been screened out as a part of the entire psycho-educational assessment

Procedure

The present study was carried out at Drishti, a referral center for assessments & therapy in Mumbai. This study is a retrospective analysis of demographic data and psycho-educational assessment data of children identified with learning disabilities, collected approximately between the period 2006-2008. History of speech and language development and consequent difficulties was available from the case history data. Psycho-educational assessments had been individualized to suit the presenting complaint. Assessment tools used were formal and standardized. Selective data from these assessments was analyzed for the present study. Assessment areas analyzed for this study were cognitive functioning and literacy skills of Reading (word reading & reading comprehension) & written language (spellings, syntax, and written expression).

Materials

Demographic and developmental data was collected using a case history form filled out by parents. The assessment data studied was across the areas of cognitive functioning and academic achievement. The selective data presented in this study includes the composite scores from the following tools.

Case History Form: A detailed case history of the referred student was gathered either by asking the parent to fill up the case history form, or with the assessing psychologist filling up the form through parental interview (when the parent was unable to do so independently). Parents were then quizzed regarding the important details presented by them in the form. The case history form included demographic data, developmental history of child (birth history, achievement of motor and speech milestones, medical history), educational and occupational status of parents, family history of disability, educational history, social/psychological history, environmental background information.

Weschler Intelligence Scale for Children-Indian adaptation (WISC)(Bhatt, M; 1973)

This test measures the verbal as well as non-verbal intelligence of the student using the verbal and performance scales. The sub-test scaled scores range from 0-20 with an average of 10. Composite scores include the Verbal IQ, Performance IQ and the Global IQ. Test retest reliability coefficients are reported to be ranging between 0.81-0.97. Inter-test correlations are seen to be in the range of 0.70-0.86.

Woodcock-Johnson Psycho-educational Battery-Revised (WJ-R) (Woodcock, R & Johnson, M; 1989-1990)

The WJ-R is a wide range comprehensive set of individually administered tests for measuring cognitive abilities, scholastic aptitude and achievement. This test yields age equivalent and grade equivalent scores for all the sub-tests. The sub-tests can be grouped into reading, written language, and math clusters. None of the sub-tests are timed tests. Standard scores (SS), Percentile ranks (PR), age equivalent scores and grade equivalent scores are computed. The reliability coefficients for the subtests range from 0.85-0.95; correlations with other measures of achievement are reported as ranging from .50-.60.

Results and Discussion

The purpose of this study was to examine the relationships between the variables of speech and language development, cognitive functioning and literacy skills in two groups of children identified

with LD; one group with a history of speech and language difficulties (SLD) (N=30) and the other group with no history of speech and language difficulties (nSLD) (N=30).

Table 1 indicates the gender distribution across the two groups. In both the groups it is seen that the number of males is greater. This was a randomly referred and studied sample.

Group	Male	Female	Total
SLD	24	6	30
nSLD	26	4	30

SLD – Speech & Language Difficulties

nSLD – No Speech & Language Difficulties

Table 1: Gender Distribution

Table 2 provides an overview of the distribution of the demographic variable of age. The age of the 60 children who formed the study sample ranged from 8.0 years to 12.0 years. In the nSLD group, the age group of 11.1-12.0 yrs. was seen to have the highest number of students (N=15), while in the SLD group the highest number was seen in the 8.0-9.0 yrs age group (N=10). This indicates that a greater number of referrals for the SLD group took place much earlier than the group with nSLD. A very small percentage of the nSLD group was referred for academic difficulties in the age group of 8-9 years.

Age Group (SLD)	N	%	Age Group (nSLD)	N	%
8.0-9.0	10	33.3	8.0-9.0	1	3.3
9.1-10.0	4	13.3	9.1-10.0	5	16.6
10.1-11.0	9	30	10.1-11.0	9	30
11.1-12.0	7	23.3	11.1-12.0	15	50
Total	30	100%	Total	30	100%

*SLD – Speech & Language Difficulties

*nSLD – No Speech & Language Difficulties

Table 2: Age Distribution

Table 3 indicates the grade wise distribution of students across the two groups. It is seen that although the age distribution is from 8-12 years, the grade distribution extends from grade 2 to grade 7. This is seen because a number of children with speech and language difficulties commenced schooling late, whereas others repeated one grade or more. The largest number of children in the nSLD group were from grade 5, while those from the SLD group were from grades 4 and 6.

Cognitive functioning of the sample was studied through the use of a standardized measure of intellectual functioning. Table 4 shows the mean IQ scores for both the groups. The mean VIQ, PIQ & GIQ scores for both the groups were in the average range. Although the scores for the nSLD group were higher, the difference between

the two groups was significant only for the PIQ and GIQ ($p < 0.05$). These results are partially in accordance with a study by Stothard, Snowling, Bishop, Chipchase, & Kaplan (1998) which showed significant differences in non-verbal and verbal ability between children with and without speech-language disorders/impairments.

SLD			nSLD		
Grades	N	Percentage	Grades	N	Percentage
II	1	3.3	II	1	3.3
III	8	26.6	III	0	0
IV	9	30	IV	4	13.3
V	3	10	V	12	40
VI	9	30	VI	9	30
VII	0	0	VII	4	13.3
Total	30	100%	Total	30	100%

*SLD – Speech & Language Difficulties

*nSLD – No Speech & Language Difficulties

Table 3: Grade Distribution

Variable	Mean	SD	t	df	Sig.
VIQ SLD group nSLD group	95.3 99.5	1.66 1.95	1.57	29	0.06 (NS)
PIQ SLD group nSLD group	100.26 104.23	1.75 1.78	1.80	29	0.04*
GIQ SLD group nSLD group	97.7 102.06	1.39 1.75	2.04	29	0.02*

* $p < 0.05$; NS – Not Significant

Note: VIQ: Verbal Intelligence Quotient; PIQ: Performance Intelligence Quotient; GIQ: Global Intelligence Quotient

Table 4: Mean IQ scores and Significance of difference in IQ scores between SLD and nSLD group

SLD: N = 30; nSLD: N = 30

Table 5 shows the mean standard scores for both the groups on the subtests of Letter-word reading, Passage (reading) comprehension, Writing samples (written expression) and Dictation (spellings and syntax). The SLD group had marginally higher scores on the subtests of Writing samples and Dictation (Spellings & Syntax). However, there was no significant difference seen between the two groups on these measures.

The results of this study correlate with the results reported by Magnusson & Naucler (1990), where within the age, sex, nonverbal IQ matched pairs, it was the language disordered children whose spelling skills were more advanced. Relatively good skills in phonological processing and grammatical understanding seems to contribute to performance in spellings and semantics (Bishop & Adams, 1990). Children with language delays and impairments having PIQ 100 and above were seen to have spelling levels that

are average for their age (Snowling, Bishop & Stothard, 2000). In cognitive terms, it is not clear what mechanism could account for the relationship between non-verbal ability and reading skill. It was speculated that relative strengths in the language resources of vocabulary and comprehension skills could be facilitating better word reading and spelling skills.

Variable	Mean	SD	t	df	Sig.
LWR SLD Group nSLD Group	85.4 90.2	1.87 2.62	1.40	29	0.08(NS)
PC SLD Group nSLD Group	79.73 79.9	1.49 2.07	0.05	29	0.47(NS)
WS SLD Group nSLD Group	80.16 77.06	2.32 2.93	-0.81	29	0.21(NS)
DICT SLD Group nSLD Group	81.33 80.66	1.57 1.77	-0.25	29	0.40(NS)

NS – Not Significant

Note: LWR: Letter-Word Reading Subtest; PC: Passage Comprehension subtest; WS: Writing Samples subtest; Dict: Dictation subtest

Table 5: Significance of difference in achievement test scores between SLD and nSLD groups

SLD: N = 30; nSLD: N = 30

Tables 6 & 7 present the correlations between cognitive ability and literacy skills in this sample. In both the groups, the relationship between reading skills and verbal ability is seen to be stronger than that with the non-verbal ability.

The correlation between VIQ and letter word identification for the SLD group was significant ($p < 0.05$) whereas that for the nSLD was not. The corresponding correlations for reading comprehension for the two groups were significant ($p < 0.05$). The relationship between verbal ability and reading comprehension seems stronger than between VIQ and word reading for this sample. Studies (Frith, 1985; Snowling 1987) have shown that for children with language delays and impairments, basic decoding skills may develop normally in the early years, but can later show a relative decline in terms of word recognition skills. Greater links are seen between VIQ and the skills of spellings, syntax, and written expression than between PIQ and these literacy skills.

The relationship between letter word reading and reading comprehension was significant for both the groups ($p < 0.01$). The inter-correlations between letter word identification subtest (word reading), Dictation subtest (spellings & syntax) and the Writing samples subtest are significant for both groups ($p < 0.01$).

	VIQSLD	PIQSLD	GIQSLD	LWSLD	PCSLD	WSSLD	DICTSLD
VIQSLD	1.000	.277	.779**	.332*	.541**	.303	.345*
Pearson Correlation	.	.069	.000	.037	.001	.052	.031
Sig (1-tailed)							
PIQSLD	.277	1.000	.811**	.114	.350*	.293	.144
Pearson Correlation	.069	.	.000	.275	.029	.058	.224
Sig (1-tailed)							
GIQSLD	.779**	.811**	1.000	.264	.543**	.369*	.309*
Pearson Correlation	.000	.000	.	.080	.001	.022	.048
Sig (1-tailed)							
LWSLD	.332*	.114	.264	1.000	.621**	.675**	.746**
Pearson Correlation	.037	.275	.080	.	.000	.000	.000
Sig (1-tailed)							
PCSLD	.541**	.350*	.543**	.621**	1.000	.427**	.574**
Pearson Correlation	.001	.029	.001	.000	.	.009	.000
Sig (1-tailed)							
WSSLD	.303	.293	.369*	.675**	.427**	1.000	.607**
Pearson Correlation	.052	.058	.022	.000	.009	.	.000
Sig (1-tailed)							
DICTSLD	.345*	.144	.309*	.746**	.574**	.607**	1.000
Pearson Correlation	.031	.224	.048	.000	.000	.000	.
Sig (1-tailed)							

**Correlation is significant at the 0.01 level (1-tailed), *Correlation is significant at the 0.05 level (1-tailed)

Note: VIQ: Verbal Intelligence Quotient; PIQ: Performance Intelligence Quotient; GIQ: Global Intelligence Quotient

Note: LWR: Letter-Word Reading Subtest; PC: Passage Comprehension subtest; WS: Writing Samples subtest; Dict: Dictation subtest

Table 6: Correlations Between cognitive ability and Literacy skills – SLD SLD: N = 30

	VIQNSLD	PIQNSLD	GIQNSLD	LWNSLD	PCNSLD	WSNSLD	DICTNSLD
VIQNSLD	1.000	.490**	.884**	.142	.454**	.458**	.486**
Pearson Correlation	.	.003	.000	.227	.006	.005	.003
Sig (1-tailed)							
PIQNSLD	.490**	1.000	.837**	-.047	-.009	.208	.190
Pearson Correlation	.003	.	.000	.402	.482	.135	.157
Sig (1-tailed)							
GIQNSLD	.884**	.837**	1.000	.040	.259	.384*	.388*
Pearson Correlation	.000	.000	.	.416	.084	.018	.017
Sig (1-tailed)							
LWNSLD	.142	-.047	.040	1.000	.657**	.594**	.787**
Pearson Correlation	.227	.402	.416	.	.000	.000	.000
Sig (1-tailed)							
PCNSLD	.454**	-.009	.259	.657**	1.000	.708**	.717**
Pearson Correlation	.006	.482	.084	.000	.	.000	.000
Sig (1-tailed)							
WSNSLD	.458**	.208	.384*	.594**	.708**	1.000	.768**
Pearson Correlation	.005	.135	.018	.000	.000	.	.000
Sig (1-tailed)							
DICTNSLD	.486**	.190	.388*	.787**	.717**	.768**	1.000
Pearson Correlation	.003	.157	.017	.000	.000	.000	.
Sig (1-tailed)							

** . Correlation is significant at the 0.01 level (1-tailed), * . Correlation is significant at the 0.05 level (1-tailed)

Note: VIQ: Verbal Intelligence Quotient; PIQ: Performance Intelligence Quotient; GIQ: Global Intelligence Quotient

Note: LWR: Letter-Word Reading Subtest; PC: Passage Comprehension subtest; WS: Writing Samples subtest; Dict: Dictation subtest

Table 7: Correlations Between cognitive ability and Literacy skills – nSLD nSLD: N = 30

Conclusions

Thus, the findings of the present study, vis-à-vis the cognitive abilities of the two groups, indicate a significant difference in the PIQ & GIQ, but not in the VIQ.

Differences in the literacy skills between the two groups were not statistically significant. This could be attributed to the age range of the sample (8-12 years) where the difficulties in early speech and language development have perhaps been compensated for by a consequent increase in the language skills of vocabulary and semantics. The 'critical age hypothesis' could also have played a role where some of the children of the SLD group had been given early intervention and have thus overcome specific language based difficulties. This has important implications for intervention program planning.

These findings have to be handled with caution as the study has been conducted on a small sample. A larger study in the Indian context could have valuable implications for literacy instruction and remedial education programs for children with learning disabilities.

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