15

Specific Learning Disabilities

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BACKGROUND

Specific learning disabilities (SLDs) are neurodevelopmental disorders defined by unexpected difficulties learning the fundamental academic skills of reading, writing, and/or mathematics (Fletcher et al., 2018, Preface, p. ix). This definition immediately raises two questions: (1) Where should learning expectations be set for any particular child? and (2) How significant must the learning difficulties be to warrant diagnosis? Table 15.1 summarizes the answers for two current influential definitions of SLDs: DSM-5-TR (American Psychiatric Association, 2022) and the Individuals with Disabilities Education Act (IDEA, 2004).

DSM-5-TR recognizes three major kinds of SLD, depending on the academic skill area affected. All three areas can be divided into basic versus complex skills, resulting in six possible SLD subtypes, each of which goes by many different names. However, not all six subtypes are well validated, and some can be lumped together (Peterson et al., 2021). The best understood SLD impacts basic literacy skills (reading *and* writing; also known as dyslexia). A large scientific literature also supports the validity of an SLD in mathematics (also known as dyscalculia), and there is a growing understanding of reading comprehension difficulties. Table 15.2 summarizes terminology and validity issues for the six possible SLD subtypes.

Individual differences in academic skill development are influenced by many genetic and environmental risk and protective factors (Grigorenko et al., 2020). As a result, the defining skills in SLDs are continuously distributed, and individual diagnosis requires placing a cutoff on the continuum (Peters & Ansari, 2019). Prevalence estimates vary depending on where the cutoff is set, with leading definitions identifying about 5–15% of the population (Grigorenko et al., 2020). As for many other neurodevelopmental disorders, there is a slight male predominance (Rutter et al., 2004). SLDs occur across countries and languages.

TABLE 15.1 Influential Definitions of Learning Disabilities

	IDEA (2004)	DSM-5
Core definition	An imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations.	Persistent and impairing difficulties learning and using reading, writing, and/or mathematical skills.
Skill discrepancies	Skills are below expectations for age, grade level, and the amount of intervention the child has received	Skills are below expectations for age.
Score cutoffs	Cutoffs vary by state, with about 5% of public-school students nationwide identified as having a learning disability. Test scores must be considered in the context of a body of evidence about the child's academic progress.	Test scores at or below the 7th percentile are suggested, but stricter or more lenient cutoffs can be used depending on the full clinical picture.
Exclusionary criteria	The learning difficulties are not primarily the result of: • visual, hearing, or motor disabilities • intellectual disability • emotional disturbance • environmental, cultural, or economic disadvantage	The learning difficulties cannot be accounted for by: • intellectual disability • uncorrected visual or auditory acuity • psychosocial adversity • other mental or neurological disorders • lack of proficiency in the language of instruction • inadequate education

The cross-cultural literature on dyslexia demonstrates impressive universality in the brain and cognitive bases of literacy difficulties, as well as some cultural specificity in their manifestation (Caravolas, 2022). Cross-cultural similarities and differences in other SLDs are not as well understood.

In the United States, socioeconomic status (SES) is positively correlated with scores on standardized academic tests (U.S. Department of Education, 2022). Thus, a higher proportion of children from lower SES backgrounds have scores that fall below the SLD cutoff. Influential definitions exclude from an SLD diagnosis those learning challenges that result from psychosocial or economic adversity. But in any individual case, disentangling lack of opportunity from disability is challenging (Washington & Lee-James, 2020). Poverty and chronic stress can have deleterious effects on brain development, increasing the risk for an SLD (Jensen, Berens, & Nelson, 2017). Access to treatment is often dependent on individual diagnosis, and so ruling out SLD diagnosis based on lack of opportunity can be ethically questionable.

SLD diagnosis is based mainly on educational history and objective academic testing. Public schools in the United States are legally required to identify and treat SLDs, but in practice, there is wide variation in how well this is implemented. Clinical neuropsychological evaluation is not required for SLD diagnosis. However, clinical neuropsychologists can play an important role, especially in assessing common cognitive correlates of SLD that could benefit from supports, like oral language, processing speed, working memory, attention, and fluid reasoning (Cirino et al., 2024; Peng et al., 2019). Clinical neuropsychologists can also evaluate for common comorbidities (such as ADHD, speech/language disorders, and adjustment difficulties), measure response to treatment, provide prognostic information,

TABLE 15.2 Specific Learning Disability Subtypes and Terminology

Academic skill area	DSM-5-TR terminology	IDEA (2004) terminology	Synonyms	Comments
Basic reading (single word reading, decoding, and reading fluency)	Specific learning disorder with impairment in reading	Specific learning disability in basic reading *or* Specific learning disability in reading fluency	• (Developmental) dyslexia • (Specific) reading disability/ disorder • Developmental learning disorder in reading • Word-level reading disability	Well-validated neurodevelopmental disorder with decades of research into epidemiology, etiology, brain bases, cognitive correlates, comorbidities, developmental course, and treatment.
Reading comprehension	Specific learning disorder with impairment in reading	Specific learning disability in reading comprehension	• Reading comprehension disability/disorder • Specific reading comprehension disability/ disorder • Poor comprehension • Text-level reading disability	An SLD in basic reading can cause downstream problems with comprehension, but some individuals have comprehension difficulties that are not fully accounted for by weak basic reading skills. This typically indicates broader language comprehension challenges. Reading comprehension is a complex skill that can be difficult to measure reliably, causing challenges for individual diagnosis.
Basic writing (spelling, punctuation/ capitalization, handwriting fluency)	Specific learning disorder with impairment in writing	Specific learning disability in written expression	• (Developmental) dysgraphia • (Specific) spelling disability/ disorder • Developmental learning disability in writing	Basic reading and writing development are tightly linked, especially for word reading and spelling. Challenges with basic writing are expected in individuals with dyslexia. Evidence does not support a separate subtype of SLD impacting basic writing only.

Written composition	Specific learning disorder with impairment in writing	Specific learning disability in written expression	• Written language disability	Difficulties with written composition are strongly linked to better-validated neurodevelopmental disorders (SLD in reading, language disorder, and ADHD). Furthermore, written composition is a complex skill that is difficult to measure. Existing standardized measures lack reliability needed for individual diagnosis.
Basic mathematics (number sense, arithmetic, math fact fluency)	Specific learning disorder with impairment in mathematics	Specific learning disability in mathematical calculation	• (Developmental) dyscalculia • Math disability/disorder • (Specific) math disability/disorder • (Specific) arithmetic disability/disorder • Developmental learning disability in mathematics	Well-validated neurodevelopmental disorder that has been studied across levels of analysis.
Mathematical problem solving	Specific learning disorder with impairment in mathematics	Specific learning disability in mathematics problem solving	• (Specific) math disability/disorder • Developmental learning disability in mathematics	Not yet well validated as distinct from SLD in basic mathematics.

and rule out other conditions that cause learning difficulties. Pediatric neuropsychologists can also expect to diagnose SLDs in children referred for chronic medical conditions, many of which convey risk for SLDs (e.g., prematurity, myelomeningocele, congenital heart disease, and epilepsy; see Chapters 5, 6, 8, and 12, respectively). In all these cases, the most impacted areas include math and complex academic skills; an isolated dyslexia profile is not expected in the absence of other dyslexia-specific risk factors (Beauchamp et al., 2022).

ASSESSMENT GOALS AND REQUISITE AREAS OF INQUIRY

Referral Questions

The most common referral question centers around differential diagnosis and treatment planning. Caregivers usually want to know, "Why is my child struggling in school, and what can be done to help?" Other potential referral questions are summarized in Table 15.3. The remainder of this section focuses on the most common referral question, including what information to gather and why during clinical interviewing. Example interview questions are included in Table 15.4.

Family History

Youth with a genetic family history of learning challenges are at higher risk for SLDs (Olson, 2018; Willcutt et al., 2010), so it is important to ask about the history of diagnosed and undiagnosed learning difficulties in the birth family. In addition, providers should ask about family history of other neurodevelopmental disorders that share etiological risk factors with SLD, including ADHD (see Chapter 14) or attention challenges, speech-sound disorder or articulation difficulties, and language disorder or delayed language milestones (McGrath et al., 2011; Hayiou-Thomas, 2008).

Developmental History

Because of the link between language development and SLDs, providers should ask whether speech/language milestones were delayed and if there are any current concerns related to

TABLE 15.3 Additional Referral Questions beyond Diagnosis

Referral question	Considerations
Request for high-stakes testing accommodations	• Reference specific documentation guidelines for the test in question • Potential for secondary gain; inclusion of performance validity measures is strongly recommended
Measuring response to interventions	• Assess response to treatment to determine if a higher dose or additional interventions are warranted • Use appropriate psychometric approaches for measuring change over time.
Contest a school district's determination	• Families dissatisfied with the evaluation conducted through their child's school district can request an independent educational evaluation (IEE) • Paid for by school system under some circumstances • Specific requirements vary across states and school districts

TABLE 15.4 Sample Interview Questions

Areas of inquiry	Sample questions	
Family history (asked of caregivers)	Are there any biological relatives who: • have been diagnosed with a learning disability, including dyslexia, dyscalculia, or dysgraphia? • struggled in school? Anyone who repeated a grade or left school early because of learning problems? If biological parents self-report a history of reading/writing difficulties: • How is your reading now? Do you like to read? Do you read more slowly than others? • How is your spelling? • Did you ever try to learn a foreign language? How was that experience?	
Developmental history (asked of caregivers)	• When did you first become concerned about your child's development? • When did they begin speaking? • When they were a toddler, did they speak as much as other children their age? Were strangers able to understand them as well as other children their age? • Did they ever participate in speech/language therapy? If so, why? Difficulties with articulation (pronouncing words), vocabulary, putting sentences together, understanding language, or a combination? • Do you have any concerns about your child's speech or language now? • Do they have trouble pronouncing any sounds? • Do they ever make funny mistakes when talking—like saying "tomato" when they mean "potato"? • Do they have trouble coming up with the words they want to say? • How well can they learn and remember names?	
Educational history (asked of both caregivers and child)	*To caregivers:* • How did your child do with learning letters and numbers? • Did preschool/kindergarten teachers notice any problems with early learning (colors, shapes, days of the week, rhyming, sorting)? • How old was your child when they consistently recognized and correctly named letters? Numbers? • How did they do with learning to count a group of objects? • Does your child do better in some subjects than others? Which ones? • What type of curriculum does the school use for reading, writing, and math?	*To child:* • How do you like school? Do you like your teacher(s)? • What subjects do you like best? What subjects do you think are easy? • What subjects don't you like? What subjects do you think are hard? • What makes that subject hard for you? Do you think it is harder for you than for other students? • Do you have to work harder than other kids your age to get through your assignments and homework?

(*continued*)

TABLE 15.4 ***(continued)***

Areas of inquiry	Sample questions	
	• Do they get any extra help in reading, writing, or math? If so, can you tell me about the type of intervention provided? Does the school use a specific reading or math program? • What kind of support does your child need for homework? • How long does homework take? What are the teachers' expectations for how long students should spend on homework? • Do they resist homework in any particular subjects? • Do you feel that the school understands your child, the way they learn, and the support they need? • Have you ever had concerns that the adults at school are misunderstanding their behavior or that they are being blamed for things that are not their fault? • What does your family feel is most important about your child's education? • What kinds of grades do you expect them to get? What do they expect for themselves? • What are their plans after high school?	• How do you feel about reading/writing/math? • Do you like to read? Have you read any books for fun recently? • Do you think you are getting too much help at school, not enough help, or the right amount of help? • Which kinds of extra help work best for you? • You said you have a low grade in (subject/class). Why is that? Are you having difficulty understanding or difficulty getting your work done? • Do you have trouble finishing tests in time? If so, why do you think that is? • Do you ever have to read out loud in class? How does that feel? • Do you ever have to solve math problems in front of the class? How does that feel?
Social, emotional, and behavioral history (asked of both caregivers and children)	*To caregivers:* • Do you have any concerns that your child's learning difficulties are taking a toll on their self-esteem? • Does your child ever make comments that indicate they don't feel as smart as other kids? • Do you notice that they get headaches or stomachaches at certain times? Do these symptoms ever seem linked to their learning difficulties or school stress? • How does homework time go? Do you have conflict with your child around homework/reading/writing/math?	*To child:* • Do you find it hard to listen or stay focused when teachers or parents are talking to you? What do you think about when you get distracted? • On a scale from 1 to 10, how well do you think you are doing as a friend, in school, and in sports/music/other relevant interests? • What do you want to do after high school/What do you want to be when you grow up?

speech or language (Peterson & Pennington, 2022). If so, several follow-up questions could be helpful (Table 15.4). Though less of a priority, questions about early motor skill development can be relevant given the comorbidity between SLDs and developmental coordination disorder (Lino & Chieffo, 2022). Broad developmental delays are not expected for youth with SLDs; the discovery of such a history should prompt consideration of intellectual developmental disorder (IDD; see Chapter 13) in the differential diagnosis.

Educational History

The child's educational history requires the most extensive interviewing when considering an SLD diagnosis. The most important areas to cover are detailed below and include: (1) acquisition of pre-academic and early academic skills, (2) kind of instruction the child has received, (3) supports provided thus far and child's response to those, (4) child's adjustment to learning/school, and (5) family/community values related to education and learning.

Acquisition of Pre-Academic and Early Academic Skills

Oftentimes, difficulty with academic skills in children with SLD can be traced back earlier than the family was made aware of them. Thus, providers should ask whether the child had more difficulty than preschool/kindergarten classmates or siblings learning pre-academic skills (letters, numbers, colors, days of the week, sorting items by category, etc.). Providers can also ask about caregivers' experiences helping the child with homework for different subjects.

Asking about the timeline of reported academic difficulties is critical, as SLDs manifest when the relevant skills are being emphasized at school. The most common SLDs impact basic academic skills and are generally evident by early elementary school, whereas later-onset difficulties can reflect other issues. For example, consider Jane, who had no difficulty with early language acquisition or early academic learning. She has no history of specialized school support. Now in sixth grade, she is struggling in most of her classes. She is not completing many of her assignments, has difficulty getting started on homework, and runs out of time on tests. In Jane's case, the inquiry into when the challenges arose and how they manifest helps clarify that school challenges are due to attentional/executive functioning concerns rather than an SLD. That said, early learning difficulties may be missed, and complex academic skills are later developing, so problems in these areas may not be evident until later elementary school.

Quantity and Quality of Instruction

To estimate current expectations for academic progress, providers should inquire about the instruction the child has received, including what age they started attending school, years of preschool, history of repeated grades, school type (e.g., public, charter, private), classroom placement (e.g., general education, mix of general and special education, bilingual classroom), and makeup of the classroom (e.g., number of students per teacher, any paraprofessionals, etc.). Providers can also ask about the type of instruction, like literacy curriculum, though many caregivers do not have this information.

For children who have been exposed to more than one language, it is important to explore a potential mismatch between their preferred language and the language of

instruction. Questions about experience with each language and current communication preferences in different settings can help establish language dominance (MacDonald et al., 2023). If the child has participated in any bilingual or English as a second language programming, providers will want to know how much instruction has been provided in each language and their current literacy skills in each language (Canas et al., 2020).

Supports Received Thus Far and Their Effectiveness

Understanding the extent and duration of support given to the child helps place their educational performance into context. For example, if the child is getting Cs but is being highly supported at school and being tutored every day after school, they may be working much harder than would be expected. Providers should ask if the child has ever received formal supports through an individualized education program (IEP), response to intervention (RtI) plan, or Section 504 plan. If so, it is helpful to know when the plan was initiated and why, as well as what specific supports are currently being provided. If the child has never had a formalized support plan, providers can ask if the child has ever received informal supports, such as extra help from a teacher after class or modified homework or testing expectations. It is also important to know if the child has received support outside of school, such as tutoring or homework help from a family member. Once providers understand the formal and informal supports, they should ask about the degree to which those have remediated the child's difficulties, which informs recommendations for further intervention.

Child's Interest, Enjoyment, and Level of Ease in Learning/School

Many youth with SLDs find school more difficult and less enjoyable than their peers. To understand the child's experience of school, providers can ask how they feel about going to school, how hard school is for them, their attitudes toward different subjects, and whether they view themselves as being as "smart" as their peers. Additional questions can provide insight into the child's ease in learning. For example, are they doing adequately only because they spend three times as long on their homework as others? Do they require repetition to understand?

Family/Community Values Related to Education and Learning

Providers can ask about what is most important to the family for their child's schooling, caregivers' hopes for the eventual level of schooling for their child, and if there are any mismatches in values the family holds and the values the school holds. This last area of questioning is particularly important if the family reports a schooling environment that is not welcoming for their child, such as evidence of systemic racism impacting their child, a limited number of teachers/peers at the school with similar identities to their child, or incidents where the child receives overly harsh discipline for behavioral concerns. These kinds of barriers to education are important to consider when conceptualizing the root of a child's school difficulties.

Social, Emotional, and Behavioral History

Youth with learning difficulties frequently experience co-occurring internalizing, externalizing, and attentional difficulties (Nelson & Harwood, 2011; Willcutt et al., 2007;

Cederlöf et al., 2017). Providers must determine if (1) another disorder, like ADHD or anxiety, is the primary cause of school difficulties; (2) the child has an SLD, which leads to lower self-esteem or anxiety about being in school but does not have a primary psychiatric disorder; or (3) the child has more than one disorder. A common misdiagnosis scenario occurs when the child has both an SLD and a comorbid diagnosis like ADHD, but only one is diagnosed because all the child's difficulties are attributed to one disorder. When present, diagnosing both an SLD and ADHD is important because the treatments for the two disorders are different. Though less common, an overdiagnosis scenario can also occur; for example, a child with ADHD is misdiagnosed with an SLD because their test scores are lowered by careless errors, and their homework takes them significantly longer than same-age peers due to distractibility.

THE PROCESS AND MEANS OF INFORMATION GATHERING

The typical process for SLD evaluation is straightforward and includes clinical interviews, review of educational records, behavioral observations, and objective testing.

Who to Interview

Caregiver interview is the primary source of background information for most children referred for SLD evaluation. However, many caregivers have their own histories of learning difficulties that influence their experience of their child's evaluation, so the provider needs to be sensitive when asking about caregivers' educational and occupational histories. Caregivers' own learning difficulties could interfere with their ability to complete paperwork. Examiners can offer options for questionnaire completion that suit a variety of communication needs. Some caregivers may prefer to receive questionnaires ahead of time, while others may prefer to do as much in interview format as possible. Collateral information from teachers may be needed if the relevant school history is not clear from available educational records. Direct child interview is also important to learn more about their attitude toward school and different kinds of academic tasks, as well as the psychological impact of their learning difficulties. Establishing a good rapport with the child during the interview is key since testing emphasizes the very skills that cause the child to feel bad about themselves, and the sense of being "put under a microscope" during one-on-one testing can intensify this difficulty. It is helpful to explore the child's concerns about the testing during the interview and take time to address anxiety or insecurities.

Review of Records

Review of educational records is a key component of SLD evaluation. Report cards can provide information about whether the child is performing below grade-level expectations as well as qualitative information about school adjustment. Most children will have participated in school-based standardized testing, including curriculum-based measures (e.g., DIBELS, AIMSWeb) and yearly state testing. Lower scores on such tests can help support a diagnosis of SLD. In some cases, school testing results are inconsistent with individually administered, norm-referenced academic tests given during the evaluation. This often occurs because the skills emphasized by the tests are different, with school tests being less

sensitive to certain SLDs. For example, verbally bright children with dyslexia may have relatively isolated difficulties with decoding and reading fluency, and a knowledgeable examiner will include direct tests of these skills. However, by middle elementary school, school-based reading measures focus on comprehension, on which many children with specific decoding or fluency problems can compensate. Records documenting any history of formal intervention, such as an RtI plan or IEP (the most recent yearly plan as well as the most recent triennial evaluation), should be requested from the school (with permission) if the caregiver has not already provided them. Extensive review of schoolwork samples is not necessary, though some caregivers may wish to identify a few notable examples that highlight the child's areas of difficulty.

Behavioral Observations

Because of the strong link between oral language development and SLDs, speech/language difficulties are often evident in interviews. These can manifest in limited vocabulary, reduced length of utterance, developmentally inappropriate grammatical errors, and difficulties understanding instructions. While such frank language difficulties convey broad risk for basic and complex skill development across academic domains, many children with dyslexia have a more specific language profile reflecting an isolated weakness in phonological processing (processing speech sounds), including frequent phonological misperceptions (mishearing one word for another), mispronunciations of words, or word-finding difficulties.

RED FLAGS, RED HERRINGS, AND POTENTIAL OTHER PITFALLS

Specificity

There is ongoing debate regarding whether SLDs are truly specific (Peters & Ansari, 2019; Peterson et al., 2021). Previous definitions of SLD required a discrepancy between IQ and academic performance, but experts abandoned this requirement due to several logical and ethical problems (Stanovich, 2020). Evidence against such specificity includes: (1) high rates of comorbidity across different SLDs and between SLDs and other neurodevelopmental disorders (Dewey, 2018); (2) strong correlations across academic skills, as well as between academic skills and measured IQ (Peterson et al., 2021); and (3) similar neurocognitive correlates, brain changes, and response to treatment between individuals with learning problems impacting a single academic area and those with more widespread learning challenges (Pennington, McGrath, and Peterson, 2019). Some individuals with learning problems do have an isolated difficulty in a single academic area; among SLDs, dyslexia is most likely to present as truly specific. However, many other individuals have difficulties in reading, writing, *and* math or with academic learning *and* language or fluid reasoning. Thus, the best policy may be to diagnose SLD(s) when the criteria in Table 15.1 are met, regardless of whether the learning challenges are specific. The main exception to diagnosing SLDs when a child struggles across academic areas is the identification of learning and adaptive skill challenges of such breadth and severity that they warrant a diagnosis of IDD (see Chapter 13).

Experts agree that it is inappropriate to *require* an IQ-achievement discrepancy for SLD diagnosis, but questions remain regarding cases with high IQ and academics that are lower than expected, but still within the average range. With respect to reading difficulties, such individuals appear to have similar changes in left hemisphere language and reading networks as do individuals with classic dyslexia (Hancock, Gabrieli, & Hoeft, 2016). In such cases, clinical interview should establish the extent to which the relative weaknesses are functionally impairing. For example, consider DJ, an intellectually curious high school student who is taking all advanced classes and who understands the material well. However, he is struggling to keep up with the reading and writing load and is distressed by how much longer it takes him to complete work than his peers. Test results showing a discrepancy between IQ (especially verbal comprehension) and basic literacy skills could support a dyslexia diagnosis in his case. Diagnosis would not automatically qualify him for formal school supports or testing accommodations. However, diagnosis could help DJ and his family understand his challenges and could guide informal supports, such as using audiobooks at home.

Severity

Because the defining skills in SLDs are continuous, making yes-or-no decisions is challenging when scores are close to established cutoffs. In these cases, clinical interview and records review play a key role. A history of persistent functional impairment despite significant interventions can support a diagnosis even if scores are now above the cutoff, suggesting the SLD is partially remediated. Such presentations are a frequent source of disagreement between school evaluations and neuropsychological evaluations because the primary goal of school evaluations is to identify children who qualify for intensive school supports. If the full clinical picture supports an SLD diagnosis but test scores do not meet the school's criteria, providers can educate families about other sources of support, such as informal school accommodations or outside tutoring. In some cases, schools will provide extended time or assistive technology via a 504 plan even if the child does not meet educational criteria for an SLD.

Uncertainty Regarding Educational Opportunity

Often, it is challenging to separate a neurodevelopmental disorder from inadequate instruction or intervention. Providers may face this quandary when evaluating children with a history of frequent school absences, limited formal education or intervention, limited proficiency in the language of instruction, homeschooling, under-resourced schools, or those with curricula that are not consistent with evidence-based practices, or individuals without available educational records. In these cases, clinical interview (ideally with multiple informants) can help establish the timeline of problems, patterns of difficulty, and degree of impairment. Sometimes the history is very clear, but other times it is not possible to make a definitive yes-or-no decision. It can be appropriate to identify individuals as being "at risk" for an SLD, especially for children who are young, bilingual, or have limited intervention histories. In these cases, a targeted re-evaluation to gauge progress after a period of more intensive support is warranted.

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