

# Autism Spectrum Disorders in Children

Rofayda Mansour Ahmad Mohamad <sup>1</sup>, Rahaf Masoud D Albalawi <sup>2</sup>, Nouf Salem Albalawi <sup>2</sup>, Nawaf Farhan Alghamdi <sup>3</sup>, Naif Ibrahim Alzahrani <sup>3</sup>, Zahraa Hussain Aljeshi <sup>4</sup>, Hanan Ali Atafi <sup>5</sup>, Hotoon Kamel Alghaythee <sup>5</sup>, Alyaa Mohammed Izaldin Haider <sup>5</sup>, Zainab Esameldeen Abujamal <sup>3</sup>, Alhanouf Radhyan Alruwili <sup>6</sup>, Majed Mohammad Qaysi <sup>7</sup>

(1) Consultant Community Medicine, Department of Preventive medicine, King Salman Armed Forces Hospital in Northwestern Region, Tabuk, Saudi Arabia

(2) Medical Student, Tabuk University, Tabuk, Saudi Arabia

(3) Intern Medicine, King Abdulaziz University, Jedda , Saudi Arabia

(4) Medical intern, King Abdulaziz University, Jeddah , Saudi Arabia

(5) Medical Student, King Abdulaziz University, Jeddah, Saudi Arabia

(6) Medical Student, Vision College, Riyadh, Saudi Arabia

(7) Medical Student, Jazan University, Jazan, Saudi Arabia

## Corresponding author:

Rofayda Mansour Ahmad Mohamad

Consultant Community Medicine , Department of Preventive medicine, King Salman Armed Forces Hospital in Northwestern Region, Tabuk, Saudi Arabia

Mobile No.: 0545450874

Email: rafimedicine@gmail.com

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## Abstract

**Background:** Autism Spectrum Disorders (ASDs) describe a category of neurodevelopmental disorders in which individuals experience difficulties of social interaction and age-appropriate play and struggle to establish healthy peer interactions at their stage of development. This study will address the various aspects of Autism in children including clinical symptoms, evaluation, diagnosis and widely used medication or care.

**Methodology:** The search strategy involved utilizing two primary sources for obtaining relevant literature: Google Scholar and PubMed. The inclusion criteria comprised articles published in peer-reviewed journals, written in English, and focusing on ASD in children. Studies with diverse designs, including experimental, observational, and review studies, were considered.

**Results:** While children with autism spectrum disorders share many characteristics with children that have other developmental disorders and can benefit from many of the same educational strategies, they pose specific challenges for families, teachers, and others who collaborate with them. A deficiency in non-verbal and verbal communication requires a great deal of effort and ability, including in teaching basic knowledge. Special challenges in social interaction

(e.g., joint attention) may require more individual instruction than most children to gain and retain their children's attention. Furthermore, ordinary social interactions between peers do not typically take place without active preparation and ongoing adult structuring in the child's environment.

**Conclusion:** The lack of traditional friendships and peer relationships influences child motivation structures and the sense of experience. Adequate social experiences can be some of the most challenging and valuable lessons a child with autism spectrum disorders can learn.

**Keywords:** ASD (Autism Spectrum Disorders), QOL (Quality Of Life), neurodevelopmental conditions, PA (Physical Activity), DSM, ICD

## Introduction

Autism Spectrum Diseases (ASDs) are a group of neurodevelopmental disorders characterized by social interaction and age-appropriate play challenges, as well as the inability to build meaningful peer connections at their developmental level [1]. Children with ASD prefer passive play and maladaptive behavior and are less likely to voluntarily engage in organized leisure activities like sports [2].

It may be a result of their substantial impairments in motor development and physical activity (PA) [3]. Social and behavioral problems associated with autism spectrum disorder can limit children's participation in physical activity and recreation programs that would eventually eliminate their inactivity [4]. Physical inactivity predisposes children with autism spectrum disorder to many comorbidities, including overweight and obesity [5]. In order to identify the key links of physical activity, previous research has also examined social variables as important determinants of ASD physical activity among children [6]. For instance, Pan [7] discovered that children with ASD who had a lower level of social contact with adults also had a lower level of physical activity. Indeed, while children with ASD receive early recovery treatments to improve day-to-day success and increase physical activity, the quality of life dimension of physical activity and leisure (QOL) is disregarded in children with ASD and their families [8].

It is a challenging task for parents and caregivers to meet the needs of infants while at the same time meeting the needs of children with those of the family or guardians. Therefore, research investigating QOL in a wide variety of individuals with ASD have recently shown that adults with ASD have lower scores of well-being measures [9,10] and children also have a sub ideal outcome [11,12]. The objective of this study is to conduct a comprehensive and systematic search of the literature on Autism Spectrum Disorders (ASD) in children. The research aims to gather relevant information, identify key findings, and provide an overview of the current knowledge and research trends in the field.

## Methodology

### Search Strategy:

The search strategy involved utilizing two primary sources for obtaining relevant literature: Google Scholar and PubMed. These sources were selected due to their extensive coverage of academic and scientific publications in various disciplines, including medical and psychological research.

### Search Terms:

A set of carefully chosen search terms was used to ensure the retrieval of relevant articles related to Autism Spectrum Disorders in children. The search terms included variations and combinations of the following keywords: "autism spectrum disorder," "ASD," "child," "pediatric," "diagnosis," "treatment," "intervention," "epidemiology,"

"etiology," "genetics," "neurodevelopment," and "behavioral symptoms."

### Inclusion and Exclusion Criteria:

In order to focus the search and select appropriate articles, specific inclusion and exclusion criteria were applied. The inclusion criteria comprised articles published in peer-reviewed journals, written in English, and focusing on ASD in children. Studies with diverse designs, including experimental, observational, and review studies, were considered. On the other hand, articles that were not directly related to ASD in children, conference abstracts, dissertations, and non-peer-reviewed sources were excluded from the search.

### Search Process:

The search process was conducted in two main stages. In the initial stage, a preliminary search was performed using the identified search terms in both Google Scholar and PubMed. The search results were reviewed, and duplicate articles were eliminated. In the subsequent stage, a more refined search was conducted by screening the titles and abstracts of the remaining articles to assess their relevance to the research objective. Full-text articles were obtained for the potentially relevant studies and further evaluated for inclusion. The findings of this literature search was synthesized and reported in a comprehensive manner. The results were organized into relevant themes and subtopics, supported by evidence from the selected studies.

## Clinical Picture

### Overview:

Autism is a neurodevelopmental disorder characterized by challenges in social interaction and communication, as well as the presence of restricted and repetitive patterns of behavior [13]. Symptoms pertaining to their child's well-being are commonly identified by parents throughout the initial three years of the child's life [1–3]. Signs of autism often exhibit a gradual progression, while certain children may manifest a regression in their communicative and social abilities subsequent to their developmental growth [14].

Risk factors that can potentially affect pregnancy outcomes encompass several factors such as infections, including rubella, exposure to toxins such as valproic acid, alcohol, cocaine, pesticides, lead, and air pollution, as well as conditions such as fetal growth restriction and autoimmune illnesses [15]. Controversies arise in relation to specific environmental factors that are commonly discussed, one of which is the vaccine theory. It is worth noting that this theory has been thoroughly debunked [16]. The condition of autism has an impact on the transmission of neural information and the binding and organization of nerve cells and their synapses. However, the precise mechanisms behind these processes are not yet fully understood [5].

### Causes:

The existence of a shared etiology across the genetic, cognitive, and neurological domains of the characteristic triad of autism symptoms has been widely acknowledged

in the literature [17]. Autism is known to possess a robust genetic foundation; yet, the underlying genetics of autism are intricate and the extent to which Autism Spectrum Disorder (ASD) is elucidated by atypical mutations with substantial impacts or by infrequent interactions among multiple genes including common genetic variations remains uncertain [18]. Numerous genes associated with autism have been uncovered through the process of sequencing the genomes of individuals affected by the condition, as well as their relatives [19].

In general, it is observed that autism spectrum disorder (ASD) does not exhibit a Mendelian inheritance pattern, characterized by a single-gene mutation or a single defect in a chromosome. Furthermore, none of the genetic disorders associated with ASD have been demonstrated to exclusively induce ASD [20]. The presence of a substantial population of individuals with autism who lack a familial history of the disorder may be attributed to spontaneous structural alterations, such as deletions, duplications, or inversions of genetic material occurring during the process of meiosis [21]. There is a possibility that autism is subject to under-diagnosis among women and girls due to the prevailing assumption that it primarily affects males [22], but genetic phenomena such as imprinting and X-linking that increase the prevalence and severity of male disorders, and hypotheses have been put forward for a genetic explanation why males are more frequently diagnosed, such as imprinted brain theory and severe male brain theory [22].

The impact of maternal nutrition and inflammation on fetal neurodevelopment is evident during the pre-conception and prenatal periods. There exists a correlation between intrauterine growth restriction and autism spectrum disorder (ASD) in both full-term and preterm infants. Maternal inflammatory and autoimmune disorders have the potential to inflict damage onto embryonic tissues, exacerbate hereditary abnormalities, or adversely affect the neurological system. Exposure to contaminated air, particularly heavy metals and particulate matter, during pregnancy has been associated with an elevated likelihood of autistic spectrum disorder [23].

#### **Characteristics:**

Autistic individuals may exhibit significant impairments in particular domains, while demonstrating typical or exceptional abilities in others. The manifestation of symptoms often begins to appear gradually after the age of six months, with full development typically observed between the ages of two and three years. These symptoms have a tendency to remain into adulthood, albeit in a less severe manner [24]. It is distinguished by a unique triad of symptoms: impaired social contact, impaired speech, and repetitive conduct. Other common features, such as abnormal eating, are not necessary for diagnosis [24]. Specific manifestations of autism occur in the general population and tend not to be substantially associated in the absence of a clear distinction between pathologically severe and usual characteristics [24].

#### **Social development:**

Behavioral differences differentiate autism and related autism spectrum disorders from many other developmental conditions [25]. Individuals diagnosed with autism spectrum disorder (ASD) may experience challenges in cognitive functioning and commonly exhibit deficits in empathic abilities that are typically observed in neurotypical individuals. Atypical social conduct manifests during the early stages of development. Infants with autism spectrum disorder (ASD) have diminished engagement with social cues, displaying reduced frequency of smiling and limited attention towards others. Furthermore, they demonstrate decreased responsiveness to their own name. Autistic toddlers exhibit notable deviations from social standards, such as reduced eye-to-eye contact and limited utilization of basic gestures, like pointing, as a means of communication [26]. Children between the ages of three and five who have been diagnosed with autism spectrum disorder (ASD) exhibit reduced tendencies to display social awareness, initiate spontaneous interactions with others, imitate and respond to emotions, engage in non-verbal communication, and establish connections with peers. However, it is important to note that children indeed form emotional bonds with their primary caregivers [27]. The majority of children diagnosed with autism have a notable decrease in attachment stability when compared to children without autism. However, this discrepancy diminishes in children who demonstrate higher levels of cognitive development or exhibit less obvious autistic traits. Individuals with Autism Spectrum Disorder (ASD) who are in the older age group have poorer performance on assessments measuring facial and emotional identification. This observed decline in performance may be attributed, at least in part, to a diminished capacity to accurately identify and articulate one's own feelings [28].

#### **Communication:**

It has been observed that a significant proportion, ranging from around one-third to half, of individuals diagnosed with autism spectrum disorder exhibit limited ability to generate sufficient spontaneous speech to effectively meet their daily communication requirements [29]. Differences in communication can manifest early in infancy and encompass delayed onset of vocalization, erratic motor behaviors, diminished responsiveness, and vocal patterns that do not align with those of the primary caregiver. During the second and third years of development, individuals diagnosed with autism exhibit less regularity and complexity in their sentence structures, consonant usage, phrase formation, and word combinations. Furthermore, their gestures are less commonly integrated with verbal expressions. Children diagnosed with autism spectrum disorder (ASD) exhibit a reduced tendency to engage in demanding behaviors or actively express their experiences, while demonstrating a heightened inclination to engage in echolalia (i.e., the repetition of words or phrases said by others) and pronoun reversal [30]. The phenomenon of joint attention has been shown to play a crucial role in the acquisition of speech skills, and it has been noted that deficiencies in joint attention abilities might serve as a distinguishing factor between newborns diagnosed with Autism Spectrum Disorder (ASD) and those without [31].



**Repetitive behaviors:**

Autistic individuals can exhibit several types of repetitive or restricted behaviors, which are classified as follows by the Repetitive Behavior Scale-Revised (RBS-R) [32]:

- Stereotyped behaviors: repeated motions, such as hand flapping, head spinning, or body rocking.
- Compulsive behavior: time-consuming activities designed to alleviate the discomfort that a person feels compelled to conduct regularly or in compliance with strict laws, such as putting items in a certain order, inspecting things, or hand washing.
- Sameness: resistance to change; for example, insisting that furniture should not be moved or refusing to be interrupted.
- Ritualistic behavior: an unchanging pattern of daily activities, such as an unchanging menu or a dressing ritual. It is closely linked to the sameness and an independent analysis proposed merging the two factors.
- Restricted passions: passions or fixations that are irregular in nature or strength of emphasis, such as concern for a particular television show, toy, or game.
- Self-injury: actions such as eye-poking, skin-picking, hand-biting, and head-banging.

No single repetitive or self-injurious behavior appears to be specific to autism, but autism appears to have an increased pattern of occurrence and severity of such behavior.

**Other symptoms**

Autistic individuals may have symptoms that are independent of diagnosis, which can affect the patient or the family [26]. It has been estimated that a small percentage, ranging from 0.5% to 10% of individuals diagnosed with Autism Spectrum Disorder (ASD) have outstanding abilities. These abilities can vary, encompassing specialized skills like recollection of trivia, as well as the exceptionally unusual capabilities observed in brilliant autistic scholars [33]. Many people with ASD have superior vision and attention abilities relative to the general population [12]. Sensory abnormalities are observed in a majority exceeding 90% of individuals diagnosed with autism spectrum disorder (ASD), with certain anomalies recognized as integral characteristics. However, the existing evidence does not definitively establish that sensory symptoms serve as discriminative factors distinguishing autism from alternative developmental diseases [34]. Differences are greater for under-responsibility (e.g. walking into things) than for over-responsibility (e.g. noise distress) or for sensation-seeking (e.g. rhythmic movements) [8]. Approximately 60–80% of autistic people have motor signs that involve weak muscle tone, poor motor planning, and toe walking; deficiencies in motor control are pervasive acrobatics.

Gastrointestinal disorders are one of the most often associated medical conditions in people with autism [35]. These are related to increased social dysfunction, irritability, issues with behavior and sleep, language disorder and mood changes [36].

**Pathophysiology:**

The manifestations of autism can be attributed to neurodevelopmental alterations in diverse cerebral regions. The etiology of autism remains poorly understood. The function can be categorized into two domains: the pathophysiology of brain structures and processes related to autism, and the neuropsychological connections between brain structures and behaviors. Behaviors often exhibit many pathophysiological mechanisms [37]. Evidence suggests that defects in the intestinal brain axis may be involved [38,39]. Neural connections and the immune system are mechanisms that can cause diseases of the intestine to spread to the brain [38].

Many lines of evidence point to synaptic dysfunction as a cause of autism (5). Several uncommon mutations can contribute to autism by disrupting certain synaptic pathways, such as those involved in cell adhesion [40]. Research conducted on mice using gene substitution studies has revealed a strong association between autistic symptoms and subsequent developmental processes that rely on synaptic activity and activity-dependent modifications. The teratogens that are currently identified as potential causes of birth defects, including autism, seem to exert their effects during the initial eight weeks following conception. While this does not entirely eliminate the potential for autism to be influenced or initiated at a later stage, substantial evidence suggests that autism manifests early in the developmental process [41].

**Assessment and Diagnosis:**

Diagnosis is focused on actions, not cause or mechanism [42]. Under the DSM-5, autism is characterized by recurrent deficiencies in social communication and interaction in various contexts, as well as limited, repeated patterns of behavior, interest, or operation. These deficits are present in early childhood, usually before the age of three, and lead to clinically significant functional impairment. Sample symptoms include lack of social or emotional reciprocity, stereotypical and repetitive use of language or idiosyncratic language, and persistent concern for unusual objects. The disruption must not be better accounted for by Rett syndrome, cognitive impairment or global developmental delay [14]. There are several diagnostic tools available. Both are widely used in autism research: the Autism Diagnostic Interview-Revised (ADI-R) is a semi-structured parent interview, and the Autism Diagnostic Assessment Schedule (ADOS) uses observation and interaction with the infant. The Childhood Autism Rating Scale (CARS) is commonly used in clinical settings to determine the extent of autism based on child observation [26]. Clinical genetic assessments are often conducted once ASD has been diagnosed, especially when other symptoms already suggest a genetic cause [43]. Although genetic technology allows clinical geneticists to link an estimated 40 percent of cases to genetic causes, consensus guidelines in the US and the UK are characterized by high-resolution chromosome and fragile X testing [44]. A genotype-first diagnostic model has been suggested, which would systematically determine the differences in the number of copies of the genome [45].

ASD may still be diagnosed at the age of 14 months, but diagnosis has become more stable over the first three years of life: for example, a one-year-old who meets the diagnostic criteria for ASD is less likely than a three-year-old to continue to do so a few years later [1]. In the United Kingdom, the National Autism Program for Children suggests a period of 30 weeks from first concern to completed diagnosis [14]. Under-diagnosis and over-diagnosis are issues in rare cases, and a significant part of the recent rise in the number of confirmed ASD cases is possibly due to changes in diagnostic practices. The prevalence of drug treatment services and the extension of benefits have provided clinicians opportunities to diagnose ASD, resulting in some over-diagnosis of children with unclear symptoms. Alternatively, the cost of screening and diagnosis and the difficulty of obtaining payment can hinder or delay diagnosis [46]. Autism among visually impaired people is particularly difficult to diagnose, partly because most of its diagnostic criteria depend on vision, and partly because of autistic symptoms similarity with those of common blindness or blindness syndromes [46].

### Management:

The primary objectives in the provision of care for children diagnosed with autism spectrum disorder (ASD) are to mitigate the impact of related impairments and alleviate the distress experienced by families, while simultaneously enhancing their overall quality of life and promoting their ability to live independently. Typically, those with higher IQs exhibit a greater propensity for positive treatment response and improved health outcomes. Various approaches can be considered and tailored to meet the individual needs of the child. Parents and the educational institution play a crucial role as the principal sources of treatment. Services will be provided by professionals such as clinical therapists, special education instructors, speech pathologists, and certified counselors. Intervention studies encounter methodological challenges that hinder the establishment of definitive findings on efficacy. In recent years, there has been notable advancement in the development of evidence-based treatments [4,8]. While there is some favorable evidence indicating the potential benefits of certain psychosocial interventions compared to no treatment, it is important to note that the methodological quality of systematic reviews in this area has generally been subpar. Additionally, the clinical outcomes of these interventions remain largely uncertain, and there is limited evidence available regarding the comparative effectiveness of different treatment options [11]. Intensive and prolonged special education services, coupled with early behavioral therapy, have the potential to facilitate the development of self-care, communication, and work skills in children. Furthermore, such interventions can enhance overall functioning and reduce the occurrence of symptoms and maladaptive behaviors. However, it is worth noting that the notion that intervention at approximately three years of age holds particular significance lacks empirical support. Although there is limited evidence supporting the efficacy of medications in alleviating core symptoms, they may be prescribed to address related symptoms as irritation, inattention, or repetitive patterns of behavior [4,5].

### Education:

Commonly employed educational tactics encompass a range of interventions such as applied behavioral analysis (ABA), developmental models, structured instruction, speech and language therapy, social skills treatment, and occupational therapy. Within these methodologies, therapeutic interventions frequently involve thorough discussions of autistic features or focus specifically on a particular domain of impairment. One intervention option employs a parent-training model, which instructs parents on the implementation of several Applied Behavior Analysis (ABA) and Developmental Social-Pragmatic (DSP) techniques. This approach empowers parents to distribute their own interventions. Several digital signal processing (DSP) services have been developed with the aim of facilitating intervention systems that can be implemented by parents in their own homes. Although parent training models have been recently developed, they have exhibited efficacy in numerous studies and have been examined as a potentially efficacious type of caregiving [47].

Recent research has demonstrated the efficacy of delayed, thorough Applied Behavior Analysis (ABA) therapy in augmenting communicative and social functioning among preschool-aged children. Additionally, it is widely acknowledged that this form of intervention significantly improves the scholastic achievement of children within this developmental stage. Similarly, the utilization of a pedagogical strategy by educators that integrates a more authentic framework of Applied Behavior Analysis (ABA) in conjunction with a developmental cognitive functional approach becomes advantageous in augmenting social communication proficiencies in young children. However, it is worth noting that there is limited empirical backing for its efficacy in addressing comprehensive symptoms. There remains a lack of effective dissemination of neuropsychological research findings to students, leading to a disparity between the implications of these studies and the content of educational instruction [48].

### Medication:

Pharmaceutical interventions may be employed to address symptoms associated with Autism Spectrum Disorder (ASD) that impede a child's successful integration into their family or school environment, particularly in cases when behavioral therapy proves ineffective. Furthermore, these devices can also be employed in the management of associated health concerns, such as Attention Deficit Hyperactivity Disorder (ADHD) or anxiety disorders. A majority of children in the United States who have been diagnosed with Autism Spectrum Disorder (ASD) are not provided psychoactive medicines or anticonvulsants. Among those who do receive such prescriptions, the most frequently prescribed pharmaceuticals are antidepressants, stimulants, and antipsychotics. The FDA has approved the use of Risperidone and Aripiprazole, which are classified as atypical antipsychotic medicines, for the treatment of aggressive and self-injurious behaviors that are associated with certain conditions [45,47,48]. However, their side effects must be weighed against their possible benefits,

and people with autism may react atypically [3]. Side effects, for example, may include weight gain, exhaustion, drooling, and aggression [3]. SSRI antidepressants are effective in reducing repetitive and ritualistic behaviors, whilst also methylphenidate is beneficial for those children with co-morbid inattentiveness or hyperactivity [49]. Limited empirical evidence exists about the effectiveness and safety of pharmacological interventions for individuals diagnosed with Autism Spectrum Disorder (ASD) during adolescence and adulthood. There is currently no pharmacological intervention that has been identified as effective in alleviating the core symptoms of autism, including those related to social and communication deficits. The symptoms associated with autism have been reversed or reduced in mice by the manipulation of gene function, as observed in experimental studies. These findings suggest the potential for the development of pharmaceutical interventions targeting specific uncommon mutations that are known to be causative factors in autism [49].

#### **Alternative medicine:**

Although there are various alternative treatments and tactics that exist, it is important to note that none of them have been supported by clinical trials. The efficacy of treatment procedures in quality-of-life contexts is constrained by a dearth of empirical evidence, while numerous services depend on performance metrics that suffer from deficiencies in statistical validity and real-world significance. Certain alternative therapies may provide a potential risk to the well-being of the child. The inclination of children diagnosed with autism spectrum disorder (ASD) towards consuming atypical food items may potentially lead to a decrease in the thickness of the cortical bone. This reduction is more pronounced in individuals adhering to casein-free diets, as these diets often result in insufficient intake of calcium and vitamin D. Nevertheless, inadequate bone development in individuals with ASD has also been associated with factors such as insufficient physical activity and gastrointestinal disorders. In 2005, a tragic incident occurred where a 5-year-old child with autism lost their life due to the unfortunate outcome of a chelation therapy procedure. The administration of chelation therapy is not advised for individuals with Autism Spectrum Disorder (ASD) due to the prevailing view that the potential hazards associated with this treatment exceed any potential benefits. CEASE therapy, an alternative medical approach that combines homeopathy, vitamins, and 'vaccine detoxification,' lacks empirical data to support its efficacy [50].

#### **Prognosis:**

There is currently no established remedy that has been scientifically validated. The severity of symptoms associated with Autism Spectrum Disorder (ASD) may diminish, occasionally resulting in the removal of the diagnosis. This phenomenon can occur following intensive intervention efforts, although it is not consistently observed. The extent of rehabilitation remains ambiguous, as various studies conducted by different researchers have shown rates ranging from 3% to 25%. The acquisition

of language in the majority of children with autism often occurs by the age of five or earlier, while a subset of individuals may develop communication abilities at later stages of development. Certain individuals diagnosed with autism spectrum disorder (ASD) may experience a deficit in social support, limited employment opportunities, and a reduced sense of self-determination. While core difficulties often exhibit long-lasting and persistent characteristics, it is worth noting that symptoms may exhibit a decrease in severity as individuals mature [25].

## **Conclusion**

Autism can be described as a spectrum of illnesses that exhibit variations in the intensity of symptoms, age at which they manifest, and association with other disorders such as intellectual disability, profound speech delay, and epilepsy. The presentation of symptoms associated with autism spectrum disorder exhibits significant variations across different developmental stages, encompassing infancy and adolescence. There is no one behavior that can be deemed universally indicative of autism, nor is there any activity that can definitively exclude a child from being diagnosed with autism. The diverse range of traits that are indicative of autistic spectrum disorders, such as deficits in social interaction, verbal and non-verbal communication, and limited patterns of interest or behavior, can be readily and consistently identified in early childhood by professionals who have received specialized training, including clinicians and educators. Nevertheless, the differentiation between classical autism and atypical autism, general developmental disorder-not otherwise specified (PDD-NOS), and Asperger's disorder can often be unclear and is commonly associated with the presence or severity of disabilities. Specialists who are educated in the treatment of young children with autism spectrum disorders can reliably diagnose these problems in 2-year-olds with adequate time and training. Efforts are currently being made to develop efficient identification tools for individuals in younger age groups. Early identification and diagnosis are crucial for children with autistic spectrum disorders, including those with vision or hearing impairments, as it enables them to acquire essential skills such as imitation and communication. This, in turn, allows them to derive maximum benefits from educational services. Moreover, there is evidence suggesting that initiating specific interventions for autistic spectrum disorders at an earlier stage is linked to a more favorable response to treatment.



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