Children with dyslexia: Not necessarily at risk for elevated internalizing symptoms

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Abstract. The risk for internalizing disorders in children with learning disabilities is frequently debated in the research community and empirical responses are equivocal. For educators and clinicians, the frequent assumption is that children with dyslexia also have at least subtle emotional problems. In this study, school-age children with reading problems and their siblings ($N = 79$) were referred for neuropsychological evaluation. As part of the assessment process, parents, teachers, and the child were asked to rate the child's level of internalizing symptoms on several behavior rating scales. Results from analyses of the data, using both discrepancy and reading cut scores for diagnosis of dyslexia, suggest that children with dyslexia are not at elevated risk for behaviors related to anxiety, depression, and somatization. Additionally, children at the lowest end of the reading distribution were no more likely to have significant internalizing symptoms than children with less impaired reading.

Key words: Dyslexia, Learning disabilities, Internalizing symptoms

Introduction

There has been some controversy in the literature over whether or not children with dyslexia are more likely to experience internalizing disorders such as depression or anxiety. Many clinicians anecdotally report that children with dyslexia or reading disabilities often have difficulty with behaviors related to these disorders, but the research has been somewhat equivocal.

The studies of the emotional characteristics of children with learning disabilities have typically focused on children with dyslexia or reading disabilities, although several studies have described the socio-emotional functioning of children with other types of learning disabilities. Porter and Rourke (1985) found that the population of children with learning disabilities was heterogeneous with respect to emotional characteristics

and no particular personality characteristics have been associated with learning disabilities. In two other studies, the majority of children with learning problems experienced minor or no behavioral problems (Fuerst, Fisk, & Rourke, 1989; Tsatsanis, Fuerst, & Rourke, 1997). Another study found that children with and without learning disabilities could not be differentiated in terms of emotional characteristics (Jorm, Share, Matthews, & McLean, 1986).

In contrast to studies demonstrating that children with dyslexia or learning disabilities have similar levels of internalizing symptoms to children without reading problems, several studies have reported less clear results. In two studies, children and adolescents with dyslexia exhibited more depressive symptomatology (Boetsch, Green, & Pennington, 1996) and had lower peer acceptance (LaGreca & Stone, 1990). In a study of children in special education classess, 11% were rated by their teachers as withdrawn (McKinney, 1989). An additional study found that children with dyslexia were more anxious than normal controls (Murray, 1978). Stevenson and Romney (1984) studied comorbid learning disabilities and depression. They found that children with both disorders were more likely to report lower self-esteem, increased sensitivity to perceived criticism, greater emotional lability, and more frequent feelings of apprehension, worry, and guilt (Stevenson & Romney, 1984). However, a more recent study found that children with dyslexia did not report increased levels of internalizing symptoms, but parents and teachers reported that children with dyslexia had significantly more internalizing problems (Heiervang, Stevenson, Lund, & Hugdahl, 2001).

The current controversy in the literature with regard to the internalizing symptoms typically present in children with reading disabilities highlights the need for additional focused study. Furthermore, there are significant differences across studies in how dyslexia is being diagnosed and internalizing symptoms are being measured. The purpose of the present study was to test the differences in internalizing symptoms as reported by multiple raters, including anxiety, depression, and somatization, in children with dyslexia and clinical controls using two diagnostic models. It was hypothesized that children with dyslexia would be similar to children without diagnosed reading difficulties in their internalizing symptoms.

Method

Participants

Participants for this study were seen as part of a National Institutes of Health funded grant (NIH/NICHD-1-R01-HD26890-06) on familial

dyslexia. Children were typically referred by their parents or teachers because of concerns about learning or behavioral problems. To meet the entrance criteria for the grant, all children were required to have been previously diagnosed with a reading disability or were having significant difficulty learning to read as documented by group standardized test scores. In some cases, siblings of referred children were also seen as part of the research process. The total percentage of sibling participation for this study was 14.5%. Some, but not all, of the children were receiving special education services at the time of their participation. None of the children had a history of seizures, head injury, birth trauma, prematurity, or severe psychopathology. Additionally, none of the children involved in the children had preexisting diagnoses of anxiety or depressive disorders, although no one was prevented from entering the study due to such diagnoses. Furthermore, both biological parents also participated in the assessment process. In many of the families, at least one parent reported difficulty in learning to read during the developmental period: 34.9% of mothers and 45.8% of fathers reported some difficulty with reading acquisition. Normal controls were not seen as part of this study as outlined in the original goals of the funding grant application.

Participants for this particular study were evaluated between the fall 1999 and spring 2003. The sample included 79 children between the ages of 6 and 16 years of age, although the vast majority of the participants were between 8 and 12 years of age. The mean age was 126.44 months (SD = 25.67), with a range between 74 months and 202 months. For this sample, 53 subjects were male and 26 subjects were female. Of the participants, 67 were Caucasian and 12 were African-American. Most of the children in the study were from rural to suburban environments. Although most of the children were from homes of moderate socio-economic status (mean = 2.23; SD = .957), the Hollingshead ratings for the families indicated some variability (range = 1–5).

Procedures

Children and their parents were seen for a full day of neuropsychological evaluation. While children started the assessment process with one examiner, parents met with another examiner and the supervising psychologist to complete a developmental and medical history about the child and a complete familial genogram. Following the interview, both biological parents received a full neuropsychological evaluation that paralleled the child assessment procedures.

For the purpose of this study, children were classified as dyslexic or normal readers using two diagnostic models. In the first model, children were grouped in the dyslexia group if assessment showed a 20-point discrepancy between standard scores of the best estimate of intelligence and a composite reading score with subaverage reading achievement (reading achievement standard score ≤85). Although controversial in the research community, this model was tested because it is consistent with the special education criteria for the eligibility category of "specific learning disability in basic reading" used by many states, including Georgia. Under these criteria, 20 children were in the dyslexia group and 59 children were in the normal readers group. Descriptive statistics for reading achievement and intellectual ability for the groups in this model are summarized in Table 1.

In the second diagnostic model, children were classified as dyslexic if they had subaverage reading achievement (i.e., standard score on a composite of basic reading skill <85), regardless of best estimate of intelligence. This cut score model is similar to that proposed by Siegel (1993). Under these criteria, 24 children were in the dyslexia group and 55 children were in the normal readers group. Descriptive statistics for reading achievement for these groups is summarized in Table 2.

Instruments

As previously stated, all children and their biological parents received a full neuropsychological evaluation with an emphasis on reading

Table 1. Descriptive statistics for grouping variables in discrepancy model.

	Mean standard score	SD	Range
Children without dyslexia ($n = 59$)			
Age (in months)	127.66	27.34	74–202
FSIQ	102.00	14.04	68–141
VIQ	98.78	14.40	71–139
PIQ	101.48	16.59	79–136
Basic reading composite	94.51	8.15	74–123
Children with dyslexia ($n = 20$)			
Age (in months)	128.64	18.79	82–178
FSIQ	96.10	13.03	66–116
VIQ	96.93	12.11	62–112
PIQ	99.07	11.12	76–119
Basic reading composite	78.03	7.86	60–93

Table 2. Descriptive statistics for reading achievement in reading cut scores model.

	Mean standard score	SD	Range
Children without dyslexia (*n* = 55)			
Age (in months)	125.80	26.22	74–202
Basic reading achievement	95.85	7.02	86–123
Children with dyslexia (*n* = 24)			
Age (in months)	132.20	25.00	82–195
Basic reading achievement	77.71	6.36	60–85

performance. For the purposes of this study, only the assessment of cognitive ability (intelligence), reading achievement, and behavior problems were relevant.

Children were administered the Weschler Abbreviated Scale of Intelligence (WASI; Psychological Corporation, 1999). The WASI is a published, abbreviated version of the Weschler series test and includes four subtests: Vocabulary, Similarities, Matrix Reasoning, and Block Design. Generally, the best estimate was the Full Scale IQ from the WASI, although there were several cases for whom this rule did not apply. For children with more than a 15-point discrepancy between Verbal IQ and Performance IQ, the higher score was judged to be the best estimate of their level of intellectual functioning. This was done to ensure that children with significant language or spatial impairments were not penalized in the determination of their cognitive ability. Seventeen children included in this study had greater than 15-point discrepancies.

Word recognition and decoding skills were assessed using the Woodcock Reading Mastery Tests – Revised (WRMT-R; Woodcock, 1998), a comprehensive battery designed to assess a wide range of reading-related skills. The Word Identification subtest on the WRMT-R required the participants to pronounce visually presented words in isolation. The individual could use decoding skills or sight recognition skills for the task and it was untimed. Because words were presented out-of-context, it was not necessary for the individual to be familiar with the words or to know the meanings of the words. The Word Attack subtest on the WRMT-R required the children to read aloud nonsense words according to phonetic rules. A reading composite score was obtained by calculating a mean value for performance on the two reading subtests.

Information about internalizing symptoms in the participants was also collected. Parents and teachers were asked to complete the Behavior Assessment System for Children (BASC; Reynolds & Kamphaus,

2002) about each participant. The BASC is comprehensive measure of problematic as well as adaptive behaviors exhibited by the child in the home and at school frequently used in schools and clinical practice. As a published and frequently used measure of childhood behavior, its psychometric properties are generally considered to be adequate and are summarized in the BASC manual. The BASC was designed to be completed by parents and teachers as a behavioral screener. Responses to items are rated on a 4-point scale from Never to Almost Always. From the parent and teacher ratings, three subscales were identified as relevant to this study: anxiety, depression, and somatization. These subscales were chosen to examine elevations in internalizing symptoms in relation to reading achievement. Scores are T-scores with a mean of 50 and higher scores (≥68) denote areas of clinical concern.

Additionally, every child who was 8 years old or older was asked to complete the Childhood Depression Inventory (CDI; Kovacs, 1985) and the Revised Childhood Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 2000). The measures are designed as self-report measures of internalizing problems and are frequently used in clinical practice. The psychometric properties of these measures are judged to be adequate and are summarized in the manual for each measure. For both measures, the broadest composite scores were used. In the event that the child was judged to have such limited reading skills that responses were likely to be invalid, an examiner read the items to the child.

Results

Prior to any statistical analyses, a power analysis was completed to test if differences between groups could be detected. Results suggested that the sample size was sufficient to detect the moderate effect that was expected with 90% confidence ($\alpha = 0.10$). Additionally, preliminary data analyses indicated no significant correlation between age of participant and internalizing problems across raters ($r^2 = 0.04$–0.17; $P = 0.096$–0.650).

In the first analysis, groups were determined by a discrepancy criteria model. Descriptive statistics for the children in each group on the internalizing variables are summarized in Table 3. Examination of the means for children with and without dyslexia reveals that both groups have mean internalizing scores within the average range by both parent and teacher report. In both groups, teacher means were slightly higher than parent ratings but well within normal limits. Child self-report scores were also within normal limits.

Table 3. Descriptive statistics for internalizing symptoms in discrepancy model.

	Mean T-Score	SD	Range
Children without dyslexia			
Parent internalizing composite	46.80	10.41	36–72
Teacher internalizing composite	51.58	11.22	38–91
Self–reported depression	47.11	10.10	36–81
Self–reported anxiety	46.29	10.28	24–68
Children with dyslexia			
Parent internalizing composite	45.79	5.86	35–55
Teacher internalizing composite	48.86	8.98	40–69
Self–reported depression	45.00	5.66	37–58
Self–reported anxiety	51.73	8.09	37–66

In the second analysis, groups were determined by reading achievement without regard to intellectual ability. As was the case with the discrepancy model, examinations of means for children with and without dyslexia revealed internalizing scores well within the average range on both parent and teacher report. Also, teacher means were again slightly higher than parent rating but within normal limits. As with the first analysis, child self-report scores were within normal limits. Results are summarized in Table 4.

For both models when differences between groups were tested via analysis of variance (ANOVA), no statistically significant differences were found. Children with dyslexia, regardless of diagnostic strategy, were highly similar to children without dyslexia in terms of their internalizing

Table 4. Descriptive statistics for internalizing symptoms in reading cut scores model.

	Mean T-score	SD	Range
Children without dyslexia			
Parent internalizing composite	46.55	10.81	36–71
Teacher internalizing composite	51.77	11.54	38–91
Self-reported depression	46.29	9.40	36–79
Self-reported anxiety	45.75	10.37	24–68
Children with dyslexia			
Parent internalizing composite	46.90	7.50	35–72
Teacher internalizing composite	49.86	9.49	40–79
Self-reported depression	48.00	10.14	37–81
Self-reported anxiety	49.92	9.13	33–66

symptoms as rated by parents, teachers, and on self-report. A summary of ANOVA results for composite scores for both models are in presented in Table 5.

Table 5. Summary of ANOVA results for internalizing composite scores in both models.

	df	F-statistic	Significance
Discrepancy model			
Parent internalizing composite			
Between groups	1	1.20	0.276
Within groups	77		
Total	78		
Teacher internalizing composite			
Between groups	1	0.13	0.723
Within groups	73		
Total	74		
Child self-report depression			
Between groups	1	0.571	0.452
Within groups	77		
Total	78		
Child self-report anxiety			
Between groups	1	3.20	0.077
Within groups	77		
Total	78		
Reading cut score model			
Parent internalizing composite			
Between groups	1	0.01	0.921
Within groups	77		
Total	78		
Teacher internalizing composite			
Between groups	1	0.60	0.442
Within groups	73		
Total	74		
Child self-report depression			
Between groups	1	0.495	0.484
Within groups	77		
Total	78		
Child self-report anxiety			
Between groups	1	2.82	0.097
Within groups	77		
Total	78		

An analysis of the outliers in terms of reading achievement was also completed to test whether children at the lowest end of the reading distribution would be more likely to have an increase in internalizing symptoms. When the seven participants with reading achievement below the 2nd percentile (standard score < 75) were examined, results indicated similar findings. Despite having a reading composite score significantly below the average range, means for these seven children on internalizing behavior levels were also within the average range. None of the seven children was identified by parent or teacher as having clinically significant symptoms associated with somatization, anxiety, or depression. Only one child reported a slightly elevated composite score on RCMAS (T-score = 66) and no children reported elevated scores on the CDI.

Discussion

Based on results from this study and in consideration of any limitations, it may be that children with dyslexia are no more likely to have internalizing problems than children with normal reading achievement. These results are consistent whether the diagnostic model specified a discrepancy criterion or a cut score criterion for the diagnosis of dyslexia. Furthermore, the children with the most severe reading impairments in this sample also have means scores for behaviors associated with anxiety, depression, and somatic complaints well within the average range. No children, with or without severe reading deficits, were identified by both parent and teacher as having significant internalizing symptoms, and only one child reported elevated anxiety symptoms.

There are several differences between this study and previous studies of internalizing symptoms in children with dyslexia. For this study, children were referred by parents or teachers if they had been previously diagnosed with a reading disability or if there was strong suspicion that the child was having significant and specific difficulty with reading acquisition. Children with more generalizing learning problems at the time of referral, like those in studies described by Porter and Rourke (1985) and Tsatsanis et al. (1997), were not generally included in the study. Also, all children in the study were referred for reading problems, rather than generalized learning disabilities (LaGreca & Stone, 1990; Stevenson & Romney, 1984). According to Porter and Rourke (1985), 26% of their participants referred for learning problems had elevated internalizing symptoms, but our study of children with specific reading problems did not yield similar results.

The assessment battery for this study also was somewhat different than that of other published studies, particularly in measuring internalizing symptoms. Several studies have used personality assessments from the perspective of parents, such as the Personality Inventory for Children, to measure internalizing symptoms (e.g., Fuerst, Risk, & Rourke, 1990). A limited number of studies have used parent report of clinical behaviors, such as the Revised Behavior Problem Checklist, to measure internalizing symptoms (e.g., LaGreca & Stone, 1990). No other studies of internalizing behavior problems have used the Behavior Assessment System for Children (BASC). The BASC is a commonly used in school and clinical settings to measure clinical and adaptive behaviors (Reynolds & Kamphaus, 2002) and reports suggest that it has good discriminate validity (Vaughn, Riccio, Hynd, & Hall, 1997).

In addition to differences in population and assessment battery, this study also differed from other studies in the diagnostic criteria used to identify children with dyslexia. In some cases, past special education diagnoses were utilized (i.e., McKinney, 1989). In other studies, significant lags in achievement (e.g., Murray, 1978) were used to identify children with dyslexia. Several studies have used discrepancy models (e.g., Jorm et al., 1986) or regression-based criteria (e.g., Boetsch et al., 1996). Other studies (e.g., Porter & Rourke, 1985) have used a cut score system wherein children scoring below a particular percentile or standard score are identified as dyslexic. For this study, two different, diagnostic models were used. In the discrepancy model, a 20-point difference between intellectual ability and a composite measure of basic reading skills was used. This large difference made it more likely that the most impaired readers were identified and reduced the likelihood of over-identifying children with dyslexia. In the cut score model, four additional children were identified suggesting that the cut score model was slightly less stringent, yet less than 35% of a population referred for severe reading acquisition problems were identified with dyslexia. By strictly defining dyslexia, we sought to separate children with dyslexia from children with other learning problems before examining internalizing symptoms.

The relatively small sample size was a limitation of this study. Although it is possible that the small sample size failed to yield significant power to detect group differences in internalizing symptoms, examination of group mean scores suggests that there were not undetectable differences between groups. In each analysis, scores for internalizing symptoms were well within the average range for children with and without dyslexia. Furthermore, small sample size did not allow for analyses to be conducted separately by sex, limiting our ability to make

hypotheses about the relationship between sex, presence or absence of dyslexia, and internalizing symptoms. Additionally, information about reading comprehension and reading fluency was also not included in this study because basic reading skills were judged to be better indicators of actual reading achievement in our school-aged sample. Future studies with larger populations and older participants will increase our understanding of under what circumstances internalizing symptoms may present in children and adolescents with dyslexia.

In summary, results from this study suggest children with dyslexia are not at increased risk for internalizing symptomatology, including anxiety, depression, and somatization. The results are consistent across reporters. Furthermore, children with the most severe reading impairments did not exhibit elevated risk for internalizing symptoms when compared to less reading impaired children.

Acknowledgement

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