

## Impulsivity in students with specific learning disabilities

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### ABSTRACT

**Background:** It has often asked whether impulsivity is a stable response style of students with specific learning disabilities. There is no straightforward emphatic answer to this question. The available literature on the theme is fraught with issues related to the definition of the terms impulsivity as well as learning disabilities. **Method:** Notwithstanding all this, this study uses a cross-sectional one-shot exploratory survey design to profile the nature, degree and extent in the presence and patterns of impulsivity by adopting a self-cum-significant other report technique for 134 respondents identified as having academic delays and specific learning disabilities to answer a simple abridged and adapted version of 25-item Barratt Impulsiveness Scale along a four-point Likert scale. **Results:** The overall impulsivity score is more than the assumed and expected mean values for children on the scale. Further, domain analysis on 1st and 2nd order factors on the scale show significantly different trends for major domains of attention, motor, and non-planning ( $p < 0.001$ ) with no such differences for sub-domains of non-planning in self-control and cognitive complexity ( $p > 0.05$ ). There appears to be no influence of the studied demographic variables like age, gender, school curriculum, and grades in the impulsivity scores of these children. Item analysis shows that these students are affected by 'extraneous thoughts,' 'get easily bored when solving thought problems,' 'do not like to think about complex problems,' and, so on. The implications of the study for developing impulsivity reduction strategies and its limitations are presented.

**Keywords:** Children with learning disability, impulsivity, attention, self-control, executive functions

Most children have times when they act as a whim without really thinking. When they behave so, they are dubbed careless, mean, or rude. When they are impulsive, they have trouble following rules consistently, cannot wait for their turn, and might end becoming aggressive toward others. They may grab things from others, or intrude during games and conversation, overreact to disappointment, criticism, and frustration. They always want to have the last word and first turn. They do not understand how their words or actions affect others or what could be the consequences of their actions. Impulsivity can occur due to

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Received: September 22, 2019; Revision Received: October 22, 2019; Accepted: December 25, 2019

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immaturity, stress, frustration, fatigue, or lack of sleep. In short, impulsivity is summarized to be characterized by traits like urgency, sensation seeking, and low consciousness (Forgan & Richey, 2015; Webster & Jackson, 1997).

There can be motor impulsivity, attention impulsivity, and impulsivity owing to lack of planning called cognitive impulsivity. Impulsivity, impulsiveness, or impulsive behavior is deemed to be characteristic of children with learning disabilities. It is a flawed observation, according to some owing to inconsistencies in methodology resulting in interpretative distortions (Walker, 1985). It is further assumed to aggravate by mediating factors like parenting stress and their sense of competence (Barahmand, Piri, & Khazaei, 2015). Impulse control difficulties can also be part of other conditions like intellectual disability, conduct disorder, opposition defiant disorder, antisocial and borderline personality, substance abuse, eating disorders, and others (Coles, 1997).

Is impulsivity is a stable response style of only students with Specific Learning Disabilities (SLD) or whether the condition itself is an overlapping part of the spectrum disorders, which includes ADHD (Mavas, Calhoun & Crowell, 2000)? Some authors have viewed impulsivity as part of executive functions that are commonly affected as a neuropsychological function both in students with SLD as well as those with ADD/ADHD (Seidman et al., 2006; 2001). others have viewed it as a heritable trait (Willcutt, Pennington & Defries, 2000)

It is important to distinguish SLD from ADD/ADHD. Children diagnosed as SLD may have attention problems when involved in the three Rs. Surprisingly, if the same child can engage for hours on activities like gadget enabled gaming, watching television, or in sports, play, art, dance, drama, or other project and practical work, one must suspect whether s/he is indeed one with SLD. Moreover, the term 'learning disability' is used in Europe, and American continents are entirely different from what is a half-baked concept of the same in India (Venkatesan, 2017a; 2017b; 2016; 2011). Although it is not the aim or within the purview of this article to get into the details of these distinctions, it is noted that the absence of clarity on this issue has led to several flawed, over-inclusive, and overlapping diagnosis of these children (Turan, Bakar, Erden, & Karakas, 2016).

Several instruments are available to measure impulsivity. Experimental animal models use a delay of reward, differential reinforcement of low rate of responding, and auto-shaping procedures to measure impulsivity. Some common paper-pencil tools used to measure impulsiveness in humans are the matching familiar figures test, the Porteus maze, and self-report questionnaires. Some have focussed on child-clinical populations. Others have targeted adults. Some tools, such as the Zuckerman-Kuhlan Personality Questionnaire III have a subscale to measure impulsivity. The Porteus Maze, although a non-verbal measure of intelligence, has been later used to measure cognitive impulsivity due to its emphasis on rule compliance during test administration. The Dickman Impulsivity Inventory (DII; Claes, Vertommen & Braspenning, 2000) is a self-report measure that distinguishes two types of impulsivity: (a) Dysfunctional impulsivity is the tendency to act with less forethought than most people of equal ability when this tendency is a source of difficulty; (b) Functional impulsivity, in contrast, is the tendency to act with relatively little forethought when such a style is optimal.

The Barratt Impulsiveness Scale (BIS; Barrat, 1959; Patton, Stanford & Barrat, 1995) is a gold-standard measure. It has been influential in shaping current theories of impulse control while studying its biological, psychological, and behavioral correlates. It is developed based

on item response theory. Although the BIS measures three domains of impulsivity (attention, motor, and non-planning), these domains are not yet empirically validated. A uni-dimensional model giving an overall impulsivity score, a six-first order factor model, a three-second order factor model, and a bi-factor model have all been questioned (Reise et al. 2013). One of the main methodological problems with the study of impulsivity is the lack of control for potentially confounding variables such as age, IQ, socio-economical status, and gender.

### REVIEW OF LITERATURE

In an attempt to identify impulsivity behavior in children with SLD in inclusion settings, from the perspective of their resource from teachers, their main problem was found to be related to lack of premeditation, followed by lack of perseverance, and urgency (Al-Dababneh & Al-Zboon, 2018). Children with SLD are faster than the control group in response time thereby clearly showing higher cognitive impulsivity (Donfrancesco, Mugnaini, & Dell'Uomo, 2005). There is more evidence to assume task-specific impulsivity in these children than a constant behavior pattern of impulsivity in these children (Harrison & Romanczyk, 1991). Others have posited their impulsivity as 'field-dependent' (Keogin & McG Donion, 1972). Impulsivity has been linked to intelligence as moderator variable to academic failure by an inverse relationship (Vigil-Colet & Morales-Vives, 2005).

Children, unlike adults, are on a dynamic developmental trajectory. All their cognitive process, including attention, impulsivity, waiting, turn-taking, self-control, planning, procrastination, and perseverance, are in persistent change. It is difficult to say whether an inability to sustain attention at age five can be deemed as predictive of attention problems few years later, or during their adolescent and adulthood (Martin, Razza, & Brooks-Gunn, 2013). Impulsivity research extensively relies on self-report trait-based rating measures which have their limitations when used in child clinical populations (Pai, Vella, & Dawes, 2018). Under these circumstances, it would be pertinent to ask: What could be the impulsivity profile of children with SLD? If present, is impulsivity an inherent trait of these children? Are there any sub-types of impulsivity that is characteristic of these children?

It was the aim of this study to ascertain the nature, degree, and extent of the profile in the presence and patterns of impulsivity in children identified as having a specific learning disability. This study uses a cross-sectional one-shot exploratory survey design on a sample of 134 such affected children.

The term Specific Learning Disability as used in this study refers to the clinical population of children assessed on standard psychometric devices as having average or above-average levels of intelligence and adaptive behavior, without any apparent sensory deficit, cultural, economic, or educational deprivation, emotional insult, missed schooling, abrupt waning of educational supports, poor teaching, study or examination taking habits, and/or the meddling presence of troublesome peer group. Such students perform poorly on individually administered achievement tests in reading, spelling, mathematics, and writing. For example, a 10-year old with matching mental age and expected school level performance of 5<sup>th</sup> grade in Indian conditions may show academic level of 1<sup>st</sup> grade. This condition or discrepancy is not due to transient or chronic health problems, brain damage, lack of opportunities, for a first-generation learner, or any other similar factors mentioned above (Venkatesan & Vasudha, 2014; Venkatesan & Holla, 2011; Venkatesan, 2011).

The term 'learning disability' is different and distinct from related often confusing terms like 'academic delay,' 'slow learner,' 'academic underachievement,' 'scholastic problem,'

‘intellectual disability,’ and ‘mental retardation.’ Children are labeled differently in the United States (as ‘Specific Learning Disorder’ or formerly as ‘Academic Skills Disorder’ (DSM-5; APA, 2013). In British countries and India, including this study, the ICD-10 diagnosis codes are officially used to designate a variety of these conditions under ‘Specific Delays in Development’ (World Health Organization, 2008) including a somewhat equivalent nomenclature called as ‘Developmental Disorder of Scholastic Skills.’

### ***Tools***

The Barratt Impulsiveness Scale is a self-report measure based on a 3-factor model that includes attention, motor, and cognitive impulsivity. The BIS comprises 30 items measuring the following 3 scales: (a) attentional impulsiveness defined as a tendency towards quick reactions and lack of attention and cognitive control; (b) motor impulsiveness measuring behavioural spontaneity such as buying things spontaneously, and (c) non-planning impulsiveness describing a lack of action planning on the level of a general attitude towards life, such as a low interest in one’s future. Table 1 gives the exact distribution of test items on the scale.

***Table 1: Distribution of Items and Factors on BIS-11***

<b>Barratt Impulsiveness Scale 11 – Factor Structure and Scoring</b>			
<b>2nd Order Factors</b>	<b>1st Order Factors</b>	<b># of items</b>	<b>Items contributing to each subscale</b>
Attentional	Attention	5	5, 9*, 11, 20*, 28
	Cognitive Instability	3	6, 24, 26
Motor	Motor	7	2, 3, 4, 17, 19, 22, 25
	Perseverance	4	16, 21, 23, 30*
Nonplanning	Self-Control	6	1*, 7*, 8*, 12*, 13*, 14
	Cognitive Complexity	5	10*, 15*, 18, 27, 29*
			*reverse scored items

Items are answered on a 4-point scale from 1 (rarely/never) to 4 (nearly always/always). The BIS shows high internal consistency (between 0.79 and 0.83 in different groups), high retest reliability ( $r_{TT} = 0.89$ ) and high construct validity as shown by the relationships to impulsive behaviors such as drug use, drunk driving, and binge eating. The translated Hindi version of BIS-11A has been developed and reportedly used to study impulsivity in rural and urban Indian adolescents (Singh, Solanki & Bhatnagar, 2008). The scale has been used in the Indian conditions to study internet addiction and impulsivity among adolescents (Chandiramani, 2014), suicidal ideation, hopelessness and impulsivity in elderly (Trivedi et al., 2014), college students (Rajesh Ilavarasu & Srinivasan, 2013).

There are no available impulsivity assessment tools and norms on the BIS-10 exclusively for children. An available ‘Impulsivity Scale for Children’ (ISC; Tsukayama, Duckworth & Kim, 2013) gives an overall mean score of 2.46 (SD: 0.90) on a range from 1-5 as ‘average.’ This scale distinguished between ‘schoolwork impulsivity score’ and ‘interpersonal impulsivity score.’ A related study attempting to investigate the reliability and validity of a Chinese

version of BIS-10 as assessed by parents for and on behalf of their children found that the scores were 'ideal and consistent' as per 'psychometric requirements' (Fei Li, Lin-Yan Su, & Yao-Gao Geng, 2015). Likewise, a modified version of this tool adapted for children across cultures found that the factor structures of the test remained stable across countries (Chahin, Cosi, Lorenz-Seva, & Vigil-Colet, 2010).

In this investigation, an abridged 25-item tool of the original 30-item tool was used by deleting statements (#10, 13, 16, 21, and 25) which were irrelevant for school-aged children. The deleted items covered details on job, savings, business, or adult living. The maximum score possible for an individual respondent on this tool is  $25 \times 4 = 100$ . There are no available norms on the BIS-10 for children. In the absence of impulsivity scales developed or standardized exclusively for children, and since no matched healthy controls were recruited, a theoretical mean norm of 50 is assumed in this study. Based on the derived overall SD values in this study, for 'Average Range at  $\pm 1$  SD' was calculated as 41-60, for 'Above Average Range' at  $+2$  to  $+3$  SD is 61-69 and for 'Below Average Range' at  $-2$  to  $-3$  SD is taken as 31-60 respectively.

### **Procedure**

The BIS-11 was administered individually on students identified as 'Specific Learning Disability' falling in the delineated inclusion and exclusion criteria. Testing was carried out in milieu, which was amicable, non-threatening, reassuring, and free from disturbances or distraction. The room had adequate lighting, furniture, temperature, and comfortable seating arrangements. Pre-testing preparations typically covered empathetic listening, rapport building, orienting the respondent on the purpose of the study, and explanations on what is in store during the test sessions. Any or all confrontationist attitude or questioning was avoided. The implication was conveyed that they were not actually 'tested' for fitness, competence, intelligence, or otherwise. It was clarified that the exercise was not being undertaken as an agent or on behalf of any agency or authorities. There was no time limit for answering the tool. They had to put up their best performance based on what they felt, thought or perceived on the items given in the tools. There were no 'right' or 'wrong' answers. They were then coded and tabulated in excel spreadsheets before attempting appropriate statistical treatments and analysis on SPSS/PC (Pallant, 2013). Ethical concerns were given due considerations as enshrined in the research practices of the investigating agency (Venkatesan, 2009).

## **RESULTS**

On the whole, for the overall sample (N: 134), the mean Impulsivity Score obtained is 63.44 (SD: 9.52). If the assumed mean for this abridged and modified 25-item four-point Likert scale is 50, this value is way above  $+2$  SD in the 'Above Average' range (Table 2). Analysis of BIS-11 scores in terms of its triumvirate 2<sup>nd</sup> order factorial domains show statistically significant high scores ( $p < 0.0001$ ) for 'non-planning' type of impulsivity (Mean: 22.34; SD: 4.11; Rank #1) than in 'attention' (Mean: 20.76; SD: 3.61; Rank #2) and 'motor impulsivity' (Mean: 20.34; SD: 4.02; Rank #3).

Analysis of BIS-11 scores in terms of its three independent pairs of 1<sup>st</sup> order factorial domains (Table 3) show statistically differences in mean scores ( $p < 0.0001$ ) only for 'attention-cognitive instability' and 'motor-perseverance' types of impulsivity but not for the 'self control-cognitive complexity' dyad of impulsivity ( $p > 0.05$ ). However, on the whole,

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**Table 2: Distribution of Scores for 2<sup>nd</sup> Order Factors on BIS-11 for Students with Specific Learning Disabilities**

	Domains	No. of Items	Max. Score	Mean	SD	%	Ranks
I	Attention	8	32	20.76	3.61	64.88	2
II	Motor	8	32	20.34	4.02	63.56	3
III	Non-planning	9	36	22.34	4.11	62.06	1
	Total	25	100	63.44	9.52		

[F (2,399) = 9.701; p: <0.0001][Norm based on Assumed Mean is 50; Average Range for -/+1 SD is 41-60; Above Average Range for +2 to +3 SD is 61-69; Below Average Range for -2 to -3 SD is 31-60]

across all the six sub-domains of the 1<sup>st</sup> order factors, as in 2<sup>nd</sup> order factorial domains, this sample of students with SLD show a significant difference (p: <0.001).

**Table 3: Distribution of Scores for 1<sup>st</sup> Order Factors on BIS-11 for Students with Specific Learning Disabilities**

	Domains	No. of Items	Max. Score	Mean	SD	%	Ranks	Probability
IA	Attention	5	20	13.09	2.48	65.45	2	t: 19.191; df: 266; p: 0.0001;
IB	Cognitive Instability	3	12	7.67	2.13	63.93	4	
IIA	Motor	6	24	15.13	3.45	63.06	5	t: 29.921; df: 266; p: 0.0001;
IIB	Perseverance	2	8	5.20	1.69	65.02	3	
IIIA	Self-Control	5	20	11.34	2.99	56.68	6	t: 1.013; df: 266; p: >0.05;
IIIB	Cognitive Complexity	4	16	11.01	2.30	68.80	1	
	Total	25	100	63.44	9.52			

[F (5,798) = 264.153; p: <0.0001]

The distribution of overall mean scores on BIS-11 for students with SLD shows that almost half of the sample (N: 66; 49.25%) fall under the 61-70 score range and an additional 15% of the sample scored is above 71 out of the maximum possible score of 100 for each respondent on this tool (Table 4). It implies that a majority of this sample is high on impulsivity score above the assumed mean of 50.

**Table 4: Distribution of Overall Mean Scores on BIS-11 for Students with Specific Learning Disabilities**

Score Range	Frequency	%
<=50	13	9.70
51-60	31	23.13
61-70	66	49.25
71-80	20	14.93
81-90	4	2.99
Total	134	100.00

As shown in table 5, the next level of analysis undertaken on the distribution of overall mean scores against various socio-demographic variables, such as age, gender, grade and curriculum of study of the participants included in this investigation did not reveal any significant differences (p: >0.05).

**Table 5: Distribution of Overall Scores on BIS-11 Based on Demographic Variables for Students with Specific Learning Disabilities**

Variable	N	Mean	SD	Probability
Overall	134	63.44	9.52	
Age				
7-9	20	63.55	7.72	F(2,131)=0.004; p: >0.05
10-12	32	63.31	7.98	
13/+	82	63.46	10.51	
Gender				
Boys	92	63.15	8.92	t: 0.515; df: 132; p: >0.05;
Girls	42	64.07	10.81	
Grade				
Primary	19	63.32	7.80	F(2,131)=0.044; p: >0.05
Secondary	32	63.88	7.41	
High	83	63.30	10.62	
Curriculum				
CBSE	48	61.19	9.01	F(2,131)=2.163; p: >0.05
State	66	64.85	9.92	
Others	20	64.20	8.80	

An item-analysis of some of the top-scoring few statements and the least scored statement on the BIS-11 (Table 6) shows that the students with SLD are affected by ‘extraneous thoughts,’ ‘get easily bored when solving thought problems,’ ‘do not like to think about complex problems,’ ‘do not plan things carefully,’ ‘do things without thinking,’ and so on. Contrast all these self-assessments or self-observations with a belief that they are ‘a careful thinker.’ This implies that these children avoid or fail in tasks requiring careful thinking or require overcoming challenges.

**Table 6: Item-wise Distribution of Scores on BIS-11 for Students with Specific Learning Disabilities**

Item Number	Statement	Mean Score	Rank
22	I often have extraneous thoughts when thinking	2.86	1
15	I get easily bored when solving thought problems	2.85	2
13*	I like to think about complex problems	2.84	3
1*	I plan things carefully	2.80	4
2	I do things without thinking	2.77	5
9*	I concentrate easily	2.76	6
3	I make up my mind quickly	2.75	7
5	I don't pay attention	2.75	7
11*	I am a careful thinker	1.56	25

[\*reverse scored items][Scores: 1-Rarely/Never; 2-Occasionally; 3-Often; 4-Almost Always]

## DISCUSSION

Many studies on cognitive impulsivity in children with SLD are criticized for their methodological limitations. The operational definition of what constitutes the clinical population of students with learning disabilities is itself a controversial and unsettled issue (Venkatesan, 2017a; 2017b; 2016; 2011). In spite of this, this inquiry attempts to use a cross-sectional one-shot exploratory survey design on a sample of 134 such affected children to

ascertain the nature, degree, and extent of the profile in the presence and patterns of their impulsivity.

Available studies on this theme state that these children show more than the average share of impulsivity in all the three assessed domains: cognitive, motor, and affective respectively. It would still be a question to determine whether the impulsivity is the cause or consequence of their condition. Non-planning type of impulsivity which includes self-control and cognitive complexity are reportedly affected more than attention impulsivity and motor impulsivity. Within these three-component conceptualizations, cognitive impulsiveness involves making quick decisions, motor impulsiveness involves acting without thinking, and non-planning impulsiveness involved lack of 'futuring' or forethought. Non-planning impulsivity, not behavior impulsivity, for instance, has been reported to be characteristic of clinical conditions like binge eating, HIV, adolescent alcohol use, problematic internet users, or others requiring long-term drug compliance (Dunne, Cook & Ennis, 2018).

For socio-demographic variables, no significant differences are seen in this study. Gender differences were found for greater attentive and motor impulsivity scores for girls than boys with ADD/ADHD (Gokce et al., 2017). In another study, based on parent reports, no significant gender differences were found as a temperamental trait (Olino et al. 2014). Admittedly, researchers must be cautious about biases in parental assessment of their children's emotionality and impulsivity (Kitamura et al. 2015). In a prospective longitudinal investigation, mother-child interactions were examined as a predictor of children's capabilities to delay gratification and for self-control (Olson Bates, & Bayles, 1990). Age of the child is often implicated for their impulsivity. Younger children are assumed to be more impulsive than their older peers. This observation has been towed to the age-dependent spontaneous or natural decline if symptoms seen in ADHD (Biederman, Mick, & Faraone, 2000).

## CONCLUSION

A larger sample size of children with SLD with less heterogeneity for age and grade as well as the use of a more child-specific content in the abridged and adapted measuring instrument could be attempted. Further, a research design incorporating matched healthy control group of unaffected children could have given further power or strength to this study. Nonetheless, this study shows the need for developing impulsivity reduction strategies in school children with SLD. Working on building skills to overcome impulsivity in children can be attempted through modelling associated with or without self-verbalization, video-feedback, developing their awareness of the condition, suggesting alternate behaviours, increasing self-control, coping skills, and responding to their frustrations. They can be taught techniques to take a deep breath, delay gratification, exercise, awaiting for their turn, praising patience, clearly laying out expectations, activity scheduling of the child's down-time or unstructured time, taking about the differences between impulsive and non-impulsive behaviours. There are useful works that have exclusively targeted on listing activities that help impulsive children (Garber, 2010; Berger & Berger, 2003).

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### **Acknowledgements**

The authors seek to thank the Director, All India Institute of Speech and Hearing, under Ministry of Health & Family Welfare, Government of India, located at Manasagangotri, Mysore: 570 006, Karnataka, India, for the encouragement and permission to complete this work. The participants in this study also deserve appreciation for their cooperation that has enabled completion of this study.

### **Conflict of Interest**

The author declared no conflict of interests.

**How to cite this article:** S. Venkatesan & L. Lokesh (2019). Impulsivity in students with specific learning disabilities. *International Journal of Indian Psychology*, 7(4), 37-47. DIP:18.01.005/20190704, DOI:10.25215/0704.005