

Research Paper

Intellectual Profile of Children with Specific Learning Disability with and without ADHD on Mallin's Intelligence Scale for Indian Children (MISIC)

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ABSTRACT

Specific learning disability (SLD) is one of the commonly diagnosed condition among school aged children. SLD often co-occur with other emotional and behavioural disorders, hence early diagnosis and intervention are vital for improving the quality of life of children with SLD. This research study was aimed to explore the intellectual profile of SLD-typical and SLD-ADHD group which is the common comorbid condition on Mallin's Intelligence scale for Indian children (MISIC). It's a retrospective cross-sectional study, 354 children referred for psychological assessment due to persistent academic difficulties and who had received a diagnosis of SLD-typical (mixed type), SLD-ADHD (Inattention/Hyperactivity) and SLD with borderline IQ at the end of the clinical evaluation were included. The results revealed that the SLD-typical and SLD-ADHD groups performed similarly on MISIC. All the three groups scored high on VSIQ than PSIQ, both SLD and SLD-ADHD groups obtained higher scores on verbal comprehension index (VCI) and perceptual reasoning index (PRI) compared to working memory (WMI) and processing speed index (PSI). We conclude that the research findings will allow for a richer understanding of the intellectual profile of children with SLD with and without ADHD on MISIC.

Keywords: SLD, ADHD, Borderline, Verbal comprehension index (VCI), Perceptual reasoning index (PRI), Working memory index (WMI), Processing speed index (PSI)

Specific learning disability (SLD) is defined as “heterogeneous group of conditions wherein there is a deficit in processing language, spoken or written, that may manifest itself as a difficulty to comprehend, speak, read, write, spell, or to do mathematical calculations and includes such conditions as perceptual disabilities, dyslexia, dysgraphia, dyscalculia, dyspraxia and developmental aphasia” (RPWD Act 2016). In India, the prevalence of SLD among school aged children ranges from 3-19% (Sahoo, Biswas & Padhy, 2015; Kuriyan & Justin, 2018; Padhy et al, 2016; Shah & Trivedi, 2017). These figures highlight that SLD is one of the common causes for school drop outs and academic underachievement among children (Sailaja, Gowri & Ananad, 2017; Sing et al, 2017).

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SLD usually do not exist in isolation (Sailaja et al, 2017), other behavioural and emotional disorders like attention deficit hyperactivity disorder (ADHD), conduct disorders, language disorders, anxiety and depression are commonly associated with SLD (Sahoo et al, 2015; Sailaja et al, 2017). Among these conditions, ADHD is found to be the most common comorbidity associated with SLD with prevalence rates of 10% to 50% (Margari et al, 2013; Karande, Satam, Kulkarni, Sholapurwala & Chitre, 2007). ADHD is characterized by persistent inattention and/or hyperactivity, poor impulse control traits interfering with normal development (American Psychiatric Association, 2013). SLD or ADHD have been called the "hidden disabilities" (Wolf, 2001) because they are not noticeable disabilities and often are detected only after significant academic failure has been experienced by the child.

Hence, understanding the intellectual functioning of children with SLD having comorbidity is important because the presence of another disorder may affect the expression and severity of the clinical picture, requiring specific treatment and intervention (Margari, 2013; Khodier, El-Sady & Mohammed, 2020).

Identifying learning disability in children is a crucial task, as SLD when not identified at an early age may not only affect the academic performance of children but also their other significant psychological facets like child's self-esteem, school adjustment, motivation, peer relationships and in some cases may lead to the development of severe behavioral or emotional disorders like depression, anxiety and conduct disorders (Sing et al 2017; Shapiro & Gallico, 1993; Shaywitz, 1998). Perhaps, SLD affects the overall quality of life of the child (Huang, 2020). For this reason, it is essential to find the most appropriate tools which aid in the diagnostic process and also for intervention planning as intelligence was found to be one of the important factors and is often positively related to academic achievement (Ritu Chandra, 2013; Sattler, 2002).

In India, Mallin's Intelligence scale for Indian children (MISIC) is the most widely used tool for assessing the cognitive abilities of children (Shah HR, Sagar JKV, Somaiya MP & Nagpal JK 2019). MISIC is the Indian adaptation (Malin, 1969) of Wechsler Intelligence Scale for Children (WISC). MISIC is administered along with achievement tests for the diagnosis of SLD as well to identify the cognitive performance (Rakhee, Anna & Shobini, 2007). Moreover, psychologists believe that, when integrated with other sources of information, Intelligence tests provide a means for understanding the cognitive strengths and weaknesses, which aid in educational programming (Dombrowski, Kamphaus & Reynolds, 2004; Hale, Casey & Ricciardi, 2013).

While MISIC is the widely used tool for the intellectual assessment in India, it was thought imperative to explore the Intellectual profile of children with SLD on MISIC and to know the differences in the cognitive pattern of children having SLD with and without ADHD, Besides, more accurate clarification about the differences in the intellectual profile of children with SLD having comorbid condition could also facilitate accurate diagnosis.

Though some research studies were conducted in India on the intellectual profile of children with learning disabilities using MISIC, these studies have not revealed the specific cognitive strengths and weaknesses and mostly focused on Full scale IQ, Verbal scale IQ and Performance scale IQ (Kohli, Kaur, Mohanty & Malhotra, 2006; Kohli, Sharma & Padhy, 2008). There is a dearth of evidence based or empirical studies on the detailed intellectual

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profile of children with SLD on MISIC. The relationship between specific cognitive patterns of SLD and comorbid conditions is still unclear.

In brief, ADHD was found to be the frequent co-occurring condition in SLD, (DuPaul, Gormley & Laracy, 2013; Somale, Kondekar, Rathi & Iyer, 2016; Gray & Climie, 2016; Sahu, Patil, Sagar & Bhargava, 2019), so we wanted to find out whether we can arrive at different cognitive profile for children having SLD-ADHD as compared to SLD-typical on MISIC our study, along with ADHD we also included another small group of children with SLD having borderline IQ, as this group was not commonly considered in researches studies and less is known about their cognitive profile (Cornoldi, Giofrè, Orsini & Pezzuti, 2014).

Additionally, with respect to Intellectual functioning of SLD, research studies based on WISC -IV reveal that factor index or cognitive domains provide significant data about the cognitive strengths and weakness of children with SLD apart from the main scales and subtests (Giofrè, Cornoldi, 2015). Therefore, in the preset study four major cognitive domains were derived along with subtest and scaled scores based on the research study of Sushmita Halder & Sushma Kotnala (2018), those are verbal comprehension index (VCI), perceptual reasoning index (PRI), working memory index (WMI) and processing speed index (PSI). Information, general comprehension, and similarities test give measure of VCI. Mazes and picture completion provide evidence of PRI. WMI can be measured by digit span and arithmetic test. Finally, PSI can be measured by coding. The knowledge about the performance of children with SLD and comorbid conditions on MISIC might help clinicians in identifying specific cognitive markers. As early identification and intervention are vital to reduce the effects of SLD on the child and to improve his/her learning capacities (Karande & Kulkarni, 2005; Karande et al., 2007).

Objective

There were three main objectives of the study first, is to find out the Intellectual profile of children with SLD-typical on Mallin's Intelligence scale Indian children (MISIC). Secondly, to understand differences in the intellectual profile among children with SLD-typical in comparison with SLD-ADHD and SLD-borderline groups and also to understand the gender wise differences among the three groups on MISIC.

METHODOLOGY

Participants

It's a retrospective cross-sectional study. Participants enrolled were children referred for psychological assessment due to persistent academic difficulties and assessed at the Total solution for learning centre, Secunderabad, Telangana state, India. Children who reported for clinical services for a period of 4 years i.e., from January 2016-January 2020 were included in the study. A total of 354 children were evaluated on psychological tests for academic difficulties and who had received a diagnosis of SLD-typical (mixed type) SLD with ADHD (Inattention/Hyperactivity) and SLD-borderline IQ at the end of the clinical evaluation were included in the study. ADHD was diagnosed by a pediatric psychiatrist. An academic achievement of two years below the actual grade placement on educational assessment with a curriculum-based test was considered for diagnostic of SLD.

Measures

Mallin's Intelligence scale for Indian children (MISIC) was used to assess the cognitive abilities of children. MISIC is the Indian adaptation of Wechsler Intelligence Scale for

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Children (WISC). It is designed for the age group of 6 to 15.11 years. It has 10 sub tests which are grouped into a verbal scale and a performance scale. The verbal scale contains 5 subtests namely, information, comprehension, arithmetic, analogies and similarities, vocabulary or digit span. The performance tests also contain 5 subtests namely picture completion, block design, object assembly coding and mazes. The total score in each of the subtest is converted to a test quotient (TQ), which is equivalent to IQ. The test gives a verbal scale IQ(VSIQ) and performance scale IQ(PSIQ) in addition to the full-scale IQ (FSIQ). The test has a reliability coefficient of 0.91 and adequate concurrent and congruent validity of (0.61 and 0.63 respectively) (Rakhee, Anna & Shobini, 2007). Children were diagnosed as having Specific learning disability and ADHD according to ICD-10 criteria (WHO,1992).

All recruited participants underwent psychological assessment focused on intellectual functioning, learning ability and behavioral assessment according to common diagnostic procedures. Parents of children with SLD signed informed written consent forms regarding diagnostic procedure and potential subsequent use of anonymous clinical data for empirical purposes.

Because all empirical data were collected during routine clinical assessment, this study did not require an ad hoc ethical committee approval by the Institutional review board.

Statistical analyses

The SPSS-22.0 software was used to calculate statistical mean differences between the groups using ANOVA, post-hoc by Scheffe's test and gender differences were computed using independent sample t-test.

RESULTS

Table-1 shows the age and gender distribution of the sample. Children were divided into three subgroups namely, SLD-typical (mixed type), SLD-ADHD (Inattention/Hyperactivity) and SLD-borderline IQ group. SLD-typical (mixed type) group comprised of children with low average-high average FSIQ's (≥ 85) (n=237; Mean age=11.7(SD=2.72); female=72), SLD-ADHD group consisted of children with low average-high average FSIQ's (≥ 85) (n=78; Mean age=11.07(SD=2.84); female=12) and the SLD-borderline included children with borderline FSIQ's ($70 < IQs < 85$) (n=39; Mean age=11.4 (SD=1.6); female=13).

In this study, there was a preponderance of boys than girls. Among SLD-typical group majority of the sample (69.6%) comprised of boys and only 30.4% were girls, similarly more percentage of boys was observed among SLD-ADHD and SLD-borderline groups (84.6%, 66.7%) respectively.

Majority of the sample are studying in CBSE board schools (89.5%). With respect to referrals, 63.8% of children were referred by rehabilitation professionals like school counsellors, resource teachers and special educators, 19% were referred by school administration, 15.6% of children were referred by parents and only 1.6% children were referred by doctors (Paediatrician/Psychiatrist/Neurologist). With reference to grade, 22.9% belonged to primary grade and 38.1% belonged to upper primary and 39% belonged to secondary grade correspondingly.

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Table-1 Age and gender distribution of the three study groups

Age group	SLD-typical	SLD-ADHD	SLD-borderline
	n %	n %	n %
6-11	60 (25.3)	18 (23.1)	6 (15.4)
11-14	96 (40.5)	43 (55.1)	20 (51.3)
14-16	81(34.2)	17 (21.8)	13(33.3)
Gender			
Male	165(69.6)	66 (84.6)	26 (66.7)
Female	72 (30.4)	12 (15.4)	13 (33.3)
Total	237	78	39

* Significant at 0.05 level ** Significant at 0.01 level

Intellectual profile of SLD-typical group

As shown in table-2 the average full-scale IQ of SLD-typical group on MISIC was found to be 97.47, the VSIQ was observed to be high (M=100.84) compared to the PSIQ (M=94.17). A 5-point discrepancy was observed between VSIQ and PSIQ. With respect to SLD-ADHD and SLD-borderline groups almost similar discrepancy was observed. MISIC standard scores for the SLD-typical group ranged from a highest score of 115.55 on verbal scale (General comprehension) to the lowest score of 78.47 on the performance scale (Object assembly). Cognitive domain profile of SLD-typical group (Table-2) reveal that this group scored high on VCI (M=320.0) and PRI (M=188.01) compared to WMI (M=183.21).

Table-2 Comparison of three study groups on MISIC three main scales & four cognitive domains

MISIC Main scales	SLD-typical (n=237) (1)		SLD-ADHD (n=78) (2)		SLD-borderline (n=39) (3)		F, p (df=2,351)	Post -hoc Scheffe's test
	M	± SD	M	± SD	M	± SD		
VSIQ	100.84	9.64	100.75	7.1	82.57	7.02	73.22**	1,2>3
PSIQ	94.17	8.72	94.16	8.50	77.12	6.63	70.17**	1,2>3
FSIQ	97.47	7.11	97.57	6.05	79.78	3.78	124.8**	1,2>3
Four Cognitive Domains								
VCI	320.00	39.76	322.56	29.45	255.10	28.47	56.44**	1,2>3
PRI	188.01	20.72	189.55	24.47	157.33	19.86	38.79**	1,2>3
WMI	183.21	17.78	181.17	14.84	157.71	14.10	36.31**	1,2>3
PSI	106.57	16.13	104.0	15.03	90.51	14.58	17.43**	1,2>3

* Significant at 0.05 level ** Significant at 0.01 level

Note. Verbal Scale IQ (VSIQ) Performance Scale IQ (PSIQ), Full-Scale IQ (FSIQ), Verbal Comprehension Index (VCI) Perceptual Reasoning Index (PRI) Working Memory Index (WMI) Processing Speed Index (PSI)

Cognitive differences between the SLD-typical group in comparison with SLD-ADHD and SLD-borderline groups

The ANOVA analysis between SLD-typical, SLD-ADHD and SLD-borderline groups reveal that both SLD- typical and SLD-ADHD group means scores are found to be higher

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than SLD-borderline groups (Table 2&3). Both SLD-typical and SLD-ADHD group showed significant difference ($p < 0.01$) in comparison to SLD-borderline groups mean scores. However, there was no significant difference between SLD-typical and SLD-ADHD group means scores on subtests as well as three main scales (VSIQ- $M=100.84, 100.75$, PSIQ- $M=94.17, 94.16$, FSIQ- $M=97.47, 97.57$) and both groups performed almost similarly on MISIC (Figure-1). The discrepancy between VSIQ-PSIQ for the SLD-ADHD group was observed to be around 5 points as similar to other two groups. The SLD-ADHD group subtest score ranged from 117.59 on verbal scale (General comprehension) to 78.85 on performance scale (Object assembly). SLD-ADHD group scored low average on picture comprehension ($M=86.88$), arithmetic ($M=89.31$) and object assembly subtests ($M=78.85$) and on the rest of the subtests they scored average (Table-3). There exists a mild discrepancy between the VCI, PRI scores of SLD-ADHD ($M=322.56, 189.55$) and SLD-typical group ($M=320.0, 188.0$) which was not statistically significant (Table-2).

Table-3 Comparison of three study groups on MISIC verbal and non-verbal subtests

MISIC Subtests	SLD- typical (n=237) (1) Mean ± SD	SLD-ADHD (n=78) (2) Mean ± SD	SLD-borderline (n=39) (3) Mean ± SD	f, p (df=2,351)	Post-hoc Scheffe's test
Information	99.46 13.20	100.04 82.10	82.10 8.68	35.96**	1,2>3
Comprehension	115.55 19.14	117.59 14.95	87.67 17.29	43.03**	1,2>3
Similarities	105.62 18.76	104.94 17.02	85.33 11.90	22.28**	1,2>3
Arithmetic	89.72 10.82	89.31 8.53	76.13 6.76	31.74**	1,2>3
Digit Span	93.49 12.93	91.87 11.58	81.59 10.79	15.36**	1,2>3
Picture Comprehension	88.75 12.95	86.88 15.87	74.74 6.90	18.96**	1,2>3
Block design	97.65 17.11	98.47 16.45	77.10 14.27	26.90**	1,2>3
Object Assembly	78.47 15.72	78.85 14.48	65.76 6.45	13.12**	1,2>3
Coding	106.57 16.13	104.0 15.03	90.51 14.58	17.43**	1,2>3
Mazes	99.27 14.56	102.67 14.99	78.05 12.18	42.23**	1,2>3

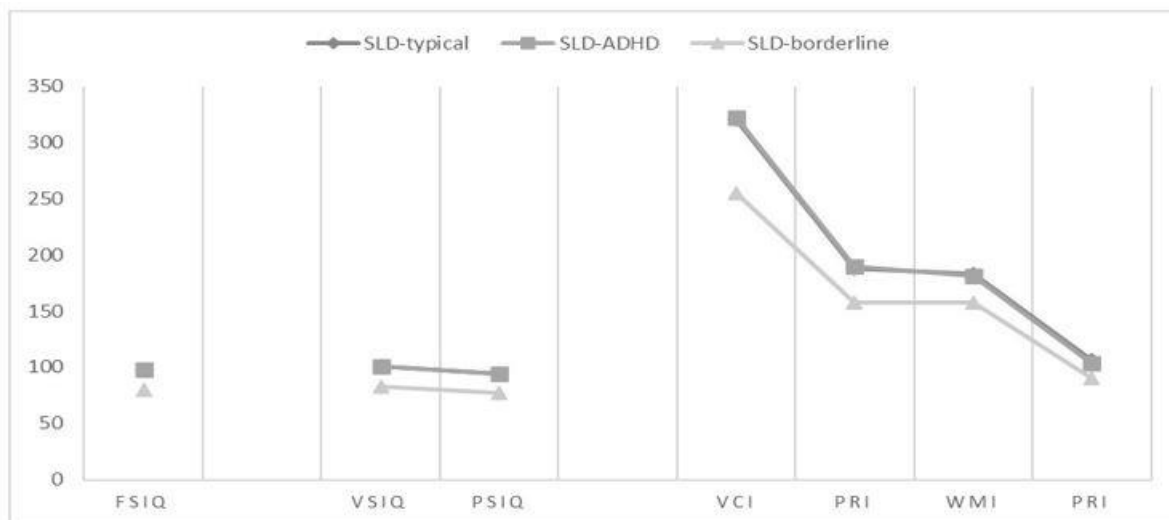
* Significant at 0.05 level ** Significant at 0.01 level

SLD-borderline IQ

As indicated in Figure 1- the cognitive profile of SLD- borderline group followed similar pattern like SLD-typical and SLD-ADHD groups, however, SLD-borderline group scored high on Coding ($M=90.51$) subtest followed by General comprehension ($M=87.67$) and Similarities ($M=85.33$) the lowest score was found to be on Object assembly ($M=65.76$). Their VSIQ was found to be higher ($M=82.57$) than the PSIQ ($M=77.12$), and the average full-scale IQ was found to be 79.78 (Table-3). With respect to cognitive domains their VCI ($M=255.10$) scores were observed to be higher than PRI and WMI ($M=157.33, 157.71$) respectively (Table-2).

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Figure-1 Performance of three groups on MISIC three main scales and four cognitive domains



Note. Full-Scale IQ (FSIQ), Verbal Scale IQ (VSIQ) Performance Scale IQ (PSIQ), Verbal Comprehension Index (VCI) Perceptual Reasoning Index (PRI) Working Memory Index (WMI) Processing Speed Index (PSI).

Table-4 shows the gender wise comparison of three groups on the MISIC three main scales and four cognitive domains. It is evident from the independent sample t-test results that among the SLD-typical group, significant difference between WMI mean scores was observed between boys and girls ($t(235) = 2.404, p < 0.05$) whereas girls PSI mean score was found to be higher than boys ($t(235) = -2.332, p < 0.05$). Among the SLD-ADHD group, significant difference between the mean scores of boys and girls was found for VSIQ ($t(75) = 2.642, p < 0.01$) and WMI ($t(75) = 2.733, p < 0.01$), girls scored low on both VSIQ and WMI. However, among the SLD-borderline group no significant difference was observed with respect to gender on MISIC.

Table-4 Gender wise comparison of three study groups on MISIC three main scales and four cognitive domains

Three main scales /Cognitive domains					
SLD-typical	Male		Female		t-value
	M	± SD	M	± SD	
VSIQ	101.26	10.0	99.88	8.74	1.017
PSIQ	94.4	9.01	93.59	8.06	.682
FSIQ	97.7	7.17	96.8	6.97	.945
VCI	320.95	41.22	319.86	36.43	.195
PRI	188.77	20.58	186.26	21.07	.858
WMI	185.03	18.15	179.05	16.28	2.404*
PSI	104.97	16.01	110.24	15.93	-2.332*
SLD-ADHD					
VSIQ	101.62	6.79	95.95	7.12	2.642**
PSIQ	94.30	8.91	93.40	6.05	.337
FSIQ	98.10	6.20	94.67	4.25	1.831
VCI	325.04	29.57	308.91	25.80	1.769
PRI	190.06	25.19	186.75	20.82	.429

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Three main scales /Cognitive domains					
SLD-typical	Male		Female		t-value
	M	± SD	M	± SD	
WMI	183.06	14.16	170.83	14.80	2.733**
PSI	103.29	14.31	107.92	18.74	-.981
SLD-Borderline					
VSIQ	82.54	7.73	82.63	5.63	-.035
PSIQ	76.65	5.60	78.07	8.50	-.627
FSIQ	79.68	4.22	79.99	2.83	-.240
VCI	253.84	28.80	257.61	28.78	-.385
PRI	156.34	16.99	159.30	25.33	-.434
WMI	158.50	15.19	156.15	12.05	.485
PSI	88.62	13.83	94.31	15.85	-1.154

* Significant at 0.05 level ** Significant at 0.01 level

Note. Full-scale IQ (FSIQ), Verbal Scale IQ (VSIQ) Performance Scale IQ (PSIQ), Verbal Comprehension Index (VCI) Perceptual Reasoning Index (PRI) Working Memory Index (WMI) Processing Speed Index (PSI).

DISCUSSION

This study explores the intellectual profile of children with SLD with and without ADHD on MISIC. It has been found from the present results that both SLD-typical and SLD-ADHD performed similarly on MISIC. Though significant difference was observed between the mean scores of SLD-typical and SLD-ADHD groups in comparison to SLD-borderline group, the cognitive profile of SLD-borderline was observed to be similar demonstrating better VSIQ compared to the PSIQ. This finding was supported by the study of Cornoldi et al (2014) where the verbal comprehension index was found to be higher than the processing speed index among children with SLD. However, in contrast the study by Kohli et al (2008) reveal different findings, where SLD group's PSIQ was found to be better than VSIQ and the discrepancy between the VSIQ and PSIQ was found to be only 1 point. In the present study, a 5-point discrepancy was observed between VSIQ-PSIQ among all the three groups.

The subtest profile indicated that SLD-typical and SLD-ADHD scored high on general comprehension and low on object assembly. However, the SLD-borderline scored high on coding subtest followed by general comprehension. However, all the three groups scored low on object assembly which assess the visual perceptual ability. It was corroborated with the study done by Gajre et al. (2015) which disclosed that poor visual perceptual aspects among children with SLD contribute to classroom challenges influencing the academic proficiency. Furthermore, no significant difference between the mean scores of SLD-typical and SLD-ADHD groups with respect to main scales and factor index scores was observed. In general, children with ADHD were found to be similar in some ways to cases of SLD (Giofrè & Cornoldi, 2015; Goker, Uneri, Guney, Dinc & Hekim-Bozkurt, 2014). Recent data has shown that there are common cognitive deficits between the two disorders (Margari et al, 2013; Willcutt et al, 2010). Similar research findings were reported in a 5-year study from India (Sing et al, 2017), where the VSIQ and PSIQ scores were found to be nearly similar for both SLD and SLD with ADHD groups. Subsequently, with respect to factor index SLD-ADHD and SLD-typical group factor index scores were found to be almost similar and their VCI and PRI were found to be better than the WMI. This finding of our study is supported by the study conducted by Sushmita Halder & Sushma Kotnala (2018), on the cognitive profile of children with ADHD in comparison to normal counterparts, this

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study revealed that children with ADHD scored high in VCI and PRI scores and low in PSI. In a similar study by Cortes et al., (2015) revealed that children with ADHD had obtained high VCI and PRI scores compared to WMI and PSI scores, which would confirm that VCI and PRI, was not affected in ADHD group and a plentiful body of research has shown that these two groups mostly have difficulty in processing speed index (PSI) and working memory index (WMI) (Mayes & Calhoun, 2006; Devena & Watkins, 2012; Swanson, 1993; Swanson & Ashbaker, 2000)

Our results might support these latter theories indicating that SLD-typical and SLD-ADHD have difficulties in PSI and WMI in comparison to VCI and PRI. Hence, these results further highlight that factor index profile provide significant information on cognitive strengths and weaknesses which might aid in the diagnosis of SLD.

Subsequently, SLD-typical and SLD-ADHD groups mean scores significantly differed from the SLD-borderline groups, but their cognitive profile pursued similar pattern. This finding was supported by the study of Cornoldi C et al. (2014) their study indicated that SLD-group both typical and SLD-borderline groups had high VCI and PRI scores than the WMI and PSI scores. Generally, children who score low on IQ tests are categorized as borderline but clinicians need to identify the cognitive markers, subtest profile along with informal assessment in order to rule out diagnosis of SLD, as only borderline diagnosis without considering the SLD features may hinder the children from utilizing the scholastic accommodations as well their intervention. Among the group of SLD with a borderline cognitive profile, it seems that children who obtain significant discrepancy between their VCI and PSI scores should first be considered for a diagnosis of SLD, whereas children with a FSIQ slightly above 70 and without discrepancies between these indexes should first be considered for a diagnosis of borderline intellectual functioning (Bremner, McTaggart, Saklofske & Janzen, 2011 as cited in Cornoldi et al., 2014), as this element may help clinicians in arriving at a diagnosis.

Gender wise comparison revealed that among the SLD-typical group, boys scored high on WMI whereas girls scored high on PSI. Among the SLD-ADHD group, boys scored high on VSIQ and WMI. No specific supporting research studies were found on gender differences on MISIC. However, future research should provide more evidence with respect to these issues for example focusing on SLD and ADHD subtypes, other associated conditions and gender wise differences to accumulate more knowledge on the effectiveness factor index profile to arrive at differential diagnosis.

Though using neuropsychological assessment was emphasized in the diagnosis of SLD and ADHD (Stefano, Bastianina, Mariella, Eva & Francesca, 2011) intellectual assessment still continues to play a significant role in the diagnosis of SLD as it is included in the initial evaluation process and IQ/ intelligence tests need to be made sensitive enough to identify and diagnose SLD and comorbid conditions as they are most frequently used procedures in the diagnosis.

Limitations

Though the sample size was large enough in the present study there were some limitations, firstly, the sample sizes among the three groups were not matched, future studies with matched sample size might provide more substantial information as well as further insights. Secondly, gender wise matching among the three groups is missing future studies with

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matched gender might provide more knowledge regarding the gender wise cognitive differences. As the study results revealed similar cognitive profile pattern among the three study groups with variations in few subtests, considering the sub types of SLD like dyslexia, dysgraphia and dyscalculia along with ADHD sub categories may provide supplementary details regarding the specific cognitive differences. Despite of these limitations, our study adds on knowledge towards the Intellectual functioning of SLD and comorbid conditions on MISIC.

Recommendations and Implications

Generally, the VSIQ-PSIQ discrepancy is regarded as one of the bench marks in diagnosing SLD, but with our study we emphasize on understanding discrepancy between the four indexes for diagnosing SLD and comorbid conditions. Furthermore, profuse research studies emphasize that cognitive domains reveal significant information about the cognitive strengths and weakness of SLD and our findings are also similar to the previous research findings. Further research studies with large sample size including various socio-demographic data of SLD with subtypes might provide more substantial information on the sensitivity of cognitive domains in diagnosing SLD and comorbid conditions using MISIC. Besides, future research with sophisticated study design should be conducted to determine if the differences in academic achievement could be attributed to these differences in cognitive processing.

CONCLUSION

In the present study, we tried to investigate the Intellectual profile of children with SLD typical, SLD-ADHD and SLD-borderline groups on MISIC. The ANOVA results indicated all the three groups had similar cognitive pattern on MISIC, as all the three groups scored high on VSIQ than PSIQ. SLD-typical and SLD- ADHD groups scored better on verbal comprehension index (VCI) and perceptual reasoning index (PRI) than working memory index (WMI). This study extends our understanding of intellectual profile of children with SLD-typical having comorbid conditions. The different findings of this study will promote further investigations which will describe more clearly the cognitive difference between SLD and comorbid conditions, in order to make differential diagnosis and improve specific interventions.

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Conflict of Interest

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