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## ORIGINAL STUDY

# Correlation of several parameters with psychiatric problems in children with dyslexia

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### Abstract

A child's development in the areas of cognition, language, emotion, socialization, and morality is greatly influenced by schools and learning. Academic abilities are the cornerstone that forms the basis for evaluating a student's success in the classroom. Therefore, fear, guilt, and inadequacy caused by a learning issue may manifest as behavioral problems in school-age children. Determining whether a behavior is comorbid with dyslexia or secondary to it is crucial when dyslexia and behavioral issues co-occur. The study's goal: to determine which parameters are correlated to the co-morbid psychiatric issues in dyslexic children in order to lessen their burden and provide a better management strategy. Material and methods: the phoniatics unit of Ain shams university and Hearing and Speech Institute Outpatient Clinics were used for this investigation. Analytical cross-sectional study design was used to carry it out. The parents of each participant signed a written consent 62 dyslexic children between the ages of 6 to 10.5 years were participated in this study. Children with an intellectual quotient of 90 or more, or those with an average mentality and children between the ages of 6 and 10.5 were included in this study. Correlation between CBCL behavioral problems and memory & word finding difficulty & language age and phonological awareness. In summary, the present investigation found that co-morbid behavioral issues were more common in dyslexic children (53%). Behavioral issues may be related to memory difficulties in the dyslexic population.

*Keywords:* Dyslexia, CBCL, WFD, PLS4, Memory

## 1. Introduction

A child's development in the areas of cognition, language, emotion, socialization, and morality is greatly influenced by schools and learning. Academic abilities are the cornerstone that forms the basis for evaluating a student's success in the classroom. Therefore, fear, guilt, and inadequacy caused by a learning issue may manifest as behavioral problems in school-age children. Any unfavorable comments from the school are probably going to affect the child's emotional, social, and familial functioning [1].

In the long run, the correlation between behavioral issues and dyslexia is quite important since behavioral issues and academic difficulties are both likely to endure and are linked to later-life maladjustment, social deviance, and unemployment [2].

Rather than 'pure dyslexia,' some research indicates that related behavioral issues have a greater impact on poor adult outcomes. Thus, for those who work with children who have learning disorders or behavioral disorders, this is a crucial issue to take into mind [3].

Determining whether a behavior is co-morbid with dyslexia or secondary to it is crucial when dyslexia and behavioral issues co-occur. When dyslexia is the source of negative behavior, treating the learning disability is frequently the best course of action. Interventions become more difficult when co-morbid since the behavior needs to be handled independently of the dyslexia. The main issue here should be considered the weight of suffering. If a habit is causing the most misery, it should be addressed first; if dyslexia is the cause, it will take precedence. It's critical to recognize the suffering

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that results from a learning deficit that impairs the intricate relationships between behaviors, emotions, and learning [4].

The study's goal: is to determine which parameters are correlated to the co-morbid psychiatric issues in dyslexic children to lessen their burden and provide a better management strategy.

## 2. Material and methods

The phoniatrics unit of Ain Shams University and Hearing and Speech Institute Outpatient Clinics were used for this investigation. An analytical cross-sectional study design was used to carry it out. The parents of each participant signed a written consent 60 dyslexic children between the ages of 6 and 10.5 years participated in this study.

Children with an intellectual quotient of 90 or more, or those with an average mentality, and children between the ages of 6 and 10.5 were included in this study.

The following criteria were excluded: Children under the age of 6 or older than 10.5, children on mental health medicine, children who are hard of vision or hearing, individuals having an IQ below 90, and deficits in sensory or gross motor neurology.

### 2.1. Assessment protocol of dyslexics

#### 2.1.1. Simple diagnostic procedures

- (1) Taking a personal history, including behavioral symptoms and which subjects the patient found more difficult Math, reading, writing, and spelling.
- (2) General examination: the objective was to look for any small somatic irregularities.
- (3) Examining the vocal tract.
- (4) Examining the nervous system (including fine neurological symptoms); patients with severe motor or sensory impairments or seizures were not admitted.

#### 2.1.2. Clinical diagnostic aids

- (1) Modified Arabic Preschool Language Scale-4 (PLS-4) [5]: evaluates the linguistic growth of the youngster. Ages at which language was receptive, expressive, and total were scored.
- (2) Phonological Awareness Assessment [6]: an exam designed to evaluate a child's phonological skills, such as their comprehension of how spoken language is divided into smaller chunks and their capacity to separate, recognize, and work with these chunks.

- (3) Word finding difficulty (WFD): the following findings provided a quasi-objective framework for evaluating the WFD. The modified Arabic dyslexia screening test has three subtests: verbal fluency, semantic fluency, and rapid naming [7].
- (4) A state of the memory: the modified Arabic dyslexia screening test [7] backward digit span subtest and the auditory sequential memory subtest of the Illinois test 'Arabic version' [8] were used to assess auditory memory. Additionally, the Illinois test Arabic version's visual sequential memory subtests [8] are used to assess visual memory.
- (5) Psychometric assessment:
  - (a) Stanford Binet Intelligence Scale 'fourth Arabic version' [9], to determine mental age, and IQ.
  - (b) The 'Arabic version' of the Child Behavior Checklist (CBCL) [10]: It is a standardized tool used to evaluate behavioral issues in children. Children between the ages of 6 and 18 can use it [11].

Data Management and Analysis: data were shown and appropriate analysis was carried out in accordance with the kind of data found for each parameter. For Microsoft Windows, SPSS Inc., Chicago, IL, USA, version 15 was used for statistical computations. For numerical data, descriptive statistics include mean, standard deviation (SD), median, and range. Statistics for analysis: Pearson the degree of relationship between two quantitative variables was evaluated using correlations. The degree and direction of the linear link between two variables are defined by the correlation coefficient, symbolically represented by 'r'. The test used for nonparametric data was this one: The Mann–Whitney Test. The test utilized for qualitative data was as follows: to investigate the association between two qualitative variables, the  $\chi^2$  test was employed. The *P* value, or significance level, was ascertained in this manner: NS (not significant) if *P* greater than 0.05 and *P* less than or equal to 0.05.

## 3. Results

This study's sample of sixty dyslexic children had a variety of psychiatric co-morbidities, in the form of: external behavior problems (9%), internal behavior problems (40%), and total issues (53%).

### 3.1. Correlation between different parameters within the dyslexic children

Tables 1–3.

Table 1. Correlation coefficient between the Child Behavior Checklist (total issues, internalizing and externalizing behavior disorders scores) and deficiencies in auditory and visual memory.

Cases	Visual	Auditory
<b>Internal behavior problem</b>		
R	-0.06	-0.31
P value	0.706	0.049
Sig.	NS	S
<b>External behavior problem</b>		
R	0.18	0.16
P value	0.273	0.326
Sig.	NS	NS
<b>Total behavior problem</b>		
R	0.06	-0.02
P value	0.721	0.912
Sig.	NS	NS

While there was no significant association found between externalizing and overall behavior problems scores on the CBCL, there was a strong positive correlation between auditory memory and internalizing behavioral difficulties. The CBCL's internalizing, externalizing, and overall behavior issues scores did not significantly correlate with visual memory.

#### 4. Discussion

The suffering caused by a learning deficiency that obstructs the complex connections between emotions, behaviors, and learning must be addressed [4]. In this study, 53% of the children had linked behavioral disorders, which may help to mitigate the effects of co-morbid mental issues on learning-disabled children and improve the efficacy of the rehabilitation program throughout the entire study group of the language-based LD group. This number was significantly higher than the 2% prevalence of emotional issues among Egyptian children between the ages of 6 and 12, who were thought to be typically developing [12].

Total 70% of the children in this study who were dyslexic had memory impairments and only

Table 2. The correlation coefficient stands for the total, internalizing, and externalizing behavior problem scores (Child Behavior Checklist broadband behavior problem scores) and word finding difficulty Preschool Language Scale-4.

Cases	WFD	PLS4
<b>Internal behavior problems</b>		
R	-0.05	-0.19
P value	0.749	0.474
Sig.	NS	NS
<b>External behavior problems</b>		
R	0.14	-0.18
P value	0.405	0.512
Sig.	NS	NS
<b>Total behavior problems</b>		
R	-0.09	0.08
P value	0.572	0.758
Sig.	NS	NS

Internalizing, externalizing, and overall behavior issues did not significantly correlate with word finding difficulty (WFD) or Preschool Language Scale-4.

Table 3. The correlation coefficient between the Child Behavior Checklist broadband behavior problem scores and the phonologic awareness outcomes across three distinct age groups is as follows.

Cases	Phon. awareness (6-6.5 years)	Phon. awareness (6.6-7.5 years)	Phon. awareness (7.6-8.6)
<b>Internalizing behavior problem</b>			
N	7	19	16
R	0.64	0.09	0.04
P value	0.246	0.825	0.911
Sig.	NS	NS	NS
<b>Externalizing behavior problem</b>			
N	5	9	9
R	-0.13	-0.59	-0.58
P value	0.834	0.091	0.104
Sig.	NS	NS	NS
<b>Total behavior problem</b>			
N	5	9	9
R	0.26	-0.25	0.06
P value	0.673	0.517	0.887
Sig.	NS	NS	NS

Phonologic awareness ratings did not significantly correlate with internalizing, externalizing, or overall behavior issue scores.

internalized behavior issues were positively connected with auditory memory. The correlation between memory impairments and behavioral issues could be explained by the fact that memory impairments can impact a person's capacity to follow instructions and plan their thoughts for writing and speaking. A person who has this issue could get quite frustrated at home or in the classroom. When educators and parents misread the signs of memory impairment, they could react to the student in a way that makes them act disruptively, isolate themselves from others, not want to try new things, or express a dislike for school [13]. According to a study by Swanson and Hsieh [14], people with RD who are older than average likewise had worse working and short-term memory than people without RD. It is impossible to overstate the significance of memory abilities for academic learning [15]. Studies have connected learning challenged children's memory deficiencies to difficulties in reading, language, spelling, and other domains. Numerous assignments that are necessary in the classroom demand memory skills according to a study by Swanson and Hsieh [14] and Bender [16]. This is consistent with recent research showing a negative correlation between anxiety and cognitive skills (such as intellect and memory) [17].

When connected with linguistic age as determined by PLS-4, this study demonstrated no significant correlation between internalizing, externalizing, and overall behavior difficulties. This might be because the study group's PLS-4 test results at the time of application were nearly normal. Many children who eventually become dyslexic have perfectly normal

language development [18], although many cases in the study showed a history of delayed language development. This could be because the language assessment tool (PLS-4) we used in this study has a maximum age of application of 7.6 years. Nevertheless, we administered the test to older children because it was the one that was available and covered the majority of the fundamental language skills in the LD assessment protocol. This finding contradicts the suggestion made by Gellert and Elbro [19] that early language issues could be underlying causes of the link between behavior issues and dyslexia. Dyslexia is a possibility for kids who exhibit delayed language development when they are 3 or 4 years old. Although reading disabilities in later school years, adolescence, and adulthood are predicted by early language difficulties and a diagnosis of language impairment in childhood, these children should be closely watched, however, not all children with language disorders in early childhood go on to become dyslexic. That is a crucial sign of a potential issue [18].

There was no discernible relationship between phonological awareness and the three CBCL broadband behavior issue scores. This finding is consistent with a study by Behfrouz and Nahvi [20] that examined the connection between psychopathy and phonological processing abilities, such as phonological awareness and quick naming. This finding could be explained by the fact that the older patients in the study, who displayed greater behavioral issues, were older than the target audience for the phonologic awareness test, and may have already developed phonologic awareness abilities that had been lacking at a younger age.

The three CBCL broadband behavior problem scores (Total problems, internalizing and externalizing behavior problems) did not significantly correlate with the results of the WFD tests [21]. Noted that dyslexics usually struggle in social situations because they struggle to find the correct words or hesitate to respond to direct questioning. This study contradicts the suggestion made by Messar and Dockrell [22] that a child who struggles with word discovery in the school can find it difficult to articulate what they know. Anxiety can be heightened by a word finding issue, which makes things more difficult.

In summary, the present investigation found that co-morbid behavioral issues were more common in dyslexic children (53%). Behavioral issues may be related to memory difficulties in the dyslexic population.

It is advised that more studies be conducted on older kids to show how co-morbid behavioral issues

change over time, both with and without appropriate treatment.

## Conflicts of interest

None.

## Institutional review board (IRB) approval number

0006379

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