
Original Paper

A Case Review on Validating an Autism Diagnosis of a 15-Year-Old Male Adolescent

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Abstract

This is a case review study of a 15-year-old Chinese boy diagnosed with Autism Spectrum Disorder (ASD) or autism (for short) when he was at 3 years old. The aim of this paper is to validate the boy's autism diagnosis as well as his functional level of learning. Therefore, the author has chosen to use an eclectic diagnostic model based on (i) the hierarchy of the six building blocks of skills and abilities (Chia, 2008; 2012), and (ii) the process of cross-battery assessment (X-BA; Flanagan & McGrew, 1997) that involves conducting a series of standardized tests and checklists. The X-BA results show that despite making significant improvements in many areas of his development, the verbal comprehension, which is a language component, continues to pose as a big challenge for him. The challenges in using language and communicating have always been a salient feature in individuals with ASD (Dombrowski, 2015; Belkadi, 2006). With this piece of information based on the latest assessment results, the author has taken a step further in her attempt to validate JC's autism diagnosis. This will certainly provide JC's therapists and supporting educators a better sense as to how they should go about their respective intervention strategies to help him.

Keywords: autism spectrum disorder, cross-battery assessment, early intervention, language impairment

1. Introduction

Autism Spectrum Disorder (ASD), or autism hereafter, is defined as, a “developmental disability significantly affecting verbal and nonverbal communication, and social interaction, usually evident before age 3 that adversely affects a child's educational performance” (Pierangelo & Giuliani, 2007, p. 249). Over the years, autism in its primary form has also been known to occur in other subtypes, such as Autistic Disorder, Asperger Syndrome and Rett Syndrome, with some slight differences in their traits and characteristics, but can also coexist with other disorders due to comorbidities resulting in syndromic autism (Chia & Yang, 2021; Melillo, 2012; Xie & Yang, 2021), such as Russell-Silver Syndrome, Pitt-Hopkins Syndrome, Fragile-X Syndrome and Tuber Sclerosis Complex.

However, in the latest publication of the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), the American Psychiatric Association (APA; 2013) decided to remove this list of terms which include Autistic Disorder; Asperger Syndrome; Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) in exchange of the umbrella term, Autism Spectrum Disorder (ASD). A spectrum disorder for the condition of autism tells us that no one individual with autism has the exact characteristics as the other (Laguipo, 2018). These varying (i.e., ranging from mild to severe) difficulties in communication, social interaction and imagination, with manifestation of repetitive stereotyped behaviors are often caused by deficits in empathizing and mentalizing, otherwise known as challenges in executive functions and theory of mind (Belkadi, 2006; Chia, 2012). More than half of the population with ASD tend to have some kind of language impairment in areas such as pragmatic, lexical, syntax, morphology and phonology and phonetic (Belkadi, 2006).

Nonetheless, an early diagnosis and appropriate educational program play a critical role in determining the future of an individual with autism (Pierangelo & Giuliani, 2007). It is well studied that a full continuum of services is the way to go to provide the greatest possible opportunities for these individuals

to have a better quality of life, such as activities in daily living (including live and work in a community), instrumental activities, social functioning, and others (Chaturvedi & Muliya, 2016). According to Corsello (2005), the early intervention carried out during the preschool years between three to six years old is especially impactful on an individual's progress in learning and development.

It is for this reason that the author of this paper has taken a keen interest to validate her client's autism diagnosis as well as to ascertain his current level of functioning in learning.

Background Information about the Case

JC (see Note 1) is a teenage boy aged 15. He is the only child in the family and lives with his parents and a stay-in helper. He was diagnosed with autism with the Modified Checklist for Autism in Toddlers (Robins, Fein, & Barton, 1999; Robins et al., 2001) that is commonly used here, when he was slightly more than three years of age at Kandang Kerbau (KK) Women and Children Hospital, Singapore. Back then, he received intermittent speech and occupational therapy sessions until he successfully enrolled into an early intervention center run by Autism Association Singapore, a voluntary welfare organization. After completing his early intervention, JC moved on to a local, mainstream primary school where he was supported by a shadow teacher to help him adapt to classroom learning and social expectations in school. During that time, JC continued to receive 1-to-1 home based tuition, social training group, speech therapy and attended enrichment classes, such as swimming and art, with the exception of social training group, till today.

JC eventually moved on from his previous mainstream primary school at the age of 11 to his present local special school for students with autism that provides such students with the opportunity to access the national mainstream curriculum. There is an option to take the National School Examination by the end of four or five years of regular education. JC is currently attending a class that offers the Normal Technical Education (NTE) and will be sitting for the Singapore-Cambridge General Certificate of Education-Normal Level Examination (GCE-N for short). As JC has shown exemplary results in his Mathematics, he has been promoted to a higher-level Mathematics (i.e., Normal Academic or NA for short) this academic year.

Over the years, JC has shown continuous and steady progress in his academic achievements and maturity in the way he presents himself. This motivates this author to do a formal review of JC's abilities and skills to gain a better understanding of his current profile of strengths and weaknesses and the validity of his autistic condition in order to assist his future learning.

Diagnostic Assessment and Results

A series of standardized tests and checklists were administered, in addition to the psycho-educational tests done previously when the JC was a child, in order to ascertain his current level of competence and performance. More importantly, it is also to assess the validity of JC's ASD diagnosis, which was given when he was three.

In order to gain a comprehensive insight into JC's cognitive abilities, the cross-battery assessment approach (X-BA for short), a method which emphasizes the use of information collected from multiple test batteries was chosen over the use of a single-battery assessment (Flanagan & McGrew, 1997). Chia (2012) posited that there are five building blocks in the hierarchy of skills and abilities to be followed in a bottom-up sequence (see Figure 1 below) for a child to be academically successful.

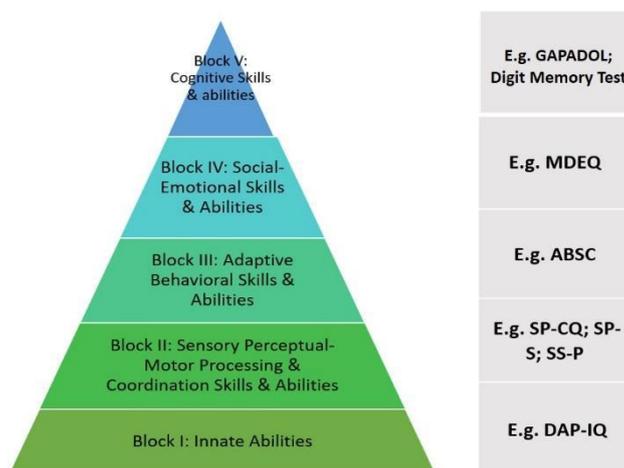


Figure 1. The Hierarchy of Building Blocks of Skills and Abilities (Chia, 2008, 2012)

Block I-Innate Abilities & Skills

Learning is built on the innate abilities inherited and genetically coded at birth. Although a child's upward ceiling performance is defined by multiple innate abilities or what Gardner (2008) has termed multiple intelligences, how near s/he comes to performing at those upper limits is determined by other elements, such as interest and motivation necessary to learning (Franken, 2002). It is these innate abilities that the child is assessed using an IQ test to determine if s/he is highly-able, able, less-able or disabled in his/her performance as a learner. Examples of such tests are the Wechsler Intelligence Scale for Children-4th Edition (WISC-IV; Wechsler, 2003) and Draw-a-Person Intellectual Ability Test for Children, Adolescents & Adults (DAP-IQ; (Reynolds & Hickman, 2004).

- **Wechsler Intelligence Scale for Children- 4th Edition (WISC-IV)**

The Wechsler Intelligence Scale- 4th Edition (WISC-IV; Wechsler, 2003) is a standardized tool which is used to assess children and adolescents aged six to sixteen to measure their cognitive abilities. It comprises of 15 subtests, 10 of which are core subtests that are usually used to measure the four index scores in the areas of Verbal Comprehension (VCI, with core subtests: Similarities, Vocabulary, and Comprehension); Perceptual Reasoning (PRI, with core subtests: Block Design, Picture Concepts, and Matrix Reasoning); Working Memory (WMI, with core subtests: Digit Span and Letter-Number Sequencing); and Processing Speed (PSI, with core subtests: Coding and Symbol Search) (see Wechsler, 2003, for detail). After which, a Full-Scale Intelligence Quotient (FSIQ) can be computed. The other five are supplementary subtests (i.e., Information and Word Reasoning for VCI; Picture Completion for PRI; Arithmetic for WMI; and Cancellation for PSI) that can be used if for some reason a core subtest (from any of the WISC-IV indexes) cannot be used or is not appropriate for a particular child.

Table 1. The WISC-IV Results (Month/Year of Administration: June 2013)

WISC-IV	Composite Score	95% Confidence Interval	Percentile Rank	Qualitative Description
● Verbal Comprehension (VCI)	N.A.	N.A.	N.A.	N.A.
● Perceptual Reasoning (PRI)	90	83-98	25	Average
● Working Memory (WMI)	N.A.	N.A.	N.A.	N.A.
● Processing Speed (PSI)	75	69-87	5	Borderline

The WISC-IV test was administered when JC was 7 years 2 months old for the purpose of school admission. However, his Full-Scale IQ could not be computed as he was unable to complete the cognitive assessment due to his difficulty with communication and language at the point of assessment. Only the subtests from Perceptual Reasoning and Processing Speed scales were administered and computed.

In an attempt to review JC's case, this author has conducted several additional assessments in order to provide an updated status on this teenager. These tests and their respective results will be discussed further.

- **Draw-a-Person Intellectual Ability Test for Children, Adolescents & Adults (DAP-IQ)**

This projective drawing test of DAP:IQ (Reynolds & Hickman, 2004) is an assessment used by professionals working with the diverse population to estimate the intellectual ability of individual of age four and above. This tool relies on scoring the elements representative of universal features of the human figure on the drawing based on a given set of scoring criteria (Reynolds & Hickman, 2004).

This DAP-IQ was administered as it is the quickest way to get an estimate of what his Intelligence Quotient (IQ) stands at. The test was administered by the author and two other dialogic-diagnostic art therapists to triangulate their results. At the time of testing, JC was 14 years 6 months and the results are shown in Table 2 below.

Table 2. Results of DAP-IQ (Month/Year of Administration: October 2020)

DAP-IQ	Raw Score	Standard Score	Percentile Rank	Descriptor
Scorer #1	33	104	61%ile	Average
Scorer #2	33	104	61%ile	Average
Average Score	33	104	61%ile	Average

The results from the DAP-IQ test show that JC scored a standard score of 104 (at 61%ile rank), which is translated to an age equivalent of 14 years 9 months and/or above. This falls within the average IQ range of 90-110, and according to Cooijmans (2005), this suggests that JC possesses the ability to access learning through abstract materials. It also means JC is functioning at five months above his chronological age.

Block II-Sensory Behavioral Abilities & Skills

Sensory-perceptual-motor coordination skills and abilities are developed from the foundation of the child's innate abilities. It covers sensory perception and motor coordination skills and abilities which are partially determined by genetic code and partly acquired through repeated interaction with the environment (Chia, 2008). Such skills can be improved with proper practice.

The sensory perceptual skills refer to those such as vision, hearing, touch, smell and taste. These exteroceptive senses are most essential for receiving information.

Psychomotor skills and abilities (include interoceptive senses, i.e., vestibular and proprioceptive senses) relate to muscles and movement, body position or posture and include crawling, walking, running, handwriting and speaking. Psychomotor skills give expression to the information our senses receive and process. If there are any deficiency in any of these skills, the intervention approach should include sensory integration therapy, occupational therapy and/or physical therapy (Chia, 2008). An example of such a test is the Sensory Profile (SP; Dunn, 1999a).

- **Sensory Profile-Caregiver Questionnaire (SP-CQ)**
- **Sensory Profile-Supplement/Summary (SP-S)**
- **Short Sensory Profile (SSP)**

The SP-CQ (Dunn, 1999a) includes 125 items that are divided into three main sections namely: Sensory Processing; Modulation and Behavioral and Emotional responses and it should be completed by the

caregiver (e.g., parents) who has daily contact with the child. The results from the SP-CQ can then be analyzed using the SP-S (Dunn, 2006) to provide a standard method for professionals to measure the causation of sensory processing and children's everyday performance and functioning (Dunn, 1999a).

The SSP (Dunn, 1999b) was designed to be used as a screening tool to identify sensory processing issue(s) that is/are affecting performance which would call for the need for further assessment by an occupational therapist. It comprises of 38-items categorized under seven sub-sections: tactile sensitivity, taste/smell sensitivity, movement sensitivity, under-responsive/seeking sensation, auditory filtering, low energy/weak, and visual/auditory sensitivity. Unlike SSP, SP-S is categorized into three sub-sections: sensory processing, modulation, and behavioral and emotional responses. All the three questionnaires can be completed by either the caregivers or teachers.

In order to assess the validity of JC's previous ASD diagnosis, it is important to complete a Sensory Profile. According to DSM-5 (APA, 2013), for an individual to be diagnosed with ASD, he/she must have persistent deficits in three areas of social communication and interaction and at least two of four types of restricted, repetitive behaviors. By administering the Sensory Profile as mentioned briefly above, the information relevant to the following four types of restricted, repetitive behaviors can be gathered:

1. Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypes, lining up toys or flipping objects, echolalia, idiosyncratic phrases)
2. Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day)
3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests)
4. Hyper- or hypo- reactivity to sensory input or unusual interest in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement) (American Psychiatric Association, 2013).

The test was administered when JC was 14 years 7 months and the results are shown in Table 3 below.

Table 3. Results of SP-S Quadrants (4 Sensory Patterns) (Month/Year of Administration: November 2020)

Quadrant	Raw Score/Total	Quadrant Range	Score	Qualitative Descriptor SUR or SOR (see Note 2)
Registration	52/75	15-58		Much more than others
Seeking	113/130	103-123		Similar to others
Sensitivity	84/100	81-94		Similar to others
Avoiding	118/145	113-133		Similar to others

Based on the SP-S results (see Table 3), JC has a sensory profile with definite difference, i.e., much more than others (MMTO), than the majority of his peers for the Registration quadrant/pattern. According to Dunn (2006), this represents the degree to which a child misses sensory input. Therefore, JC who has gotten a "Much More Than Others" score misses sensory input at a higher rate than his peers.

According to the Pediatric Development Center (n.d.), sensory registration (or registration) is "the process by which children respond or attend to sensory input in their environments. The nervous system must first notice the sensory information, once registered the memory compares it to things they have heard or seen, and thus gives new information meaning" (para. 9). In this case, JC is found to experience the issue of missing out in his sensory registration. Weak sensory registration is often associated with weaker sensory systems such as auditory and vestibular processing.

Table 4. Results of SP-CQ Sections on Sensory Processing (Month/Year of Administration: November 2020)

Sensory Processing [SP]	Raw Score	Disorder Score Ranges			SPD Qualitative
		ASD	ODs	SPD	Descriptor
A. Auditory processing	31/40	20-30	20-33	30-38	Similar to others
B. Visual processing	39/45	25-37	25-37	32-41	Similar to others
C. Vestibular processing	51/55	37-47	40-55	48-55	Similar to others
D. Touch processing	83/90	50-70	60-80	73-88	Similar to others
E. Multisensory Processing	30/35	15-25	20-30	27-33	Similar to others
F. Oral sensory Processing	50/60	27-47	37-55	46-59	Similar to others
Number of SP subdomains that meet the criteria	--	0/6	4/6	0/6	--
Percentage [%]	--	0%	67%	0%	Average %: 22%

From the SP-CQ results (see Table 4), JC's sensory processing performance for all the six different sensory processes (i.e., auditory, visual, vestibular, touch, multisensory, and oral sensory) is within the typical range under the SPD (Sensory Processing Disorder) when compared to his peers in all areas of Sensory Processing. However, under the different disorder score ranges, he scored 67% to meet the traits related to ODs (Other Disabilities) and 0% for traits related to ASD (Autism Spectrum Disorder) and/or Sensory Processing Disorder (SPD). The average cut-off percentage for SP domain is 22%. This suggests JC has shown evidence of sensory-related learning and behavioral challenges under ODs.

Table 5. Results of SP-CQ Sections on Sensory Modulation (Month/Year of Administration: November 2020)

Sensory Modulation [SM]	Raw Score	Disorder Score Ranges			SPD Qualitative
		ASD	ODs	SPD	Descriptor
G. Sensory processing related to endurance or tone	27/45	25-47	25-45	9-35	Much more than others
H. Modulation related to body position and movement	45/50	30-40	35-45	41-49	Similar to others
I. Modulation of movement affecting activity level	21/35	17-25	20-25	19-22	More than others
J. Modulation of sensory input affecting emotional responses	16/20	10-15	10-15	16-20	Similar to others
K. Modulation of visual input affecting emotional responses & activity level	15/20	10-15	10-15	15-19	Similar to others
Number of SM subdomains that meet the criteria	--	3/5	4/5	2/5	--
Percentage [%]	--	60%	80%	40%	Average %: 60%

From the SP-CQ results (see Table 5), JC presents a certain amount of challenge with regards to sensory processing related to endurance or tone as he scored “Much More Than Others”. He also shows a rating of “More than Others” in terms of modulation of movement affecting activity level. This is an indication that he can present with slight difficulties when it comes to this area of sensory concern.

JC has scored in the SP-CQ under the three disorder score ranges: (i) 60% of the SP-CQ items to meet the traits related to ASD; (ii) 80% of the items to meet the traits related ODS; and (iii) only 40% of the items to meet the traits related to SPD. The average cut-off percentage for Sensory Modulation (SM) domain is 60%. This suggests that most of JC’s traits of ODS are the prodromal causative results of ASD rather than SPD traits.

Table 6. Results of SP-CQ Sections on Behavior and Emotional Responses (Month/Year of Administration: November 2020)

Behavioral Responses [BR]	Raw Score	Disorder Score Ranges			SPD Qualitative Descriptor
		ASD	ODs	SPD	
L. Emotional/Social Responses	67/85	40-60	40-65	63-79	Similar to others
M. Behavioral Outcomes of sensory Processing	26/30	15-20	15-23	22-28	Similar to others
N. Items indicating thresholds for response	14/15	7-14	10-14	12-15	Similar to others
Number of BR subdomains that met the criteria	--	1/3	1/3	0/3	--
Percentage [%]	--	33%	33%	0%	Average %: 22%

Based on the SP-CQ results (see Table 6 above), JC is within the typical range when compared to his peers in all areas of Behavior and Emotional Responses.

Under the disorder score ranges, JC has scored 33% of the SP-CQ items found in the traits related to ASD and/or ODS. None has been identified or recorded for traits related to SPD. The average cut-off percentage for Behavioral Responses (BR) domain is 60%. This suggests that most of JC’s challenging behavioral responses are the causative results being indicative of prodromal traits of ASD.

Table 7. Results of SP-CQ 9 Factors (Month/Year of Administration: November 2020)

Sensory Factors [SFs]	Raw Score	ASD	ODs	SPD	Qualitative Descriptor
1. Sensory Seeking	76/85	45-65	50-70	63-81	Similar to others
2. Emotionally Reactive	60/80	35-50	30-60	57-74	Similar to others
3. Low Endurance/Tone	27/45	35-43	25-44	9-35	Much more than others
4. Oral Sensory Sensitivity	35/45	25-37	25-43	33-44	Similar to others
5. Inattention/Distractibility	26/35	15-25	15-25	25-32	Similar to others
6. Poor Registration	34/40	23-33	27-35	33-40	Similar to others
7. Sensory Sensitivity	18/20	10-20	15-20	16-20	Similar to others
8. Sedentary	8/20	10-15	10-17	4-9	Much more than others
9. Fine Motor/Perceptual	15/15	5-10	7-13	10-15	Similar to others
Number of SFs met the criteria	--	2/9	5/9	2/9	--
Percentage [%]	--	22%	56%	22%	Average %: 33%

From the SP-S results (see Table 7), it can be observed that there are “Much More” situations where JC will present low endurance/tone. Additionally, he would also prefer to spend “Much More” of his time in Sedentary.

JC scored 22% of the SP-S items to meet the traits related to ASD and SPD. He scored 56% of the items to meet the traits related to ODs. The average cut-off percentage for Sensory Factors (SFs) is 33%. This suggests that out of JC’s challenging ODs: (i) 22% are caused by ASD-related traits (i.e., oral sensory sensitivity and sensory sensitivity); (ii) 22% are standalone behavioral challenges without being caused by either ASD or SPD-related traits (i.e., emotionally reactive and low registration); and (iii) 11% are caused by SPD-related traits (i.e., low endurance/tone). Only 11% of the SPD, i.e., the sedentary disposition, is of sensorigenic causation.

Results from Tables 4, 5, 6 and 7 show that JC scored 6 out of 23 SP-CQ subsections or 26% on traits related to ASD, 10 out of 23 or 43% on traits related to ODs, and only 4 out of 23 on traits related to SPD, at the average percentage score of 29%. That suggests that JC manifests less of ASD-like and SPD-like traits but more on OD-like traits which are more of behavioral issues of concern.

The SP-CQ Visual/Tactile Processing Cluster has been administered to determine the possibility if JC might have Attention Deficit-Hyperactivity Disorder (ADHD).

Table 8. SP-CQ Visual/Tactile Processing Cluster (Month/Year of Administration: November 2020)

Sensory Profile Location	Section	Item	Item No.	Description	Raw Score
B. Visual Processing	Visual		12	Becomes frustrated when trying to find objects in competing backgrounds (e.g., a cluttered drawer)	3
			17	Has a hard time finding objects in completing backgrounds (e.g., shoes in a messy room)	3
D. Touch Processing	Tactile		36	Reacts emotionally or aggressively to touch	4
			38	Has difficulty standing in line or close to other people	5
			40	Touches people/objects to the point of irritating others	5
E. Multisensory Processing	Aural		50	Seems oblivious within an active environment (e.g., unaware of activity)	4
H. Modulation related to Body Position & Movement	Socio-Emotional		75	Seems accident-prone	4
I. Modulation of Movement affecting Activity Level	Activity		91	Avoids quiet play activities	5
K. Modulation of Visual Input affecting Emotional Responses & Activity level	Visual		96	Avoids eye contact	4
			97	Stares intently at objects or people	3
			98	Watches everyone when they move around the room	4
M. Behavioral Outcomes of Sensory Processing	Socio-Emotional		120	Uses inefficient ways of doing things (e.g., wastes time, moves slowly, does things a harder way than is needed)	4
Cluster Raw Score Total					48

JC's score of 48 in the SP-CQ Visual/Tactile Processing Cluster (Dunn, 1999a) has placed him within the Typical Performance range of scores 60 and 46.

Table 9. Visual-Tactile Processing Cluster & Sensory Factors (Month/Year of Administration: November 2020)

Subdomains	Raw Score	Section Score Range	Qualitative Descriptor
Visual/Tactile Processing Cluster	48/60	46-60	Typical
Factor 1: Sensory Seeking	76/85	63-85	Typical
Factor 2: Emotionally Reactive	60/80	57-80	Typical
Factor 5: Inattention/Distractibility	26/35	25-35	Typical

The results shown in Table 9 derived from the SP-CQ Visual/Tactile Processing Cluster indicate that JC shows no evidence of Attention Deficit-Hyperactivity Disorder (ADHD) within Typical Range within the cluster.

Table 10. SSP Results (Month/Year of Administration: November 2020)

Section	Raw Score Total	Section Score Range	Qualitative Descriptor
Tactile Sensitivity	33/35	30-35	Typical
Taste/Smell Sensitivity	16/20	15-20	Typical
Movement Sensitivity	14/15	13-15	Typical
Under-responsive/Seeks Sensation	31/35	27-35	Typical
Auditory Filtering	22/30	20-22	Probable Difference
Low Energy/Weak	18/30	6-23	Definite Difference
Visual/Auditory Sensitivity	23/25	19-25	Typical
Total:	157/190	155-190	Typical

Based on the SSP results (see Table 10), although JC has demonstrated Probable Difference and Definite Difference in Auditory Filtering and Low Energy/Weak respectively, his overall score is within the typical range.

Block III-Adaptive Behavioral Abilities & Skills

Adaptive behavioral skills and abilities as an essential learning process refer to “the effectiveness or degree with which an individual meets the standards of personal independence and social responsibility expected of his/her age and social group” (Grossman, 1973, p. 11). This broad spectrum of skills and abilities are covered across the different levels of lifespan development.

During infancy and early childhood, the adaptive behavioral process of learning covers sensory-motor skills, communication skills, self-help skills and social skills. Later, during the period of late childhood and early adolescence, this block of skills and abilities will cover the application of basic academic skills in everyday life activities, application of appropriate reasoning and judgment in mastery of the environment, and social skills. Finally, during late adolescence and adulthood, it concerns vocational and social responsibility and performance.

For any child with adaptive behavioral deficits, an assessment such as the Vineland Adaptive Behavior Scales-2nd Edition (VABS-2; Sparrow, Cicchetti, & Balla, 2005) or Adaptive Behavior Development

Scale (ABDS; Pearson, Patton, & Mruzek, 2016) will be needed to know the child's adaptive behavioral issues of concern. The intervention approach will include, for example, the applied behavior analysis (ABA) which involves systematically arranging environmental events to produce desired changes in his/her behavior (Chia, 2008). An example of such a measure is the informal ABLE Adaptive Behavior Skills Checklist (Alamance Community College, 2016).

- **ABLE Adaptive Behavior Skills Checklist (ABSC)**

The test was developed by Alamance Community College (2016) is based on a developmentally determined set of coping skills. Deficits in adaptive behavior are defined as non-existent in an individual's effectiveness in meeting the standards of maturation, learning, personal independence, social responsibility and school performance. was administered when JC was 14 years 6 months and the ABSC results are shown in Table 11 below.

Table 11. The Results of ABSC (Month/Year of Administration: November 2020)

Domain	Total Domain Score	Qualitative Descriptor	Comments
Communication Skills (CS)	7/8 (87.5%)	Normal	Although JC does not hold conversation at age-appropriate language level, he is generally able to get his message/idea across as a communicator. He communicates (e.g., make requests, ask questions) basic needs and interaction purposes. However, he is not fluent at communicating his feelings to others.
Socialization Skills (SS)	9/9 (100%)	Normal	JC is aware of the basic school & social rules (e.g., not interrupting a conversation; speaking with an indoor voice, etc.) and would mostly follow them as he knows there are consequences for breaking them. At times, he would pull a trick on his peers or teachers just as any teenager but he gets along with people. He does not hesitate to help when asked to. He has learnt to control his emotions better especially in a social situation.
Daily Living Skills (DLS)	5/5 (100%)	Normal	JC is an independent boy who can take care of his personal needs and is aware of basic hygiene. He takes responsibility for his own belongings.
Total Score:	21/22 (95.5%)	Normal	Overall, JC demonstrates no challenges in his adaptive behavior skills and abilities. He is within the typical range of development even though his language may not be as fluent as his same age peers.

From the ABSC results (see Table 11 above), the author concludes that JC's adaptive skills are within normal range.

- **Gilliam Autism Rating Scale- Second Edition (GARS-2)**

GARS-2 (Gilliam, 2006) is a norm-referenced instrument that is used by teachers, parents and clinicians to identify autism in individuals aged 3 years to 22 years. It has been normed against individuals diagnosed with autism so as to determine the likelihood of autism as it looks into specific characteristics typically noted in this population. These characteristics are in the areas of Stereotyped Behaviors, Communication, and Social Interaction and it contains a developmental history which is meant to be filled out by parents. The Parent Interview of the Summary/Response booklet can be indicative of the delays or abnormal functioning of a child prior to three years of age and this is important information for the diagnosis of Autism. However, a GARS instrument should not be used in isolation to derive a

diagnosis of Autism (Gilliam, 2006).

As there is no available official record of JC's ASD diagnosis except for a verbal confirmation from JC's mother, who told this author that he was diagnosed at the age of three at a public hospital. As a result, this author administered the GARS-2 when JC was 14 years 11 months to identify the likelihood of autism in the boy. The results from the Parent Interview of GARS-2 have also confirmed notable developmental delays in JC when he was younger and his abnormal functioning before the age of three.

Table 12. The GARS-2 Results (Month/Year of Administration: March 2021)

Subtests	Raw Score	Scaled Score	Percentile Rank	SEM
• Stereotyped Behaviors	2	3	1%ile	1
• Communication	6	5	3%ile	1
• Social Interaction	3	3	1%ile	1
• Sum of Standard Score		11		
		Standard Score	Percentile Rank	SEM
• Autism Index		59	<1%ile	4

JC's standard score of 59 indicates that he is unlikely to have ASD based on the Autism Index ranging between 69 or below, or subscale standard score of 1 to 3 (Unlikely). The results from the GARS-2 administration have contradicted the earlier historical evaluation and diagnosis of JC's condition of autism when he was about three years old at a public hospital for women and children. However, it is important to take precaution when interpreting the GARS-2 results. As the rating scale was completed by JC's parents after many years later when the child was first suspected to have autism, there is a high possibility of confirmation bias on the part of the parents when they were completing the test. One explanation is parental denial of the condition. Another explanation is that JC has shown such a tremendous improvement over the years of early intervention and various helpful therapies that his condition of autism has gradually declined. This must not be mistaken for "being cured" because autism cannot be cured at all in the present times (Lindberg, 2019).

According to Noor (2020), confirmation bias "is the tendency of people to favor information that confirms their existing beliefs or hypotheses" (para. 1). A confirmation bias can occur when an individual provides more weight to evidence that confirms his/her belief and undervalues evidence that could have otherwise disproved it. "People display this bias when they gather or recall information selectively or when they interpret it in a biased way. The effect is stronger for emotionally charged issues and for deeply entrenched beliefs" (Noor, 2020, para. 1).

Table 13. The GARS-2 Parent Interview Results (Month/Year of Administration: March 2021)

GARS-2 Section IV	<i>Delays in</i>		<i>Abnormal Functioning in</i>			Total Score
	Social Interaction	Language used in Social Communication	Social Interaction	Language used in Social Communication	Symbolic or Imaginative Play	
Score	2/5	4/5	4/5	2/5	4/5	16/25
Percentage	40%	80%	80%	40%	80%	64%

Despite the high likelihood of confirmation bias in the GARS-2 administration, however, interestingly, the GARS-2 results (see Table 13 above) under its Parental Interview have indicated significant

challenges in many areas when JC was in the first 3 years of his life. A score of 64% is indicative of a developmental delay and anomaly.

Block IV – Social-Emotional Skills & Abilities

Socio-emotional skills and abilities comprise of adaptive, internalizing and externalizing behavioral skills (Pulkkinen, Kaprio, & Rose, 2006) and are concerned with what are known as *good people skills*. All these skills are dependent on an individual's motivational needs (Maslow, 1943) as well as his/her mind (perception), personal belief, emotions and maturity level that are developing throughout the course of his/her lifetime. This is termed as psychosocial development (Erikson, 1950). The socio-emotional domain encompasses qualities that are prerequisites for socially acceptable behaviors in children, such as desirable interests, attitudes, values, and character development (Kratiwohi, Bloom, & Massa, 1964). Learning in this domain is often challenging because of its subjective nature.

“Unlike sensory-motor and cognitive skills that can be evaluated by written examination or practical testing, socio-emotional behavioral skills are difficult to identify, quantify, and assess” (Chia, 2008, p. 30). Hence, the intervention approach to remedy deficits in this area of concern includes social skill training, behavior modification, play therapy and counselling. An example is the Multidimensional Emotional Questionnaire (Klonsky, Victor, Hibbert, & Hajcak, 2019).

- **Multidimensional Emotional Questionnaire**

Multidimensional Emotional Questionnaire (MEQ; Klonsky, Victor, Hibbert, & Hajcak, 2019) is a self-report tool which measures both discrete emotions and broad dimensions and takes into account the time-course of emotional experience, and distinguishes emotional reactivity and regulation. Ten discrete emotions (five positive and five negative) are assessed for four components of emotional reactivity namely; frequency, intensity; persistence and one's ability to regulate the emotion (Klonsky, Victor, Hibbert, & Hajcak, 2019).

The MDEQ was selected to evaluate JC's social-emotional skills and abilities as he demonstrates the ability (based on his DAP:IQ) to complete a self-report tool on his own. This test was done when JC was 14 years 8 months.

Table 14. MDEQ Results (Month/Year of Administration: December 2020)

Emotions	Subtotal Raw Score	Percentage	Example(s)
1. Happy	12/20	60%	Example: Watching videos & Korean Dramas
(a) Frequency	4	2 or 3 times each day	
(b) Intensity	3	Moderate	
(c) Duration	2	1-10 mins	
(d) Ease of Regulation	3	Moderate	
2. Sad	10/20	50%	Example: When I cannot do well for exam
(a) Frequency	2	About once per week	
(b) Intensity	3	Moderate	
(c) Duration	2	1-10 mins	
(d) Ease of Regulation	3	Moderate	
3. Afraid	10/20	50%	Example: very loud thunder and sudden loud noises
(a) Frequency	1	Once per month or less	
(b) Intensity	4	High	
(c) Duration	2	1-10 mins	

(d)	Ease of Regulation	3	Moderate	
4.	Excited	14/20	70%	Example: thinking about Mr Bean/roller coaster
(a)	Frequency	5	More than 3 times each day	
(b)	Intensity	4	High	
(c)	Duration	2	1-10 mins	
(d)	Ease of Regulation	3	Moderate	
5.	Angry	11/20	55%	Example: losing my things
(a)	Frequency	4	2 or 3 times each day	
(b)	Intensity	3	Moderate	
(c)	Duration	2	1-10 mins	
(d)	Ease of Regulation	2	Easy	
6.	Ashamed	11/20	55%	Example: when I cannot stop myself from laughing and laughing
(a)	Frequency	4	2 or 3 times each day	
(b)	Intensity	2	Low	
(c)	Duration	2	1-10 mins	
(d)	Ease of Regulation	3	Moderate	
7.	Enthusiastic	10/20	50%	Example: play game on iPad & TV
(a)	Frequency	3	About once per week	
(b)	Intensity	3	Moderate	
(c)	Duration	2	1-10 mins	
(d)	Ease of Regulation	2	Easy	
8.	Proud	10/20	50%	Example: when I get good marks for exam
(a)	Frequency	2	About once per week	
(b)	Intensity	3	Moderate	
(c)	Duration	3	11-60 mins	
(d)	Ease of Regulation	2	Easy	
9.	Anxious	10/20	50%	Example: thinking about not doing well for exams
(a)	Frequency	2	About once per week	
(b)	Intensity	3	Moderate	
(c)	Duration	2	1-10 mins	
(d)	Ease of Regulation	3	Moderate	
10.	Inspired	12/20	60%	Example: relaxation routines
(a)	Frequency	2	About once per week	
(b)	Intensity	4	High	
(c)	Duration	3	11-60 mins	
(d)	Ease of Regulation	3	Moderate	

JC’s current emotional states of mind are in the easy-to-moderate ease of regulation with moderate to high intensity. The MDEQ results have also helped in confirming the challenges the boy encounters in his sensory modulation and social/emotional behavioral responses that are very much of psychogenic nature due to his condition of ASD.

Block V – Cognitive Skills & Abilities

- **The Digit Memory Test (DMT)**

The Digit Memory Test, which consists of two components: (i) Digits Forward, and (ii) Digits Backward, is an assessment procedure used by specialist teachers to find out the verbal memory of their students (Turner & Ridsdale, 2004).

In scoring the test, the “[T]otal number managed (ticks) backwards and forwards are added together. This can also be expressed as a percentile equivalent. This test was administered for assessment of auditory attention and verbal memory (Nilsoge et al., 2016, p. 8). This test was administered by the author when JC was 14 years 11 months to obtain a quick indication of JC’s current Working Memory Index (WMI) which was not available from his previous WISC-IV assessment.

Table 15. The Digit Memory Test (DMT) Results (Month/Year of Administration: March 2021)

Total forwards and backwards:	15
Standard Score:	96
Percentile Rank:	39%ile

Based on the DMT results, JC achieved a standard score of 96, which places him in the 39% percentile. This means that JC scored within the average range, and according to Holmes, Gathercole and Dunning (2009), it suggests that the boy should be capable of making good academic progress during his school years.

- **GAPADOL Reading Comprehension Test**

This test, which uses a Cloze Technique, is designed to identify the level of reading ability of adolescent children (McLeod & Anderson, 1972). As the Verbal Comprehension Index (VCI) of the WISC-IV was not previously computed, this test has been selected as a substitute to identify JC’s current level of Verbal Ability at his chronological age of 14 years 11 months.

Table 16. The GAPADOL Results (Month/Year of Administration: March 2021)

Raw Score:	18
Reading Age from Raw Score:	10.0
Chronological Age (at the time of testing):	14.11

JC’s GAPADOL results (see Table 16) shows that his reading age of 10 years 0 month was almost five years behind his chronological age. The score of 18 indicates a score that places him in the bottom 10% of his age group.

- **Progress Report from PL School for 2019 & 2020**

His past year school examinations results shown below has been selected as an indication of JC’s academic capacity.

Table 17. Progress Report (Academic Years: 2019-2020)

Subject	Marks Scored & Grade (2019)	Marks Scored & Grade (2020)
Art	76/100 (A)	82/100 (A)
Computer Application	80/100 (A)	86/100 (A)
Design & Technology	69/100 (C)	89/100 (A)
English Language	65/100 (C)	62/100 (C)
Food & Consumer Education	60/100 (C)	75/100 (A)
Life Readiness	Excellent	Excellent
Mathematics	90/100 (A)	89/100 (A)
Physical Education	Satisfactory	Satisfactory
Science	86/100 (A)	75/100 (A)

Overall Comments:

- JC is a self-motivated learner. He demonstrates enthusiasm in learning and is able to complete his work independently. He is given the Most Competent Pupil Award in his class (2019).
- JC is meticulous and prompt in the submission of work. He is a self-directed learner. He has high expectations of himself and is goal-oriented. He is able to complete work independently (2020).

Based on his progress report taken from the past two years (2019-2020), JC has demonstrated the ability to attain good results for most of his academic subjects, with his strength being in Mathematics.

2. Conclusion

The results obtained from the DAP-IQ administration show that JC's standard score of 104 (within the average IQ range of 90-110) can be translated to an age equivalent of 14 years 9 months and/or above (see Table 1 for DAP-IQ results). This also means that at the point of the test administration, JC was actually functioning 5 months above his chronological age. This piece of information was not available more than seven years ago as his FSIQ could not be computed due to his incomplete VCI. It is an important information to have as it constitutes one of the several elements that set the foundation level of innate abilities as stated in the hierarchy of abilities and skills. The innate abilities deal with the use of language to communicate, abstract thoughts and reasoning skills, memory retention as well as problem solving skills (Chia, 2008). With this information, it tells the teachers and therapists working with JC that the boy possesses the capacity to access learning through abstract materials (Cooijmans, 2005).

Next, the adaptive behavioral skills are functional living skills needed to meet the day-to-day demands in one's environment and these include being able to effectively and independently take care one's wellbeing and to interact with other people. Children with autism have poor executive functioning (Chia, 2012) and often need direct instructions in adaptive behavioral skills, which in turn require the use of good working memory and executive functioning skills (Holmes, Gathercole & Dunning, 2009). However, this is not an issue of concern for JC, whose scores are within typical range of development as compared to his same-age peers (see Table 11 for detail). The main challenge that he is currently facing does not have a major impact on the overall score of the ABSC measure: the use of language use for communication. His score on communication in the ABSC administration reveals that though within the normal range, JC does not hold conversation at age-appropriate language level. Though the boy is generally able to get his message/idea across as a communicator, he does so (e.g., make requests, ask questions) to meet his basic needs and for simple social interaction. He is observed to be not fluent at communicating his feelings to others.

According to Williams, Botting and Boucher (2008), children with autism are often associated with having language impairment and tend to use sentences which are grammatically less complex. This

language impairment/difficulty is also reflected in his GAPADOL test (see results in Table 16) where he was found to be five years behind his chronological age. Similarly, English is his weakest academic subject in school according to his progress report (see Table 17 for detail).

Nonetheless, unlike most individuals with autism who experience difficulty with working memory, JC has an average working memory which is an important skill in learning Mathematics (Rosenfeld, 2019). This is reflected on his progress report from the past 2 years whereby JC attained superior results for his Mathematics examination.

Although the GARS-2 results suggest the unlikelihood of JC having autism, it must be noted that one can only have their symptoms reduced or eliminated (Hobbs, 2021) instead of being cured of it (Lindberg, 2019). JC's manifestation of autism-like traits (at 26% of the traits related to ASD on the SP-CQ administration) can be traced in the results of his SP-CQ administration with additional inputs from SP-S and SSP (see Tables 3 to 10 for detail) and also the Parental Interview in the GARS-2 administration. Based on the results found in the SP-CQ sub-sections on Sensory Modulation, and Behavior and Emotion Response, challenges which JC faces are (what this author feels) the prodromal causative traits related to ASD rather than traits related to ODs and/or SPD.

Tiwari (2021) argues that autism being a spectrum disorder, i.e., "an individual can be a little autistic or extremely autistic, and people can have shifting indications" (para. 5). This suggests a broad autism phenotype, ranging from a milder phenotype in family members of individuals with autism, subjectively characterized with the classical triad of impairments (in social, communication, and limited interests and behavior) to the more extensive broader autism phenotype. "The broader autism phenotype (BAP) itself is anything but a demonstrative element" (Tiwari, 2021, para. 13). In other words, BAP depicts "a considerably more extensive scope of people who display issues with character, language, and social-behavioral qualities at a level that is viewed as higher than normal yet lower than is diagnosable with autism" (Tiwari, 2021, para. 6). Perhaps one good recommendation that has been suggested by Xie (in private communication) to validate the autism diagnosis of JC is to put him through a test known as the Social Responsiveness Scale-2nd Edition (SRS-2; Constantino & Gruber, 2012).

Furthermore, the results from his MDEQ (refer to Table 14 for detail) also help to confirm the challenges he continues to encounter in his sensory modulation and social/emotional behavioral responses that are very much of psychogenic nature due to his autistic condition. Nonetheless, with the consistent interventions which JC started to receive when he was young and has continued over the years, he has in fact improved tremendously to the point where he is able to fit almost within typical range (Koegel et al., 2014), and also to lead the life of a typical teenage boy. For instance, JC is able to appreciate watching a Korean television drama series and idolizing pop singers. He also enjoys playing computer games.

According to American Psychiatric Association (2013), an individual's condition of autism is no longer evaluated solely on its severity but rather the level of support that is needed to meet the challenges s/he faces. An individual with autism who needs some support will be considered to be at ASD Level 1. Another individual with ASD who needs substantial support will be placed at ASD Level 2. Finally, for an individual with severe autism, s/he will need very substantial support and will be placed at ASD Level 3. The more support that is needed, it indicates the higher degree of severity in autism (Camulli & Goh, 2018).

Finally, with the results gathered and consolidated from a battery of tests in the X-BA, both teachers and therapists working with JC can be certain that the boy – given the broad autism phenotype – can now be put on ASD Level 1 support to meet his needs on a wider range of available resources rather than when he was provided ASD Level 2 support previously.

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Notes

Note 1. JC is the initials of the client's name to keep his actual name in full privacy and confidentiality as required by the law in Singapore.

Note 2. SUR = Sensory Under-Responsivity (Much less than others); SOR = Sensory Over-Responsivity (Much more than others). However, in the recent update on the understanding of Sensory Processing (based on Dunn's model) for Infant/Toddler Sensory Profile, under-responsive is not equivalent to *less than others*, and over-responsive is not equivalent to *more than others*. *Less than others* simply means that the person does the behaviors listed in that grouping (sections or quadrant groups) less than typical peers. *More than others* simply means that the person does the behaviors listed in that grouping (sections or quadrant groups) more than typical peers. When discussing general sensory responses, we can use the terms under-responsive and over-responsive (e.g., Tommy is generally under-responsive to his environment) (Psychological Corporation, 2003).