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A COMPARATIVE STUDY OF FREEDOM FROM DISTRACTIBILITY FACTOR AMONG DYSCALCULIA AND NON-DYSCALCULIA STUDENTS

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ABSTRACT

Several students with Specific learning disabilities (SLD) face major problems in learning mathematics. Mathematical learning disability or dyscalculia can be a very serious problem at school as well as in later life. For clinical practitioners, psychologists have hard time to assess cognitive strengths and weaknesses of dyscalculia students in crowded class rooms. Many clinicians believe that the Wechsler Intelligence Scale for Children (WISC) is a valuable instrument to assess cognitive strength and weakness of SLD children (Weiss, Beal, Saklofske, Alloway, & Prifitera, 2008). Clinical interpretation of subtest score profiles on intelligence tests is a common practice. Freedom from Distractibility (FD) factor is one of the subtest profiles in WISC which consists of three subtests Digit span, Arithmetic and coding tests. The present study examines the difference in Freedom from Distractibility (FD) factor between dyscalculia & non-dyscalculia students.

The sample of 37 children (boys- 20, girls - 17) in the age range of 6 to 14 yrs was collected from different clinics & schools. The results showed that there is a significant difference in Freedom from Distractibility (FD) factor between Dyscalculia and Non- Dyscalculia students.

KEYWORDS: *Dyscalculia, Non-Dyscalculia, Intelligence Quotient, Freedom from Distractibility factor (FD), Digit span, coding, Arithmetic and MISC.*

INTRODUCTION

Learning disabilities make up a complex, heterogeneous, loosely defined disorder with a wide variety of manifestations and many different theories regarding causation (A. Kaufman & Kaufman, 2002; Sattler, 2002: L Siegel, 1999). A central component of all definitions is that learning disabilities involve difficulties in developing skills in reading (most commonly), writing, listening, speaking, reasoning, spelling, or math. This is sometimes summarized as poor information processing. Further essential features are these: learning –disabled persons have adequate intelligence, show a significant discrepancy between achievement and intellectual ability & have a disorder that is considered primarily intrinsic to the person, presumably because of central nervous system dysfunction. The underachievement cannot be primarily the result of an intellectual disability (MR), brain damage, behavior problems, sensory handicaps or environmental disadvantage.

Several students with Specific learning disabilities face major problems in learning mathematics. Mathematical learning disability or dyscalculia (derived from the generic term, mathematics

difficulty) can be a very serious problem at school as well as in later life. A.J.Baroody and H.P.Ginsburg in their book, test of early mathematics ability have defined dyscalculia as, "A specific disturbance in learning mathematical concepts and computation and is associated with an organic dysfunction."

There are many people who have a high IQ level, learn quickly, are excellent readers, creative writers, but have serious difficulties with mathematics.I met a ten-year-old boy who was very hardworking and intelligent, but his poor number skills had always been a severe handicap. Shopping was a big embarrassment for him. He did not understand prices. He did not know how much money he had to pay or if the balance returned was correct or not. He was a dyscalculic.

The major purpose of Specific learning disability assessment is to identify a client's strengths and weakness to be able to decide on an appropriate placement and to design an optimal program. Relevant areas to assess include developmental- cognitive processes achievement, environmental demands, and reactions of others to the client difficulties & the possible interaction of additional factors, such as fear of failure, overall level of interpersonal adjustment & family history of similar difficulties.

Different techniques are utilized to analyze SLD and can include: (an) immediate perceptions (DuPaul, 1992), (b) organized meetings (Power and Ikeda, 1996), (c) conduct rating scales (Barkley, 1991), (d) various stage assessment (DuPaul, 1992), and (e) intellectual profiles (Prifitera and Dersh, 1993). Albeit organized meetings and conduct rating scales are viewed as best practice for the recognizable proof of SLD (American Academy of Child and Adolescent Psychiatry, 2007), examination of psychological profiles has likewise been prescribed (Prifitera and Dersh, 1993) on the grounds that subjective tests measure capacities, for example, working memory, which are thought to be hypothetical underpinnings of SLD (Schwean and 2 McCrimmon, 2008). A few specialists recommend that subjective profiles are valuable in comprehension the psychological qualities and shortcomings of youngsters that can, consequently, add to treatment arranging (Kaufman, 1994). For instance, clinicians may utilize handling speed intercessions for youngsters with SLD profiles (Schwean and McCrimmon). Since psychological test utilize is far reaching in school appraisals (Wilson and Reschly, 1996), and profiles can give extra data to evaluation (Schwean and McCrimmon), they warrant advance examination.

Of all the available cognitive tests, the Wechsler series is the most popular with clinicians (Kaufman & Lichtenberger, 2000) Many clinicians believe that the WISC, beyond its popularity, is a valuable instrument for the diagnostic assessment of children (Weiss, Beal, Saklofske, Alloway, & Prifitera, 2008). The Wechsler scales are typically considered essential as a means of identifying the clients overall level of functioning and specific cognitive strengths and weakness and to eliminate the possibility of intellectual disability (MR).

Clinicians sometimes use the Wechsler tests to detect SLD in children by examining specific score patterns that have been identified through research as markers of SLD (Sattler, 2008). Past research has shown three main cognitive subtest score patterns linked to SLD. First, Kauffman (1994) found a profile of low scores on the Arithmetic, Coding, and Digit Span subtests on the Wechsler Intelligence Scale for Children–Revised (WISC-R; Wechsler, 1974). With the introduction of the Wechsler Intelligence Scale for Children–Third Edition (WISC-III; Wechsler, 1991) the freedom from distractibility (FD) profile was modified to consist of just the Arithmetic and Digit Span subtests to match the 3 factor structure of the WISC-III. When children scored high on this FD profile it was thought to indicate the ability to sustain attention and when they scored low on this FD profile it was thought to indicate distractibility (Kauffman). Because of this hypothesis, low scores on the FD profile were considered a possible indicator of SLD. A quantitative test of the ability of the FD factor to differentially identify children with ADHD was reported by Anastopoulous, Spisto, and Maher (1994). They administered the WISC–III and several behavior rating scales to 40 children with ADHD and found that, on average, FD scores were significantly lower than VC and PO scoresFD scores also correlated significantly with teacher measures of inattention (r=–.49), but not with teacher ratings of impulsivity, hyperactivity, or other internalizing or externalizing problems.

Considerable effort has been placed into searching for a specific Wechsler scale profile that is unique to learning-disabled populations. The WAIS-III index scores of working memory and processing speed

(compared to perceptual organization and verbal comprehension) were also found to be particularly low among a sample of adults diagnosed with reading disabilities(psychological corporation 1997). Additional research with groups of children with and without SLD found that, on average, scores of the SLD groups on those two subtests were significantly lower than the scores for non-SLD groups (Anastopoulos, Spisto, & Maher, 1994; Wielkiewicz, 1990).

In general many people with specific learning disabilities have weakness on the following subtests on the WISC;

• Arithmetic in which they are asked to solve word problems and do mathematical calculations in their heads
• Digit span in which they are asked to repeat series of numbers.
• Coding in which they are asked to quickly copy geometric shapes in a code format.

Difficulty with these subtests and others can artificially lower IQ scores. Therefore most people with specific learning disabilities in fact have higher intellectual potential than is measured by the full-scale IQ on the WISC. It is also important to remember that the main pattern of the specific learning disabilities learning style is diversity. People have all types of strengths and weakness that can have an impact on test performance. When a student's is suspected of having specific learning disabilities, therefore it is critically important for the school psychologist who is administering and evaluating the test to have an understanding of the learning style.

Collectively the preceding profiles suggest that many specific learning-disabled individuals perform best on tasks requiring holistic, right brain, simultaneous, processing (Object Assembly, picture completion, Block Design) and worst on those requiring sequential processing (Digit span, Digit symbol/coding, Picture Arrangement), which is expressed in difficulties with planning, reading & numerical ability. Wielkiewiez (1990) has further suggested that these subtests indicate a poorly functioning executive ability in when the individual experience difficulty attending to stimuli while simultaneously performing other mental tasks. Although the Freedom from Distractibility profiles appeared to be valid markers of SLD in these studies

Given the previous research, the following conclusions are warranted (adapted from Groth-Marnat.2002).

• There is moderate –to-equivocal evidence that some profiles (relatively low processing speed and working memory/freedom from distractibility, spatial>conceptual>sequential, ACID) occur more frequently in learning –disabled population compared to the general population.
• The various patterns of Wechsler subtests can, at times, be used to further understand individual cases of persons experiencing learning difficulties.

NEED OF THE STUDY:-

A variety of research has been conducted on the association between Wechsler subtest Cognitive profile and SLD. The results of the studies have not been entirely consistent at the same time very less research is done in Dyscalculia area, continued research on the association between these variables is needed. Most of the researches are based on western culture and there is very limited research in Dyscalculia and cognitive profile at Indian condition. So, continued research on the association between these variables is needed.

AIM OF THE STUDY

The present study is designed to examine the differences in Freedom from Distractibility (FD) factor between dyscalculia & non-dyscalculia students.

OBJECTIVES

1.To find out the difference between Freedom of Distractibility (FD) factor among Dyscalculia and Non-Dyscalculia children.

HYPOTHESES

1.There will be significant difference in Freedom of Distractibility (FD) factor between Dyscalculia children and NON-Dyscalculia children.

METHODOLOGY

Participants

The data were collected as part of a small research designed to examine significant freedom of Distractibility factor difference between dyscalculia & non-dyscalculia students. The samples were collected from clinic & schools with help of reference from doctors, psychiatrist & school teachers. The samples were consisting of 37 children (20 - boys, 17-girls). Children ranged in age from 6 to 14yrs.

Tools and Statistics

We applied Behavior checklist for Screening Learning Disability,Colour progressive matrices (CPM), Malin's intelligence scale for Indian children (Indian Adaptation of WISC) and Diagnostic Arithmetic Test to 20 sample of Dyscalculia children with 17 sample of NON-Dyscalculia children aged 6 yrs to 14yrs. The data were analyzed using Mean, SD and T-test.

LIMITATIONS:-

1. We took only small sample; need to do with large samples in future research.
2. We have collected the sample only at English medium school and in and around Coimbatore.
3. Students who volunteered for the study only taken.
4. The socio-economic status was not taken into consideration.

RESULTS & DISCUSSION

The results of the analysis are presented below in the tables & the discussion follows.

The Table 1 shows Mean, SD and t-test values on Freedom from Distractibility factor

Study Groups	Mean	S.D		T-test value
Dyscalculia students	42.00	*8.74*		
Non-Dyscalculia Students	65.02	*19.67*		4.730**

** Significant at (P<0.01)

Table 1 indicates that there is significant difference in Freedom from Distractibility factor between dyscalculia and non-dyscalculia students. Hence the hypothesis 1 which states that there will be significant difference between dyscalculia and non-dyscalculia students on Freedom from Distractibility factor is accepted. This means that there is difference between dyscalculia and non-dyscalculia students on Freedom of Distractibility factor. The obtained findings support the observation of Wielkiewicz, (1990). Non-dyscalculia students have high score in Freedom form Distractibility which revealed that those students have good auditory short-term memory, attention, concentration, ability to shift mental set, capacity for sustained effort, Associative learning and ability to imitate newly learned visual material and mathematical reasoning than Dyscalculia students.

The Table 2 shows Mean, SD and t-test values on Digit span test

Study Groups	Mean	S.D		T-test value
Dyscalculia students	7.25	*2.12*		2.940**
Non-Dyscalculia Students	9.41	*2.35*		

** Significant at (P<0.01)

Table 2 indicates that there is significant difference in Digit span test between dyscalculia and non-dyscalculia students. Hence the hypothesis 2 which states that there will be significant difference between dyscalculia and non-dyscalculia students on Digit span test is accepted. This means that there is difference between dyscalculia and non-dyscalculia students Digit span test. The obtained findings support the observation of Cordoni, O'Donnell,Ramaniah, Kurtz, & Rosenshein, (1981) Lezak, 1995; Reitan & Wolfson, (1993) . Non-dyscalculia students have high score in Digit Span test which revealed that those students have good auditory short-term memory, immediate rote recall, attention and concentration and auditory sequencing than Dyscalculia students.

The Table 3 shows Mean, SD and t-test values on Arithmetic test.

Study Groups	Mean	S.D		T-test value
Dyscalculia students	6.35	*1.39*		3.818**
Non-Dyscalculia Students	8.53	2.07		

** Significant at (P<0.01)

Table 3 indicates that there is significant difference in Arithmetic test between dyscalculia and non-dyscalculia students. Hence the hypothesis 3 which states that there will be significant difference between dyscalculia and non-dyscalculia students on Arithmetic test is accepted. This means that there is difference in Arithmetic test between dyscalculia and non-dyscalculia students. The obtained findings support the observation of A. Kaufman & Lichtenberger,(2002) . Non-dyscalculia students have high score in Arithmetic test which revealed that those students have good mathematical reasoning, attention, concentration and Reality contact and mental alertness than Dyscalculia students.

The Table 4 shows Mean, SD and t-test values on Coding test.

Study Groups	Mean	S.D		T-test value
Dyscalculia students	28.40	*7.67*		4.417**
Non-Dyscalculia Students	47.12	*17.06*		

** Significant at (P<0.01)

Table 4 indicates that there is significant difference in Coding test between dyscalculia and non-dyscalculia students. Hence the hypothesis 4 which states that there will be significant difference between dyscalculia and non-dyscalculia students on Coding test is accepted. This means that there is difference

between dyscalculia and non-dyscalculia students on Coding test. The obtained findings support the observation of Yamakawa, (1993); Wechsler, (1991), Groth-Marnat (2002). Non-dyscalculia students have high score in Coding test which revealed that those students have performed well psychomotor speed, Clerical speed and accuracy, attention, concentration, Sequencing ability and Visual short-term memory than Dyscalculia students.

FINDINGS:-

1.Dyscalculia students and NON-Dyscalculia students differ in Freedom of Distractibility (FD) factor.
2.Dyscalculia students and NON-Dyscalculia students differ in Digit span test.
3.Dyscalculia students and NON-Dyscalculia students differ in Arithmetic test.
4.Dyscalculia students and NON-Dyscalculia students differ in Coding test.

CONCLUSION:-

The present study results showed that Dyscalculia students have taken low score in Freedom form distractibility (FD) factor than NON-Dyscalculia. The freedom from Distractibility factor assesses student's auditory short-term memory, attention and concentration level and mathematical reasoning skills. Non-dyscalculia students have high score in Freedom form Distractibility which showed that those students have good at psychomotor speed, Clerical speed and accuracy auditory short-term memory, attention and concentration, Sequencing ability, Visual short-term memory and mathematical reasoning than Dyscalculia students. In my second part of doctoral research the identify dyscalculia student will be remediate with Pass Reading Enhancement Program to remedy their weak cognitive profile.

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