

## A comprehensive overview of the tools used in diagnosing Autism Spectrum Disorder

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### **Abstract:**

The research aims to highlight the importance of accuracy in diagnosing Autism Spectrum Disorder by identifying the diagnostic procedures to be followed using effective diagnostic tools specifically for this disorder. It also takes into account the conditions and circumstances of applying these tools, in addition to the necessity of linking each of them with a measure of adaptive behavior. This measure can identify areas of difficulty in the child's ability to meet the demands of daily life for a child with Autism Spectrum Disorder.

**Keywords:** deficits, Autism Spectrum, diagnosis, adaptive behavior.

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### **Introduction:**

Today, the world is facing a very serious problem, which is the alarming spread of Autism Spectrum Disorder. According to the latest statistics from the CDC (Centers for Disease Control and Prevention), one in every 68 births results in an autistic child (Saleh, 2021: 237). Based on this and in light of the education of autistic children, the diagnostic process takes on great importance as it forms the cornerstone upon which many decisions concerning the lives of individuals with Autism Spectrum Disorder are built. This helps autistic children to achieve the highest level of adaptation as early as possible. An incorrect diagnosis leads to an inappropriate therapeutic plan that does

not align with the needs and requirements of the diagnosed child, resulting in severe consequences that can delay the child's treatment and deprive them of beneficial early educational and rehabilitative intervention programs that are critical for acquiring various skills in adaptive behavior. This is supported by many recent studies in this field, which confirmed the high degree of neuroplasticity that appears in the child during the early stages of their life, in addition to the psychological effects that arise for parents upon hearing their child's diagnosis. Therefore, special education specialists must be cautious in choosing their terms and exhibit a spirit of responsibility and humanity when dealing with children with Autism Spectrum Disorder and their parents, as parents play an active role in the therapeutic process and it is essential not to overlook this.

Involving parents and caretakers in either gathering information during the diagnostic process or in applying the individual education plan for the child with autism is crucial. They are the primary support who provides the specialist with the course of the therapeutic program being followed, ensuring the accuracy of the initial proposed diagnosis.

In this study, we discuss the advantages and benefits of accurately diagnosing Autism Spectrum Disorder, and we try to gauge the weight of each benefit by looking at previous studies conducted on the topic, as well as the lived reality in our community. Therefore, the research and its results hold significant importance if utilized properly, especially since we are in dire need to learn more about the diagnostic process and become familiar with the measures and tests used to diagnose Autism Spectrum Disorder.

We pose the following question:

- What are the steps followed to diagnose Autism Spectrum Disorder?

To answer this question, we follow a descriptive and analytical approach suitable for this type of study, since our study is theoretical rather than applied; we evaluate the importance of the diagnostic process through the results of some studies, and we also utilize scientific analysis to reach conclusions.

## **1. Previous Studies**

### **1.1. The study by Hosna Ihsan Omar Halwani (1996)**

It focused on the distinguishing diagnostic indicators for children with autism based on their performance on certain psychological scales. The study aimed to explore the theoretical frameworks and models that sought to explain the emergence and development of autism, as well as to identify the characteristics of behavioral disorders that distinguish children with autism. The study also aimed to uncover the possibility of diagnosing autism cases and differentiating them from cases of intellectual disabilities through performance on the psychological scales used in the study, with a sample consisting of 81 children who were assessed using the Stanford-Binet scale, the Goddard scale for intelligence, the Child Behavior Checklist, and the Conners scale for assessing child behavior.

### **2.1. The study by Susan Shakir Majid (2010)**

It aimed to identify the main features of Autism Spectrum Disorder in order to diagnose it and determine its symptoms at different age stages of the child, in addition to mentioning some diagnostic tools used in the field of diagnosing Autism Spectrum Disorder.

### **3.1. The study by Fatima Said Mohammed (2010)**

This study aimed to develop a program to train children with autism in self-management to achieve higher levels of independence in social academic activities, with a sample consisting of 10 children ranging in age. Between the ages of 8 and 12, participants were assessed using the Wechsler Intelligence Scale for Children, the

Egyptian Family Economic and Social Scale, an autism diagnostic scale, a self-management scale, and a self-management training program. The results showed the program's effectiveness in improving adaptive behavior and reducing behavioral problems for high functioning autistic individuals.

#### **4.1. The study by Mohamed Akram Hamdan (2019)**

focused on evaluating parents' experiences regarding the diagnosis process of Autism Spectrum Disorder and its relationship with certain variables. The study aimed to assess parents' experiences around the diagnosis process, with a sample consisting of 24 fathers and 48 mothers of children with autism attending care centers in Saudi Arabia. To achieve the study's objectives, the researcher developed a questionnaire consisting of 39 items measuring parents' experiences regarding the diagnosis process. The results revealed that parents' evaluations of the diagnosis process were at a moderate level in both the overall and sub-dimensions of the study's questionnaire. Additionally, there were statistically significant differences in parents' evaluations of the diagnosis depending on the type of diagnosing institution, favoring private institutions, and also related to economic status, favoring those with higher economic status.

## **2. Theoretical Framework:**

From reviewing previous studies, we conclude the following:

- Our study aligned with most studies in emphasizing the necessity for early diagnosis and screening to achieve the desired results from therapeutic and training programs for children with Autism Spectrum Disorder.
- Most studies have indicated the importance of family involvement in individual programs directed at children with autism.

- Key studies highlighted the importance of designing and developing training programs for autistic children to enhance various adaptive skills aimed at school and social integration.
- Our study differed from some studies that used experimental and quasi-experimental methods to implement training and rehabilitation programs focused on developing adaptive skills in children with Autism Spectrum Disorder.
- Our study also differed from most studies in terms of the sample and research tools, as those studies were field-based, while ours was theoretical.
- Most studies did not rely on modern diagnostic criteria, unlike our study, which emphasized the need to keep up with developments in diagnosis according to the Statistical and Diagnostic Manual, Fifth Edition, released in 2013.
- Our study differs from most previous studies in terms of the topic addressed and the tools used. Most studies focused on adaptive behavior for early intervention, rather than understanding the impact of diagnosis on developing a treatment plan and care. Therefore, the research procedures varied according to the nature of each subject.

### **3. Diagnostic Procedures:**

Diagnosing cases of autism spectrum disorder requires a multidisciplinary team including a psychiatrist, neurologist, psychologist, speech therapist, pediatrician, and psychomotor specialist. Team members conduct a comprehensive assessment along with observations from the parents or the child's supervisor after the child turns three, because "most criteria for diagnosing autism cannot be determined with certainty before the age of two or three" (Al-Shami, 2004: 28).

\*The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, known as "DSM-5," tells us that to diagnose autism spectrum disorder, specific diagnostic criteria must be met: 3 out of 3 in Criterion A and at least 2 out of 4 in Criterion B.

### **1.3. Criterion A:**

Persistent impairment in communication and social interaction across multiple contexts, currently or as evidenced by history, as manifested by the following:

- Deficits in emotional reciprocity, ranging from atypical social approach and failure to engage in back-and-forth conversation to reduced sharing of interests, emotions, or affect, extending to failure to initiate or respond to social interactions.
- Deficits in nonverbal communicative behaviors used for social interaction, ranging from poorly integrated verbal and nonverbal communication to abnormal eye contact and body language or deficits in understanding and using gestures, to a complete lack of facial expressions and nonverbal communication.
- Deficits in developing, maintaining, and understanding relationships, ranging from difficulties in adjusting behavior to different social contexts to challenges in sharing imaginative play or making friends, to a complete lack of interest in peers.

### **2.3. Criterion B:**

Specified patterns of behavior, interests, or activities, with at least two of the following being present, currently or as evidenced by historical records:

- Repetitive patterns of movement or use of objects, or speech, such as simple motor patterns, arranging toys or flipping objects, verbal echoing, and idiosyncratic phrases.
- Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior, such as extreme distress at small changes, difficulty with transitions, rigid thinking patterns and greeting rituals, and the need to take the same route or eat the same food every day.
- Highly specific and unusual interests in intensity or focus, such as intense attachment or preoccupation with unusual objects and overly restricted interests.

— Excessive or diminished response to sensory input or unusual interest in sensory aspects of the environment, such as clear indifference to pain, temperature, and negative responses to specific sounds or textures, to over-sensing and touching things, and being captivated visually by lights or movement.

### **3.3. Determining current severity:**

Severity is based on social communication deficits and the specific, repetitive patterns of behavior.

C / — Symptoms appear in the early developmental period, but the impairment may not become evident until social communication demands exceed limited capacities or may be masked by later-learned strategies in life.

D / — Symptoms cause clinically significant impairment in current social and occupational functioning, or in other important areas.

E / — These disturbances are not better explained by intellectual disability or any global developmental delay.

Intellectual disability and autism spectrum disorder often co-occur, and for a dual diagnosis of intellectual disability and autism spectrum disorder, social communication should be below what is expected for their general developmental level.

Individuals with established diagnoses under the fourth edition criteria for autism disorder, Asperger's disorder, or pervasive developmental disorder not otherwise specified should be given a diagnosis of autism spectrum disorder.

Individuals with clear impairments in social communication but whose symptoms do not meet the criteria for autism spectrum disorder should be assessed for

communication disorders. , but their symptoms do not meet the criteria for Autism Spectrum Disorder; they should be evaluated for a Social Communication Disorder. It determines whether: -- with or without accompanying intellectual impairment. -- with or without accompanying language impairment. -- associated with another neurodevelopmental, mental, or behavioral disorder. -- associated with a known medical or genetic condition or environmental factor. An additional code is used to specify the accompanying medical or genetic condition, such as F06.1.

#### **4. Supplementary medical tests for diagnosis:**

The general medical exam is one of the most important tests in this context, as its significance lies in ruling out the organic aspect of the condition on one hand and identifying the disturbances and disabilities associated with Autism Spectrum Disorder on the other. This allows the care team to prepare everything needed for treating the conditions that come with autism, including dietary plans, hearing devices, and seizure medications, among others. Based on the symptoms that appear, the doctor will determine the child's need for medical tests individually.

##### **1.4. Hearing Test PEA:**

This stands for "Les Potentiels Evoqués Auditifs," which refers to auditory evoked potentials or brainstem response through activation transmitted to it via electrical impulses. This allows us to accurately diagnose the type and severity of hearing loss. The test also reveals the presence of hypersensitivity to sound (Hyperacusis), which has often been considered a common symptom among individuals with autism. Studies provide preliminary evidence that almost one in five individuals with Autism Spectrum Disorder experiences significant sound sensitivity, a rare phenomenon in typically developing children.

##### **2.4. Chromosomal Analysis:**

This is the "Chromosomal analysis to discover the fragile X chromosome syndrome" (Mahmoud, 2015: 45).

### **3.4. Electroencephalography (EEG):**

Electroencephalography (EEG) is considered one of the earliest methods used to examine the brain. Dr. Lotfy El-Sherbini emphasizes in the field of autism spectrum disorder that "treatment follows a plan that includes routine healthcare, diagnosis of disabilities and associated health conditions, and conducting necessary tests to confirm the diagnosis, such as EEG" (El-Sherbini, 2015: 24). Research and studies that utilized it have shown irregularities and disruptions in the electrical activity of the brain, as well as pathological seizures in individuals with autism. These findings were clear indicators that support the biological basis for the emergence of disorder symptoms. One early study in 1974 showed that there were abnormalities in brain electrical activity in 58% and seizure episodes in 19% of a sample consisting of 58 adolescents with autism. Other studies have shown abnormalities ranging from 13% to 83% in the electrical activity of the brain in individuals with autism, depending on the research methodology, sample, and criteria used to interpret this activity. However, the largest and most recent study conducted by Tsai in 1985 on a sample of one hundred autistic children revealed abnormalities in brain electrical activity in forty-three of them, indicating the presence of spread nerves or slow waves. This study confirmed that this disruption in brain electrical activity is often accompanied by pathological seizures in those with autism spectrum disorder.

### **4.4. Magnetic Resonance Imaging (MRI):**

Magnetic Resonance Imaging (MRI) is a technique that allows for two- or three-dimensional imaging of the human body for diagnostic purposes. The MRI machine exploits the magnetic properties in the human body to capture images. The MRI technique relies on utilizing the magnetic properties within hydrogen protons in the body. "MRI studies and examinations have shown that the brain size in autistic

children is larger than that of typically developing children" (Mustafa, 2011: 43). There are other tests such as DNA testing, blood metabolic screening, assessments of lead levels in the body, functional imaging, automated axial scanning, vision tests, and practical MRI, which show the migration and clustering of neurotransmitters in specific areas of the brain. In addition to identifying dormant cells while performing the specified activities required from the examinee.

## **5. Diagnostic and evaluative tools:**

In addition to clinical observations and comparing them with the diagnostic criteria found in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), there are early screening tools during the first 24 months of a child's life that can detect or predict the likelihood of autism spectrum disorder, such as:

### **1.5. M-CHAT-R/F:** which stands for:

Modified Checklist for Autism in Toddlers, Revised with Follow-Up.

The revised version of the modified checklist for autism in toddlers with complementary follow-up is a two-stage screening tool answered by parents or caregivers to assess the likelihood of autism spectrum disorders in children.

Both the screening checklist and the follow-up checklist consist of 20 questions, and the results are interpreted as follows:

Low likelihood of impairment: total score of 0 to 2; if the child is under 24 months, the screening should be repeated when the child reaches two years.

Moderate likelihood of impairment: total score of 3 to 7. The complementary follow-up is applied to gather additional information on responses or answers that indicate potential impairment.

If the score from the complementary follow-up is 2 or more, the child's screening is considered positive, and the required action is to refer the child for diagnostic evaluation and determine their need for early intervention.

If the complementary follow-up score is between 0 and 1, then the child's screening is considered negative.

No action is required unless monitoring the child indicates a potential diagnosis of autism spectrum disorders; in that case, a re-evaluation should be conducted during the child's future routine visits.

High likelihood of impairment: total score of 8 to 20. It is acceptable to bypass the complementary follow-up and refer immediately for diagnostic evaluation and determine the need for early intervention.

### **2.5. ADOS Scale:**

This stands for Autism Diagnostic Observation Schedule, which is a system for observing and recording data to diagnose Autism Spectrum Disorder. The tool consists of four subscales focused on language level, pre-linguistic development, words, sentences, advanced child language, and late child language. Observations focus on: free play, response to calling the child's name, shared attention responses, ball play, anticipation of routines, response to social smiles, anticipation of social routines, functional and symbolic imitation, and holiday party rituals. Scoring is based on: language and communication, reciprocal social interaction, play, stereotypical behaviors and restricted interests, and other atypical behaviors.

### **3.5. ADI-R Scale:**

This stands for Autism Diagnostic Interview, which is a diagnostic tool implemented through an interview lasting between two to three hours with the child's caregiver. The goal is to recount the child's developmental history, and the answers are

recorded on a special form to check for the possible presence of Autism Spectrum Disorder. The questions revolve around six specific areas: general orientation, early developmental history, communication and language, social interaction and play, unusual interests and behaviors, and unspecified behavioral difficulties. (Ghamash, 2011)

#### **4.5. CARS Scale:**

This stands for Childhood Autism Rating Scale. It's a tool for estimating the severity of autism, containing 15 items that are applied through direct observation. The results allow for classification of autism severity, with each item scored from 1 to 4 points, and scoring can also include 1.5 if the answer falls between the first and second questions, and 2.5 if it falls between the second and third, and 3.5 if it's between the third and fourth questions. The overall score ranges from 15 to 60 points as follows:

Up to 15 points: no autism but the child remains under constant observation.

From 16 to 30 points: level one.

From 31 to 42 points: level two.

From 43 to 60 points: level three. (Shaban, 2016)

#### **5.5. BECS Scale:** which stands for

Batterie d'Evaluation des capacités Cognitives et Socio-émotionnelle

The Battery for the Assessment of Cognitive and Socio-emotional Skills, developed by Jean-Louis Adrian in (1994), with a revision released in 1999 and the latest edition in 2007 by ECPA. It is a test that measures developmental age from 4 months to 24 months, specifically for children who have autism spectrum disorder. This test is aimed at the age group from 2 to 10 years old, and the battery consists of

16 scales for growth in two main areas: the cognitive aspect and the socio-emotional aspect. This battery allows us to calculate the child's actual developmental age and thus register whether there is a delay compared to their chronological age. "Diagnosis doesn't clarify how much a person is lagging compared to others, nor does it indicate the individual's level of development in various areas such as cognition, language, general intelligence, social skills, and their strengths and weaknesses or their learning speed or style." (Al-Shami, 2004: 255)

The ages are divided into four stages as follows:

Stage One: from 4 to 8 months.

Stage Two: from 8 to 12 months.

Stage Three: from 12 to 18 months.

Stage Four: from 18 to 24 months.

#### **1.5.5. Cognitive Domain:**

This aspect of the battery includes cognitive activities related to motor structure, which in turn relates to sensory-motor systems and represents the coordination between them. The seven items of the cognitive domain include: self-image, symbolic play, schemes of relation to objects, practical causality, means and goals, spatial relationships, and object permanence.

#### **2.5.5. Socio-emotional Domain:**

This aspect of the battery contains activities that determine the socio-emotional capabilities of an autistic child, where the nine items of the socio-emotional domain include: social interaction, joint attention, expressive language, receptive language, verbal imitation, physical imitation, meaningful relationships, emotional expression, and behavior regulation.

## **Conclusion:**

From what has been discussed, it is clear that there is no specific medical drug that definitively eliminates the main symptoms of autism spectrum disorder. However, this doesn't mean that medications aren't helpful in treating aspects of the accompanying conditions, especially with the growing belief that biological factors play an important role in alleviating the severity of the disorder, such as dietary interventions for children sensitive to gluten or casein found in milk, among others. This is also true for psychological treatment methods, even if the term "treatment" doesn't imply a cure but aims to equip the child with as many adaptive skills as possible, which are fundamental for psychological stability. These skills represent the ideal understanding of fully embracing the values and social frameworks widely accepted among members of the same community. The more adaptive skills a child with autism acquires and reinforces repeatedly, the more they can adapt and integrate into their society, which provides psychological comfort for their guardians.

## **Suggestions:**

- Focus more on the field of diagnosis to develop skills, especially adaptive ones.
- Increase studies on individualized educational programs for children with autism.
- Enhance research concerning school support for individuals with autism spectrum disorder.
- Pay more attention to the topic of early intervention for children with disabilities in general, and specifically for those with autism.

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