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Original Research Article

Domain-specific prevalence of learning disability among government and non-government school children

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ABSTRACT

Background: Learning disability is a neurodevelopmental disorder characterized by persistent difficulties in acquiring academic skills despite adequate intelligence and educational opportunities. Educational environments may influence the pattern and prevalence of learning disability. However, comparative evidence across different school systems remains limited. This study aimed to determine the prevalence of learning disability among school children in government and non-government schools. Additionally, to examine the relationship between Intelligence Quotient (IQ) and learning disability diagnostic inventory (LDDI) domains along with perceptual deficits.
Methods: A cross-sectional observational study was conducted among 240 school children aged between 8-12 years. Learning disability were assessed using the LDDI, while intelligence was evaluated using Raven's Coloured Progressive Matrices (CPM). Descriptive statistics were used to estimate prevalence across domains and school types. Correlation analysis was performed to examine the association between IQ and LDDI domains, with statistical significance considered at $p<0.05$.
Results: Domain specific prevalence of learning disability was observed. Listening disability was the most prevalent domain, affecting (30%) students in government and (16%) of non-government school students, followed by speaking (27% and 12.5% respectively). Among perceptual deficits, position in space (11.6% and 10%) and eye-hand coordination (4-6%) were most frequently observed. Overall, government school students showed a relatively higher prevalence. A significant association was observed between learning disability domains and Intelligence quotient scores ($p<0.05$)
Conclusions: The study highlights the domain-specific prevalence of learning disability among school children and emphasizes the importance of early screening, targeted educational strategies and school-based interventions to improve learning outcomes.

Keywords: Coloured progressive matrices, Intelligence tests, Learning disability diagnostic inventory, Learning disabilities, Neurodevelopmental disorders

INTRODUCTION

Learning disability is a multifactorial neurodevelopmental disorder characterized by persistent impairments in the acquisition, integration and processing of information. These difficulties often affect both expressive and receptive functions.[1] The individuals with disabilities education act (IDEA) defines learning disability as a psychological disorder characterized by challenges in the domains such as reading, writing, speaking, listening, reasoning and mathematical performance.[2]

The diagnostic process requires exclusion of visual and hearing impairments, intellectual disability and socio-cultural disadvantages.[3] The prevalence of learning disability varies across educational settings. Students attending government school, often operating under structured state curriculum and limited infrastructural

resources, may demonstrate different learning patterns compared to students in non-government schools, admission criteria and academic exposure may differ.[4] In primary school settings, approximately 26% have been reported to be at the risk of likelihood of specific learning disability.[5] However, comparative data regarding prevalence across domain specific government and non-government schools remain limited.

Learning disability poses substantial obstacles to academic achievement with deficits frequently more pronounced compared typically developing peers. Listening skills form the foundation for classroom and academic engagement can create learning difficulties in schools.[6] The aetiology of learning disability is complex and involves neurological, environmental and psychological components. The intelligence quotient (IQ) markedly plays an important part in cognition processing and academic performance.[7]

Visuospatial dysfunction has been considered as a key marker, particularly in non-verbal learning disability and is often associated with impairments in phonological processing and arithmetic performance. The interaction between IQ and perceptual domains contributes meaningfully to overall cognitive and academic outcomes.[8] Early identification of learning disability at the school level facilitates improved academic and socio-emotional adjustments.[9]

Standard assessment protocols aligned with the diagnostic and statistical manual of mental disorders (DSM-V) emphasize the importance of comprehensive evaluation across domains while excluding sensory and intellectual impairments.[10] The LDDI, a DSM- aligned and validated tool for school going children, was used to ensure reliable and structured identification of domain specific learning disability.[11]

Most existing studies have predominantly focused on either government schools or non-government schools independently with limited comparative evaluation between two. Furthermore, the relationship between IQ and domain specific learning disability within different school environments remains underexplored in across various geographical areas.

Therefore, the present study aimed to determine the prevalence of learning disability in school-going kids of government and non-government schools by using LDDI and to examine the association between IQ and LDDI domains, along with evaluation of perception deficits and association of IQ with LDDI.

METHODS

This cross-sectional observational study was directed according to the STROBE guidelines.12 Ethical approval was obtained from the Departmental Research Board and the Institutional Ethical Committee, Punjabi University, Patiala under the following IEC No. 35/IEC/PUP/2023 and conducted according the principles of Declaration of Helsinki. Students were recruited from class III-V from different type of schools, including two governments and three non- government schools of district Patiala, Punjab. Written permission was obtained from the higher authorities of schools, teachers and parents. The sample size was calculated using G-power software 3.1.9.7. A total of 240 students were included in the study, comprising 120 from government schools and 120 from non-government schools. Students aged between 8 and 12 years were recruited.

The study was conducted from August 2023 to April 2024 across five schools in Patiala, Punjab. Government schools included (Playways Senior Secondary School, Senior Secondary Model School) while non-government schools included (Ryan International School, Auro Mirro Centre of Education and Scholar Fields Public School) all schools were located in district Patiala, Punjab.

Demographic details were documented by using detailed questionnaire and further assessed by using coloured progressive matrices for IQ and visual and auditory perception components from diagnostic test of learning disability filled by student. The learning disability diagnostic inventory was administered by teachers with standardized instructions to evaluate for each student.

Eligibility criteria

Students from class III to V from both government and non-government schools. Both male and female students within the age group 8-12 years and those whose parental consent was obtained.

Exclusion criteria- Students with visual or auditory impairments, above the age group (8-12) years, neurological history, cerebral palsy, epilepsy, head injury or any trauma, students with co-morbidities like autism spectrum disorders and attention deficit hyperactivity disorder (ADHD) and emotional sensory disturbances and that parental consent was not obtained. Data collection was done and statistical analysis was done through descriptive statistics and inferences.

Objective assessment of the participants

The LDDI is a standardized tool used to identify intrinsic processing disorders among students with learning disability. Developed based on criteria from the national joint committee on learning disability, it assesses behavioral indictors across six domains-listening, speaking, writing, reading, mathematics and reasoning.

The scale is designed for students aged between 8-17 years and demonstrates strong psychometric properties. Scoring includes raw scores, percentiles and stanine values with ratings ranging from 1 (most frequently) to 9 (rarely).[11] The diagnostic test of learning disability developed by

Swaroop and Mehta, evaluates specific learning disability by assessing ten psychological process areas.

Six domains measure perceptual processes (eye hand coordination, figure ground perception, figure constancy, position in space and other cognitive functioning components).[13] The colored progressive matrices is a widely used non-verbal measure of intelligence for children. It consists of 36 items arranged in three sets with increasing difficulty and assesses visual comparison and analogical reasoning abilities reflecting intellectual domain.[14]

Statistical analysis

Statistical analysis was done by using SPSS software 20. Descriptive statistics was performed as continuous variables were expressed as mean and standard deviation. Categorical variables were presented as frequency and percentage to find prevalence across both school types. Pearson's correlation coefficient was calculated to find the relationship between IQ and LDDI Index and p value of <0.05 was considered statistically significant.

RESULTS

Of the 300 students initially screened, 60 were excluded did not meet inclusion criteria. Additionally, 18 students did not complete the CPM assessment and 12 students were absent during the evaluation. Finally, 240 students were included in the final analysis (Figure 1).

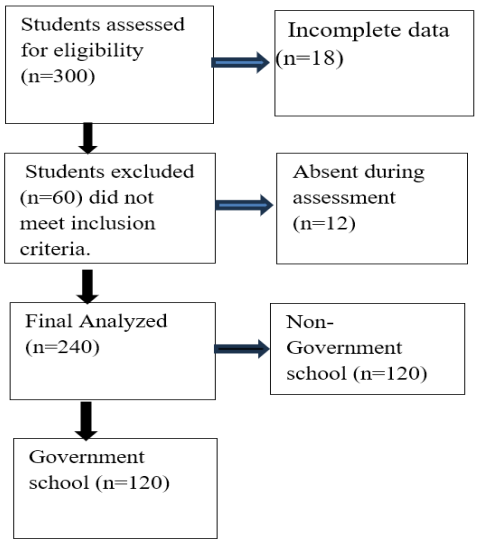

Figure 1: Flowchart illustrating participant inclusion and final analysis in the study on prevalence of learning disability among school -going children.

The demographic characteristics of the 240 students included in the study. The sample consisted of 120 students (50%) from government schools and 120 students (50%) from non-government schools. The mean age of the participants was 9.64±1.0 year and students from class III, IV and V were included. The gender distribution was nearly equal with 116 males (48.3%) and 124 females (51.7%) (Table 1).

Table 1: Demographic characteristics of the study participants (n=240).

Variable	N	%	Mean±SD
School type	240		
Government school	120	50	
Non-government school	120	50	
Age (in years)			
Age (8-12)	240		9.641±1.0
Class	240		
Class III	91	37.9	
Class IV	78	32.5	
Class V	71	29.6	
Gender	240		
Male	116	48.3	
Female	124	51.7	

Table 2: Domain-wise prevalence of learning disability and perceptual deficits across school types (n=240).

Perceptual deficits	Government school N (%) likely	Non-government school N (%) likely
Reading (RD)	16 (13)	9 (7.5)
Writing (WT)	12 (10)	6 (5)
Speaking (SP)	32 (27)	15 (12.5)
Listening (LI)	36 (30)	19 (16)
Mathematics (MT)	9 (7.5)	11 (9)
Reasoning (RE)	10 (8)	8 (7)
Components of DTLD	**N (%) (Severe)**	**N (%) (Severe)**

Continued.

Perceptual deficits	Government school N (%) likely	Non-government school N (%) likely
Eye- hand coordination (EHC)	6 (5)	5 (4)
Figure ground (FG)	1 (1)	2 (1.6)
Figure constancy (FC)	2 (1.6)	2 (1.6)
Position in space (PS)	14 (11.6)	12 (10)

Table 3: Correlation between CPM (IQ) and LDDI Index.

Variables	Government school		Non-government school	
CPM(IQ) & LDDI components	**'r' Value**	**P value**	**'r' value**	**P value**
CPM (IQ) & reading	-0.212	0.02	-0.155	0.09
CPM (IQ) & listening	-0.266	0.003	-0.151	0.1
CPM (IQ) & speaking	-0.22	0.016	-0.147	0.11
CPM (IQ) & writing	-0.182	0.046	0.1	0.279
CPM (IQ) & mathematics	-0.171	0.062	-0.21	0.021
CPM (IQ) & reasoning	-0.136	0.139	-0.246	0.007

Domain- wise prevalence of learning disability and perceptual deficits among school types. Among the LDDI domains, listening disability was the most prevalent domain among both school settings followed by speaking disability. Overall, students from government schools exhibited a higher prevalence compared to non-government schools.

Class-wise distribution showed variability across domains, with a higher prevalence of learning disability observed among class IV students in government schools and class V students in non-government schools. Additionally, the prevalence of perceptual deficits was assessed among students using DTLD components, Position in Space deficit was the most prevalent in both government schools (11.6%) and non-government schools (10%) followed by eye hand coordination deficits (Table 2).

The correlation between the CPM (IQ) and LDDI index. The analysis revealed that, in government schools, CPM scores demonstrated significant negative correlation with several domains of learning disability including domains of reading (-0.212), listening (-0.266), speaking (-0.220), writing (-0.182) whereas mathematics (-0.210) and reasoning (-0.246) domains in non-government school. These findings revealed a modest association between lower IQ scores and greater severity of learning disability across specific domains (Table 3).

DISCUSSION

The present study examined the prevalence of learning disability among school going children in government and non-government schools. The findings indicate that the prevalence was higher in government schools compared to non-government school students. Among the assessed domains, listening disability was identified as the most affected domain across both school settings. Additionally, the prevalence appeared higher in primary classes, particularly in Class IV in government schools and Class V in non-government schools. The study also recognized variability across learning domains and revealed a statistically significant but weak association between IQ and Learning Disability Index.

The domain-specific prevalence patterns observed in present study are consistent with previous findings that reported prevalence rates of dyslexia (7.4%), dysgraphia (8.6%) and dyscalculia (7.1%), indicating comparable involvement of reading, writing and mathematics domains. Similarly, prior studies have reported significant involvement of reading (12.5%), writing (15.6%) and mathematics (9.9%) among school going children, which aligns with academic domains evaluated in the present study.[15] The relatively higher prevalence observed in government schools may reflect contextual influences such as limited educational resources, variation in classroom infrastructure and variability in instructional support. Additionally, variation in admission practices and academic screening procedures between school system may contribute to the observed differences in prevalence.[10]

Class-wise analysis revealed a higher prevalence of learning disability in Class IV among government school children and in Class V among non-government school children. Similar patterns have been exhibited in earlier studies, Bandla et al, suggested that increasing academic demands and curricular complexity in upper primary classes is often associated with increased academic expectations and cognitive load, which may contribute to a higher prevalence of learning disability during these classes.[16] The prevalence of learning disability appears to be more prevalent among primary classes. A significant finding of the present study was that listening disability revealed as the most prevalent domain across both school settings. This observation may reflect the critical role of auditory processing in classroom-based experiences, where comprehension of verbal instructions forms the foundation of academic engagement.[17] Despite norming listening, children with altered cortical connections shows deficits in central auditory processing. Classroom based factors like instructional delivery, linguistic complexity

and background noise further influence the auditory comprehension in children. Previous studies have highlighted the contribution of central auditory processing and cortical connectivity in academic comprehension.[18] These findings may support the consistent pattern observed across both school types irrespective of institutional variability.

Additionally, prevalence of perceptual deficits related to position in space and eye- hand coordination was observed in school settings. Visuospatial integration and motor coordination are supported by cerebellar and cortico-parietal networks, which are implicated in executive functioning and academic performance.[10,17,19] Prior findings have suggested that impairments in visuo-spatial integration are associated with broader academic challenges, supporting the multidimensional nature of learning disability observed in the study. These findings reflect that perceptual deficit may represent underlying neurodevelopmental factors rather than solely influenced by institutional or environmental factors.

Correlation analysis in the present study revealed a statistically significant association but weak association between IQ and certain LDDI domains. In non-government schools, stronger associations were observed with mathematics and reasoning, whereas in government school associations were noted with reading, speaking, listening and writing. These findings suggest that that intelligence may contributes to performance in certain academic domains but does independently determine the learning disability due to its multifactorial nature.[20] Previous research has also reported stronger associations between fluid intelligence and analytical abilities compared to language-based skills.[21] The involvement of fronto-parietal neural networks in reasoning and numerical processing may explain the close association of IQ with reasoning and mathematics.[22]

These findings reinforce that intelligence contributes to non-verbal domains whereas verbal domains are greatly influenced by neurobiological foundation and environmental factors.[9,20,22] In contrast, Language based domains are largely governed by temporo-parietal neural networks and are influenced by a wide range of instructional, linguistic and environmental factors.[23] Therefore, intelligence may contribute to academic performance but does not independently determine the occurrence of learning disability.

The present study has numerous strengths. First, comparative evaluation between government and non-government schools, provide insights for evaluation of environmental influences on prevalence of learning disability. Second, the use of standardized domain-specific assessment tools allowed identification of specific learning difficulties rather than limited analysis to prevalence. Furthermore, correlation between IQ and Learning domains provides more neurocognitive insights. The inclusion of perceptual components strengthened the multi-dimensional approach of the study, thereby enhancing the comprehensiveness of the evaluation.

Despite these strengths, the study has certain limitations. The study was conducted within a limited geographic region which may restrict the generalizability of the results to the broader educational settings. Additionally, the use of screening tools rather than comprehensive diagnostic assessments may have influenced the estimation of prevalence. Environmental and psychosocial perspectives were not deeply analysed which may have provided deeper contextual understanding of learning disability. Future research should incorporate longitudinal design and include a large number of schools would provide a more comprehensive understanding of the educational dynamics associated with learning disability. Comprehensive diagnostic assessments would provide more insights in prevalence. The inclusion of environmental and psychosocial variables may further clarify the role of contextual factors in the development and manifestation of learning disability.

CONCLUSION

The study concludes that prevalence of learning disability is higher in government school compared to non-government schools with listening and perceptual domains being most commonly affected. A mild negative correlation between IQ and LDDI index suggests that it partially affects the cognitive ability. Early screening and domain specific interventions in both school settings are essential and comprehensive evaluations at continuous basis for making an early identification of learning disability at the school level, thereby reducing the likelihood of school dropouts.

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