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Specific Learning Disorder (SLD) and Associated Neurobehavioural Patterns: A Critical Review

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ABSTRACT

Specific Learning Disorder (SLD) is a neurodevelopmental condition that significantly affects children's ability to acquire and use academic skills in domains such as reading, written expression, and mathematics. These symptoms should last for at least 6 months despite academic help or interventions. The DSM-5-TR removed the wide gap between an individual's IQ scores and academic achievement, and instead focused on actual functional academic difficulties. An estimated 5 to 15% of school-age children struggle with a learning disability, along with emotional, social, and behavioural functioning.

Children with SLD frequently exhibit difficulties across domains identified in the Child Behaviour Checklist (CBCL), including Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule-Breaking Behaviour, and Aggressive Behaviour. These neurobehavioural and emotional difficulties often co-occur with academic failure, reduced motivation, and impaired peer relationships, further compounding functional impairment.

Behavioural difficulties in SLD are frequently linked to underlying deficits in executive functioning (working memory, impulse control, cognitive flexibility, planning, decision-making, critical and abstract thinking, concentration, etc.) processing speed, phonological processing, and attentional regulation. Challenges in these domains not only underlie academic underachievement but also predispose children to difficulties in self-regulation, emotional control, and social cognition — manifesting behaviourally as the internalizing (Anxious/ Depressed, Withdrawn/Depressed, Somatic Complaints) and externalizing (Rule-Breaking, Aggressive Behaviour) syndromes captured on the CBCL, along with Attention and Social Problems that bridge both cognitive and behavioural domains.

The present review examines the relationship between SLD and Neurobehavioural aspects in children and adolescents through this integrated neuropsychological–behavioural lens. Existing literature suggests that behavioural difficulties among children with SLD arise from the interaction of core neuropsychological deficits, repeated academic failure, environmental and family responses, comorbid neurodevelopmental conditions (e.g., ADHD), and broader psychosocial factors. The review highlights the importance of early identification, comprehensive neuropsychological and behavioural assessment (including standardized tools such as the CBCL), and family- and teacher-mediated interventions addressing both academic, functional and behavioural needs. Future research should focus on culturally appropriate assessment, longitudinal designs tracking neuropsychological-behavioural trajectories, and integrated educational, functional, and neuropsychological interventions.

Keywords

Specific Learning Disorder (SLD), neurodevelopmental, executive functioning, behavioural difficulties, Child Behaviour Checklist (CBCL), behavioural assessment, processing speed, phonological processing, attentional regulation.

1. INTRODUCTION

Specific learning disorder (SLD) is a neurodevelopmental condition marked by persistent and unexpected difficulty in acquiring core academic skills – reading (dyslexia), written expression (dysgraphia) and mathematics (dyscalculia) – despite adequate intellectual ability, instruction and opportunity to learn.

For better understanding we can say that SLD is an umbrella term for a group of neurodevelopmental disorders that are typically diagnosed in early school-aged children, although they may not be recognized until adulthood.

The education classification system & diagnostic frameworks such as DSM-5-TR define SLD primarily through academic underachievement, a substantial body of research indicates that its impact is rarely confined to the classroom. Children with SLD frequently present with co-occurring behavioral, emotional & social difficulties that can be functionally

Impairing as the academic deficits themselves, means it affects both activity for daily life (ADL) & learning patterns.

The review paper examines the relationship between SLD and neurobehavioural functioning in children and adolescents. It adopts an integrative lens, situating behavioural outcomes within the eight empirically derived syndrome domains of the Achenbach Child Behaviour Checklist (CBCL) — Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule-Breaking Behaviour, and Aggressive Behaviour — while also drawing on neuropsychological research to explain the cognitive mechanisms that may underlie these behavioural patterns. The review paper is organized around six recurring themes identified in the literature: (a) co-occurrence of internalizing and externalizing problems, (b) comorbidity with other neurodevelopmental conditions, (c) self-concept and motivational sequelae, (d) social skills and peer-relationship deficits, (e) family and environmental moderators, and (f) implications for intervention.

2. CONCEPTUAL AND DIAGNOSTIC OVERVIEW OF SLD

SLD is conceptualized as a heterogeneous category encompassing distinct but sometimes overlapping profiles: dyslexia (impairment in word reading accuracy, fluency, and/or spelling), dysgraphia (impairment in the mechanics and organization of written expression), and dyscalculia (impairment in number sense, calculation, and mathematical reasoning). Diagnostic criteria typically require that academic performance falls substantially below age-expected levels, that difficulties have persisted for a defined period despite targeted intervention, and that the difficulties are not better explained by intellectual disability, sensory impairment, or lack of educational opportunity. Prevalence estimates vary across populations around (5% to 15%) and standard screening methods in India(NIM HANS SLD index, Glad) but SLD is consistently identified as one of the most common reasons for special-education referral in school-age children.

3. REVIEW OF LITERATURE

DuPaul, Gormley, and Laracy (2013) reviewed 17 studies published between 2001 and 2011 and reported substantial co-occurrence between learning disabilities and ADHD. Their review emphasized that the overlap between the two conditions has important implications for assessment and intervention because academic difficulties may be intensified when attentional and executive difficulties occur simultaneously.

Megari (2026) reviewed executive-function difficulties in children with ADHD and SLD and highlighted executive functioning as an important pathway through which neurodevelopmental difficulties may influence learning, behavior, social functioning, and adaptation.

Rastgar-Farajzadeh et al. (2026), in a review of 48 peer-reviewed studies, reported different working-memory profiles across SLD domains. Phonological-loop difficulties were particularly associated with reading difficulties, visuospatial working-memory difficulties were prominent in mathematics difficulties, while central-executive difficulties were especially evident among children with difficulties across reading and mathematics.

Tang et al. (2023) conducted a meta-analysis of 54 studies involving 4,211 participants and found evidence of deficits in visual attention span among individuals with developmental dyslexia compared with typically developing controls. The magnitude of the difference varied according to task characteristics, writing system, and comparison-group characteristics.

Donolato et al. (2022) examined internalizing and externalizing problems among children with language and learning disorders. Across 53 independent samples for internalizing problems and 37 samples for externalizing problems, children with learning/language disorders showed higher levels of both internalizing and externalizing difficulties than comparison groups. The pooled effects were Hedges' $g = 0.36$ for internalizing problems and $g = 0.42$ for externalizing problems.

Karande and colleagues reported that children with SLD may experience behavioral and emotional problems ranging from ADHD and anxiety to depression and other psychological difficulties. The authors emphasized that such comorbidities can complicate diagnosis and contribute to additional academic difficulties.

Espinas, Vaughn, and Fuchs (2025) reported that approximately 40% of children and adolescents with SLD may also present with ADHD, although estimates vary according to diagnostic criteria and assessment procedures. The authors emphasized that interventions focusing only on academic skills may be insufficient when attention difficulties are also present.

4. THEORETICAL FRAMEWORKS LINKING SLD AND BEHAVIOUR

4.1 The Failure-Driven Behavioural Model

One of the most explanatory frameworks holds that behavioural difficulties in SLD are secondary to chronic academic failure. According to this model, repeated experiences of underachievement — particularly in front of peers — generate frustration, shame, and anxiety, which in turn manifest as withdrawal, avoidance, or oppositional behaviour. Over time, the

classroom becomes a conditioned source of threat rather than mastery, and behaviour problems emerge as a maladaptive coping response to an unmanageable academic environment.

4.2 Attribution Theory and Learned Helplessness

A second framework draws on attribution theory to explain motivational decline in SLD. Children who repeatedly fail despite effort may come to attribute their failures to stable, internal, and uncontrollable causes ("" I don't have any ability"I am not smart"etc) rather than to effort or strategy. This attributional style — termed learned helplessness (concept given by positive psychologist Martin Seligman) predicts reduced persistence, lower academic self-concept, and increased vulnerability to anxiety and depressive symptoms, even when the child's broader self-esteem in non-academic domains remains relatively intact.

4.3 The Neuropsychological / Executive Function Model

A third, increasingly influential framework locates the origin of behavioural difficulties not solely in the psychosocial consequences of failure, but in shared underlying neurocognitive deficits. Executive functions — working memory, inhibitory control(holding back impulse) cognitive flexibility,(switching between task) and (planning, along with processing speed, phonological processing, and attentional regulation) support both academic learning and behavioural self-regulation. So a single neuropsychological weakness, such as poor inhibitory control, can cause academic underachievement and behavioural problems at the same time. This explains why the two are intertwined rather than merely correlated.

The three frameworks (failure-driven, attributional, and neuropsychological) are not mutually exclusive. Contemporary transactional models propose that neuropsychological vulnerabilities create initial risk for both kinds of difficulty, and that this risk is amplified over time by frustration, negative attributions, and responses from parents, teachers, and peers.

5. BEHAVIOR PATTERNS

5.1 Internalizing and Externalizing Behaviours

Research shows that children with SLD have higher rates of internalizing difficulties (anxiety, low self-esteem, depressive symptoms, somatic complaints like stomachache, headache, fatigue) and externalizing behaviours (defiance, aggression, hyperactivity, rule-breaking) than typically developing peers. CBCL evidence most consistently points to the Anxious/Depressed, Withdrawn/Depressed, Attention Problems, and Aggressive Behaviour domains.

The relationship is bidirectional: academic failure fuels frustration, distress, and withdrawal or acting out, while pre-existing attention and self-regulation difficulties further impair learning. Together they form a cycle that harms the child's academic, emotional, and behavioural functioning.

5.2 Neurobehavioural Patterns

SLD frequently co-occurs with other neurodevelopmental and behavioural conditions like specific phobia, oppositional defiant disorder, enuresis, and tic disorders, with Attention-Deficit/Hyperactivity Disorder (ADHD) being one of the most commonly reported comorbid conditions(25%-40%) Studies have reported that the reported prevalence varies considerably depending on the SLD subtype, diagnostic criteria, assessment methods, and characteristics of the child. The substantial overlap between SLD and ADHD can complicate clinical identification and differential diagnosis, as difficulties in attention, executive functioning, impulse control, and behavioural regulation may overlap with or intensify the academic difficulties associated with SLD. Hence, age- appropriate, and tailor made intervention planning is needed.

5.3 Self-concept, Motivation and Learned helplessness:

Children with SLD are at risk of learned helplessness as attributing failure to fixed and internal traits rather than effort. This lowers academic self-concept and motivation, even if global self-esteem stays intact. The child may appear well adjusted, but general measures can miss academic self-doubt and later disengagement from schooling.

5.4 Peer relationship and Social skill deficits :

More rejection and neglect, caused by family members, peer group and teachers can trouble reading social cues, fewer positive interactions (remedial placement), and stigmatizing labels are also a severe problem. It shows in CBCL Social Problems and often goes with Withdrawn/Depressed and Anxious/Depressed scores, so exclusion and internalizing symptoms compound with other behaviour problems

5.5 Family and environmental factors :

Parental stress, inconsistent expectations, and low family cohesion worsen desired outcomes in a child. Family support,consistent structure, and early identification of SLD can protect further damage. School De- stigmatization on such children (special education labelling,

reduced teacher expectations) also matters which can escalate positive behavioural outcomes managing child neuropsychological vulnerability

5.6 Behavioural Profiles Mapped onto CBCL Domains :

With standardized behavioural assessment, children with SLD can be understood to show elevated risk across all eight CBCL syndrome scales, though not uniformly. Internalizing syndromes (Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints) are most closely tied to chronic failure and worthlessness experiences and attributional processes; externalizing syndromes (Rule-Breaking Behaviour, Aggressive Behaviour) are more closely tied to frustration-driven acting out and comorbid ADHD; and the "bridging" domains — Attention Problems, Social Problems, and Thought Problems — appear to reflect the direct behavioural expression of underlying neuropsychological deficits in executive function and attentional regulation, rather than purely reactive or environmental responses. This mapping offers a useful conceptual bridge between standardized behavioural assessment and the neuropsychological mechanisms.

6. METHODOLOGY OF THE PRESENT REVIEW

This review is uses a narrative approach appropriate for integrating conceptually and methodologically heterogeneous literature spanning neuropsychology, clinical psychology, and special education. A comprehensive narrative review, rather than a strict systematic review or meta-analysis, was selected because the aim was to synthesize thematic patterns and theoretical frameworks across decades of research rather than to quantify combined effect sizes from homogeneous studies.

7. DISCUSSION AND SYNTHESIS

The reviewed literature suggests that neurobehavioural difficulties in SLD arise from the interaction of neuropsychological vulnerabilities, academic difficulties, maladaptive attributions, social experiences, and environmental stressors. These factors may reinforce one another over time, contributing to emotional and behavioural difficulties.

First, the findings highlight the importance of early neuropsychological assessment and intervention, rather than waiting for significant behavioural problems to emerge. Second, effective management should therefore combine academic remediation, cognitive support, and behavioural–emotional interventions to address both the underlying difficulties and their

behavioural consequences. It helps specially to break the failure - attribution-withdrawal cycle which accumulates cognitive vulnerabilities in these children.

8. IMPLICATIONS FOR PRACTICE

- Early, comprehensive assessment. Combine academic, neuropsychological, and standardized behavioural measures (e.g., the CBCL) rather than relying on academic testing alone.
- Multi-modal intervention. Combine remedial teaching with social-emotional learning (SEL) and cognitive-behavioural strategies.
- Structured reinforcement in the classroom. Design behaviour reward systems together with special educators and school psychologists.
- Family psychoeducation. Help parents reduce stress and set consistent, supportive expectations at home.
- Teacher training. Reduce the harm caused by labelling, and help teachers see that early behaviour problems may come from academic frustration rather than defiance.
- Routine screening. Check children with SLD for ADHD and other co-occurring conditions, because the overlap is substantial.

9. LIMITATIONS

This review has several limitations. As a narrative review, it may be subject to selective emphasis and does not provide pooled quantitative effect estimates. The predominantly cross-sectional evidence limits conclusions about causal relationships. Variations in SLD definitions and diagnostic approaches across studies, along with the predominance of Western, English-speaking samples, may also limit the generalizability of the findings across cultures and populations.

10. CONCLUSION

Specific Learning Disability (SLD) is not limited to academic difficulties but may also involve behavioural, emotional, and social challenges. These difficulties arise through the interaction of neuropsychological vulnerabilities, academic struggles, maladaptive self-perceptions, and social–environmental factors. Early identification, comprehensive assessment, and integrated academic, behavioural, and family-based interventions are therefore essential for promoting better outcomes in children and adolescents with SLD.

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