NLD on the Web!

The Misunderstood Child:

The Child With a Nonverbal Learning Disorder

by Liza Little, PsyD, RN

Learning disorders are common among elementary school children. As many as 10% of school-aged children have problems with educational achievement or behavior in school (Weinberg, Harper, & Brumback, 1995). As many as 15%-30% of children may suffer school failures because of learning disorders that result from subtle problems with neurological development or mild brain dysfunctions (Levine, 1995).

Despite the prevalence of learning disorders in children, few nursing professionals are familiar with nonverbal learning disorders (NLD) and their manifestations. This may be because 80% of all children with learning disabilities have verbal learning disabilities that affect their ability to read, speak, or listen (Johnson, 1995) but not their nonverbal learning. Or it may be that nurses see learning as the domain of educational specialists and psychologists. Yet health consequences abound for children with learning disorders, particularly the child with NLD. Nonetheless, a search of the nursing literature over the last five years produced no articles on NLD. The purpose of this paper is to introduce nurses to the characteristics of NLD and their psychosocial trajectory in children. The implications for nurses working with

children with NLD will also be discussed.

Verbal Learning Disorders versus Nonverbal Learning Disorders

Learning disabilities "are circumscribed deficiencies in a cognitive area in an otherwise intellectually normal child or adolescent" (Johnson, 1995, pg.2). Learning disabilities generally can be divided into three types: verbal learning disabilities; nonverbal learning disabilities; and learning disabilities that affect executive functions, such as attention-deficit hyperactivity disorder (ADHD). Children with NLD have difficulties with nonverbal communication. Since approximately 65% of meaning is communicated by nonverbal cues, such as tone of voice, facial expression, posture and body language, there is a significant deficit for the child who cannot decipher or interpret nonverbal behavior (Nowicki & Duke, 1992; Thompson, 1997).

Learning disabilities research on the long-term outcomes of children with verbal and nonverbal learning disorders suggests that the child with NLD may have increasing difficulties as he/she ages and faces worse over time than the child with a verbal learning disability (Fuerst & Rourke, 1993; Harnadek & Rourke, 1994; Rourke, 1995). This is due in part to the nature of the nonverbal disorder. Children with NLD have problems integrating new information, which makes it difficult for them to cope with new situations. They also have difficulties applying learning from one situation to another (Rourke, 1995; Voeller, 1995). The child's learning difficulties, coupled with the inability to decipher social cues and deal with increasing levels of social complexity, make life more difficult as the child gets older.

Characteristics of Nonverbal Learning Disorders

Nonverbal learning disorders, or right-hemisphere dysfunction affect one of every ten children with a learning disability (Rourke, 1995; Torgeson, 1993). Characteristics of children with NLD can be divided into five areas and remembered by the acronym SAVME (Table 1). The characteristics include problems in the

areas of social competencies, academic performance, visual spatial abilities, motor coordination, and emotional functioning. Part of the difficulty in diagnosis is that a child may not show deficits in every domain. In addition, children may vary in terms of the severity of the particular deficit.

Table 1

SAVME: Common Characteristics of Nonverbal Learning Disorders	
Social	Lack of ability to comprehend nonverbal communication
	Significant deficiencies in social judgment and social interaction
Academic	Problems in math, reading comprehension, handwriting
	Problems with organization, problem-solving, higher reasoning
	Strengths include strong verbal and auditory attention and memory
Visual-Spatial	Lack of image, poor visual recall
	Faulty spatial perception and spatial relations
Motor	Lack of coordination
	Severe balance problems
	Difficulties with fine motor skills
Emotional	Frequent tantrums, difficulties soothing, easily overwhelmed
	Fears of new places and changes in routines
	Prone to depression and anxiety as they get older

Social Competencies

Extreme difficulty in coping with novel and complex situations and an over-reliance on rote, commonplace behaviors are observed (Harnadek & Rourke, 1994). The child with NLD may find it very difficult to try new

things, such as playing a game they haven't played before. These children find new experiences anxiety-provoking, so that staying at a friend's house, summer camp, vacationing in new places, or being left with babysitters may be difficult.

Children with NLD may speak well and be verbose, but it is of a rote nature with poor linguistic pragmatics. These children and young adults often interrupt and have difficulty entering into a conversation appropriately. Their speech has little rhythm or variation in tone and inflection; long, windy monologues are not uncommon (Gregg & Jackson, 1989) and what they talk about may seem boring. Dinner conversation may be difficult, as they interrupt and change the subject to unrelated and irrelevant issues. Friends of these children may find them boring because they talk all the time, the substance often is irrelevant, and the conversation may be nonreciprocal.

Children with NLD demonstrate significant deficits in social perception, social judgment, and social interaction skills, and marked deficiencies in the appreciation of incongruities and age-appropriate humor. Nonverbal cues serve multiple affective and cognitive functions that affect communication (Hoy, Gregg, King, & Moreland, 1993). Since children with NLD have difficulty noting and understanding facial expressions, tone of voice, and body language, they frequently have difficulty with relationships. The poor interpretation of social cues makes children and adults with NLD vulnerable to ridicule, rejection, and victimization (Denckla, 1991; Foss, 1991; Fuerst and Rourke, 1993; Grace & Malloy, 1992; Harnadek and Rourke, 1994; Little, 1998; Rourke, 1995; Thompson, 1997, Weintraub & Mesulam, 1983). These children often are negatively labeled by their peers.

Children with NLD make many social faux pas. They may laugh at someone who is crying or angry, or say something inappropriate to another peer or adult and be absolutely unaware of its appropriateness. A middle-school child with NLD might tell her mixed-gender peer group that the reason her friend isn't in the room at that moment is "she is changing her tampon." He/she may tell a friend bluntly, "I am bored

of you." or "You are fat."

Academic performance

Marked lack of aptitude and proficiency in mechanical arithmetic, reading comprehension, spelling, difficulties with concept formation, problem-solving, and transferring learning from one situation to a new situation, are evidence with NLD. Academic achievement in mechanical arithmetic beyond a fifth-grade level is uncommon (Rourke, 1995). Common elementary school math competencies, such as telling time and handling money, are difficult. Word recognition and sight reading are strong but overall reading comprehensive is not. The children may tell you the story but not be able to describe the main point, the main conflict, or the major themes. Handwriting is arduous and spelling errors are limited almost exclusively to a phonetic variety. As the child moves into middle school, science becomes very difficult because of the demand for more abstract thinking and to apply learning to new situations.

Visual-spatial abilities

Major problems with visual-spatial organizational abilities and visual memory are characteristic of NLD. Children with NLD have difficulty forming visual images and, therefore, don't revisualize as a strategy for learning (Thompson, 1997). The child will focus on the details of what he or she sees and fail to grasp the whole picture. These children also have very poor visual memory, so they don't remember what they've read or seen. This makes copying from a blackboard and recognizing people's faces difficult, and getting lost is very common. It also means that by middle school, homework takes more time as more writing and reading are required. As a result of visual-spatial problems, many children with NLD meet the clinical criteria for attention deficit disorder (ADD) (Gross-Tsur, Shalev, Manor, & Amir, 1995). These children have difficulty moving their bodies in space; they bump into people, stand too close, and have difficulty understanding spatial relationships.

Motor coordination

Children with NLD exhibit gross and fine motor clumsiness as a result of poor proprioception and kinesthesia, often marked on the left side of the body. They may have problems with reflexes, gait abnormalities, tremors, and lack of coordination (Harnadek & Rourke, 1994). The child or adolescent with NLD may spill and knock things over, bump into things and fall, and bump into others beyond an age where this is appropriate. Problems using scissors and fastening buttons are common. The inability to learn how to tie shoelaces is considered a pathognomonic sign (Heller, 1997). The child with NLD frequently has a faulty sense of balance, which affects his/her ability to learn how to ride a bike, skate, and perform any activity that demands good balance. Standing on one foot may not be possible. These children frequently avoid slides and Jungle-Gyms at an early age.

Poor tactile discrimination is another sign of NLD. The child may have less sensitivity for touch in his/her fingers and, therefore, have problems holding a pencil to write.

Emotional functioning

Children with NLD have problems processing emotional information. They have a difficult time interpreting emotional experiences of others and themselves. Their risk for depression, isolation, and self-esteem problems is high because they are unable to learn from past experience, including social interactions (Heller, 1998; Voeller, 1995).

A child with NLD may misinterpret a mild criticism or reproach from a parent as a major rejection and cry inconsolably for hours. A child may get very excited, then suddenly become overwhelmed and cry. The emotional intensity of the excitement and complexity of feelings may lead the child to feelings of panic and severe distress. These children are overwhelmed easily by feelings. Children with NLD are often described as easily frustrated and chronically inflexible (Greene, 1998).

Identifying Children with NLD

Two decades have passed since the early research on children with NLD (Thompson, 1997). Nonetheless, very few professionals today outside the fields of neurology and neuropsychology understand or recognize NLD. Presently there isn't a medical or psychiatric diagnosis for NLD, although research is being conducted to clarify and refine a diagnosis (Rourke, 1995). Research continues to delineate the characteristics of the syndrome and the spectrum of its associated disorders. Currently, some authors view NLD as part of a spectrum of disorders characterized by major difficulties in social interaction. The NLD syndrome has been identified in children with Asperger's syndrome, hyperlexia, Williams, syndrome, and traumatic brain injury (Rourke, 1995; Rourke & Fisk, 1992).

NLD is thought to result from dysmyelination of the white matter fibers, primarily in the right hemisphere of the brain. These fibers may be damaged by a variety of neurological diseases, adverse biological events, and certain environmental conditions, before or after birth (Rourke, 1995). White matter contains nerve fibers that connect the left and right hemispheres of the brain (the corpus callosum), as well as the posterior and frontal areas of the brain. It has been hypothesized that for NLD to occur, there must be a destruction or dysfunction of the white matter that is required for intermodal integration (Rourke, 1995).

Nurses are familiar with patients who sustain right-hemisphere damage or have right-hemisphere lesions; they respond indifferently to emotionally disturbing events and seem impaired in the comprehension or production of affective signals and higher-order cognition related to emotions. They are likely to be impulsive, exhibit poor social judgment, and lack the ability to understand or integrate complex information and stimuli (Voeller, 1995). Children with NLD can have similar symptoms, but these may be less severe or less well defined.

The urgency of identifying and intervening with children who have NLD is especially important. If the child with NLD is not identified, unrealistic demands and overestimations of the child's ability are common

(Thompson, 1997). Lack of knowledge of the syndrome can lead to ongoing emotional problems in the child and the development of a negative feedback loop. Lack of identification leads to inappropriate interventions, which leads to reactive symptoms of distress, including the child's inability to finish homework assignments, thereby being called unmotivated and given detention. The child's anxiety and frustration increases, and he/she starts to act out. The problem with the homework may lie in the children's poor organizational abilities, problem-solving difficulties, or even the length of time it takes him/her to write; but the child frequently cannot articulate the problem and becomes distressed by the criticism.

Several authors have noted that one of the consequences of NLD seems to be a marked tendency toward social withdrawal as age increases (Harnadek & Rourke, 1994; Rourke, 1995; Voeller, 1995). Children who have NLD are at significant risk for developing internalized forms of psychopathology such as depression and anxiety (Harnadek & Rourke, 1994; Rourke, 1995; Voeller, 1995). It is unclear if the development of secondary symptoms in children with NLD, such as depression and anxiety, is the result of frequently being punished or criticized for things they cannot help, or the frustration of feeling lost in a world that makes demands they cannot meet (Thompson, 1997). Untreated, children with NLD may grow into adults who are depressed, isolated, and have significant problems with day-to-day functioning (Denckla, 1991; Rourke, 1995; Voeller, 1995). Because of a paucity of understanding about this disorder, it is possible that some adolescents and young adults are not being treated effectively or appropriately (Little, 1998; Weintraub & Mesulam, 1983).

Screening and Diagnosing Nonverbal Learning Disorders

NLD is diagnosed by a careful history and cognitive and neuropsychological testing. The history will reveal a description of a child with NLD characteristics. There is no standard battery of tests used in an assessment of NLD; however, common tests used in a

neuropsychological assessment may include the Wechsler Intelligence Test (IQ test) and the Wechsler Individual Achievement Tests (WIAT) in word reading and math reasoning, all of which often are used in school testing. The California Verbal Learning Tests for children (CVLT-C) are used to examine the ability to organize words into categorical relationships, and the Rey-Osterietch Complex Figure Test is used to measure the child's ability to organize complex visual-spatial material (Lezak, 1995). Neurological exams often will show left-sided neurological signs and asymmetrical posturing of the left arm during walking, decreased balance, mild choreiform movements, and differences in left-right tactile sensitivity. An electroencephalogram may show charges in brain-wave activity (Grace & Malloy, 1992; Voeller, 1995). Children with NLD usually score higher on tests of verbal memory than on nonverbal memory tests. Subtest scatter also is very important, because there may be variations that suggest the NLD disorder even with less prominent splits in overall cognitive domains. In addition, as the child gets older and the demands for abstract reasoning increase, greater variations may occur among subtest scores.

Nurses' Role

Nurses and primary care providers may be the first to hear about this child but may be uninformed about what they are hearing. Developmental trajectories are different for these children. Parents often are the first to know that something is unusual about their child. A parent may describe a preschool child who exhibits common NLD characteristics. Too often this parent may be dismissed or reassured that "many children are like that" and "they grow out of it." A well-informed nurse could begin to track symptoms and compare developmental profile symptoms.

The elementary school child may come to the attention of the school nurse or primary care provider, as parents describe ongoing aspects of the child's behavior in health-care visits. During the elementary school years, the child with NLD may be described as working slowly, not working well in groups, having difficulty completing tasks on time, and exhibiting

other NLD behaviors. A parent may be told that the child is having emotional difficulties and to pursue therapy, or that "many children can be like that, they grow out of it." A school nurse, however, can gather data from teachers on the child's difficulties and bring the family concerns to the attention of the special education team or refer the child for testing.

By middle school, parents may describe the child with NLD as persecuted by peers, misunderstood by teachers, coming home with stories of social conflict at school, and having problems with work habits organization and memory, math, writing, sports, and reading comprehension. These difficulties often are mislabeled by teachers as motivational issues or issues in the home. Children with NLD can be misdiagnosed with ADD and put on medications. When the behavior doesn't change, the child can be labeled as resistant or oppositional. This is the age where secondary psychiatric symptoms may begin to appear; depression and anxiety are common.

If the NLD teen reaches high school without any intervention or remediation, a typical scenario is to find a worsening of symptoms as the child attempts to negotiate even more complicated social interactions and situations. Children may drop out of school as a coping strategy. They may enter the psychiatric system for depression, anxiety, or acting-out behaviors as they fail to succeed or achieve normal developmental and academic adolescent milestones. (Foss, 1991; Rourke, 1995; Thompson, 1997).

Nurses are prime candidates to assess and make referrals. There are no checklists or assessment tools for basic screening in a medical setting; checklists should be created to identify patterns of behaviors so referrals can be made. Diagnosis cannot be made from a checklist alone, but it can be the first step to establish a problem in need of further evaluation.

Medical and Educational Interventions

Interventions should reflect an ecological approach to the biopsychosocial needs of the child with NLD. Children with NLD will need an interdisciplinary team of

specialists. Interventions include diagnosis and treatment. Nurses can provide the leadership in identification, screening, referrals, and intervening with the family.

Medical Interventions

Children with NLD need proper diagnosis, and typically a developmental pediatrician or child neuropsychologist is the person who does this. In addition, these children often need assessment by a psychiatrist for medications that may help attention difficulties, severe tantrums, and anxiety. Many children with NLD are treated with stimulants, and moderate improvement from medication has been documented (Gross-Tsur et al., 1995; Rourke, 1995; Voeller, 1995). In addition, children with NLD may be treated for tantrums, problem-solving, contextualizing, and coping with emotions. Typically, antidepressants are administered; there is some clinical documentation of trials with mood stabilizers as well (Ternes, Woody, & Livingston, 1987).

Educational Interventions

Children with NLD need individualized educational plans that take into account the nature of their deficits and strengths. This will include modifications, accommodations, and strategies to teach them (Thompson, 1997). Children with NLD often require an aide in the classroom in elementary, middle school, and in some cases high school. Primary to learning is to teach the child sequentially and use the child's verbal strengths to compensate whenever possible. The child will need training in social skills and pragmatics (the study of nonverbal behavior); these skills are not part of a curriculum or typical education plan. Finding these types of groups may be difficult, but as understanding of NLD increases, so do the resources.

Nursing Interventions

Safety

Once a diagnosis is made, several nursing issues emerge. Children with NLD are particularly prone to

getting hurt. Although nurses educate all parents about safety for their children, children with NLD are more at risk. Small children need uncluttered, danger-free environments, where they can't bump into sharp objects (Thompson, 1997). They should be supervised carefully on slides and Jungle-Gyms because of their poor coordination and visual-spatial problems. Crossing streets, biking, turning on hot water, and learning to use the stove are areas that need specific teaching. Instruction should be verbal, sequential, and repeated many times, because these children do not apply learning from one situation to another.

Risk for victimization is also high. Children with NLD don't understand nonverbal communication or social cues. They are easy targets for ridicule and exploitation by peers, adults, and parents. Talking about each new social situation with the child is important. Describing typical behavior and typical responses is helpful. Another important point to teach parents is that becoming angry at these children is very easy, therefore teaching parental coping strategies to help with the frustration is vital.

Physical health

Children with NLD are prone to be sedentary and to avoid physical activity that challenges their disabilities. As the child matures, weight may become a problem, in part due to the child's reluctance to be physically active. Talking with parents about types of activities to promote physical health is important. For example, the child with NLD may be able to learn how to shoot baskets if allowed to practice over and over again. Being expected to know how to play effectively in a game, however, requires a different level of complexity.

Advocate

Advocating for the child with NLD is key. This may be the child who shows up in the school nurse's office a great deal with a variety of somatic symptoms (Woodbury, 1993). On the surface the child with NLD may seem articulate, with no apparent difficulties; however, the child with NLD is often criticized, reprimanded, and given negative feedback for

behaviors resulting from lack of coordination, visual-spatial organization deficiencies, and failure to comprehend nonverbal communication (Thompson, 1997).

Empower parents

Nurses can educate parents on the symptoms and neurological basis of NLD. Pamphlets, checklists, web sites, and source books should be recommended. Parents need to be educated to advocate for their children's physical, academic, and social needs, and to demand that schools and health professionals recognize the problems of children with NLD. One of the biggest issues of working with parents is teaching them to support the independence of the child without overloading the child (Thompson, 1999). Finding this balance may be difficult because the child has real limitations. Supporting parents is crucial. NLD is a syndrome for which many uninformed professionals blame and judge parents as too protective of the child (Rourke, 1989).

Conclusions

Children with learning disabilities face challenges in learning. The more critical the child's deficit is to his or her functioning, the more devastating the impact (Palombo, 1996). The child with NLD faces unique problems in the social, academic, visual-spatial, motoric, and emotional spheres. The inability to decipher social cues and nonverbal behavior leaves these children without the requisite skills to negotiate social interaction, develop intimate relationships, and lead fulfilling lives. Misdiagnosis and lack of knowledge of NLD create havoc in the already chaotic world of children with NLD. Nurses need to educate themselves and their colleagues about the syndrome, provide resources to parents, and advocate for these children in all settings. Although there are no longer-term, large-scale data on the outcome trajectories for children with NLD, these children can live qualitatively better lives with early identification and interventions by health professionals.

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