# Commentary

## Child Mental Health in the Age of AI: Clinical Applications and Ethical Reflections

**Maryam Ayub,**[1] **Sania Mumtaz Tahir**[2]

[1,2]*Fellow Child and Adolescent Psychiatry, Department of Child and Family Psychiatry, King Edward Medical University, Lahore*

**Abstract**

Artificial Intelligence (AI) is making useful changes in field of child and adolescent mental health. The current review aims to look at use of AI in child psychiatry, with an emphasis on disorders including neurodevelopmental disorders, mood disorders, psychosis and suicide prevention. AI methods like machine learning (ML) and natural language processing (NLP) have shown promise in detecting early behavioral and neurobiological signs using home videos, neuroimaging, wearable technology, and electronic health information. AI-powered chatbots and virtual reality-based tests are already being utilized for diagnosis and treatment. AI has also demonstrated a high degree of predictive accuracy in suicide prevention by analyzing social media content and clinical data. Despite these advances, AI use in child mental health poses significant ethical challenges. For AI to be genuinely transformational, the emphasis on growing research must be accompanied with a high standard of responsibility, patient rights protection, inter-disciplinary collaboration, and clinician oversight.

**Corresponding Author** | Dr. Maryam Ayub, Fellow Child and Adolescent Psychiatry, Department of Child and Family Psychiatry, King Edward Medical University, Lahore . **Email:** drmaryamayub@yahoo.com

## Introduction

Artificial intelligence (AI) is gradually changing every field in realm of medicine including child and adolescent mental health. AI is rapidly giving professionals new tools for early detection of mental health disorders, more accurate diagnoses, and development of personalized treatment plans for children. This review highlights current and upcoming applications of AI in child and adolescent psychiatry. This includes AI use in diagnosis and treatments of neurodevelopmental disorders like autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD), mood disorders (depression and anxiety) and psychosis. It also calls attention to the related challenges and ethical dilemmas involving data privacy, bias, and transparency.

### Early Detection and Diagnosis

AI is being used in autism research to develop a pre-screening tool, using recording of home videos of children. Machine learning (ML) model based on eXtreme Gradient Boosting (XGBoost) has been developed that successfully detects red flags in three core sensorimotor, behavioural, and emotional aspects.[1] Facial expression analysis, gaze detection, and even vocal tone and rhythm are used to train algorithms to flag potential ASD traits in toddlers as young as 9 to 18 months. This is significantly earlier

than the average age of diagnosis, which is often after the age of 3. Machine learning (ML) and deep learning (DL) algorithms have also been used to analyze functional MRI (fMRI) and diffuser tensor imaging (DTI) to detect complex brain imaging features that are associated with ASD even before behavioral symptoms become evident, demonstrating high classification accuracies (e.g., up to 96.6%) in detecting ASD, enabling earlier diagnosis, sometimes as early as six months of age.[2]

Numerous useful AI tools are currently being used in diagnosis in various childhood psychiatric disorders. To enable early diagnosis and individualized evaluation of ASD, AI can analyze a variety of data sources, including genetics (sequencing and protein markers), diverse neuroimaging (from prenatal ultrasounds to fMRIs), behavioral patterns (from video recordings, wearable devices and structured assessments), and electronic medical records.[3,4] AI can also be used for diagnosis of ADHD using imaging techniques, physiological signals (EEG, ECG and metencephelography), machine learning and deep learning models.[3] AttnKare-D is one such AI tool which has been used for diagnosis of ADHD in children by analyzing their behavior in Virtual Reality using Artificial Intelligence.[5] Deep Learning , a type of machine learning based on artificial neural networks has been proven helpful in diagnosis of numerous psychiatric disorders including depression[6,7] and can also predict presence of co-morbidities.[7]

***Treatment of Child and Adolescent Psychiatric Disorders:***
Treatment Selection and Prediction AI systems can be used to process massive volumes of data to anticipate therapy results and help in treatment choices.

· AI can be utilized to help people with Autism Spectrum Disorder (ASD) communicate better and complete daily tasks. Apple's Siri, SideKick, and iPrompts are examples of personalized assistants that consider user preferences and dislikes. Similarly numerous applications are available which can serve as tools for children and parents. "JeStimule" is useful for emotion recognition and "Jemine" has been specially designed for autistic children.[3,8] The augmentive communication systems, virtual reality-based social skills training and robot-assisted therapies are making great strides in enhancing management and social skills in children with ASD.[4]

· For children with ADHD and attention difficulties, AVS (Aide de Vie 4. Scolaire) is a robot that uses EEG detection and motion-sensing cameras to assist them in refocusing on schoolwork and utilizing motivational aspects.[3,8]

· There are applications available to help with anxiety and sadness. For example, The Flow app uses breathing exercises and games to alleviate anxiety and control hyperventilation episodes.[3,9]

· Various treatments can now employ AI to enhance their outcomes. Computer-assisted therapy (CAT) AI is being utilized to optimize conventional therapies like Cognitive-behavioral therapy (CBT) through computer-delivered CBT (cCBT). Such CAT is more cost-effective, promotes self-disclosure and is less worrying for patients.[10] AI based chatbots (Woebot, Tess) offer conversational CBT based interventions and short-term use has shown significant improvement in depressive symptoms.[7]

· Deep learning (DL), a type of Machine Learning (ML), uses artificial neural networks with numerous layers to extract higher-level characteristics from data. It works by combining multiple data sources, including genetics, environmental neuroimaging, molecular information, and other characteristics. DL may be used to predict antidepressant therapy based on pharmacogenomic data with up to 80% accuracy.[7]

· AI models can also be used to forecast schizophrenia treatment response with significant prediction power and near-to-high test accuracy. EEG-based models had the highest sensitivity and specificity (89% and 94% respectively) followed by imaging-

based models. Such studies have useful implications in providing insights for tailored treatments, increasing adherence and lowering relapses.[11]

· In patients with schizophrenia and auditory hallucinations, AI can make a digital simulation of the patient's troubling hallucinations, which can then create a three-way communication between the patient, doctor and avatar. One such example is the AVATAR system, which has shown to reduce anxiety.[12,13]

AI can help in real-time symptom tracking and follow-up in many patients, offering a scalable way to manage ADHD, ASD, and other psychiatric orders.[3]

### Suicide Prediction and Prevention:

Application of AI, through machine learning (ML) and Natural Language Processing (NLP), for suicidal behavioral forecastinghas shown high classification accuracy often exceeding 90%.[14] In a systematic review of 87 studies, it was seen that ML models frequently outperformed traditional clinical assessments, providing early diagnosis in emergency situations.[14] AI can help in analyzing huge datasets, especially electronic health records and social media posts to accurately predict suicidal ideation, attempts and deaths. The study while highlighting previously identified risk factors (mood/substance use disorders, being male, family history, previous history of hospitalization, unemployment and delinquency), also identified new risk variables related to sleep, circadian rhythms, neural substrates and Natural Language Processing (NLP) derived indices of speech or user data.[14]

Applications like the Calm Harm app are easily accessible online resources that offer meditation and mindfulness exercises, specifically targeting self-harm and suicide prevention among adolescents.[9] Studies have shown that using such applications can reduce self-harming behaviors in adolescents who are experiencing such risky thoughts. Approximately 25% of young people may struggle to control intense urges to self-harm, but after using the applications, they reported a decrease or in some cases even complete disappearance of these thoughts.[9]

### Challenges and Ethical Issues regarding AI in Child Psychiatry:

There are quite a few challenges currently faced by AI's use in psychiatry and specially child psychiatry. The use of AI is currently gaining traction, but the research related to long term effects is lagging far behind. The diagnosis of the disorders even when AI is used, depends on humans and filled questionnaires which can lead to inaccuracies. Many psychiatric disorders have evolving nature, but current AI algorithms may not capture their change leading to bias, brittleness and inapplicability.[13] Patients or health professionals may become excessively dependent on AI leading to addictive behaviours, avoidance of face-to-face visits and dire risk in emergency situations which most AI software, currently cannot handle.[15]

Currently AIs are not being regulated by ethical and legal frameworks in most countries. There is lack of laws by government and even guidelines by mental health associations to hold software designers accountable. This leads to lack of transparency and accountability in decision making of AI and can also cause additional bias towards already marginalized communities.[13] Furthermore automating care may lead to difficulties in establishing good therapeutic relationships. Some cultures may view interacting with AI as insulting leading to exacerbation of existing health disparities.[15] Additionally due to challenges of data safety, there are serious concerns for privacy and confidentiality of very personal information of users especially in child and adolescent patients.[13]

### Conclusion

The integration of Artificial Intelligence in child and adolescent psychiatry has immense potential of revolutionizing the field in coming future. AI, through machine learning, deep learning, virtual reality and integrated apps can be profoundly useful in effective screening, early diagnosis and personalized therapeutic interventions of various neurodevelopmental, mood and psychotic disorders. At the same times, as we step up use of AI in vulnerable population of youth facing psychiatric issues , we should be careful of the ethical and legal dilemmas like data privacy, lack of regulation, biases and gradual loss of human connection. For AI to be truly transformative, the focus on increasing research

should also come with immense responsibility, safeguarding of patients' rights, inter-disciplinary collaboration and clinician oversight.

## References

1. Paolucci C, Giorgini F, Scheda R, Alessi FV, Diciotti S. Early prediction of Autism Spectrum Disorders through interaction analysis in home videos and explainable artificial intelligence. Comput Human Behav. 2023;148(107877):107877. http://dx.doi.org/10.1016/j.chb.2023.107877.

2. Helmy E, Elnakib A, ElNakieb Y, Khudri M, Abdelrahim M, Yousaf J, et al. Role of artificial intelligence for autism diagnosis using DTI and fMRI: A survey. Biomedicines. 2023;11(7):1858.http://dx.doi.org/10.3390/biomedicines11071858

3. Till AC, Briganti G. AI in child psychiatry: Exploring future tools for the detection and management of mental disorders in children and adolescents. Psychiatr Danub. 2023;35(2):20–5.

4. Wankhede N, Kale M, Shukla M, Nathiya D, Kaur P, Goyanka B, et al. Leveraging AI for the diagnosis and treatment of autism spectrum disorder: Current trends and future prospects. Asian J Psychiatry. 2024;101:104241. http://dx.doi.org/10.1016/j.ajp.2024.104241

5. Oh S, Joung YS, Chung TM, Lee J, Seok BJ, Kim N, et al. Diagnosis of ADHD using virtual reality and artificial intelligence: an exploratory study of clinical applications. Front Psychiatry. 2024;15:1383547. http://dx.doi.org/10.3389/fpsyt.2024.1383547

6. Khosla A, Khandnor P, Chand T. Automated diagnosis of depression from EEG signals using traditional and deep learning approaches: A comparative analysis. Biocybern Biomed Eng . 2022;42(1):108–42. http://dx.doi.org/10.1016/j.bbe.2021.12.005

7. Ricci F, Giallanella D, Gaggiano C, Torales J, Castaldelli-Maia JM, Liebrenz M, et al. Artificial intelligence in the detection and treatment of depressive disorders: a narrative review of literature. Int Rev Psychiatry. 2025;37(1):39–51. http://dx.doi.org/10.1080/09540261.2024.2384727

8. Cohen D, Anzalone S, Chetouani M: Intelligence artificielle: Quelles applications pour la psychopathologie du développement? Neuropsychiatrie de l'Enfance et de l'Adolescence 2022; 70:287–95. https://doi.org/10.1016/j.neurenf.2022.03.003

9. Hubbard M. Suicide prevention: Reducing self-harm in adolescents using the smart phone app "calm harm." J Med Clin Nurs. 2022;1–7. http://dx.doi.org/10.47363/jmcn/2022(3)148

10. Rost T, Stein J, Löbner M, Kersting A, Luck-Sikorski C, Riedel-Heller SG. User acceptance of computerized cognitive behavioral therapy for depression: Systematic review. J Med Internet Res. 2017;19(9):309. http://dx.doi.org/10.2196/jmir.7662

11. Saboori Amleshi R, Ilaghi M, Rezaei M, Zangiabadian M, Rezazadeh H, Wegener G, et al. Predictive utility of artificial intelligence on schizophrenia treatment outcomes: A systematic review and meta-analysis. Neurosci Biobehav Rev. 2025;169:105968. http://dx.doi.org/10.1016/j.neubiorev.2024.105968

12. Garety P, Edwards CJ, Ward T, Emsley R, Huckvale M, McCrone P, et al. Optimising AVATAR therapy for people who hear distressing voices: study protocol for the AVATAR2 multi-centre randomised controlled trial. Trials. 2021;22(1):366. http://dx.doi.org/10.1186/s13063-021-05301-w

13. Terra M, Baklola M, Ali S, El-Bastawisy K. Opportunities, applications, challenges and ethical implications of artificial intelligence in psychiatry: a narrative review. Egypt J Neurol Psychiat Neurosurg. 2023;59(1):80. https://doi.org/10.1186/s41983-023-00681-z

14. Bernert RA, Hilberg AM, Melia R, Kim JP, Shah NH, Abnousi F. Artificial intelligence and suicide prevention: A systematic review of machine learning investigations. Int J Environ Res Public Health. 2020;17(16):5929. http://dx.doi.org/10.3390/ijerph17165929

15. Kretzschmar K, Tyroll H, Pavarini G, Manzini A, Singh I. Can your phone be your therapist? Young people's ethical perspectives on the use of fully automated conversational agents (Chatbots) in mental health support. Biomed Inform Insights. 2019;11:117822261982908. https://doi.org/10.1177/1178222619829083