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Intellectual Disability (Mental Retardation): Focus on Poverty, India, and Use of a Brain-Based Diagnostic Tool

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ABSTRACT

Mental Retardation as a label has been replaced by several others including Severe Learning Disability in Britain. Intellectual Disability is the most commonly used one. The present report begins with the distinction between genetic factors and cultural-familial conditions such as maternal health and poverty. Assessment of intellectual ability as a diagnostic tool based on a Brain-Based approach to Intelligence is preceded by a brief description of its incidence in India where poverty is a significant cultural disadvantage. Brain-Based Intelligence Test (BBIT) comprising two major cognitive scales –Planning -Executive functions and Information-Integration is presented in a graphic model. This is followed by report an individual case. Record of test results shows a cognitive profile of Mild Intellectual Disability However a clinical examination of the case suggests a diagnosis of Autistic Spectrum Disorder. A case of dual diagnosis.

Keywords

Mental retardation, Prenatal Risk Factors, Premature Birth.

Mental Retardation (Intellectual Disability) is less of a Handicap Today

Treatment for mental retardation as a consequence of physical damage such as toxins, radiation, and infections, have been adopted for a long time by the medical profession. However, attempts at increasing intelligence by prescribing drugs which were quite popular in the 1930s to 50s, have been discontinued. For example, treatment with massive amounts of glutamic acid or pituitary hormones was once popular but proved to be ineffective. Although some medical practitioners may still continue to recommend vitamins and stimulants for so-called brain functions, it is now accepted that there is no drug cure for mental retardation, unless the condition is associated with a disease that can receive recommended medication. For many of these medical conditions, such as infections, preventive measures are suggested, especially for pregnant women. For example, vaccinations for rubella and HIV will be effective in preventing mental retardation associated with these conditions. Pregnant women are routinely advised to avoid infections and toxins; alcohol and tobacco consumption is also discouraged. All of these preventive measures can be grouped as primary ones in contrast to secondary and tertiary measures [1].

Intellectual Disability (Mental Retardation): A few words about Intellectual Disability or (IDs) in India

Prevalence of ID is likely to be higher than in countries like Canada (2%) because of two major reasons: (a) Better health-care facilities, and (b) hugely reduced poverty.

Both the factors affect organic and cultural - familial categories of Intellectual Deficiencies (IDs). Nongenetic causes comprise prenatal, perinatal & postnatal factors. However, due to recent on-going improvements in economic status in India, the prevalence of Intellectual Disabilities (ID) would be reduced. Intellectual disability (ID) can have various causes and risk factors. Here are some key factors associated with intellectual disability (ID) during the prenatal, perinatal, and postnatal periods.

- **Prenatal Risk Factors**

a) Genetic Factors: Inherited genetic conditions or mutations such as Down's Syndrome [2] can contribute to intellectual disabilities.

b) Maternal Health: Conditions such as maternal malnutrition, infections, substance abuse, and exposure to environmental toxins during pregnancy can increase the risk.

- **Premature Birth**

Babies born prematurely are at a higher risk of intellectual disabilities.

- **Fetal Alcohol Syndrome**

Exposure to alcohol during pregnancy can lead to intellectual disabilities.

- **Perinatal Risk Factors (around the time of birth)**

a) Birth Complications: Traumatic birth events, oxygen deprivation, or other complications during delivery can increase the risk.
b) Low Birth Weight: Babies born with low birth weight are more vulnerable to developmental issues.

Some frequently associated conditions observed by health professionals include during birth, complications in delivery including lack of oxygen (blue babies), and injuries in the brain due to improper use of forceps. However, this organic type of intellectual deficiency (IDs) may be influenced by cultural-familial factors a & b.

For example, mother's small pelvic size is a likely reason for a greater incidence of 'blue babies unusually longer delivery time, leading to a lack of oxygen. A small pelvic size is more common among the poor. Literally, a narrow pelvis may be inherited from generations of poverty & malnutrition [3]. Likewise common toxic environment in the womb is mother's alcohol consumption during pregnancy. However, in India this condition is rarely seen among upper class and middle-class would-be mothers unlike in Canada or USA. Exceptions include indigenous people and other so-called 'back- ward classes, *Fetal alcohol syndrome* is not a rare occurrence.

Poverty is a Cultural Disadvantage

Research on language problems showed that environmental factors associated with poverty, as in low SES families, are more powerful than genetic factors in accounting for similarities in language development in children in the same family. Furthermore, 60% of the variance in cognitive abilities, including language development, was accounted for by shared environmental factors among children living in poverty, with the genetic contribution close to zero [4].

Thus, an early advantage of children from middle and high SES (socio-economic status) is exposure to language. A frequently quoted study by Hart & Risley [5] found that children from more affluent homes heard 30 million more words by age 3 than children from more impoverished environments. Maternal speech specifically influences vocabulary, sentence structure, and complexity of produced speech. Poverty is usually associated with poor nutrition, and unhealthy environmental conditions due to insanitary conditions, and such basics as toilets and clean water. Parental expectation of children's education promotes academic achievement. Realistically, it is low in poor families. Effect of poverty on cognitive functions that increases the risk of Intellectual is discussed at length by Eric Jensen [6] and other famous studies [5,7].

Brain-Based Intelligence Test: A brief introduction

The Brain-Based Test of Intelligence (BBIT) for India is a relatively new test designed to measure intelligence based on brain-based principles. The test was specifically developed for the Indian population, considering cultural, social, and educational factors that may influence cognitive performance. Since its introduction, the BBIT has been gaining popularity as a tool for assessing cognitive abilities in individuals. The BBIT incorporates various cognitive domains, including executive functions, to measure intelligence. It utilizes elements of neuroscience and psychology to assess cognitive abilities and identify potential strengths and weaknesses in areas such as attention, memory, processing speed, problem-solving, and decision-making. To measure executive functions using the BBIT, specific tasks or items within the test may target different aspects of executive function, such as planning, cognitive flexibility, inhibitory control, working memory, and attentional control.

BBIT (Brain-Based Intelligence Test) is Relevant for Identification of Intellectual Disability [8-15]

BBIT (Brain-Based Intelligence Test) Brain-Based Approaches to the Study of Intelligence

A brain-based approach can provide a framework for intelligence, for integration of biology and cognitive processes that have direct implications for education and brain plasticity. Intelligence is reframed here as a selective cluster of different cognitive processes often localized in broad divisions of the brain. Theories and systems that have guided investigation into the brain mechanisms for cognitive processes are reviewed. The focus is on education and cultural disadvantage, delineating changes in the brain due to learning and its dysfunction. Selected programs for enhancement of neurocognitive abilities are presented. Neuronal changes appear to occur as a consequence of learning throughout life. A brain-based approach not only relates to how intelligence works, but also opens the door to understanding the mind and hence consciousness. One may say that the mind is not an eclectic collection of intellectual functions of the brain. Rather, the ultimate goal of intelligence is to form a better view of self that gives meaning to an individual's existence.

What is BBIT?

BBIT comprises two main batteries of tests and a FastTrack shorter test derived from them. The two main batteries are *Plan-Ex Battery* and *Information Integration Battery*.

A model of BBIT (Brain-Based Intelligence Tests)

BBIT Figure is schematic diagram of Plan-Ex. It presents the essential components of the Plan-Ex assessment in the BBIT. It is followed by a description of Information Integration tests.

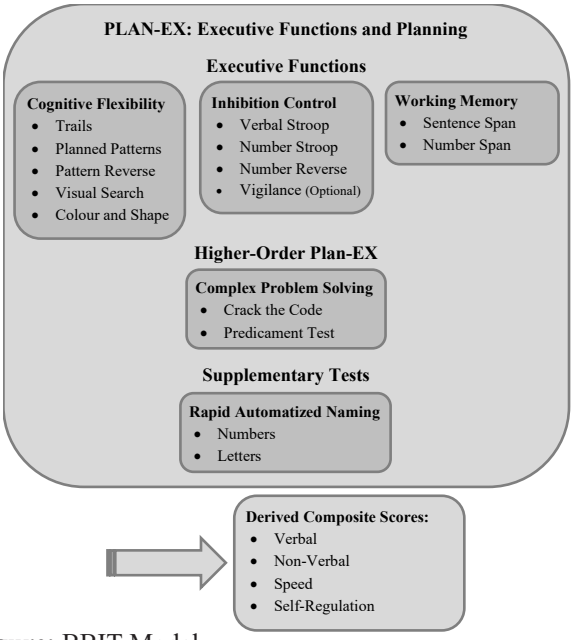
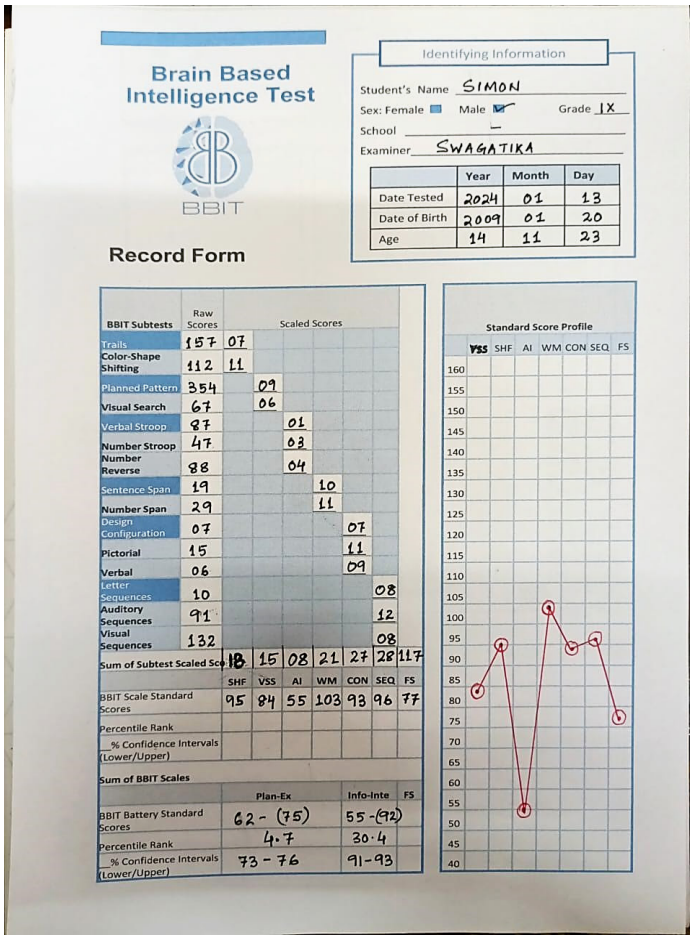


Figure: BBIT Model

Application of BBIT in Behavioural Medicine

BBIT is used as a Diagnostic Test in Intellectual Deficit. The following is a Cognitive Profile of a student with suspected Intellectual Disability.

Figure: BBIT Test items and Cognitive picture of one person with Mild ID (Mental Retardation)



Executive Functions

Numbers are standard scores. Mean=100, SD=15
FS=Full scores derived from individual tests. Similar to IQ.

1.Cognitive Flexibility
Trails
Planned Patterns
Pattern Reverse
Visual Search
Colour and Shape Shifting … Trails + Colour-Shape Shifting = **Shifting** …..95
Plan Pattern + Visual Search = **Vis Spatial**….84

2.Inhibition Control
VerbStroop + NumbStr + Number Rev = **Attn-Inhibition**…55
Verbal Stroop
Number Stroop
Number Reverse
Vigilance (Optional)

3.WorkingMemory……
Sent Span+NumbSpan=**Wkng Memory**…….103
Sentence Span
Number Span

INFORMATION-INTEGRATION
Test Items:
Configurations……Design+pict+verbal =**Configure(Simult)**……93
Shape Design
Pictorial/Verbal
Sequences Letter+Aud+*Vis Sequences*…**Succssesive**……96
Letter Sequence
Auditory Sequences
Visual Sequences

Full Scale- BBIT =77 Mild Intellectual Disability

Interpretation of Cognitive Performance

Notice the differences in performance Test by Test.
Given this spread of abilities, an overall Full Scale (IQ) is not at all informative.

The Clinical Psychologist could not agree with the diagnosis of Mild Intellectual Disability as shown in **BBIT** not without a clinical observation and obtaining a case history. On rethinking, suspected diagnosis of Autism, ASD, could not be ruled out. The biographical case history revealed, and interview of the case called for using CARS. The Childhood Autism Rating Scale (CARS) is a widely used diagnostic tool for autism spectrum disorder (ASD) in children. It's a behavior rating scale that helps clinicians evaluate the severity of autism symptoms based on direct observation and information from parents or caregivers. It consists of 15 items that cover various aspects of behavior typically affected in autism, such as social interaction, communication, and repetitive behaviors. To use the CARS effectively, a trained professional observes the child and rates behavior on each item according to predefined criteria. The ratings are then scored to determine the severity of autism symptoms, ranging from non-autistic to severely autistic.

Here's a brief overview of how the CARS works:

1. **Observation and Evaluation:** The clinician observes the child's behavior in different contexts, such as during structured activities, interactions with others, and playtime.
2. **Rating Scale:** Each item on the CARS has specific criteria for

rating the severity of autism-related behaviors. These criteria cover areas such as social relationships, emotional responses, communication skills, and sensory sensitivities.

3. **Parent/Caregiver Input:** In addition to direct observation, the clinician may gather information from parents or caregivers about the child's behavior and developmental history to supplement their assessment.
4. **Scoring:** After completing the evaluation, the clinician scores each item on the CARS based on the observed behavior. The total score indicates the severity of autism symptoms, with higher scores indicating more severe impairment.
5. **Interpretation:** The final score helps clinicians make a diagnosis of autism spectrum disorder and determine the appropriate level of support and intervention needed for the child.

It is important to note that while the CARS is a valuable tool in diagnosing autism, it should be used as part of a comprehensive assessment that should include other measures such as interviews, standardized tests, and observations in various settings. Indeed, CARS supported an ASD diagnosis of the reported case. As we know, a High Functioning ASD previously named as Asperger's Syndrome appeared to be a most probable category. As we know, a dual diagnosis, mild Intellectual Disability and ASD are not incompatible. The clinical psychologist observed autistic behaviour. Autistic behavioural test confirmed a mild form of autism. As a final diagnosis, the most probable diagnosis was a case of high functioning Autism.

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