



Use of Artificial Intelligence in Autism Spectrum Disorder: A Comprehensive Review in Assessment, Intervention, and Data Collection

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1. Abstract

Autism Spectrum Disorder (ASD) presents varied challenges across assessment, intervention, and behavioural monitoring. With recent advancements in Artificial Intelligence (AI), introduced tools have emerged that support clinicians, educators, and families in understanding and managing ASD more effectively. Considerable revolutions include the initiation of AI use through explainable AI, mobile applications, computer vision, and wearable devices, which establish promising capabilities to strengthen. precision, accessibility, and consistency of care. This review produces findings from recent literature to examine how AI contributes to the ASD care process. It highlights the benefits of AI while noting ethical and practical considerations. Also addresses challenges in data security, privacy, and ethical AI deployment within ASD care settings.

Keywords

Artificial Intelligence (AI); Autism Spectrum Disorder (ASD); Applied Behaviour Analysis (ABA); Assessment; Intervention; Data Collection; Ethics

2. Introduction

Autism spectrum disorder (ASD) is defined as a neurodevelopmental disorder affecting an individual's communication, social interaction, and exhibiting behaviour problems according to The American Psychiatric Association (2013). Early detection and intervention in ASD are vital to enhance adaptive skills, support participation in education and social life, and improve developmental outcomes (Vivanti et al., 2022; Whitehouse et al., 2021). Despite all concessions for early detection and intervention, the need for momentous facilitation often depends seriously on subjective clinical judgment and can hinder access to services (Howes et al., 2021). Moreover, demand for developmental professionals, such as ABA, is increasingly dependent on data-driven, scalable tools (Ghafghazi et al., 2021).

Furthermore, addressing challenges in ASD care through simplified strategies that followup progress monitoring, adapt treatment methods, and evaluate programmes for every case. One potential solution is artificial intelligence (AI), which enables automated assessments, personalised treatment plans, and systematic progress tracking (Bone et al., 2016; Ghafghazi et al., 2021). While AI involves managing large datasets to improve diagnostic accuracy and support personalised therapies, its application in ASD research and therapy is closely linked to the fields of information technology and AI (Bone et al., 2016; Ghafghazi et al., 2021). AI-powered wearable and mobile technologies also address important data privacy concerns by ensuring the secure management of sensitive behavioural and physiological data (Torkzadehmahani et al., 2022). Furthermore, by integrating adaptive learning platforms and AI-assisted educational tools, combining AI with digital educational systems helps individuals with ASD develop skills and provides personalised educational experiences (Shahamiri et al., 2022).

AI's role in ASD or any healthcare aligns with the Evidence-Based Practice (EBP) framework, covering research evidence, clinical proficiency, and individual needs. Within the Assistive Technology and Human Services model (Olugbami et al., 2025), AI functions as an enabling tool that bridges functional gaps, enhances participation, and optimizes interventions through data-driven, objective support.

Nevertheless, research is still limited for estimations that have synthesised evidence across the field of ASD care; similarly, ethical and cross-cultural challenges are rarely addressed, especially in areas where access to specialised care

is inadequate. This review aims to highlight these gaps by providing a comprehensive perspective on the use of AI for ASD.

3. Review Approach / Method

During this review, highlights on the current implementations of AI in ASD research and practice were compiled by a systematic literature review. The main methodology for this review had specific terms in search, like "autism spectrum disorder," "Artificial Intelligence," "machine learning," "mobile applications," and "wearable devices,". Particularly, the searches were conducted across specific sites, PubMed, IEEE Xplore, and Scopus. The studies that determine the inclusion criteria present practical data, technology frameworks, or AI-assisted interventions in ASD diagnosis, therapy, or behavioural monitoring. Excluded all papers without practical application, not addressing ASD, and not written in English. This system facilitates AI-based diagnostic instruments, adaptive interventions, wearable and mobile monitoring systems, and related ethical considerations widely, highlighting the field's advancements, obstacles, and research gaps.

4. AI in Assessment and Diagnosis of ASD

Recent AI in assessment and diagnosis identify behaviours associated with ASD, using a variety of machine learning algorithms and intelligent systems that evaluate behavioural, speech, and imaging data (Bhatt, et al., 2023). Subsequently, AI has sparked significant interest in the ability to eliminate diagnostic gaps and enhance early detection of cases of developmental delay (Chaddad et al., 2021).

Systematic reviews suggest that AI replaces traditional diagnosis by improving objectivity and scalability with behavioural and neuroimaging datasets (Cavus et al., 2021; Chaddad et al., 2021). Furthermore, this transparency significantly improves confidence among mechanical systems. One notable development in the field of artificial intelligence is Explainable Artificial Intelligence (XAI). XAI offers interpretability and transparency, enabling medical professionals to comprehend the reasoning behind an AI-generated diagnosis (Rane et al., 2023).

Mobile platforms have also emerged as accessible diagnostic tools. For example, Hamieli and Habbal (2024) developed an AI mobile application capable of screening ASD symptoms using a combination of image recognition, speech processing, and behaviour classification algorithms. Such tools are especially valuable in regions with limited access to specialists. Other diagnostic innovations include the use of computer vision and natural language processing. Samad et al. (2016) introduced a vision-based system designed to detect behavioural markers associated with ASD, such as atypical gaze patterns and facial expressions. Similarly, Deng et al. (2024) proposed a language-assisted deep learning model that integrates both verbal and non-verbal cues to identify autistic behaviour more comprehensively.

The World Health Organisation's digital health guidelines, which emphasise equity, accessibility, and the adaptation of AI interventions to local contexts (WHO, 2021). This approach aligns with the Middle East and North Africa (MENA), where mobile-based AI screening has expanded early detection probability, offering culturally adapted services, but access is limited (El-Jardali et al., 2023).

The integration of AI into the diagnostic process holds the promise of earlier identification of ASD symptoms, facilitating access to intervention services during critical developmental windows.

5. AI-Driven Interventions for ASD

Once a diagnosis is confirmed, the focus shifts to a different way of deciding and applying efficient interventions. These days, AI technologies offer opportunities provides personalise and enhance therapeutic systems for individuals with ASD (Maspul & Ardhin, 2025). Likewise, AI-augmented Applied Behaviour Analysis (ABA) has been an obvious area of research. One of the researchers Ghafghazi et al. (2021), introduced a structure that utilises AI to analyse behavioural data and adapt treatment plans based on each child's progress. Additionally, Kohli et al. (2022) extended this area by employing machine learning algorithms to recommend individualised ABA treatment strategies, thereby increasing treatment accuracy and effectiveness.

For instance, the development of social skills is one of the gaps in ASD that needs to be addressed. Therefore, Jayousi et al. (2023) proposed a method to support the social inclusion of children with neurodevelopmental disorders in an Information and Communication Technology (ICT) context. The ICT system assists therapists to create, monitor, and analyse structured ABA-based interventions plan for social skills development using AI-assisted tools. Also, other

obstacles for ASD include that inclusive education could use AI tools that can correct satisfied delivery, deliver real-time feedback, and categorise areas where additional support is needed. Hence, Lan et al. (2025) and Ahmed et al. (2025) emphasise the potential of AI in inclusive education by supporting adaptive learning environments tailored to the diverse needs of students with ASD.

Additionally, it facilitates parents' roles for support involvement and provides interventions. Lee et al. (2024) demonstrate this through a randomised controlled trial evaluating a mobile app that helped parents implement behaviour management plans. The study found notable improvements in children's behaviour and increased parental self-confidence.

Collectively, these interventions demonstrate that AI not only enhances the quality of ASD services but also improves the approach by extending expert-guided tools into homes and schools.

6. AI in Data Collection and Behaviour Monitoring

Continuous data collection is essential for tracking the progress of ASD interventions and modification plans (Drakeford & Majebi, 2024). One of the AI tools is a wearable social interaction tool presented by Haber et al. (2020), which illustrates a tool that facilitates therapeutic applications by collecting data on gaze, movement, and emotional reactions while providing real-time feedback during social encounters. In a similar vein, Das et al. (2024) created a video analysis system that protects privacy to observe classroom behaviour. Another AI highlights the need for monitoring, as presented by Sideraki and Anagnostopoulos (2025). These systems can identify patterns that indicate progress or regression and notify therapists and carers, enabling proactive intervention changes.

These AI systems aid in reducing the responsibility required; at the same time, observation, documentation, and data analysis increase the accuracy and strength of behavioural data.

7. Cybersecurity, Data Privacy Challenges, and Ethical Considerations

Currently, revolutionary AI has abilities in several areas, including education, health, management, and other sectors. Conversely, it develops a variety of tools such as speech analysis and facial recognition, which, despite their strength, need to be subject to stringent ethical guidelines to protect. Furthermore, an individual's control requires careful consideration, as well as the gathering and analysis of behaviourally sensitive data, informed consent, and data protection. Additionally, it agreed that Human dignity, autonomy, and trust should never be sacrificed for the promise of AI (Williams et al., 2021). Moreover, the fact that many AI models usually fail to represent a range of individuals when trained on datasets leads to a significant AI bias problem. Consequently, these results limited diagnostic outcomes or ineffective intervention plans. Hence, to confirm equity, future AI systems must be advanced via inclusive datasets that reflect the comprehensive spectrum of human diversity (Obermeyer et al., 2019). Additionally, international laws such as GDPR and HIPAA enhance human oversight, authorisation, and openness in health AI-linked (Mittelstadt et al., 2019). Similar ideas are represented regionally in the UAE's ethical AI standards, Saudi Arabia's PDPL, and Jordan's PDPL (No. 24/2023). Lastly, AI needs continuous tracking and updates to fit its essential role.

8. Conclusion

AI has the potential to improve assessments, customise therapies, and enable real-time monitoring in the treatment of ASD. Moreover, AI shows a significant advantage in treating ASD at all stages, from early detection to monitoring progress. However, AI should complement human expertise, which requires dedicated ethical and continuous research. Future investigations should focus attention on hybrid care models, longitudinal assessment of AI-assisted interventions, and the addition of professional guidelines for the accountable integration of these approaches. With wise supervision, AI can serve as a beneficial adjunct in delivering accessible, ethical, and ABA-based care for individuals with ASD.

9. Limitations

Limitations of this study include the variety of included papers. Additionally, more thorough and long-term studies are needed to completely comprehend the long-term efficacy of AI-driven solutions in the ASD field.

10. References

1. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing.
2. Vivanti, G., Bent, C., Capes, K., Upson, S., Hudry, K., Dissanayake, C., & Victorian ASELCC Team. (2022). Characteristics of children on the autism spectrum who benefit the most from receiving intervention in inclusive versus specialised early childhood education settings. *Autism Research*, 15(11), 2200-2209.
3. Whitehouse, A. J., Varcin, K. J., Pillar, S., Billingham, W., Alvares, G. A., Barbaro, J., ... & Hudry, K. (2021). Effect of preemptive intervention on developmental outcomes among infants showing early signs of autism: A randomized clinical trial of outcomes to diagnosis. *JAMA pediatrics*, 175(11), e213298-e213298.
4. Howes, A. E., Burns, M. E., & Surtees, A. D. (2021). Barriers, facilitators, and experiences of the autism assessment process: A systematic review of qualitative research with health professionals. *Professional Psychology: Research and Practice*, 52(5), 449.
5. Ghafghazi, S., Carnett, A., Neely, L., Das, A., & Rad, P. (2021). AI-augmented behavior analysis for children with developmental disabilities: building toward precision treatment. *IEEE Systems, Man, and Cybernetics Magazine*, 7(4), 4-12.
6. Bone, D., Bishop, S. L., Black, M. P., Goodwin, M. S., Lord, C., & Narayanan, S. S. (2016). Use of machine learning to improve autism screening and diagnostic instruments: Effectiveness, efficiency, and multi-instrument fusion. *Journal of Child Psychology and Psychiatry*, 57(8), 927-937.
7. Torkzadehmahani, R., Nasirigerdeh, R., Blumenthal, D. B., Kacprowski, T., List, M., Matschinske, J., ... & Baumbach, J. (2022). Privacy-preserving artificial intelligence techniques in biomedicine. *Methods of information in medicine*, 61(S 01), e12-e27.
8. Shahamiri, S. R., Thabtah, F., & Abdelhamid, N. (2022). A new classification system for autism based on machine learning of artificial intelligence. *Technology and Health Care*, 30(3), 605-622.
9. Olugbami, O. O., Ogundeko, O., Lawan, M., & Foster, E. (2025). Harnessing data for impact: Transforming public health interventions through evidence-based decision-making. *World Journal of Advanced Research and Reviews*, 25(1), 2085-2103.
10. Bhatt, P., Sethi, A., Tasgaonkar, V., Shroff, J., Pendharkar, I., Desai, A., ... & Jain, N. K. (2023). Machine learning for cognitive behavioral analysis: datasets, methods, paradigms, and research directions. *Brain informatics*, 10(1), 18.
11. Chaddad, A., Li, J., Lu, Q., Li, Y., Okuwobi, I. P., Tanougast, C., ... & Niazi, T. (2021). Can autism be diagnosed with artificial intelligence? A narrative review. *Diagnostics*, 11(11), 2032.
12. Cavus, N., Lawan, A. A., Ibrahim, Z., Dahiru, A., Tahir, S., Abdulrazak, U. I., & Hussaini, A. (2021). A systematic literature review on the application of machine-learning models in behavioral assessment of autism spectrum disorder. *Journal of Personalized Medicine*, 11(4), 299.
13. Rane, N., Choudhary, S., & Rane, J. (2023). Explainable artificial intelligence (XAI) in healthcare: interpretable models for clinical decision support. *Available at SSRN 4637897*.
14. Al Hamieli, M., & Habbal, F. (2024). Developing an AI-Driven Mobile Application for Early Autism Diagnosis and Classification. *International Journal For Autism Challenges & Solution*, 1(2), 63-81.
15. Samad, M. D., Diawara, N., Bobzien, J. L., Harrington, J. W., Witherow, M. A., & Iftekharuddin, K. M. (2017). A feasibility study of autism behavioral markers in spontaneous facial, visual, and hand movement response data. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 26(2), 353-361.
16. Deng, A., Yang, T., Chen, C., Chen, Q., Neely, L., & Oyama, S. (2024). Language-assisted deep learning for autistic behaviors recognition. *Smart Health*, 32, 100444.
17. World Health Organization. (2021). *Global strategy on digital health 2020–2025*. WHO. <https://www.who.int/publications/i/item/9789240020924>
18. El-Jardali, F., Bou-Karroum, L., Jabbour, M., Bou-Karroum, K., Aoun, A., Salameh, S., ... & Sinha, C. (2023). Digital health in fragile states in the Middle East and North Africa (MENA) region: a scoping review of the literature. *PloS one*, 18(4), e0285226.
19. Maspul, K. A., & Ardhin, M. (2025). AI Empowers Autism Nutritional Care Solutions: A Family-Centred Innovation. *Health & Medical Sciences*, 2(3), 19-19.
20. Kohli, M., Kar, A. K., Bangalore, A., & Ap, P. (2022). Machine learning-based ABA treatment recommendation and personalization for autism spectrum disorder: an exploratory study. *Brain Informatics*, 9(1), 16.
21. Jayousi, Sara, Alessio Martinelli, Paolo Lucattini, and Lorenzo Mucchi. "ICT framework for supporting applied behavior analysis in the social inclusion of children with neurodevelopmental disorders." *Sensors* 23, no. 15 (2023): 6914.
22. Lan, L., Li, K., & Li, D. (2025). Exploring the application of AI in the education of children with autism: a public health perspective. *Frontiers in Psychiatry*, 15, 1521926.

23. Ahmed, S., Rahman, M. S., Kaiser, M. S., & Hosen, A. S. M. (2025). Advancing Personalized and Inclusive Education for Students with Disability Through Artificial Intelligence: Perspectives, Challenges, and Opportunities. *Digital*, 5(2).
24. Lee, J., Lim, J., Kang, S., Kim, S., Jung, S. Y., Hong, S. B., & Park, Y. R. (2024). Mobile App-Assisted Parent Training Intervention for Behavioral Problems in Children With Autism Spectrum Disorder: Pilot Randomized Controlled Trial. *JMIR Human Factors*, 11(1), e52295.
25. Drakeford, O. M., & Majebi, N. L. (2024). Advancing Personalized Autism Interventions in the US A Data Analytics-Driven Conceptual Framework for Social Work. *International Journal of Engineering Research and Development*, 22(12), 385-391.
26. Haber, N., Voss, C., Daniels, J., Washington, P., Fazel, A., Kline, A., ... & Wall, D. P. (2020). A wearable social interaction aid for children with autism. *arXiv preprint arXiv:2004.14281*.
27. Das, B., Anderson, C., Villavicencio, T., Lantz, J., Foster, J., Hamlin, T., ... & Kwon, H. (2024). Explainable Artificial Intelligence for Quantifying Interfering and High-Risk Behaviors in Autism Spectrum Disorder in a Real-World Classroom Environment Using Privacy-Preserving Video Analysis. *arXiv preprint arXiv:2407.21691*.
28. Sideraki, A., & Anagnostopoulos, C. N. (2025). The use of Artificial Intelligence for Intervention and Assessment in Individuals with ASD. *arXiv preprint arXiv:2505.02747*.
29. Williams, R., & Yampolskiy, R. (2021). Understanding and avoiding ai failures: A practical guide. *Philosophies*, 6(3), 53.
30. Obermeyer, Z., Powers, B., Vogeli, C., & Mullainathan, S. (2019). Dissecting racial bias in an algorithm used to manage the health of populations. *Science*, 366(6464), 447-453.
31. Mittelstadt, B., Russell, C., & Wachter, S. (2019, January). Explaining explanations in AI. In *Proceedings of the conference on fairness, accountability, and transparency* (pp. 279-288).