Autistic Learning & Behavioural Difficulties Inventory: Validation of the Screening Instrument

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Abstract: *The triad of impairments in communication, social interaction, and imagination is often used in autism screening tools. In this paper, the authors have proposed an alternative by examining autistic learning and behavioural challenges in cognitive, conative, affective and sensory processes. The alternative pinpoints the specific needs and strengths for informing decisions on selecting appropriate autism treatment strategies to follow up. They trialled the use of the Autistic Learning and Behavioural Difficulties Inventory (ALBDI) on 53 participants and validated it on the Gilliam Autism Rating Scale-Second Edition (GARS-2). Findings of their study suggested that ALBDI is a useful measure where its total autistic learning and behavioural difficulties scores correlated significantly with the GARS-2 total standard scores of its subtests and its Autism Index with Pearson correlation coefficients r = .800 (p<.01) and r = .801 (p<.01) respectively. ALBDI is included in the Appendix.*

Keywords: *Autism, Behavioural Difficulties, Learning Difficulties. Screening, Validation*

I. Introduction

Over the past decades, the diagnostic criteria used for Autism Spectrum Disorder (ASD) have been changing. The Diagnostic and Statistical Manual of Mental Disorders (DSM) published by the American Psychiatric Association (APA) provides a good starting point for all to understand what ASD is. Table 1 shows some changes in the DSM diagnostic criteria for ASD over a period of time from 1980 to 2013 with the publication of the fifth edition of DSM.

Table 1. Changes in the DSM diagnostic criteria for ASD 1980-2013

DSM-III (1980)	DSM-III-R (1987)	DSM-IV (1994) DSM-IV-TR (2000)	DSM-V (2013)
Onset before 30 months	Onset before 36 months	Delays or abnormal functioning in one area (social interaction, language or play) before 36 months	Symptoms in early developmental period (may not manifest until social demands exceed limited capacities)
Gross deficits in language development	Qualitative impairment in both verbal and nonverbal communication	Qualitative impairment in communication	Persistent deficits in social communication and social interaction.
Pervasive lack of responsiveness to others	Qualitative impairment in reciprocal social interaction	Qualitative impairment in social interaction	Deficits in social-emotional reciprocity and social relationships

Hyper- or hypo-sensitivity to sensory stimuli was included in DSM-III but was omitted in DSM-IV and DSM-IV-TR. Now, it has been included again in DSM-V.

ASD is such a complex developmental disability that typically appears during the first three years of life. It is best defined "by a certain set of behaviours and is a spectrum disorder that affects individuals differently and to varying degrees" (Autism Society of America, 2011:para.1). There is still no definite biological marker for ASD. As a result, a diagnosis of ASD has to be made on the basis of a behavioural profile using screening tests such as the Checklist for Autism in Toddlers, the Early Screening for Autistic Traits, the Gilliam Autism Rating Scale, the Childhood Autism Rating Scale and the Autism Diagnostic Interview-Revised. Other important tests that need to be done in addition to these autism screening tests include the IQ tests (e.g., Wechsler Intelligence Scale for Children), the Sensory Profile and the Vineland Adaptive Behaviour Scales.

The primary aim of this study is to validate one autism screening test, i.e., the Autistic Learning and Behavioural Difficulties Inventory (ALBDI) (Chia, Kee, & Shaifudin, 2010), which is currently used by allied educators supporting children with ASD in mainstream schools and special education teachers in special schools

in Singapore, as a valid and reliable tool to identify children with high probability of ASD. The tool also reveals the autistic learning and behavioural difficulties (in terms of challenges in cognition[1], conation[2], affect[3] and sensation[4]) so that appropriate treatment plans can be designed and implemented to manage these problems. To address this concern, we have chosen the Gilliam Autism Rating Scale-Second Edition (GARS-2) (Gilliams, 2006) as a validated screening measure to compare the ALBDS scores with the scores of its three subscales, i.e., Stereotyped Behaviours, Communication and Social Interaction as well as its Autism Index.

II.   The Study

This study used the correlational design. The results from ALBDI were compared with the results of GARS-2 for determination of the degree of correlation. It is assumed that high correlation would implicate validity of ALBDI.

2.1 Participating Subjects

Through a series of autism workshops organized by the Pioneer Family Life Champion and held at The Frontier Community Centre in 2010, we were able to recruit participating parents, whose children have been identified as having ASD by psychologists and/or therapists. At the time of the study, their children were currently undergoing various autism treatment programs at various public and private autism clinics or early intervention centres run by voluntary welfare organizations such as the Autism Association Singapore and the Autism Resource Centre.

We used convenience sampling in this study for two reasons: Firstly, it allowed us to select subjects, who were readily available and also be willing to participate in the study (Creswell, 2012); and secondly, it allowed us to proceed with the study in the shortest possible time.

We were able to recruit 67 participants to take part in the study, but in the end, our group size went down to 53 parents with children between the ages of 8 and 15 years old. This was because only 53 out of 67 parents duly completed the forms given to them in our study. We acknowledge that our sample group might not be representative of the entire population with ASD in Singapore.

2.2 Procedure

The 53 participating parents were required to complete the 42-item form from GARS-2 and the 80-item form from ALBDI. Our email addresses were given to parents if they wished to know the results of the two autism screening tests.

2.3 Instrumentation

We chose to administer GARS-2 in this study as it has been validated, normed and is also widely used as a screening tool for ASD in Singapore.

1.3.1.1   Gilliam Autism Rating Scale-Second Edition (GARS-2):

This is a norm-referenced instrument with three subscales: Stereotyped Behaviours (SB), Communication (Comm), and Social Interaction (SI). The sum of the standard scores of the three subscales is then used to determine the Autism Index (AI), which indicates the probability level of autism. Teachers, clinicians and parents can use GARS-2 to identify ASD in individuals aged 3 through 22 and in estimating the severity of the disorder. Using objective, frequency-based ratings, the GARS-2 can be individually administered in 5 to 10 minutes.

The GARS-2 was normed on a representative sample of 1,107 individuals with ASD from 48 states within the USA. Gender was divided to 81% male and 19% female following the trend that autism is more prominently identified in males. The sample by age is unevenly distributed with ages 3 to 8 comprising 54% of the total sample. The content of the GARS-2 also reflects a number of behavioural characteristics that apply to individuals with ASD and may help guide the user in understanding the autistic triad of impairments (Wilkinson, 2011).

GARS-2 has strong psychometric characteristics that were confirmed through studies of the test's reliability and validity. Coefficients of reliability (internal consistency and test-retest) for the three subscales and

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[1] *Cognition:* This component is the act of apprehending or ability to grasp or lay hold of mentally. It also refers to consciously held belief or opinion.

[2] *Conation:* This component is that faculty of desiring or willing. It also refers to the disposition of action.

[3] *Affect:* This component refers to emotional tone or feeling.

[4] *Sensation:* This component consists of interoceptive senses (i.e., vestibular and proprioceptive senses) and exteroceptive senses (i.e., visual, auditory, haptic, olfactory and gustatory senses) and through sensory processing, helps to link up cognition, conation and affect with each other.

entire test are all large to very large in magnitude (Gilliam, 2006). For instance, the three subscales (i.e., SB, Comm and SI) have shown adequate internal consistency, as did the total score, with estimates ranging from .84 to .94. Gilliam (2006) reported acceptable test-retest stability in the GARS-2 manual, but it was based on an extremely small study (n=37 individuals) over only a 1-week interval. However, the AI is considered the most valuable and reliable score available on the screening tool in identifying individuals with ASD, and best used with another measure as part of a comprehensive evaluation system. More information that addresses various forms of validity, including content-, criterion-, and construct-forms, can be found in the GARS-2 manual.

We decided to use the GARS-2 as the validated autism screening tool to compare the ALBDI scores with its subscale scores and its AI because the measure is still widely used in Singapore besides the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1993).

1.3.1.2 Autistic Learning and Behavioural Difficulties Inventory (ALBDI):

Chia, Kee, and Shaifudin (2010) developed this screening instrument that most allied educators, special education teachers and therapists in Singapore are currently using to identify learning and behavioural challenges in terms of cognitive, conative, affective and sensory difficulties which children with ASD manifest as well as to determine the probability of a child having ASD. Content validity was established through checking with three faculty staff familiar with ASD.

The screening tool is divided into four subscales: Cognitive Learning and Behavioural Difficulties (CogLBD), Conative Learning and Behavioural Difficulties (ConLBD), Affective Learning and Behavioural Difficulties (AffLBD), and Sensory Learning and Behavioural Difficulties (SenLBD). Each subscale consists of 20 items with a score of 1 per item observed to be present. There is a total of 80 items from all four subscales put together in the measure (see Appendix). The sum of the four subscales – also termed as the Total Learning and Behavioural Difficulties (Total LBD) score – is used to determine the probability level of ASD.

III.   Results

Data analysis was conducted in two distinct steps in the current study. Firstly, an inter-correlational matrix of components of GARS-2 and ALBDI was computed. Secondly, reliability of both GARS-2 and ALBDI was calculated using Cronbach alpha α (Cronbach, 1951) and the Intra-class Correlation Coefficient (ICC) for Average measures.

Table 1. Inter-correlations for GARS-2 and ALBDI

	1	2	3	4	5	6	7	8	9
1. SB (GARS-2)	--								
2. Comm (GARS-2)	.642**	--							
3. SI (GARS-2)	.737**	.658**							
4. AI (GARS-2)	.907**	.875**	.871**	--					
5. CogLBD	.469**	.739**	.582**	.671**	--				
6. ConLBD	.771**	.558**	.695**	.760**	.395**	--			
7. AffLBD	.409**	.383**	.536**	.487**	.384**	.371**	--		
8. SenLBD	.418**	.498**	.509**	.531**	.720**	.383**	.305*	--	
9. TotalLBD	.676**	.712**	.758**	.801**	.830**	.703**	.637**	.840**	--

* *p* < .05.
** *p* < .01.

3.1 Correlational Analysis

Table 1 provides a summary of the correlations between the scores of GARS-2 (i.e., SB, Comm, SI and AI) with the ALBDI (i.e., CogLBD, ConLBD, AffLBD, and Total LBD).

Creswell (2012) provided the interpretation of correlation coefficients whereby a range of r values between .35 and .65 provides limited prediction, whilst r values of between .66 to .85 give a good prediction. Table 1 reveals that ALBDI total score has significant and good correlation with GARS-2 Autism Index (r = .80, p < .01). In practice, it implies that ALBDI can similarly be used like GARS-2 as there is good prediction between the tools.

The ALBSI subscales of CogLBD (r =.830, p < .01), ConLBD (r = .703, p < .01) and SenLBD (r = .840, p < .01) have been found to be significant good predictors of ALBDI total. However, AffLBD (r = .637, p <.01) has limited prediction of TotalLBD. When the ALBDI subscales are correlated with GARS-2 Autism Index(AI), CogLBD (r =.671, p < .01) and ConLBD (r = .760, p < .01) have been found to be significant good

predictors of AI. However, both SenLBD (r = .531, p < .01) and AffLBD (r = .487, p <.01) have limited prediction of AI.

3.2 Reliability Analysis

The Cronbach's Alpha α for ALBDI is .80 (n = 53). Kinnear and Gray (2010:439) suggested that "it is generally accepted that the reliability of a test r should be at least .80 for the test to be useful." Thus, ALBDI has a good enough reliability to be useful.

The Intra-class Correlation Coefficient (ICC) for Average Measures has the value of .834 (p < .01) for GARS-2 (df = 52) and ALBDI (df = 52). This means that both tools when used produce consistent similar results identifying autism quantitatively. However, interpretation of the quantities can be different as the probability levels of ASD are arbitrarily decided.

IV.   Discussion

As mentioned earlier, this study aimed to determine if the ALBDI is a valid and reliable screening tool to identify children with high probability of ASD. According to the study, the results suggest that both screening measures are similarly useful in determining children with ASD. However, they differ in the items used in their respective subscales in identifying autistic traits. GARS-2 uses the triad of impairments in screening for ASD. The ALBDI uses the learning and behavioural difficulties, in terms of deficits in cognition, conation, affect and sensation.

The results of this study also show there are good correlations between the CogLBD subscale and the Comm subscale (r = .739, p < .01), and also between the ConLBD subscale and the SB subscale (r = .771, p < .01). These findings suggest that the cognitive and conative learning and behavioural difficulties are somewhat measured by communication and stereotyped behaviour subscales of the GARS-2. One possible explanation is that cognitive and conative learning and behavioural difficulties are non-variant problems exhibited by all children with ASD.

However, the AffLBD subscale (r = .487, p < .01) and SenLBD subscale (r = .531, p < .01) do not correlate well with the AI. One possible explanation is that children with ASD may also have other co-morbid psychiatric disorders (Leyfer et al., 2006). In the normal screening procedure for ASD in children, co-morbid psychiatric disorders are difficult to diagnose and thus, are often missed out (Leyfer et al., 2006). Another explanation is that children with ASD will find difficulty to describe their mental states, mental experiences, and even their personal feelings about daily events that are happening around them. Hence, it is difficult to screen them for affective learning and behavioural difficulties.

In a study by Auyeung et al. (2009) involving 46 girls and 219 boys with ASD, the researchers found that girls with ASD (Mean = 15.43; SD = 6.27) generally scored higher (though not significantly) on the Empathy (Affective) Quotient-Child Total than boys with ASD (Mean = 13.66; SD = 6.90), possibly explaining variability of AffLBD subscale. In our study, we have 17 participating parents with girls, while the remaining 36 have boys. With our small number, it is not possible or fair to say that affective learning and behavioral difficulties have little impact on identifying ASD. A bigger sample size for both genders will be needed for a future study.

Finally, the SenLBD subscale of the ALBDI has a limited predictive correlation (r=.531, p <.01) with the Autism Index (AI) of the GARS-2, which does not include sensory challenge as one of the key traits of ASD. One explanation, according to Kershaw (2011), is that individuals with ASD feel sensory information differently. Some may be hyper-sensitive or hypo-sensitive or indifferent to similar sensations. According to another study by Tomcheck and Dunn (2007), 95 percent of individuals with ASD (n = 281) manifested sensory processing difficulties in the following sensory areas: 79.4% with tactile problems, 68% with olfactory/gustatory problems, 44.1% with movement problems, 92.2% with auditory filtering difficulty and 69.1% with visual-auditory sensitivity issues. Lane et al. (2010) found that out of 87 percent of individuals with ASD (n = 54), 66.6% with tactile problems, 61.2% with olfactory/gustatory problems, 33.4% with movement problems, 92.6% with auditory filtering difficulty and 57.4% with visual-auditory sensitivity issues. Perhaps the 20-item SenLBD subscale is inadequate to cover all sensory deficits involving exteroceptive senses (i.e., visual, auditory, haptic, olfactory and gustatory senses) and interocpetive senses (i.e., vestibular and proprioceptive senses). As a result, a better measure to screen for sensory processing challenges in children with ASD is needed. One good example is the Sensory Profile (Dunn, 1999).

V.   Conclusion

Establishing the validity of screening measures for ASD has been hindered by the lack of a gold standard diagnostic tool (McBrien, 2003). There is no valid, reliable measure for diagnosing present and lifetime psychopathology in children with ASD or other related developmental disorders (Leyfer et al., 2006). The ALBDI is a modest attempt to provide allied educators and special education teachers a quick and easy-to-

administer screening tool to identify children with ASD with a degree of certainty and also to look into areas of learning and behavioural difficulties manifested by them.

Findings of the present study show that the ALBDI is indeed a useful measure where its total LBD score correlated significantly with the AI of the GARS-2.

Most prior studies of ASD (e.g., Cashin & Barker, 2009; Wing, Gould, & Gillberg, 2011) have identified the empathizing (affective) deficits of these children on the triad of impairments, i.e., social impairment, communication difficulties and rigid and repetitive behaviours. There is no doubt that thus the triad-of-impairments approach has been successful and there is a large body of converging evidence regarding the empathizing (affective) deficits that characterize ASD. However, the approach has failed to include the hyper- and hypo-sensitive challenges of children with ASD or taken into consideration that ASD manifests itself differently in different children of different genders. Hence, no two children with ASD are alike.

5.1 Significance of the Study

Other than validating the ALBDI as a useful screening tool for ASD, this study has taken a significant attempt to use a different approach, an approach that re-conceptualizes ASD in terms of cognitive, conative, affective and sensory difficulties that, in turn, impact on the learning process and behavioural patterns of children with ASD. A dissonance in any of or between/among these four components – cognition, conation, affect and sensation – could result in a spectrum of different autistic learning and behavioural profiles of children with ASD. For instance, individuals with ASD manifest cognitive dissonance, i.e., "an emotional state set up when two simultaneously held attitudes or cognitions are inconsistent or when there is a conflict between belief and overt behaviour" (Reber et al., 2009:140). Unlike the way in which normal or non-autistic individuals think, individuals with ASD possess systemizing abilities with their respective autistic thinking styles that affect the way they perceive their immediate world around them, i.e., autistic logic, as in sensory imagining which can be propositional or objectual (Chia, 2011). More studies will be needed to find out more about cognitive, conative, affective and sensory dissonances in individuals with ASD.

5.2 Limitations of the Study

This study has several limitations. Firstly, the validity of the ALBDI is determined by comparing with GARS-2 that uses a different set of criteria (i.e., the triad of impairments) from ALBDI (i.e., cognition, conation, affect and sensation).

Secondly, the accuracy of data depends on how well the participating parents know their children. We are aware that many of these participating parents might not be the direct caregiver and they could be maids or grandparents. Information from multiple sources (e.g. teachers and therapists) can help to improve the accuracy.

Thirdly, we also acknowledge that 20 items in each of the four ALBDI subscales may not be sufficient. The number of items was arbitrarily decided by the developers for each subscale to pragmatically limit the completion time for parents to complete.

5.3 Implications of the Study

Findings of this study show that ALBDI is a useful measure to screen children with ASD that can be easily used, not only by professionals such as doctors, nurses and therapists, but also by parents and teachers who work with these children.

More importantly the findings suggest that cognitive and conative dissonances in children with ASD are evident while more research is needed to study the affective and sensory dissonances.
Lastly, on the whole, the ALBDI can be used to create specific autistic profiles of individual children with ASD since no two of them are alike in every way. It highlights the need to design customized treatment plans to meet the individual learning and/or behavioural needs of children with ASD.

5.4 Recommendations for Future Studies

There is still room for fine tuning and improving the ALBDI, particularly the AffLBD and SenLBD subscales. In addition, a further study is needed to examine the reliability of the SenLBD subscale of the ALBDI on the Sensory Profile (Dunn, 1999) since there is no equivalent subscale found in the GARS-2.

Moreover, more studies with a bigger sample size of participants, involving not only the parents, but also teachers and other allied professionals working with children with ASD, will be needed to better ascertain the reliability of the ALBDI. As mentioned earlier, we want to reiterate that it is very important to obtain information from multiple sources in screening children for ASD with the ALBDI.

Finally, it may be used to benchmark and monitor the effectiveness of treatment or interventions in terms of cognitive, conative, affective and sensory difficulties, and to recommend appropriate intervention strategies that can tackle these challenges, as suggested in a follow-up monograph on autism treatments basing on the results of the ALBDI (see Chia, 2010, for more detail).

References
[1]. American Psychiatric Association (1980) Diagnostic and Statistical Manual of Mental Disorders-Third edition (DSM-III). Washington, DC: The Author.
[2]. (1987) Diagnostic and Statistical Manual of Mental Disorders-Third edition-Revised (DSM-III-R). Washington, DC: The Author.
[3]. (1994) Diagnostic and Statistical Manual of Mental Disorders-Fourth edition (DSM-IV). Washington, DC: The Author.
[4]. (2000) Diagnostic and Statistical Manual of Mental Disorders-Fourth edition-Text Revision (DSM-IV-TR). Washington, DC: The Author.
[5]. (2013) Diagnostic and Statistical Manual of Mental Disorders-Fifth edition (DSM-V). Washington, DC: The Author.
[6]. Autism Society of America (2011) What is autism? Retrieved from http://autism-society.org.
[7]. Auyeung, B., Wheelwright, S., Allison, C., Atkinson, M., Samarawickrema, N., and Baron-Cohen, S. (2009) The children's empathy quotient and systemizing quotient: Sex differences in typical development and in autism spectrum conditions. Journal of Autism and Developmental Disorder, 39: 1509-1521.
[8]. Cashin, A., and Barker, P. (2009) The triad of impairments in autism revisited. Journal of Child and Adolescent Psychiatric Nursing, 22 (4): 189-193.
[9]. Chia, N.K.H. (2010) Basic learning and behavioural support activities for children with mild/moderate autism. In Practical tips for teaching children with mild/moderate autism in mainstream schools: Paper No.3. Singapore: Cobee Publishing House.
[10]. Chia, N.K.H. (2011, Spring/Summer) Teaching Singaporean children with autism spectrum disorders to understand science concepts through autistic logic analysis/synthesis (ALA/S). Journal of the American Academy of Special Education Professionals: 79-89.
[11]. Chia, N.K.H., Kee, N.K.N., and Shaifudin, M.M.Y. (2010) Identifying and profiling autistic learning and behavioural difficulties in children. In Practical tips on teaching children with mild/moderate autism in mainstream schools: Paper No.1. Singapore: Cobee Publishing House.
[12]. Creswell, J.W. (2012) Educational research: planning, conducting, and evaluating quantitative and qualitative research (4th ed.). Upper Saddle River, NJ: Pearson Education.
[13]. Cronbach, L.J. (1951) Coefficient alpha and the internal structure of tests. Psychometika, 16 (3): 297-334.
[14]. Dunn, W. (1999) The Sensory Profile: User's manual. San Antonio, TX: Psychological Corporation.
[15]. Gilliam, J. (2006) GARS-2: Gilliam Autism Rating Scale (2nd ed.). Austin, TX: Pro-Ed.
[16]. Kershaw, P. (2011) The ASD workbook: Understanding your autism spectrum disorder. London: Jessica Kingsley.
[17]. Kinnear, P.R., and Gray, C.D. (2010) IBM SPSS statistics 18 made simple. New York: Psychology Press.
[18]. Lane, A.E., Young, R.L., Baker, A.E.Z., and Angley, M.T. (2010) Sensory processing subtypes in autism: Association with adaptive behaviour. Journal of Autism and Developmental Disorders, 40 (1): 112-122.
[19]. Leyfer, O.T., Folstein, S.E., Bacalman, S., Davis, N.O., Dinh, E., Morgan, J., Tager-Flusberg, H., and Lainhart, J.E. (2006) Co-morbid psychiatric disorders in children with autism: Interview development and rates of disorders. Journal of Autism and Developmental Disorders, 36: 849-861.
[20]. McBrien, J.A. (2003) Assessment and diagnosis of depression in people with intellectual disability. Journal of Intellectual Disability Research, 47: 1-13.
[21]. Reber, A.S., Allen, R., and Reber, E.S. (2009) The Penguin dictionary of psychology (4th ed.). London: Penguin Books.
[22]. Schopler, E., Reichler, R., and Renner, B. R. (1993) Childhood Autism Rating Scale. Los Angeles, CA: Western Psychological Services.
[23]. Tomchek, S.D. and Dunn, W. (2007) Sensory processing in children with and without autism: A comparative study using the short sensory profile. American Journal of Occupational Therapy, 61 (2): 190-200.
[24]. Wilkinson, L.A. (2011, March 16) Test review: The Gilliam Autism Rating Scale: Second edition (GARS-2). Retrieved from: http://bestpracticeautism.blogspot.sg/2011/03/best-practice-review-gilliam-autism.html.
[25]. Wing, L., Gould, J., and Gillberg, C. (2011) Autism spectrum disorders in the DSM-V: better or worse than the DSM-IV? Research in Developmental Disabilities, 32 (2): 768-773.

Appendix
Autistic Learning and Behavioural Difficulties (ALBD) Inventory
Instructions:
Score 1 for items that are **Present** or 0 for items that are **Absent** in P/A column: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20.

Rating for each of the four subscales:

14-20	Probability of ALBD is high
7-13	Probability of ALBD is average
1-6	Probability of ALBD is low

Subscale 1: Cognitive Learning & Behavioural Difficulties

Autistic Learning & Behavioural Difficulties	P/A
1. No speech or there is speech delay (no utterance)	
2. Echolalic speech (repeated utterance)	
3. Neologic speech (meaningless utterance)	
4. Hyperlexia (can recognize print or symbol and utter them but cannot comprehend)	

		P/A
5.	Lacking conversational interaction for social purpose	
6.	Never initiate or sustain a conversation	
7.	Uses second or third personal pronouns inappropriately and rarely uses I	
8.	Answers questions incorrectly or inappropriately	
9.	Does not use gestures or body language in communication	
10.	Use gestures and body language in an unusual way	
11.	Use facial expressions that do not match the expressed emotion	
12.	Manifest abnormal gestures or facial expression or body posture in communication	
13.	Absence of or lacking in joint attention	
14.	Fleeting eye contact or keeping it limited	
15.	Does not engage in any social play with others in peer group	
16.	No or lack of imaginative play	
17.	Prefers to spin any object that he/she can find or get hold on	
18.	Prefers to line objects in a straight line	
19.	Display a narrow of focal interest	
20.	Stares intensely at other people or objects	

Subscale 2: Conative Learning & Behavioural Difficulties

Autistic Learning & Behavioural Difficulties		P/A
1.	Obsessive with a specific object or task	
2.	Impulsive in action (unaware of danger to oneself)	
3.	Hyperactive in action	
4.	Disruptive in behaviour	
5.	Destructive in behaviour	
6.	Easily distracted by happenings around him/her	
7.	Echopraxic (repetitive in action)	
8.	Asks the same question repeatedly until satisfied with an answer whether or not he/she has understood	
9.	Talks continuously about a special interest (unaware that the other person is no longer paying attention)	
10.	Talks continuously to someone who is engaged in other activity	
11.	Talks continuously to someone who is not even there	
12.	Makes meaningless vocal noises (vocal self-stimulatory behavioural traits)	
13.	Displays tics or facial grimaces (motor tics or motor self-stimulatory behavioral traits)	
14.	Rigid in performing a task or activity (rule-bound)	
15.	Unable to shift attention or tends to be over-focused (to go with the flow of an activity)	
16.	Does not follow rules of the game	
17.	Spends all time completely focused on a specific area of interest	
18.	Easily frustrated by difficult task or activity	
19.	Refuses to do or avoid doing a certain task or activity	
20.	Stays in the same position for a long time (e.g., staring blankly into the air)	

Subscale 3: Affective Learning & Behavioural Difficulties

Autistic Learning and Behavioural Difficulties		P/A
1.	Displays a limited emotional awareness of others	
2.	Appears as if he/she is aloof or arrogant	
3.	Prefers solitary activities or tasks that are best done alone	
4.	Seldom or never asks others for assistance or bothers others	
5.	Difficulty with feelings of empathy for others	
6.	Unable to read facial expressions and body language of others (e.g., anger, displeasure, shock)	
7.	Looks elsewhere when in conversation with others	
8.	Prefers to stay on the periphery of a group to observe than to join in for any activity	
9.	Responds with anger when feels threatened or others are not following rules	
10.	Laughs inappropriately at something that is sad or tragic	
11.	Asks questions that are considered personal to the other person	
12.	Does not know how to respond to others (e.g., request, offer of help, compliments)	
13.	Lacks of desire to interact or does not care to interact with others	
14.	Unable to choose activities that are of interest to others	
15.	Lacks of appreciation of social cues or socially indifferent	
16.	Lacks of awareness of personal or social space (stand too close or too far)	
17.	Sits or stands apart from others	
18.	Makes rude remarks or blunt comments	
19.	Disciplines or reprimands others for their actions (which he/she perceives as not right or unacceptable)	
20.	Unaware of unspoken or hidden rules (e.g., tells on peers, break the code of silence or confidentiality)	

Subscale 4: Sensory Learning & Behavioural Difficulties

Autistic Learning and Behavioural Difficulties	P/A
1. Behaves in a fearful or frightened manner without any reason/explanation	
2. Engages in vocal or motor self-stimulatory or odd behaviours	
3. Flapping of hands for no reason	
4. Flicking fingers in front of eyes for a short period of time	
5. Rocking oneself or while sitting on a chair/stool	
6. Tiptoeing when standing, walking or even running	
7. Lunging rapidly or darting from place to place	
8. Making meaningless noises or high-pitched sounds (vocal stimulation)	
9. Hugs or kisses others without realizing that it can be inappropriate at times (especially if the individual is an adolescent or young adult)	
10. Resists physical contact with others (e.g., someone wants to hold or shake his/her hand)	
11. Smells any object that he/she gets hold on	
12. Bites or licks (tastes) any inedible object that he/she gets hold on	
13. Hits, bites or attempt to injure self	
14. Touches own private part in public without realizing that it is inappropriate	
15. Touches others' private parts without realizing it is inappropriate	
16. Very selective with food and prefers the same food that he/she has been eating or drinking all this while	
17. Allergic to certain food (e.g., gluten or casein)	
18. Likes to spin any object round and round repeatedly	
19. Likes to spin oneself without feeling dizzy	
20. Likes to rub oneself against any big object (furniture) or another person	

Summary of Results

A summary of the results based on the subscale scores and the total score of the ALBDI Learning and Behavioural Difficulties is as follows:

Rating Subscales for Autistic Learning & Behavioural Difficulties	Subscale Scores	Probability of ASD
Cognitive Learning & Behavioural Difficulties score	/20	
Conative Learning & Behavioural Difficulties score	/20	
Affective Learning & Behavioural Difficulties score	/20	
Sensory Learning & Behavioural Difficulties score	/20	
Total Autistic Learning & Behavioural Difficulties score	/80	

Rating Scale for Total Autistic Learning and Behavioural Difficulties (LBD) scores

56-80	Probability of ASD is high
28-55	Probability of ASD is average
20-27	Probability of ASD is low