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Differences in Executive Functions among Individuals with Autism Spectrum Disorder According to the ICD-11 Classification

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Abstract
The present study aimed to examine differences in executive functions among individuals with Autism Spectrum Disorder (ASD) according to the ICD-11 classification. The study sample consisted of 71 individuals diagnosed with ASD. Executive functions were assessed using a scale developed by the researcher, comprising 40 items measuring eight executive functions. The results indicated a general decline across all executive functions. The most prominent executive difficulty observed among individuals with ASD was initiation. The findings further showed that there were no statistically significant differences associated with the variable of intellectual ability, with the exception of working memory, for which statistically significant differences were identified. In relation to the gender variable, the results revealed statistically significant differences in favor of males in attention. Additionally, statistically significant differences were found in favor of verbal individuals on the dimensions of cognitive flexibility, planning, and self-monitoring.

Keywords: Executive Functions, Individuals with Autism Spectrum Disorder, ICD-11 Classification

1. Introduction

Various cognitive skills are among the most essential competencies individuals require for purposes of planning, organization, thinking, and other higher-order processes that must be mastered alongside academic skills. Accordingly, educators seek to emphasize these skills by training students in modes of thinking, attention, organization, planning, and problem solving, and by enabling them to apply these skills in their daily lives. These skills are referred to as executive functions, a concept that is considered relatively recent within the field of neuropsychology, particularly in research and studies that have linked executive functions to special education populations, including autism.

The concept of executive functions refers to the individual's ability to control behavior and regulate performance in order to achieve desired goals, such as successful school performance. Executive functions encompass a range

of diverse cognitive abilities and are classified among higher-order cognitive skills, including planning, organization, and self-monitoring. These functions are composed of basic executive functions such as inhibitory control, emotional regulation, and working memory (Huizinga et al., 2006).

Executive functions regulate behavior by allowing a person to self-evaluate behavior. Executive functions are the system under which an individual's behavior and thoughts are organized and directed in a flexible fashion toward goals. They are central to processing information in the brain, from reception and integration of information, by processing and generating appropriate responses to situational demands (Lawson et al., 2015).

Pribram, one of the first scholars to use the term, introduced the concept of executive functions in 1973 and had a great impact on understanding the role of the prefrontal cortex. His work helped to explain the complex structure of executive functions, revealing both behavioral and cognitive components of how human behavior is regulated. These functions are associated with behavioural adaptation and their maturation is dependent on the level of complexity of task-related and the individual (Rosenthal et al., 2013).

Contemporary thinking recognizes executive functions as a narrow, multi-dimensional entity consisting of several higher-order cognitive processes or abilities. These processes are at least one or more processes that include: initiation of task, generation of hypothesis, generalization, cognitive flexibility, decision making, self-regulation, use of feedback, self-awareness and inhibitory control. Executive functions are generally defined as a combination of higher-order cognitive abilities that inform strategic planning, problem-solving, cognitive flexibility, self-regulation, and goal-directed behavior (Khudair, 2019).

Naglieri and Goldstein (2013) also explained that executive functions are related to cognitive processes driven by the PFC. Deficits in these functions can impact multiple aspects of the social, educational and vocational functioning of a person, including impairments in core skills that negatively affect daily life activities to different degrees based on the severity of the dysfunction. In their eyes, executive functions are a complex set of interrelated functions that create purposeful, goal-directed behavior that serves as a means for problem-solving in everyday and practical life.

Executive functions are important because they need to be adaptable and activated in order to successfully engage in everyday life situations. These functions enable effective behavior strategies and help to better understand the value and meaning of unexpected situations as well as propose a variety of alternate strategies to address emerging changes and prevent inappropriate behavior (Garon et al., 2008).

Executive functions are important in special education because they are central to every cognitive process, especially among special education populations. Executive functions coordinate, organize, plan, monitor, inhibit, and modify neural communications in the brain and between the brain and other structures, such as the thalamus and cerebral cortex, to ensure effective student adaptation in the school environment and optimal utilization of learning experiences without encountering barriers that prevent participation (Haddah, 2014).

Executive positions also influence the ability to perform well in many ways, including academic achievement, social performance, and daily living. Types of impairment in certain executive functions in generally developing children can lead to more general developmental, cognitive, and social difficulties. These difficulties particularly concern students in special education, particularly those with specific learning disorders such as attention-deficit/hyperactivity disorder and autism spectrum disorder (Craig et al., 2016).

ASD students are characterized by structural and functional neurological deficits, including deficits in executive functioning during childhood, and are therefore likely to encounter more challenges in meeting basic everyday needs. The parents report that ASD patients between the ages of 7 and 14 have significant deficits in executive functions related to daily activities compared with typically developing peers at the same age. Thus, the aim of improving executive functions is a major component of ASD intervention and the improvement of these students' social competence (Vogan, 2018).

Autism spectrum disorder is one of the most talked about developmental conditions. Its increasing prevalence has attracted considerable attention here in the United States, and has become known around the world. There remains a debate on whether autism should be understood most clearly as a disorder or a set of uniquely unique abilities that could serve as strength areas (Urbanowicz et al., 2019).

The World Health Organization defines autism spectrum disorder as a widespread developmental disorder that occurs in the first three years of life and is characterized by challenges in social interaction, communication and limited repetitive behavior. Males experience the disorder three to four times more often than females (World Health Organization, 2013).

The American Psychiatric Association defines autism spectrum disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) as a neurodevelopmental disorder with persistent deficits in social communication and social interaction across contexts. These deficits include impairments in social-emotional reciprocity, from reduced sharing of interests or emotions to failure to initiate or respond to social interactions. This disorder also leads to deficits in nonverbal communicative behaviors used for social interaction including deficits in verbal and nonverbal communication, eye contact, body language, gesture use, and facial expressions. Also, people have difficulty with establishing, maintaining and interpreting social relationships, and they have difficulty with repetitive and restricted behavior, interests or activities such as stereotypical movements, insisting on sameness, and inflexible adherence to routines. These symptoms are common in early developmental years and present clinically significant deficits in social, occupational, or other important areas of functioning, underscored by the importance of early development of communication skills among children (American Psychiatric Association, 2022).

1.1 Executive Functions and Individuals with Autism Spectrum Disorder

Evidence consistently supports autism spectrum disorder's deficits in several executive functions. These are at greater executive dysfunction than their typically developing peers or those with some other disorders, such as specific learning disorders (Semrud-Clikeman et al., 2008). Steele et al. (2007) reported that executive deficits in ASD are particularly evident in working memory, particularly spatial working memory, reduced use of organized search strategies, impaired planning ability, rigid behavioral patterns, and deficits in cognitive flexibility (Hill, 2004).

Lawson et al. (2015) also reported that ASD sufferers experience impairments in planning, cognitive flexibility, response inhibition, and concept formation. Hovik et al. (2017) reported individuals with ASD and ADHD possess deficits in self-monitoring and executive dysfunction, which have negative effects on academic performance, social capabilities, adaptive behavior, and life quality (Pellicano, 2010).

The cognitive impact theory of ASD of autism spectrum disorder states that ASD symptoms are the result of executive function deficits. Executive functions include inhibition and control of communication and behavior in social interactions, and flexible language use. Repetitive behaviors involve stereotyped movements and behavioral rigidity. Russo et al. (2007) listed three factors: (1) social communication; (2) inflexible language and behavior; and (3) sensory and motor repetition, with the latter two likely resulting in deficits of cognitive flexibility and motor perseverance, respectively.

Executive dysfunction can explain many typical ASD behaviors, but executive deficits are not unique to ASD and can also be found in other disorders, such as learning disabilities and ADHD. Working memory impairments are present in many forms. But, studies of the functions of executive functioning in ASD are critical as the type of executive challenges revealed provides an important insight into the struggles experienced daily by ASD patients and the commonality of these disorders with other disorders (Russo et al., 2007).

Those with ASD experience challenges in inhibiting control and often perform very badly in their daily lives. For instance, inappropriate responses must be suppressed in order to respond appropriately in social interactions. In the same way, language use requires breaking free of dominant or literal meanings to produce contextually

appropriate interpretations. ASD often has behavioral characteristics associated with literary interpretation. Although these behaviors have negative consequences, inhibition difficulties can also lead to repetitive behaviors (Leung et al., 2016).

ASD individuals with ASD also experience working memory problems, as reported by parents who report difficulty with following instructions. Children who hear and understand well have difficulty completing multiple tasks at once. The process of understanding and storage of information can be challenging, but it is challenging to manipulate and apply information when it is needed. Working memory is critical to everyday functioning, such as remembering directions or names, and in particular for educational contexts, where teachers lead learning or parents guide learning. Working memory deficiencies can also impact social behavior; effective interaction requires rapid processing and integration of facial expressions, tone of voice, and body language in order to respond appropriately (Causton-Theoharis et al., 2009).

Repetitive, stereotyped behavior is a major diagnostic hallmark of ASD, and has an important social and communication impact. One of the hallmarks of behavioral inflexibility is cognitive flexibility, a key executive function in the explanation of behavior associated with ASD. Cognitive flexibility facilitates rapid change in task and strategy during everyday tasks. Individuals with ASD may have difficulty responding to sudden events as a result of their inability to adapt their behavior flexibly to changing contexts. Nevertheless, while evidence supports the association between ASD symptoms and cognitive flexibility is inconsistent, empirical research has not found a strong association between symptoms of ASD and cognitive flexibility, even though cognitive flexibility is not the only factor implicated in WCST performance (Verté et al., 2006).

Pugliese et al. (2015) investigated the role of executive functions among children and adolescents with ASD, and found a strong relationship between executive functions and adaptive behavior. Poorer adaptive functioning was associated with difficulties with executive functions. Metacognitive factors such as initiation of tasks, working memory, planning, organization, and self-monitoring were more predictive of adaptive behavior, particularly communication and social skills, than intelligence was predictive of ASD symptoms.

Al-Huwaidi and Al-Sa‘idi (2016) found differences between ASD-hard-working children and mild intellectual disability in performance in executive function. They found statistically significant differences between the two groups in favor of the mild intellectual disability group.

Vogan (2018) conducted a study to better understand the differences in executive function deficits between ASD and typically developing children. Results indicated structural and functional neurological impairments in executive function during childhood, as well as increased environmental demands and challenges. Parental reports showed that children with ASD, 7–15 years, experienced marked deficits in daily executive functioning, indicating the importance of targeted intervention to reduce symptoms and improve social competence.

Ali et al. (2020) investigated executive function and working memory efficiency among students with ASD and correlated autistic characteristics, reciprocal social interaction deficits, repetitive behaviors, and performance on executive function and working memory components. It found strong associations between autistic traits and performance in executive function and working memory as well as correlations between executive function and working memory components. There were no gender differences and autistic traits were predictive of executive function and working memory performance.

El-Sayyid Ahlah et al. (2021) found the highest levels of executive function for children with ASD and identified the most impaired executive functions. The results showed that monitoring, cognitive flexibility, working memory, and initiation were severely impaired, as was response inhibition, planning, emotional regulation, and organization of materials.

Gentil-Gutiérrez et al. (2022) used a descriptive, cross-sectional, multicenter design to investigate executive function development among children and adolescents with ASD in home and school settings with 102 participants including parents and special education professionals. Results indicated that although executive function

difficulties were common, perceptions of these difficulties varied between informants, in different contexts (school versus home).

1.2 ICD-11 Classification of Autism

The ICD-11 defines autism spectrum disorder as having many possible characteristics, some of which are not necessarily expected, but may be difficult to detect. There is no number of symptoms that is required by ICD-11 to identify a patient.

ICD-11 changes the notion of autism spectrum disorder from a strictly neurodevelopmental disorder (medical model) to a socially rooted disorder based on identity-related experiences within the body. This change presents diagnostic challenges since subjective, and ambiguous constructs, like "compensation" and symptoms that "emerge only later," are inclusion, giving false diagnoses that degrade the assessment power of observed behavioral features. ICD-11 defines autism into seven subcategories based on functional language and intellectual ability (World Health Organization, 2025). Some researchers believe ICD-11 classification allows for more accurate categorization of children by linguistic and cognitive ability so that educators can select the educational goals and instructional strategies to be followed (Reed et al., 2019).

1.3 Study Questions

1. What is the level of executive functions among children with autism spectrum disorder?
2. Are there statistically significant differences in executive functions among individuals with autism spectrum disorder according to ICD-11 classification (verbal vs. nonverbal; average vs. below-average intellectual ability)?
3. Are there statistically significant differences in executive functions among individuals with autism spectrum disorder attributable to gender and age group.

2. Procedures

2.1 Study Methodology

The descriptive–analytical research design was employed, as it is appropriate for the procedures and objectives of the present study.

2.2 Study Participants

The study sample consisted of 71 individuals with Autism Spectrum Disorder, including 48 males and 23 females.

Table 1: Study Sample Characteristics

Age Group	Intellectual Ability (Average or Above)	Intellectual Ability (Below Average)	Verbal	Nonverbal	Total
3–10 years	13	26	20	17	37
11–14 years	10	22	15	19	34
Total	23	48	35	36	71

Source: Author

2.3 Study Instrument

The study instrument was developed based on a review of several relevant references and sources addressing executive functions, including Al-Aradi and Al-Owaidi (2023), Manenti et al. (2024), and Failla et al. (2024).

2.3.1 Instrument Description

The instrument consisted of 40 items formulated in both positively and negatively worded statements, designed to measure executive functions using a four-point Likert scale.

2.3.2 Scoring Key

Mean Score Range	Interpretation
3.00–4.00	High level of executive function impairment
2.00–2.99	Moderate level of executive function impairment
Below 2.00	Low level of executive function impairment

Source: Author

2.4 Validity and Reliability of the Instrument

2.4.1 Validity Evidence

Content validity was established through expert judgment by presenting the instrument to specialists in special education. Their feedback and recommendations were incorporated, and an agreement rate of 80% was adopted as the criterion for acceptance.

2.4.2 Reliability Evidence

Reliability was assessed using Cronbach's alpha coefficient, calculated on a pilot sample of 20 individuals. The results indicated that the Cronbach's alpha value for the total instrument score was 0.81, reflecting acceptable internal consistency.

2.5 Study Procedures

- The study instruments were developed based on a review of relevant literature.
- Validity and reliability indicators were verified using a pilot sample of 30 individuals with Autism Spectrum Disorder.
- The instruments were finalized in their definitive form, consisting of 40 items.
- The instrument was administered electronically using a Google Forms format.
- A total of 71 specialists completed the instrument.
- Data were analyzed using a statistical analysis software package.

3. Results

What Is the Level of Executive Functions among Individuals with Autism Spectrum Disorder?

To answer this question, arithmetic means and standard deviations were calculated for the main dimensions of the scale. Table 2 presents the results related to this question.

Table 2: Means and Standard Deviations for the Main Dimensions of the Executive Functions Scale

Dimension	Mean	Standard Deviation
Self-monitoring	2.39	0.95
Attention	2.32	0.39
Emotional regulation	2.27	0.44
Flexibility	2.36	0.88
Behavioral inhibition	2.92	0.85
Initiation	3.12	0.65
Planning	2.74	0.62
Working memory	2.62	0.45

Source: Author

As shown in Table 2, people with autism spectrum disorder exhibit deficits in all aspects of executive function. The highest mean score was obtained for initiation and the lowest mean score was obtained for emotional regulation.

This suggests that individuals with ASD have a markedly lower initiation level of executive functions. A similar impairment appears to be more closely related to difficulties in activating self-directed, goal-oriented behavior than to deficits in cognitive ability. Despite knowing the action to take, the transition from “intention” to “action” is interrupted by malfunctioning executive control mechanisms that generate response and initiate behavior without prompts from outside.

This is possible because initiation is dependent on the efficiency of frontal neural networks responsible for planning and monitoring. A drop in their efficiency causes slower task completion and more dependence on external guidance. In addition, education can enhance the role of direct instruction by reinforcing behavior initiation through cues or prompts that negatively influence performance in situations where task control is required by the teacher. In turn, impaired initiation is understood to represent an executive difficulty associated with autism that manifests as hesitation in the beginning of tasks, delayed engagement, and difficulty going between activities.

To determine the level of each executive function, arithmetic means and standard deviations were calculated at the item level. These results are presented in Table 3.

Table 3: Means and Standard Deviations of Items on the Executive Functions Scale

Item	Mean	Standard Deviation
Works effectively for a long period	1.97	0.77
Maintains attention for an appropriate duration	2.61	0.95
Attends to details	2.25	0.89
Focuses on one task at a time	2.32	0.82
Listens well to instructions	2.11	0.89
Is easily distracted	2.68	0.94
Attention (dimension)	2.32	0.39
Remains calm in emotional situations	2.13	0.89
Has difficulty controlling emotions	2.73	1.03
Becomes upset in new situations	2.17	1.12
Expresses emotions appropriately	2.04	0.84
Emotional regulation (dimension)	2.27	0.44
Has multiple ways to solve problems	2.25	1.26
Uses the same solution even if ineffective	2.42	1.13
Modifies behavior according to the situation	2.46	1.24
Has multiple ideas about one topic	2.24	1.27
Adapts to new situations	2.44	0.97
Flexibility (dimension)	2.36	0.88
Has difficulty controlling behavior	2.82	1.00
Does not consider consequences of behavior	3.17	1.01
Has difficulty waiting for their turn	2.83	1.07
Does not keep promises	3.18	1.13
Does not complete time-consuming tasks	2.62	1.13
Behavioral regulation (dimension)	2.92	0.85
Needs guidance to begin tasks	3.70	0.57
Shows low motivation when working	2.76	0.80
Has difficulty initiating tasks	2.73	0.97
Does not initiate conversation	3.27	1.21

Initiation (dimension)	3.12	0.65
Is disorganized	2.75	0.97
Has difficulty managing time	3.54	0.77
Performs multiple tasks simultaneously	2.35	1.17
Preserves personal belongings	2.58	1.31
Completes tasks on time	2.49	1.00
Planning and organization (dimension)	2.74	0.62
Forgets given instructions	2.61	0.90
Remembers steps of task execution	2.00	0.77
Forgets multi-step instructions	2.70	0.87
Needs instructions repeated	2.61	0.90
Does not remember where objects are placed	3.10	0.72
Forgets information heard	2.52	0.94
Working memory (dimension)	2.62	0.45
Corrects own mistakes	2.28	1.27
Learns from mistakes	2.28	1.16
Makes many errors	2.93	1.00
Monitors time while performing tasks	2.23	1.33
Monitors time during task performance	2.24	1.36
Self-monitoring (dimension)	2.39	0.95
Total score	2.58	0.95

Source: Author

Table 3 shows that the weakest performance within the attention domain was related to distractibility. Within flexibility, the most impaired item was difficulty modifying behavior according to context. Within behavioral regulation, failure to keep promises showed the highest mean. In initiation, the most pronounced difficulty was lack of conversational initiation. In planning, difficulty performing multiple tasks simultaneously was evident. Most working memory items reflected impairment, while repetitive errors were most prominent in self-monitoring.

4.1 Differences According to ICD-11 Classification: Intellectual Ability

To examine whether statistically significant differences exist in executive functions according to ICD-11 classification based on intellectual ability (average vs. below average), descriptive statistics were calculated, as shown in Table 4.

Table 4: Means and Standard Deviations According to ICD-11 Intellectual Ability Classification

Dimension	Intellectual Ability	N	Mean	SD
Attention	Average	23	2.21	0.29
	Below average	48	2.38	0.39
Emotional regulation	Average	23	2.05	0.38
	Below average	48	2.30	0.44
Flexibility	Average	23	3.14	0.88
	Below average	48	2.33	0.79
Behavioral inhibition	Average	23	3.16	0.92
	Below average	48	2.86	0.85
Initiation	Average	23	3.46	0.48
	Below average	48	2.95	0.62

Planning	Average	23	3.49	0.56
	Below average	48	2.68	0.55
Working memory	Average	23	2.88	0.36
	Below average	48	2.50	0.51
Self-monitoring	Average	23	3.39	0.74
	Below average	48	2.28	0.93

Source: Author

Apparent differences were observed; therefore, independent samples t-tests were conducted to examine statistical significance. Table 5 presents the results.

Table 5: t-Test Results for Differences According to Intellectual Ability

Dimension	F value	Sig.
Attention	1.254	0.269
Emotional regulation	0.228	0.635
Flexibility	0.047	0.829
Behavioral inhibition	0.041	0.840
Initiation	1.804	0.186
Planning	0.505	0.481
Working memory	3.830	0.057
Self-monitoring	2.326	0.135

Source: Author

Results indicate that no statistically significant differences were found in executive functions according to intellectual ability, with the exception of working memory.

This demonstrates that executive dysfunction associated with autism does not vary greatly in relation to intellectual ability other than working memory, which is directly related to brain activity. The findings also support the assumption that impairments of executive function are associated primarily with neurodevelopmental dysfunction associated with autism and which tend to persist throughout life.

4.2 Differences According to Language Ability (Verbal vs. Nonverbal)

Table 6 presents descriptive statistics for executive functions according to language ability.

Table 6: Means and Standard Deviations According to Language Ability

Dimension	Language	N	Mean	SD
Attention	Verbal	35	2.38	0.34
	Nonverbal	36	2.27	0.43
Emotional regulation	Verbal	35	2.19	0.42
	Nonverbal	36	2.35	0.44
Flexibility	Verbal	35	2.86	0.84
	Nonverbal	36	1.88	0.62

Behavioral inhibition	Verbal	35	2.87	0.82
	Nonverbal	36	2.98	0.90
Initiation	Verbal	35	3.04	0.65
	Nonverbal	36	3.19	0.66
Planning	Verbal	35	3.01	0.67
	Nonverbal	36	2.48	0.45
Working memory	Verbal	35	2.64	0.44
	Nonverbal	36	2.61	0.46
Self-monitoring	Verbal	35	2.93	0.97
	Nonverbal	36	1.87	0.56

Source: Author

Independent samples t-tests were conducted, as shown in Table 7.

Table 7: t-Test Results According to Language Ability

Dimension	F value	Sig.
Attention	2.386	0.127
Emotional regulation	0.072	0.789
Flexibility	6.487	0.013
Behavioral inhibition	0.247	0.621
Initiation	0.007	0.933
Planning	13.305	0.001
Working memory	0.022	0.884
Self-monitoring	21.656	0.000

Source: Author

There were statistically significant differences in flexibility, planning, and self-monitoring between verbal and individuals with written language proficiency. These results suggest that language ability is an important factor for differences in specific executive functions.

4.3 Differences According to Gender

Table 8 presents descriptive statistics by gender.

Table 8: Means and Standard Deviations According to Gender

Dimension	Gender	N	Mean	SD
Attention	Male	48	2.35	0.42
	Female	23	2.28	0.33
Emotional regulation	Male	48	2.27	0.47
	Female	23	2.26	0.36
Flexibility	Male	48	2.36	0.85
	Female	23	2.37	0.96

Behavioral inhibition	Male	48	2.92	0.86
	Female	23	2.94	0.86
Initiation	Male	48	3.08	0.62
	Female	23	3.20	0.72
Planning	Male	48	2.80	0.64
	Female	23	2.61	0.57
Working memory	Male	48	2.61	0.50
	Female	23	2.66	0.32
Self-monitoring	Male	48	2.30	0.90
	Female	23	2.58	1.02

Source: Author

Independent samples t-tests were conducted (Table 9).

Table 9: t-Test Results According to Gender

Dimension	F value	Sig.
Attention	0.609	0.040
Emotional regulation	0.798	0.375
Flexibility	0.356	0.553
Behavioral inhibition	0.078	0.780
Initiation	0.830	0.365
Planning	1.115	0.295
Working memory	6.562	0.013
Self-monitoring	1.244	0.269

Source: Author

Results show that males had the highest level of attention while females had the lowest level of attention. This suggests attention may be more responsive to gender differences in ASD, with males having a better attention performance.

4. Conclusions

Individuals with autism spectrum disorder have a significant impact on executive functions. Lack of executive functions was not found according to the ICD-11 intellectual ability or language classifications because there were no differences in impairment across children regardless of cognition or linguistic ability. This finding is consistent with the neurodevelopmental nature of autism, which is found early in life and represents widespread executive dysfunction that indirectly impacts a variety of cognitive and behavioral domains.

Author Contributions: The sole author, A.A.-O, was responsible for conceptualization; methodology; data curation; formal analysis; investigation; resources; writing – original draft; writing – review and editing; visualization; supervision; project administration; and final approval of the manuscript.

Conflicts of Interest: The author declares no conflict of interest

Informed Consent Statement/Ethics approval: This study was conducted in accordance with the ethical principles governing scientific research and in compliance with national and international research ethics standards. All participants were informed of the nature and objectives of the study, and their informed consent was obtained prior to participation. Participation was entirely voluntary, and participants were assured that the data would be used solely for scientific research purposes, with full confidentiality maintained and no disclosure of personal identities. As the study is descriptive and non-experimental in nature, no foreseeable risks to participants were anticipated.

Data Availability Statement: The datasets generated and analyzed during the current study are not publicly available due to ethical restrictions related to the protection of participants' privacy and confidentiality, as the study involved children with autism spectrum disorder. De-identified data may be made available from the corresponding author upon reasonable request and subject to approval by the relevant ethics committee.

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