

Does your patient have a psychiatric illness or nonverbal learning disorder?

Clinical clues help differentiate overlapping symptoms and syndromes

Patients who present with impairment in academic, cognitive, social, and vocational functioning might be struggling with an unrecognized learning disorder. Ten percent of the US population has some form of learning disability, and up to 40% of those with learning disorders may meet diagnostic criteria for a psychiatric disorder.^{1,2} Some learning disorders affect a person's ability to read, write, or do math, whereas less-recognized nonverbal learning disorder (NLD) impacts the social and emotional functioning of children, adolescents, and adults. Common features of NLD include:

- deficits in nonlinguistic information processing
- speech prosody deficits
- difficulty reading facial expressions
- associated impairment in interpersonal functioning.

The severity of these deficits varies among individuals with NLD. Patients may experience chronic low self-esteem, anxiety, and mood symptoms because of their limited ability to express their feelings within an appropriate social context. NLD may be first misdiagnosed as attention-deficit/hyperactivity disorder (ADHD), bipolar disorder (BD), or Asperger's disorder.

In this article we review the underlying neurophysiology of NLD and present a clinical approach to these patients, including the differential diagnosis and factors that will allow clinicians to distinguish NLD from psychiatric conditions with symptomatic and syndromic overlap. We also describe treatment for patients with NLD.

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Nonverbal learning disorder

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Children with NLD may be hyperverbal and use language at a higher-than-expected level, which may mask learning difficulties

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Visit this article at CurrentPsychiatry.com for a description of the neurophysiology of NLD

Table 1

Clinical manifestation of nonverbal learning disorder

Tactile-perceptual deficits and psychomotor coordination deficiencies, usually more marked on the left side

Visual-spatial organization deficits

Deficiencies in nonverbal problem solving, such as hypothesis testing and understanding cause-effect relationships

Difficulty adapting to novel situations and reliance on rote behaviors

Relative deficiencies in mechanical arithmetic with proficiencies in reading, word recognition, and spelling

Well developed rote verbal-memory skills

Verbosity characterized by poor pragmatics

Deficits in social perception, judgment, and interaction

Source: Reference 7

The learning process

Learning is a cognitive process of acquiring and processing information and experiences from the environment that allows us to acquire knowledge, skills, and social abilities. When we learn how to relate to others, we undergo neurophysiologic changes that subsequently influence behavior and the way we understand our environment. Deficits in learning processes or the ability to acquire relational skills result in impaired affect regulation in regard to others and may lead to low self-esteem, depression, anxiety, interpersonal conflict, and anger toward others. Learning influences a person's ability to navigate social relationships and perform academically and occupationally.

The impact of learning deficits may be magnified in adulthood after an individual has suffered years of insecurities and poor self-esteem. Adults with learning disabilities often seek psychiatric treatment as a result of their disappointment about difficulties in relationships and work. NLD may coexist with or mimic other neuropsychiatric disorders. For example, problematic behavior within a family or at the workplace is a common reason for referral to a psychiatrist. These behaviors may be influenced by a patient's NLD symptoms, which can complicate diagnosis and treatment.

Persons with NLD are at increased risk for depression because of failures in coping, loss of self-esteem, internalized psychopathology, and other social and emotional strains. In addition, individuals with NLD may experience multiple psychosocial impairments, including difficulty maintaining employment, achieving goals, and maintaining relationships.³

A variable presentation

NLD has been associated with right hemispheric dysfunction.³ For a description of the neurophysiology of NLD, see this article at CurrentPsychiatry.com. In childhood, NLD may present as deficits in:

- processing nonlinguistic information
- expressing or comprehending nonverbal components of language such as pitch, volume, or rate of speech (aprosodia)
- reading facial expressions
- social or emotional functioning, such as difficulty understanding social situations, violations of personal space, or difficulty learning from past emotional experiences.⁴

The extent of these deficits varies among patients. As children, patients with NLD often show strengths in rote verbal memory, spoken language mechanics or form, and word reading. These children may be hyperverbal and use language at a level higher than expected for their age group, which may mask some learning difficulties and delay diagnosis.

Throughout life, NLD manifests as difficulty interacting with peers. Children with NLD may have difficulty playing with others and making friends and as result may feel socially isolated. Without the critical skills of social reciprocity or understanding social context, NLD patients often have many superficial friendships but lack deep relationships.^{4,5}

Patients with NLD may rely on their verbal skills for relating socially and relieving anxiety and tend to withdraw from social situations as they become aware of their deficits.

NLD can be characterized on the basis of primary, secondary, and tertiary deficits. Primary deficits in tactile and visual per-

Table 2

Differences among NLD, ADHD, and bipolar disorder

Clinical features	NLD	ADHD	Bipolar disorder
Cognition	Impairment stable	Impairment fluctuates with attention	Impairment fluctuates with mood episodes
IQ	1.5 to 2 standard deviations between verbal and performance IQ	Full scale IQ within one standard deviation of healthy subjects	Independent of disorder
Experiential learning	Deficits present	Successful with treatment	Experiences influence behavior
Social competency	Mostly aware of shortcomings, a degree of mind sharing, empathy	Generally good, attentive to others	Generally good, when manic patients are 'the life of the party'
Peer relationships	Often lack friends, victims of bullying	Often have friends	Often have friends
Motor coordination	Multiple impairments	No impairments (may be good at sports)	No impairments

ADHD: attention-deficit/hyperactivity disorder; IQ: intelligence quotient; NLD: nonverbal learning disorder

Source: References 11,12

ception and complex psychomotor skills lead to secondary deficits in attention and exploratory behavior, which lead to tertiary deficits in memory and executive function.⁶

Given NLD's variable presentation, clinicians must remain vigilant to this possible diagnosis in patients with a history of multiple pharmacotherapy or psychotherapy failures for axis I disorders. Using clues from symptoms described in *Table 1*⁷ may provide information necessary to refer for formal psychoeducational testing to diagnose NLD. Early diagnosis can help target NLD symptoms and tailor treatment of comorbid psychopathology.⁷ NLD is a chronic disability and—similar to other learning disabilities—early, targeted interventions initiated by parents, teachers, and clinicians can improve outcomes.

Neuropsychological/psychoeducational testing. Traditionally, clinicians suspected NLD if a patient had a ≥ 10 point difference between performance intelligence quotient (IQ) and verbal IQ on the Wechsler Intelligence Scale for Children (WISC-III).⁸ However, the most recent version—the WISC-IV⁹—incorporates changes based on new neurologic models of cognitive functioning, and performance IQ and verbal IQ

are no longer calculated. Thus, interpreting this split in IQ type with regard to NLD is no longer straightforward. IQ tests, such as the Woodcock-Johnson¹⁰ battery, which assesses visual-spatial thinking and fluid reasoning, may be particularly important in characterizing NLD deficits—especially when used in conjunction with other neuropsychological batteries, which may directly assess discrete abilities related to visual and spatial processing.

A thorough social and educational history, IQ testing, neuropsychological batteries, and a psychoeducational assessment can help determine the extent of cognitive deficits that may require accommodations at school or work and characterize the complex interplay of specific deficits and functioning.

Differential diagnosis

ADHD. Patients diagnosed with ADHD or NLD may have a history of attention difficulties and hyperactivity. These clinical similarities may include restlessness, distractibility, impulsivity, and poor attention (*Table 2*).^{11,12} In adults, these features may attenuate and patients with NLD or ADHD could appear normoactive. Individuals with NLD demonstrate withdrawal, anxiety, and continued

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Individuals with NLD demonstrate anxiety and social skills deficits, whereas adult ADHD patients show persistent attention difficulties

Table 3

Differences between NLD and Asperger’s disorder

Clinical features	NLD	Asperger’s disorder
Spatial cognition	Poor sense of direction	Precise sense of direction
Reading and math comprehension	Good word recognition and ‘word attack,’ with poor reading comprehension	Good
Interests	Intense interest in 1 topic for short periods, frequent changes	Idiosyncratic, repetitive, inflexible
Social competency	Mostly aware of shortcomings, a degree of mind sharing, empathy	Blames others for social difficulties, poor empathy
Regulation of affect	Often impaired, unaware when infringing on others’ personal space	May be impaired when anxious; fear of being in close proximity to nonfamily members

NLD: nonverbal learning disorder

Source: References 21-23

social skills deficits,¹³ whereas adult ADHD patients show persistent attention difficulties. Although both groups may have difficulty maintaining steady employment, NLD patients’ employment failures often are caused by cognitive and social difficulties as opposed to problems with attention.

The psychopathology of these 2 conditions differs in that ADHD is characterized primarily by prefrontal dysfunction.¹⁴ However, in a small study of children with NLD (N = 20), all participants also met diagnostic criteria for ADHD; therefore, the true epidemiologic comorbidity is unknown.¹⁵

BD. Because patients with NLD may experience affective symptoms similar to those with BD, it is critical to clarify the temporal course of mood symptoms and understand the complex relationships between symptoms and external events (*Table 2, page 19*).^{11,12} In BD, mood symptoms are cyclical, punctuated by discrete periods of euthymia. In NLD affective symptoms are clearly linked to learning difficulties and impaired information processing. Research shows cognitive deficits in individuals with BD often persist during euthymic periods.¹⁶ Literature suggests that cognitive deficits in adult BD commonly involve verbal memory, executive function, and attention, whereas patients with NLD often have strong verbal memory.^{17,18}

Individuals with BD may understand the intentions of others and—especially

in periods of hypomania or mania—will engage others. In contrast, persons with NLD struggle to attract and engage friends, may be irritable when they misunderstand social cues, may be bullied or taken advantage of by others, and may struggle to communicate this problem to clinicians. NLD patients’ sense of frustration typically does not vary; a continuous depressed or anxious mood may improve briefly when they feel accepted in their environment. This pattern can be discerned from BD by strictly applying DSM-IV-TR criteria for variability in mood states.¹⁹ BD treatment may be complicated in patients with comorbid NLD. These patients may underreport adverse effects of medications, including metabolic effects and cognitive dulling, which results in a complicated and frustrating clinical course.²⁰

Asperger’s disorder. Patients with NLD—a neuropsychological disorder—may present with social interaction difficulties that seem similar to those of Asperger’s disorder—a behavioral disorder. Overlapping behaviors, similar cognitive processes, and coexisting conditions may challenge even experienced clinicians (*Table 3*).²¹⁻²³ However, impairments are more severe in Asperger’s disorder and will present as early as age 4. Patients with Asperger’s disorder show difficulty communicating characterized by unusual interactions, such as pedantic or 1-sided discussions of

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Cognitive deficits in BD involve verbal memory, executive function, and attention; NLD patients often have strong verbal memory



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Individuals with Asperger's disorder will demonstrate restrictive interests or repetitive behaviors, a characteristic typically not seen in NLD

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Table 4

Treating patients with NLD

Remember that treating patients with NLD can be challenging

Clinical neuropsychological and psychoeducational assessments often are necessary

Employ open dialogue with patient and family about need for multifaceted approach

Recognize a patient's individual strengths and weaknesses

Suggest academic and workplace accommodations

Provide written instructions and discuss your patient's understanding of them

Suggest the use of frequent visual cues and reminders of scheduled tasks and appointments

Provide supportive psychotherapy and review the treatment plan frequently

Recognize the increased risk of suicide and develop a safety plan appropriate to your patient's cognitive abilities

NLD: nonverbal learning disorder

Source: References 7,26

topics that are unusual for the patient's age group and inattentiveness to social cues. By contrast, communication difficulties in children with NLD are not apparent until after they start school.

Both Asperger's disorder and NLD patients will show noticeable variations in thought process that often are apparent in conversations. Individuals with Asperger's disorder may have some concrete thinking, although they often express idiosyncratic thinking, whereas individuals with NLD often show concrete logic. An individual with NLD may be easily overwhelmed by peer group social interactions but remains emotionally aware of his or her shortcomings and may be able to handle 1-on-1 interactions. Individuals with Asperger's disorder will demonstrate restrictive interests or repetitive behaviors, a characteristic typically not seen in individuals with NLD. Patients with Asperger's disorder may have specific skills, such as expertise with directions and spatial reasoning, whereas individuals with NLD may get lost even when traveling to familiar places or may have

difficulty relating directions. Both groups likely will have good reading skills but patients with NLD will have trouble comprehending and integrating the material, evident by difficulty with multiple choice questions or "story problems." Individuals with either disorder may develop frustration and anger with their challenges.

In adults, many of these subtle differences in language and thought process may be masked by years of difficult and frustrating communication, making definitive diagnosis challenging. Semistructured interviews, such as the Autism Diagnostic Observation Schedule²⁴ or the Gilliam Asperger's Disorder Scale,²⁵ may help in differentiating Asperger's disorder from NLD. However, these 2 disorders may be comorbid, thus complicating the diagnostic process.²¹

Treatment implications

The day-to-day care of patients with NLD and a comorbid psychiatric disorder may include systems-level interventions, supportive psychotherapy, and psychopharmacologic treatments that are informed by the comorbid condition (Table 4).^{7,26} Open, honest dialogue about strengths and challenges for individuals with NLD will help reframe expectations and frustrations. Early recognition of NLD may, in some cases, prevent internalized psychopathology and loss of self-esteem.^{27,28}

Children and adolescents with NLD require early intervention to help them function socially and academically. Involving family and school personnel is important to develop accommodations to improve functioning. Comprehension problems associated with NLD often become more noticeable as the student moves into upper elementary grades, where abstract thinking and the ability to manage novelty (eg, unfamiliar content or situations) are required. Many students with NLD can manage rote memorization and concrete facts, but have trouble with inference, integration, and reasoning. Academically appropriate classroom placement, limited writing, and use of voice recognition software may aid success.

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Early recognition of NLD may, in some cases, prevent internalized psychopathology and loss of self-esteem

Related Resources

- Rourke BP. Syndrome of nonverbal learning disabilities: Neurodevelopmental manifestations. New York, NY: Guilford Press; 1995.
- NLD Line. www.nldline.com.
- NLD on the Web. www.nldontheweb.org.
- Massachusetts General Hospital school psychiatry program and Mood and Anxiety Disorders Institute resource center. www2.massgeneral.org/schoolpsychiatry.

Disclosures

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Parents can help by teaching and modeling social skills such as appropriate expression of emotions, which can be facilitated by watching movies or attending group activities together.

Adults. Patients with NLD may be late for appointments and often forget what is discussed. They may be at increased risk for noncompliance with pharmacotherapy for comorbid disorders and may require written instructions, frequent reminders, and reviews of treatment plan. In addition, interactions with clinicians may seem shallow and unsatisfying, despite the clinician's best efforts to empathize. The pattern of feeling misunderstood likely exists in the patient's other relationships, including significant others and employers. Although no systemic evaluations exist, mindfulness-based therapies might help alleviate this deficit.^{29,30}

Treatment plans may involve family-focused modalities where NLD patients learn to rely on family members to interpret others' motives and intentions.³¹ Education of the patient and family and friends should emphasize the need for consistent daily schedules and frequent verbal feedback, such as taking turns in conversations. Academic accommodations in college are crucial for success. Education experts have advocated for increased use of technology for students with NLD, including voice recognition software, laptop computers, and audio recordings of class notes.³²

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Bottom Line

Nonverbal learning disorder (NLD) is a chronic disorder that can be misdiagnosed as or comorbid with several psychiatric disorders. Understanding NLD will help clinicians identify affected individuals and develop appropriate treatment plans, thus improving long-term outcomes.

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NLD patients' interactions with clinicians may seem shallow and unsatisfying, despite the clinician's best efforts to empathize

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Differential Diagnosis and Therapeutic Management of Schizoaffective Disorder

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Neurophysiology of nonverbal learning disorder

Rourke^a conceptualized nonverbal learning disorder (NLD) as being related to dysfunction in the right cerebral hemisphere with subsequent disruption of the cognitive functions modulated by that region. Difficulties associated with NLD were thought to be related to dysfunction in intermodal integration, a process that inherently depends on white matter connectivity.^b

More recent data suggest that although right brain dysfunction may affect cognition,

NLD patients likely exhibit dysfunction in multiple brain regions.^{c-e} Nonetheless, right hemisphere lesions in adults often result in similar disturbances as those observed in patients with NLD (eg, visual-spatial integration, attention, nonverbal memory, and expression and integration of emotion).^{f,g} Functional brain imaging studies and functional connectivity studies are needed to better elucidate the neurocircuitry of NLD.

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