



## Non Verbal Learning Disability (NLD): Assessment And Intervention

\* Dr. Johnson Alex

\* Assistant Professor, Department of Clinical Psychology, Manipal University, Manipal – 576104, Udupi, Karnataka, India

### ABSTRACT

*Nonverbal Learning Disability (NLD) is neuropsychological syndrome due to right-hemisphere malfunction and lack of mental coordination (Rourke, 1989). Approximately 10% of general population identified as NLD. Expression of NLD symptoms is deficits predominantly attributed to motor coordination, visuo-spatial & perceptual disturbance, and arithmetical difficulty. Etiology of NLD considered as dysfunction of white matter in the right hemisphere. Current classification systems are not supporting the diagnosis of NLD, however the impact of this syndrome plays significant role in children's academic performance. Future direction of research on NLD need to be addressed with appropriate individualized intervention strategies.*

**Keywords : Nonverbal Learning Disability, Assessment, Intervention**

### Introduction

The term learning disabilities were used to describe children with normal intelligence who were not achieving adequate in academic performance. But, Nonverbal Learning Disabilities (NLD) described as a neuropsychological syndrome due to right-hemisphere malfunction and lack of mental coordination (Rourke, 1989). NLD was first noticed in the early 1970s as the researchers noted the large discrepancies between the verbal and performance IQ scores of some children with learning disabilities (Myklebust, 1975). The NLD contributes significant deterioration in academic performances. Identification of NLD by mental health professionals are finding difficult because of the overlapping nature of the NLD syndrome with other disorders such as Pervasive Developmental Disorder, Asperger's Syndrome, Attention Deficit Hyperactivity Disorder.

### Prevalence

NLD is grossly under-recognized and these individuals are frequently misdiagnosed. Whereas it is approximated that about 10% of the general population could be found to have identifiable learning disabilities, it is thought that only 1 to 10% of those individuals would be found to have NLD. Females are experiencing the NLD syndrome more compared to males (approximately 1:1 sex ratio) and incidence of left-handedness is uncommon. However, NLD syndrome is gaining considerable importance, but no clinical diagnostic criteria or category in standard taxonomies of diseases and developmental disorders such as the International Classification of Diseases (ICD-10).

### Manifestation of NLD

Clinical presentation of child with NLD will be outlined as follows: Performance IQ significantly lower than verbal IQ, early speech and vocabulary development, remarkable rote memory skills, early reading skills development, excellent spelling skills, expresses him or herself expressively, lack of coordination, difficulties with fine motor skills, lack of image, poor visual recall, faulty spatial perceptions, lack of ability to comprehend nonverbal communication, difficulty in adjusting to transitions and new situations, significant deficits in social judgment and interaction, problem with maths concepts - difficulty understanding what the operations are trying to achieve, very reliant on the step-by-step processes, difficulty maintaining attention, where the material is difficult (or uninteresting), enthusiastic and successful at socialising in the earlier years,

struggle to read peoples body language, facial expressions, tone of voice, choice of words etc., Communicate verbally with ease. Underlying understanding of the world may be relatively limited-recurring sense of confusion generating anxiety, basic concepts such as time and money may be difficult, abstract scientific concepts such as the weather may be a struggle, get lost easily, have trouble with maps, and have difficulty with team sports where direction and movement are important, and Speech prosody and problems understanding and/or expressing emotional intonation

Sometimes these symptoms are present in other diagnostic conditions. Attention Deficit Hyperactivity Disorder may lead to NLD. They will show similar symptoms outlined above. Children with Intellectual Disability, if children are clever verbally, early intellectual assessments may overestimate their IQ. Only later testing will reveal their true abilities. Children who are temperamentally anxious, or who are in abusive situations causing anxiety may have difficulty in the areas outlined above. If their anxiety settles their skills can usually catch up to some degree. Lack of opportunity to learn, struggle with maths and handwriting because they never learned the basics properly. With some additional support, these children usually catch up. The difference between Asperger Syndrome and NLD is not clear cut. Does not have trouble with maths, handwriting, attention and organization. Semantic-Pragmatic language disorder; This is a type of language problem where more complex language is impaired, leading to difficulties in comprehension and the social use of language. Does not usually include problems with maths, handwriting, organization and attention.

### Etiology

"Current evidence and theories suggest destruction, disorder or dysfunction of the white matter (long myelinated fibers in the brain) in the right hemisphere could be the cause for non-verbal learning disorders" (Thompson, 1997).

Rourke (1982) proposed the first comprehensive etiological model for NLD based on discrepancies between right and left hemisphere systems. Subsequently, he revised and expanded his model (Rourke, 1987, 1988). This revised model proposed that deficit in subcortical white matter were responsible for the symptoms seen in NLD. Prior to this revision, deficits in right cerebral hemisphere systems were thought to cause the NLD syndrome. Currently, a number of conditions

affecting white matter areas of the brain have been found to lead to the NLD syndrome (Rourke, 1995). Some examples of neurological disorders leading to white matter deficits and NLD symptoms include callosal agenesis (Smith & Rourke, 1995), hydrocephalus (Fletcher, Brookshire, Bohan, Brandt, & Davidson, 1995), metachromatic leukodystrophy (fool, Fuerst, & Rourke, 1995), multiple sclerosis (White & Kregel, 1995), encephalomyelitis, certain types of traumatic brain injuries (Ewing-Cobbs, Fletcher, & Levin, 1995), and toxic encephalopathies (White & Kregel, 1995). There is less direct evidence to implicate defects in white matter as causal in developmental cases of the disorder.

The various dimensions affected due to NLD syndrome such as cognitive and neuropsychological performance issues, intellectual functioning, executive functions and higher level reasoning, memory functions, language functions, visual-spatial abilities, sensory-perceptual and motor functioning, education and academics, social performance issues, and emotional issues

### Assessment

An initial interview of the child and parents may help us to profile the basic symptoms related to NLD. Rourke (1995) organized NLD into three categories; neuropsychological deficits, academic deficits, and social-emotional/adaptational deficits. On the basis of this category, Rourke proposed diagnostic criteria to evaluate NLD; they are deficits in tactile perception, psychomotor coordination, visuo-spatial organizational abilities, difficulty in dealing with novel or complex information or situations, difficult to solve nonverbal problems, distorted sense of time, well developed rote verbal abilities, high verbal ability but deficits in functional or pragmatic aspect of language, deficits in mechanical, arithmetic & reading comprehension and deficits in social perception, judgment or interaction.

David B. Goldstein (1999) developed Children's nonverbal learning disability scale. It consists of mainly three dimensions such as Motor skills, Visual-spatial skills and Interpersonal skills (Rourke, 1994).

Dorothy Bishop Children's Communication Checklist (CCC) The CCC is a 70-item checklist that may be completed by parents, caregivers, or service providers. The respondent is asked to rate statements on nine dimensions of communication, five of which focus on aspects of pragmatic communication that are reported as clinically significant (e.g., inappropriate initiations, difficulties with coherence, stereotyped conversation, difficulties in using conversational context, and difficulties in establishing conversational rapport).

Intellectual assessments attempt to test all the cognitive skills necessary for academic success in school. These include language, memory, speed, attention and non-verbal thinking. The resulting overall IQ score is the combined results from all these different component tests. In addition to the overall IQ, results are often organized into verbal and non-verbal (performance) scores. It is the difference between these that suggests NLD.

Rey-Osterreith Complex Figure (ROCF) was devised in 1941 by the Swiss psychologist Andre Rey for the purpose of assessing perceptual organization (how we integrate and organize what we see) and visual memory in brain injured subject. It can show how children with NLD perceive and remember information piece-by-piece rather than binding that information up into a single whole.

The Wide Range Assessment of Memory and Learning (WRAMI) directly assesses memory and the ability to learn. Its use for children with NLD is that it examines verbal & language information separately from visual information.

Other assessments: There is no single assessment that makes the diagnosis of NLD. It comes from the total body of evidence. Other tests which may be useful include: Aca-

ademic Achievement Tests-Wechsler individual achievement test (WIAT), Language function tests, and Visual Perception-Beery test of Visual-Motor Integration.

### Management

The management of NLD addresses various areas of day to day life. Interventions of NLD consist of multidisciplinary team such as Clinical Psychologist, Occupational Therapist, and Speech Therapist. Generally interventions are grouped into four categories to address the deficits; areas such as motor coordination, visuo-spatial skills & perceptions, executive functioning, social & emotional deficits and parent education.

The academic interventions are addressed to help the children in mastering various affected areas such as mathematics, writing, planning/organization, and reading comprehension. Mathematics interventions are

Motor Coordination: children with NLD require assistance in fine and gross motor tasks. Train children in tasks such as tie shoe lace, buttoning skills, catching balls, keyboarding skills, handwriting skills. Written outlines facilitate organization and alleviate the frustration of copying from the board or taking copious notes.

Visuo-spatial & Perception: Children with NLD often have a difficulty in image formation, visualize the situation, poor visual recall and faulty perceptions. Techniques like, Optometric exercises to improve the eye tracking system, direct instruction through educational training, concept mapping training through drawing, photography classes etc. help the children to manage the difficulties.

Executive Functioning: Children are often facing problem with decision making, planning, initiative, prioritizing tasks, ordering, emotional regulation, problem solving, establishing goals, impulse control, monitoring results of action, self-correcting, working memory and problems with spatial relations. Help the child to follow a simple daily schedule, break tasks down into manageable parts and provide explicit step-by-step directions, teach inductive and deductive approach to problems, self-monitoring the behaviors and implement the tasks to improve working memories. Teach "verbal feedback" strategies. Provide outlines that are clear and not visually overwhelming.

Social and Emotional: Provide direct instruction in social skills, how to recognize and understand facial expressions, body language, and emotions, through role playing. Social skills related to interpersonal relationship will help the children adjust to the novel situations and adjusting to transitions, and taking social judgment.

Parent Education: Its involving addressing the various dimensions of these deficits is an important component to reduce the improper communication with children. Avoid punitive measures and replace them with constructive criticism and clear, consistent expectations.

### Prognosis

The problems tend to worsen over time. As the academic curriculum and life in general (socially, organizationally) become more challenging and complex, the difficulties for children with NLD increase. The demands of writing, organization and general conceptual understanding, maths and comprehension increase in a cumulative way. If the underlying disorder is not recognized and managed, the experience for children can be frightening. As indicated above, the disorder already seems to include a predisposition to anxiety. The urgency of identifying and giving support services to children with NLD is "especially acute" due to the risk of depression, withdrawal, panic attacks, anxiety, and even possible suicide (Thompson, 1997) When we overestimate the child's abilities or put unrealistic demands on the child, ongoing emotional problems can result (Fletcher, 1989, Kowaichuk & King, 1989). Good prognosis for the child with NLD depends upon early identification and appropriate early intervention.

**Directions for further research**

Nonverbal learning disorder syndrome is not a widely recognized diagnosis, to get listed as a diagnostic category, much work remains to be done to better delineate its etiology, prevalence, and practical consequences. From an educational and neuropsychological perspective, further research in this discipline of study needs to be done to become more aware of the complexity of human learning and its associated problems. The impact of NLD on various dimensions of academic performance is a significant one.

**Conclusion**

Nonverbal learning disability encompasses a combination of learning, academic, social and emotional issues which may not be shown up early in life due to academic and social relation's strengths and weaknesses. In order for children with complex syndromes such as NLD to be better and more appropriately served, it is essential that educators, clinicians, and administrators become better informed about the contributions of Neuropsychology to understanding learning.

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