

Application of artificial intelligence (AI) in patients with autism spectrum disorder and associated comorbidities: a narrative review

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Abstract

Artificial intelligence (AI) is used in medicine to assist clinicians in diagnosing and treating patients with various medical conditions. It can have specific benefits for children with special needs, as it can assist in daily activities by enhancing support for these children. The incidence and prevalence of autism spectrum disorder (ASD) are rapidly increasing. ASD can be associated with other comorbid conditions involving multisystem medical and genetic disorders. AI can help with the early diagnosis and management of ASD and related comorbid conditions. This review aimed to study how AI can be used in patients with ASD and comorbidities.

A narrative review was conducted to find the answer to the study. Electronic PubMed/Medline and Google Scholar databases were searched for peer-reviewed articles. Papers that were not written in the English language were excluded. Results of the study found that, along with providing autistic children the practice of identifying facial expressions, interacting socially, and responding appropriately to social cues, AI can help deal with complex comorbid conditions. AI heavily depends on large amounts of good-quality data, so it faces fundamental technological challenges, such as hallucinations, false results, data privacy, security, and ethical concerns. However, by addressing the challenges and limitations,

AI can be a great tool for children with ASD and their families to navigate the associated comorbidities and improve the overall quality of life of these patients. Future research and collaboration of providers with policymakers and community partners can overcome the challenges for AI applications in patients with ASD and associated comorbidities.

Keywords

Artificial intelligence, AI, autism spectrum disorder, ASD, machine learning, deep learning, attention deficit hyperactivity disorder, ADHD, artificial neural network, ANN.

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Introduction

Artificial intelligence (AI) is changing the approach to tackling the complex issues in all fields, including healthcare. In healthcare, it helps enhance care for vulnerable populations, particularly children, by improving early disease detection through the prediction of patterns, facilitating accuracy in diagnosis through object detection, and classification of medical imaging. Large language model (LLM)-powered AI agents can provide personalized interventions and help streamline administrative tasks. Machine learning (ML) and deep learning (DL) models can support healthcare professionals, ultimately leading to better health outcomes for children at risk [1].

Autism spectrum disorder (ASD) affects 1 in 31 children in the U.S. from various backgrounds and is often linked with other comorbidities [2]. As per May 2024 CDC data, ASD is reported in all socioeconomic, ethnic, and racial groups, and it is more common in males compared to females. During the study performed for children in the age group of 3-17 years, 17% of children were found to have disabilities [2].

Diagnosis of ASD is mainly based on symptoms. Sometimes, providers refer patients with behavioral concerns to the developmental specialist for a definitive diagnosis. According to DSM-5 criteria of the American Psychiatric Association, children with ASD may present with symptoms of persistent deficits in interaction and communication, restricted, repetitive behaviors during the early developmental period, causing significant impairment in areas of functioning [3].

Comorbid conditions are more common in children with ASD than in the general population. ASD can be associated with other comorbid conditions such as speech delay, global developmental delay, attention deficit hyperactivity disorder (ADHD), sleep issues, feeding problems, obesity, epilepsy, gastrointestinal (GI) disorders, and other mental health conditions [4]. Levy et al. studied the co-occurrence of other comorbidities in 2,568 children who met the surveillance definition for ASD. 83% of children were found to have equal or more than 1 non-ASD developmental diagnosis, 10% of patients were found to have psychiatric, 16% were found to have neurological, and 4% were found to have a possibly genetic or neurological component [4].

Genetic disorders are also found to be associated with ASD including fragile X syndrome, Rett syndrome, tuberous sclerosis complex, and 22q11.2 deletion syndrome. Some other syndromes such as Smith-Lemli-Opitz syndrome, Angelman syndrome, Prader-Willi syndrome, and Timothy syndrome are also linked to ASD.

AI tools can assist in prediction, progression and population susceptibility to genetic syndromes. They can analyze genetic data and help with better management options. AI is helping to reduce the complexity of the management of ASD and associated comorbidities. The training of parents and health professionals, the cost, and the availability of AI may create challenges while using it [5].

Please refer to **Fig. 1** for the summary of ASD and associated comorbidities [3-5].

The increasing prevalence of ASD and associated comorbidities are making the lives of patients with ASD very complex. AI tools are helping all kinds of medical conditions and making progress in the treatment of patients with ASD. So, we aimed to study the applications of AI tools in patients with ASD and associated comorbidities.

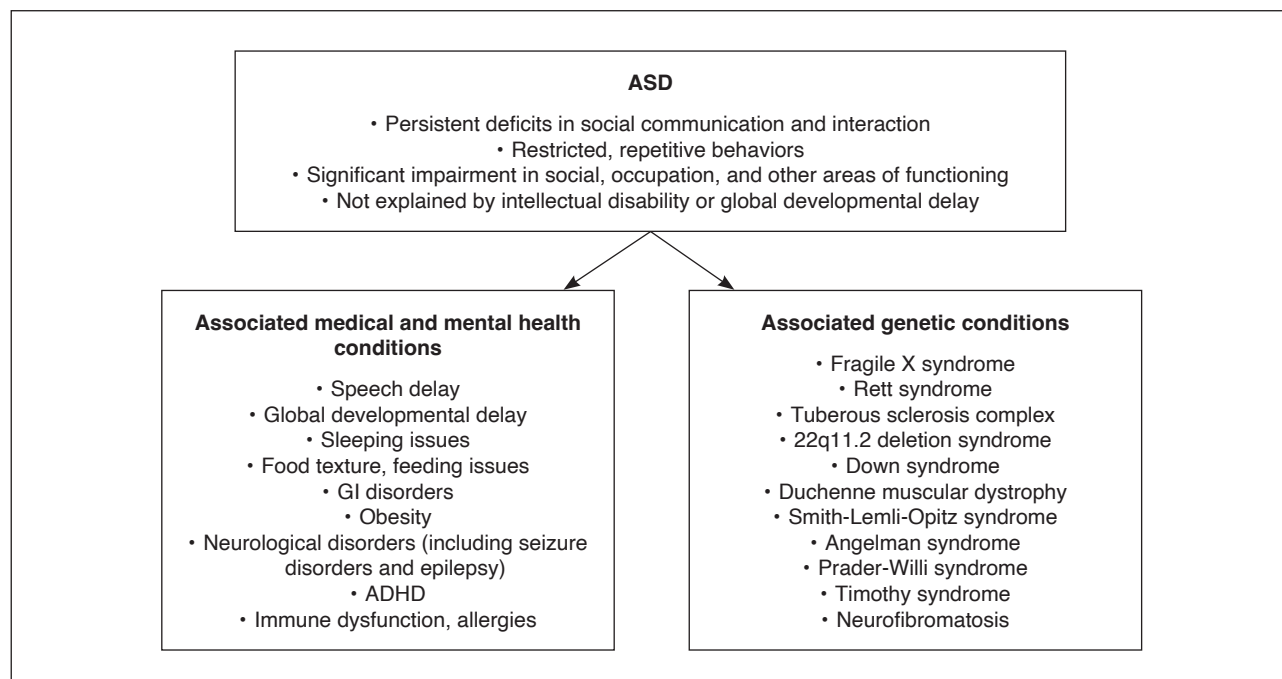


Figure 1. Autism spectrum disorder (ASD) and associated comorbid conditions [3-5].

ADHD: attention deficit hyperactivity disorder; ASD: autism spectrum disorder; GI: gastrointestinal.

Materials and methods

For this review, we searched the electronic PubMed/Medline and Google Scholar databases for peer-reviewed articles that addressed ASD and comorbidities, preferably published from 2020 onwards. The keywords used were autism spectrum disorder (ASD), artificial intelligence (AI), attention deficit hyperactivity disorder (ADHD), feeding problems, GI issues, allergies, neurological disorders, and sleeping issues. As a result, a total of 88 articles were identified. The aim was to synthesize the existing evidence through the narrative text and offer critical analysis and insights to provide the information to the providers. The papers were evaluated based on their titles, abstracts, and complete texts, with the primary inclusion criteria being the description of ASD and associated comorbidities. The most important exclusion criterion was that the article addressed diseases other than ASD. Papers that were not written in the English language were also excluded. An independent search was performed by all 3 authors in the mentioned databases. The included articles met all inclusion and exclusion criteria, including articles written specifically for children less than 18 years of age. One author studied the reference list of each retrieved article to find which other articles could be selected per the eligibility criteria. The review of data sources

was conducted in February 2025. The review included 24 articles after the final evaluation [1-24].

Adoption of artificial intelligence in patients with autism spectrum disorder

Unlike medical conditions, there are not universally accepted, readily available tests or procedures to definitively identify all the potential medical and psychiatric comorbidities associated with ASD [4].

It's not always easy to spot early traits of the autism spectrum, especially in high-functioning autism, and some traits can also occur with other unrelated disorders or personality differences. It can take months or longer to get a diagnosis, and a late diagnosis may cause delays in getting therapies and services. Evaluators may be uncertain whether a particular behavior is part of autism or just a personality pattern, and there is hesitancy to label a child with a diagnosis until they are sure. ASD and ADHD are 2 commonly overlapping neurodevelopmental conditions that share signs and symptoms, including social interaction [6].

A subset of AI called DL is better at spotting relevant patterns. These models may be a good way to provide evaluators with confirmation of a diagnosis or suggest the need for further

evaluation. Parents can upload videos of their children, allowing experts to study behavior patterns and help with early diagnosis. Song et al. [7] studied the role of ML in diagnosing ASD comorbid intellectual disability in comparison with traditional regression models. The study used 4 models – traditional diagnostic models of logistic regression (LR), support vector machine (SVM), and learning algorithms such as random forest (RF) and XGBoost. Data from behavioral observation and socio-demographics were used to distinguish if autistic children had combined intellectual disability. Out of 241 children studied, 40.66% were found to have autism with intellectual disability, and out of 4 models, SVM showed maximum accuracy (0.836). LR had the best sensitivity (0.939), while SVM, RF, and XGBoost performed significantly higher than LR (0.355) in terms of specificity. The study concluded that, as compared to the traditional regression model, SVM has a better ability to distinguish whether autistic children have co-occurrence of intellectual disability [7].

Patients with ASD are often overwhelmed by the demands of human interaction, social expectations, sensory challenges, and attention issues, and need supportive therapies such as occupational, speech, and physical therapy. They may respond more positively to AI bots than to a human therapist. AI bots can have unlimited patience and can repeat the same cues without time constraints, helping patients across various tasks continuously and consistently [8]. The application of AI bots in therapy can help by allowing them to practice identifying facial expressions, interacting socially, and responding appropriately to social cues. AI innovative, friendly bots can help predict and prevent behavioral meltdowns before they happen, especially in school and social settings [8]. Meneses do Rêgo and Araújo-Filho have reviewed AI applications, including therapeutic chatbots, for their capacity in improving the quality of life for patients with ASD. TalkEase Bots can offer ongoing help through interactive therapeutic interventions [8].

In another study, performed by Haque and Rubya, the perception of mental health chatbots by users was studied. They analyzed reviews from users who used 10 different apps with chatbot features offering management plans for mental health issues. Chatbots used in this study followed a non-judgmental environment, and users felt comfortable sharing sensitive information. Chat-

bots were individualized, simple to use, available anytime, and could act like human beings. They were welcomed by users. However, users lost interest due to inappropriate responses and assumptions made by chatbots about users' personalities. It was found that chatbots may lack the ability to identify a crisis. There is a possibility that users may like chatbots more than their surrounding people. The study provided suggestions for the development and balanced design of chatbots to support patients with mental health issues [9].

Iannone et al. performed a narrative review to study the integration of AI tools and assistive technology to discuss new methods that are in progress at the intersection of AI and robotics, creating automated devices like smart glasses that offer potential innovations for improved communication, social interaction, and engagement for patients with autism [10]. Patients with ASD and other associated conditions may create a large amount of data. This data can be used to train the AI model, which can study the data, accurately predict the patterns, and create a personalized plan for the patient, which can be reviewed by the healthcare professionals before it is assigned to the patient. Based on AI-predicted patterns, parents can better understand their child's needs and reach and allocate the best available resources to meet their child's needs at home and school. This may allow a more holistic approach for better management of symptoms. Detecting these health conditions earlier may ultimately lead to improved overall care development, educational societal outcomes, and quality of life for both patients and families, which can benefit all communities, especially children from low socioeconomic families, as they are less likely to visit their pediatricians and primary care physicians as often [7, 8].

Artificial intelligence use in comorbidities associated with autism spectrum disorder

Artificial intelligence use in autism spectrum disorder and attention deficit hyperactivity disorder

Some psychiatric conditions present very similarly to each other, making the task of distinguishing and diagnosing one psychiatric disorder from another extremely difficult. ASD and ADHD are frequently co-occurring conditions sharing specific common symptoms and presenting

with challenges in diagnosis. A study was done by Wolff et al. [6] with an AI data-driven ML approach to differentiate between 4 groups of patients: patients with ASD, ADHD, ASD + ADHD, and the fourth group, no diagnosis (ND). The study found a subset of 5 features from clinical observation and parental interviews reliably differentiating between ASD groups (ASD & ASD + ADHD) and non-ASD groups (ADHD & ND). The features corresponded to social communication and restrictive and repetitive behavior domains. The study supported the idea that detecting ASD in individuals with suspected signs of the diagnosis, including those with co-occurring ADHD, is possible with a data-driven ML AI approach. This could indicate that AI can be expanded to detect other comorbid conditions in ASD patients. AI/ML engineers and researchers can use the common symptomatology of these conditions to assess if a child with ASD is also suffering from any of these other comorbid conditions [6].

ADHD symptoms can affect the patient's social and educational status. LLM-powered AI agents may provide opportunities to attract attention, engage the patients, and do the tasks repeatedly as per the patient's demands. Aldakhil studied the effects of AI-based play activities in 61 children with ADHD aged between 8 and 12 years. The study used 12 45-minute sessions, which children received over a period of 4 weeks. Along with the experimental group of children, a control group was created that did not receive the sessions. Children and parents in the experimental group completed 3 different surveys – pre-test, post-test, and the survey performed during the follow-up. The results of the study found that the experimental group showed improvements in all dimensions and total scores of the surveys. The helpful effects of the play activities delivered via AI tools were maintained at the 7-week follow-up [11].

Artificial intelligence use in autism spectrum disorder and allergies

Patients with autism are found to be more likely to have eczema, skin, food allergies, and asthma. Some of these are related to the pathogenesis of the disease, and others may be the consequence of ASD itself. Al-Ayadhi et al. conducted a study to find the dermatological manifestations in patients with ASD; 363 patients were studied. 52.1% of participants were autistic and were found to have

asthma, anxiety, depression, and autoimmune disease as compared to the controls. The results also showed that skin conditions were present in 50%, food allergies were present in 22.2%, and respiratory allergies were present in 14.8% of patients. Statistically significant association of these diseases was found with ASD compared to the controls [12].

Liu et al. used the AI-driven target discovery platform, PandaOmics, to identify common targets of shared pathophysiology for treating asthma, eczema, and food allergy. The study used 32 case control comparisons generated from datasets to allocate them into 3 groups. For asthma, 558 cases and 315 controls, for food allergy, 208 cases and 106 controls, and for eczema, 441 cases and 371 controls were used. The results of the study found 6 targets for these 3 diseases. Based on identified targets, therapeutic targets were advised. Out of 6 identified targets, *IL-5* was found to be an important target based on its association with allergies. *PTAFR* target was found for drug repurposing, and the *RNF19B* target was found as a new target for treatment. Patients with ASD may be very sensitive to touch and may not like routine skincare or the application of moisturizers or lotions. That may lead to skin dryness, exacerbating symptoms of atopic dermatitis. AI-based tools may also help children with ASD to become more accepting of receiving skin care through occupational therapy (OT). During OT, DL-powered virtual reality environments can simulate real-life scenarios, allowing patients to practice functional skills in a controlled and safe setting to accept the care. The prediction of sensitivity to allergens, their mapping, automated monitoring for reaction, and targeted immunotherapy can be enhanced by further research in the use of AI tools in allergic conditions [13].

Artificial intelligence use in autism spectrum disorder and gastrointestinal issues

A variety of GI issues are present in patients with ASD. AI-assisted endoscopy done in patients with ASD can be more specific, sensitive, and accurate in detecting and diagnosing GI diseases at all levels. AI can help improve mucosal image quality and detect their precise anatomical location. Patients with GI issues, GI-fellows, and gastroenterologists are accepting the use of AI to deal with GI disorders. Van der Zander et al. performed a study on 377 patients to find the perspectives on

AI use in healthcare. The study also involved 35 gastroenterologists and 45 GI-fellows. 25% of GI-doctors reported experience with AI technology, and 62.5% of patients reported familiarity with AI. Both patients and physicians acknowledged the advantages of AI use in healthcare in the form of shorter waiting times, faster management plans, and improved quality of care. However, GI-patients reported a lack of personal contact, and GI-physicians reported the need for sufficiently developed infrastructures. The study received a good response from gastroenterologists for the use of AI as compared to GI-fellows, and GI-fellows were more accepting of the use of AI as compared to the patients [14].

Almost half of the patients with ASD have symptoms of chronic constipation, which could be related to a restricted diet with low fiber intake, abnormal bowel training, and associated hypothyroidism, causing increased intestinal transit time. Food allergies and GI dysmotility may increase the chances of reflux, nausea, and vomiting. Simple, functional disorders such as irritable bowel syndrome or organic causes may cause them to present with frequent abdominal pain [15]. Artificial neural network (ANN) models can predict the presence of gastroesophageal reflux disease (GERD) without the need for invasive diagnostic techniques in patients with GERD symptoms. AI-based “Smart Toilet” with a microcomputer and a camera attached to the conventional toilet can monitor bowel health and guide the management of toilet disorders by using innovative AI toilet technology in patients with ASD [15].

Children with ASD may have more feeding problems, adding to the daily burden of various dysfunctional behaviors at mealtimes. They may have food texture issues or a preference for certain foods. They have limited feeding independence and need extra feeding time. Dysfunctional behaviors at mealtime may be related to sensorial, behavioral, or medical factors. AI tools may be used for behavioral and sensory modifications and to enhance the adaptations [16].

Artificial intelligence use in occupational therapy in patients with autism spectrum disorder

All senses are combined to make sense of our environment. However, some children with autism may have difficulty filtering sensory information, making it overwhelming and uncomfortable.

When a person is experiencing sensory overload, it can be incorrectly perceived as distressed behavior. Sensory overload may also result in a withdrawal or complete shutdown. OT may help children access their surrounding environments comfortably, increase their independence, and improve their ability to participate in activities. OT can help target each sense and help the child’s nervous system become more organized and regulated. This can help to improve their attention, performance, and acceptance of their environment [17]. Multidisciplinary, goal-oriented, family-centered research interventions may be needed to support children with autism in different contexts of the use of AI in OT. Escobar et al. [17] studied the opinions of parents of patients who used AI tools in OT for the patients in the form of a survey. The survey was performed for 9 caregivers of children between the ages of 3 and 18 years who received OT services. Some caregivers were ready to use AI tools in OT, but the results were affected by the education level of the caregivers. The results highlighted the need for a family-centered approach and consideration of the demographics and social contexts of patients and caregivers to use AI tools effectively in pediatric OT services [17].

Agentic-AI-driven therapy platforms can analyze data from multiple sources, facilitating accurate evaluations of the cognitive, physical, and emotional capacities of children with autism. With the help of these platforms, occupational therapists can arrange for specialized management programs based on the identified needs of their patients. Personalized recommendations generated by AI can support adherence to therapy plans and self-management strategies by analyzing patients’ movements and progress. It can help adjust therapies and exercises in real time to suit specific needs. This adaptability may improve recovery and keep children with autism motivated and engaged throughout their course [18]. Mousavi Baigi et al. have performed a systematic review based on 6 studies to find the use of AI in OT. The study used different AI approaches, such as ML, ANN, DL models, multi-core learning models, and classification and regression trees. The results of the study were promising. AI models helped to improve the symptoms, avoid the recurrence, achieve faster recovery, and help the overall health level of patients. The study concluded that AI models had limitations in the form of potential for errors and low accuracy [18].

Artificial intelligence use in sleep disorders in patients with autism spectrum disorder

Patients with ASD have problems falling asleep and staying asleep for an adequate amount of time. Sleep apnea is another major concern, and it may remain undiagnosed, or even if diagnosed, may not be optimally treated. AI can help in the diagnosis and management of sleep apnea and other sleep disorders. AI can be used in screening, monitoring, prevention, prediction, diagnosis, and treatment of associated sleep disorders in patients with autism [19]. Verma et al. reviewed the use of AI ML, DL, and natural language processing technologies in sleep apnea at present and in the future. The review concluded that AI tools can be used to identify signals of treatment failure, which can alert providers to intervene on time. The integration of AI with electronic health record systems can alert professionals to use available data to predict the risk of the development of sleep-disordered breathing. The daily workflow of sleep providers guided by AI tools can improve efficiency and effectiveness. The review concluded that AI will play a big role in the management of sleep disorders in the future [19].

Polysomnography (PSG) is the best method of objectively testing sleep issues, creating a large amount of electrophysiological data. AI agents are well-suited for the analysis of this data. AI may provide new insights to inform the clinical care of sleep disorders and advance the understanding of sleep's integral role in human health when combined with other health data sources. Additionally, AI agents can streamline day-to-day operations and optimize care by the sleep disorders team. Analysis of multiple physiological signals acquired during PSG may deepen the understanding of the architecture of normal and disturbed sleep. It may help to improve disease subtyping and increase the efficiency of sleep laboratory operations to improve patient care [20]. Goldstein et al. have reviewed that the American Academy of Sleep Medicine Foundation has considered AI use in sleep medicine as one of the domains targeted by its 2020 Strategic Research Award program. However, the use of AI in sleep medicine has to be complemented with comprehensive clinical involvement. It must be done in association with the clinical features of patients, their demographics, and associated comorbidities. AI tools will transform medicine with significant support and collaboration of sleep disorder provider teams, developers, and researchers [20].

Artificial intelligence use in neurological disorders in patients with autism spectrum disorder

Children with autism may have associated neurological disorders such as seizure disorder, intellectual disability, motor impairment, tremors, and congenital malformations of the nervous system. These comorbidities may interfere with the learning and adaptation of skills, where AI tools can be used to make adjustments per the needs of the patients with autism [5].

Seizure disorders and epilepsy are among the most common neurological disorders in patients with ASD. AI applications in epilepsy use a variety of data modalities, such as neuroimaging, electroencephalography, electronic health records, medical devices, and multimodal data integration. This can help in seizure detection and prediction, seizure lateralization, localization of the seizure-onset zone, and assessment for surgical or neurostimulation interventions [21]. Lucas et al. discussed the use of AI applications in epilepsy patients, along with considerations and limitations that need to be addressed to integrate AI into the management of epilepsy patients. The review provided an overview of the present state of the field and future guidance on using AI to improve the management of patients with epilepsy [21].

Variable and complex presentations of neurological disorders may make it difficult to localize and diagnose the lesions. Brain structures can be accurately identified, and abnormalities can be detected precisely using AI image interpretation task tools and AI algorithms. This may accelerate diagnosis and reduce the workload on medical professionals. The smart device AI tool can be used in other neurological conditions, such as monitoring tremors and recognizing their phenotypes by evaluating fine motor functions. Image analysis activities, such as identifying particular brain regions, calculating changes in brain volume over time, and detecting abnormalities in brain scans, can be automated by AI systems [22]. Patel et al. reviewed the literature to guide providers in the use of ML and DL to help in the management of neurological diseases. The review highlighted the application of unsupervised aspects of ML to improve patient outcomes. They concluded that AI can analyze data, monitor, and develop new protocols, and help deal with large amounts of data efficiently and accurately [22].

Please refer to **Tab. 1** for the summary of ASD with comorbidities and the use of AI to manage them [6-22].

Table 1. Summary of use of artificial intelligence (AI) in autism spectrum disorder (ASD) and comorbidities [6-22].

ASD and comorbidities	Use of AI
ASD	<ul style="list-style-type: none"> • Analysis of behavior patterns • Integration of multiple sources of data and comprehensive assessment • Personalized learning material and activities
ADHD	<ul style="list-style-type: none"> • Cognitive training, task, time management, and focus enhancement
Obesity	<ul style="list-style-type: none"> • Tracking of physical activity, eating habits • Monitoring progress, individualized recommendations for weight loss
Feeding issues	<ul style="list-style-type: none"> • Behavioral modification • Friendly environment to meet sensory needs • OT to help with food texture
GI issues	<ul style="list-style-type: none"> • Study of gut microbiota • Dietary intervention • More sensitive, specific, and endoscopic evaluations and treatments
Speech delay	<ul style="list-style-type: none"> • Analysis of voice for early detection • Interactive games for skills • Real-time feedback with apps
Disorders of sleep	<ul style="list-style-type: none"> • Monitoring of sleep patterns, personalized recommendations, and early detection of sleep disorders
Neurological disorders	<ul style="list-style-type: none"> • Analysis of complex data from EEG and neuroimaging • Occurrence prediction, subtle signs detection • Real-time monitoring and treatment
Allergy and immunological issues	<ul style="list-style-type: none"> • Symptom prediction and monitoring
Genetic syndromes	<ul style="list-style-type: none"> • Progression and population susceptibility prediction • Analysis of genetic data • Better management options

ADHD: attention deficit hyperactivity disorder; AI: artificial intelligence; ASD: autism spectrum disorder; EEG: electroencephalography; GI: gastrointestinal; OT: occupational therapy.

Limitations of the use of artificial intelligence in patients with autism spectrum disorder and comorbidities and future directions

Despite the immense benefits of AI technology, numerous ethical and practical issues may arise before the development of diagnostic tools continues. More advocacy may be needed to expand guidelines and regulations to handle personal medical data appropriately. Regulations may include secure management of medical data and protection of this data throughout the research and implementation process. The other issue is biases ingrained in AI that may affect its ability to diagnose patients without confounding factors. Previous research has shown that AI is greatly affected by biases that predominantly affect underserved communities [23]. Singh et al. have reviewed the benefits and limitations of AI use in pediatrics. They highlighted how virtual technologies and AI can enhance the quality of healthcare. However, they found that, as compared to virtual care, there are challenges in adopting AI into community care. They discussed various options such as training of providers, policy and

regulations, data governance, better access to internet technology, and handling reimbursement issues [23].

The unavailability of infrastructure and low funding may interfere with the transition of low-income communities to adopt costly AI-driven tools. Due to this inability to afford AI tools, disparities in healthcare access could continue to widen. The involvement of policymakers for the easy availability and affordability in various healthcare settings may also benefit ASD patients with comorbidities and help promote brighter futures for children with ASD with comorbidities and their families [24]. Jeyaraman et al. studied AI, ML, natural language processing, and LLMs, which can act like the human brain. OpenAI's ChatGPT and sophisticated LLM are becoming very useful in research and medicine. However, they bring ethical challenges and the need for cautious use. The study emphasized concerns about quality data, bias, privacy, clarity, and faith. To preserve the confidentiality of data, they suggested the use of homomorphic encryption, secure multiparty computation, and explainable AI in offering comprehensive patient care [24].

Clinical relevance and practical implications

The review findings guide the clinical relevance and practical implications of AI tools in patients with ASD and associated comorbidities. AI models can improve overall management of patients with ASD right from early detection to potentially leading to enhanced learning and social support systems. AI tools are assisting children with ASD in all related comorbidities with better development opportunities.

Conclusion

Emerging AI technologies are becoming a good resource tool to help patients with ASD and their families. AI shows promise in improving the quality of life for patients with ASD and comorbid conditions by enhancing accuracy in diagnosis and

personalized interventions. Despite its potential, integrating AI in the management of ASD has several limitations, such as ethical concerns, data privacy, and bias in AI algorithms. Affordability has been another challenge for families/schools using AI system interventions. Future research for collaborative efforts between researchers, healthcare professionals, policymakers, and community leaders may help improve the accuracy and reliability of AI systems. Additionally, a focus on community-based initiatives could deliver essential understanding into the practical application of AI technologies for patients with ASD and related comorbidities everywhere, including underprivileged areas.

Take-home messages

Please refer to **Fig. 2** for the take-home messages.

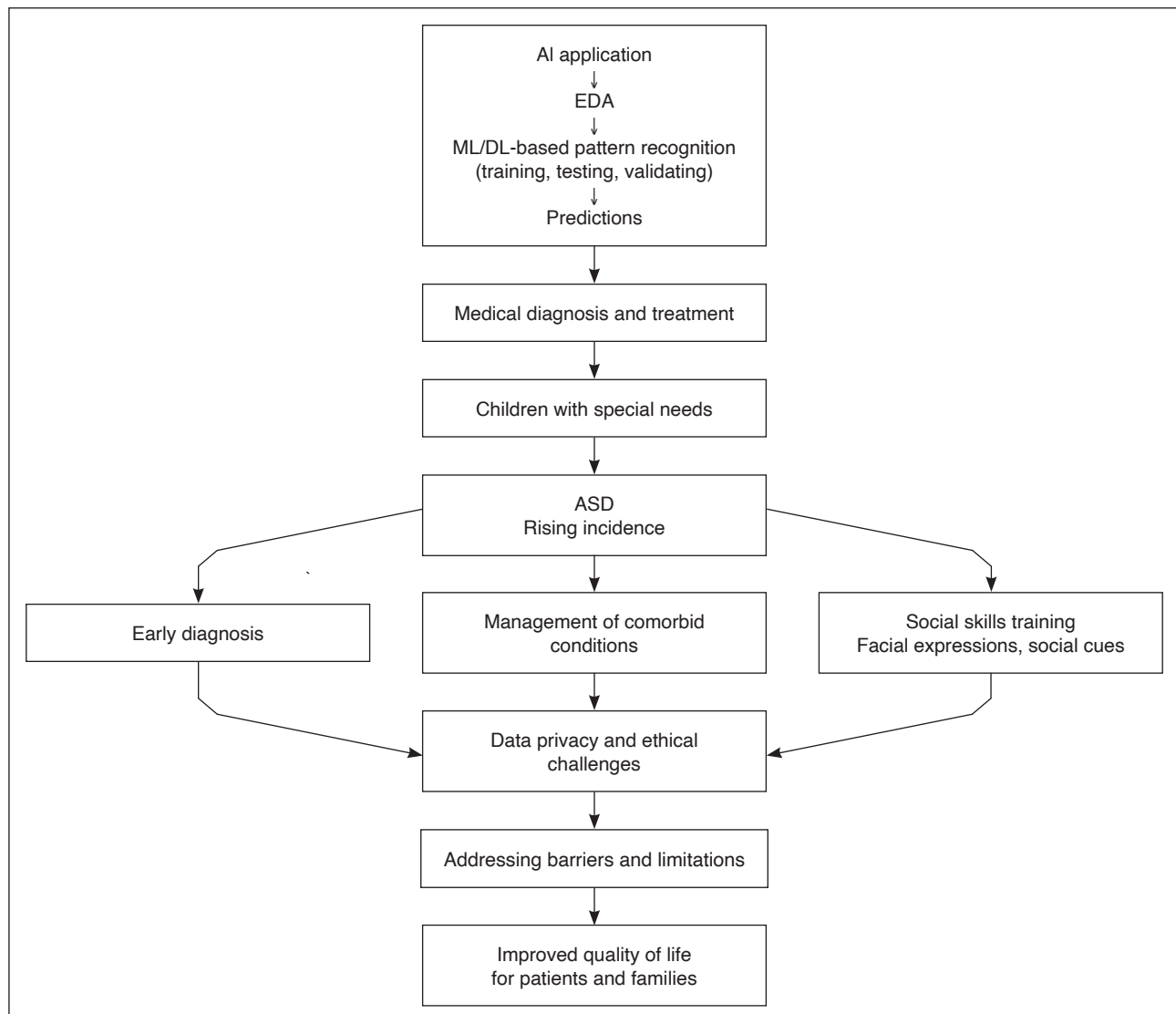


Figure 2. Take-home messages.

AI: artificial intelligence; ASD: autism spectrum disorder; DL: deep learning; EDA: exploratory data analysis; ML: machine learning.

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Declaration of interest

The Authors declare that there is no conflict of interest. Financial support: none.

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