

## Review Article

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## The Impact of AI on Diagnosis and Treatment of Eating Disorders: Advancing Patient-Centered Care

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### Abstract

Eating Disorders (EDs) are complex psychiatric conditions that often go underdiagnosed and undertreated. Artificial Intelligence (AI) offers new opportunities to enhance early detection, personalize treatment, and improve access to care. This narrative review synthesizes recent literature on the use of AI in the diagnosis and treatment of EDs, focusing on its potential to support patient-centered approaches. Studies show that machine learning models can accurately predict ED risk using data from self-reports, neuroimaging, and social media. Chatbots using natural language processing have demonstrated efficacy in delivering psychoeducation and reducing ED-related concerns, particularly among high-risk populations. AI tools are also being adopted by clinicians for administrative tasks and clinical decision support, though their impact on therapeutic outcomes remains limited. Despite these promising developments, challenges persist. Concerns about algorithmic bias, data privacy, lack of transparency, and limited real-world validation highlight the need for caution. Ethical questions surrounding the use of AI in emotionally sensitive care further complicate its integration. While AI shows strong potential to complement traditional ED care, its success depends on careful implementation, interdisciplinary collaboration, and ongoing research. When developed responsibly, AI can become a valuable tool in advancing equitable, effective, and patient-centered eating disorder services.

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### Introduction

Eating Disorders (EDs) are complex psychiatric conditions characterized by persistent disturbances in eating behaviors and associated emotional distress. They contribute significantly to global disability and mortality, particularly among adolescents and young adults [1,2]. Despite the development of evidence-based treatments, access to timely, personalized, and effective care remains limited, with many individuals remaining undiagnosed or untreated [3,4].

Artificial Intelligence (AI) is increasingly recognized as a transformative tool in mental health care, offering new possibilities in the detection, diagnosis, and treatment of EDs. Machine learning, Natural Language Processing (NLP), and Large Language Models (LLMs) can analyze large volumes of heterogeneous data to identify clinically relevant patterns and support early intervention efforts [5,6]. These technologies promise to alleviate diagnostic delays and support personalized treatment approaches by enhancing clinicians' ability to synthesize complex data from various sources [7,8].

Several recent studies have demonstrated how AI applications are being leveraged across the ED care continuum. Machine learning models have been used to classify individuals at risk based on

neuroimaging, survey responses, or social media content with high accuracy. Chatbot-based interventions have shown promise in ED prevention by reducing weight and shape concerns and improving early engagement with at-risk individuals [9]. Moreover, mental health professionals are beginning to adopt generative AI tools like ChatGPT for administrative documentation, initial assessment, and clinical decision support, although widespread implementation remains limited [10,11].

However, the integration of AI into ED care also introduces a host of challenges. These include risks of algorithmic bias, limited transparency, ethical dilemmas around patient data, and uncertainty about the role of AI in therapeutic relationships [12,13]. Furthermore, most current research is at the proof-of-concept stage and lacks sufficient real-world validation across diverse populations [6,14].

This literature review aims to synthesize findings from recent research on the use of AI in diagnosing and treating eating disorders. It explores how AI may advance patient-centered care while critically evaluating the limitations and ethical concerns that accompany these innovations. Through this analysis, the review identifies knowledge gaps and future directions essential for the responsible and effective integration of AI into clinical practice.

### Methods

This review employed a narrative approach to explore how

artificial intelligence is being applied in the diagnosis and treatment of eating disorders. A broad literature search was conducted in PubMed, Embase and PsycInfo using terms related to AI, machine learning, and eating disorders. Articles were selected based on their relevance to clinical applications of AI, particularly in diagnostic or therapeutic contexts. Empirical studies, reviews, and conceptual papers were included to capture a wide range of perspectives. Key themes were identified through close reading and synthesis, with a focus on patient-centered implications, emerging trends, and areas requiring further investigation.

## Results

The reviewed literature demonstrates that artificial intelligence is increasingly being applied across multiple domains of Eating Disorder (ED) care. Machine learning algorithms have been successfully used to analyze diverse data sources, including self-report scales, neuroimaging, and social media posts, to identify individuals at risk of EDs with notable accuracy [7,14]. These technologies show promise in supplementing traditional screening tools by enhancing early detection, often with performance comparable to or exceeding that of standard clinical assessments.

Chatbots, powered by AI and natural language processing, have also emerged as tools for ED prevention and support. These systems have been used to deliver psychoeducation and coping strategies, particularly to high-risk populations who may otherwise not seek help. Studies have shown positive outcomes such as reductions in weight/shape concerns and symptom severity following chatbot-guided interventions [9,15]. Chatbots also offer anonymity and 24/7 accessibility, which may help overcome stigma and logistical barriers to care [7].

Clinicians themselves are beginning to integrate AI tools into their workflows, primarily for administrative efficiency, clinical note-taking, and information synthesis. A recent survey revealed that 59% of clinicians treating EDs had used AI systems like ChatGPT for professional purposes, although fewer believed these tools could meaningfully improve therapeutic outcomes [8]. Community participants showed less engagement with AI tools, with concerns centering around data security, lack of emotional nuance, and the depersonalization of care.

Despite promising developments, the clinical adoption of AI remains limited. Several barriers persist, including uncertainty about algorithmic accuracy, the lack of robust validation studies, and skepticism regarding the ability of AI to replicate complex human dynamics such as empathy and rapport [11,13]. Ethical concerns also feature prominently in the literature, with attention to data bias, privacy, and the risk of misapplication in sensitive clinical contexts [12,16].

Overall, AI has demonstrated notable potential in screening, monitoring, and augmenting treatment for eating disorders. However, its role remains complementary rather than central, with researchers and practitioners advocating for cautious, evidence-based integration that preserves core principles of patient-centered care.

## Discussion

The integration of artificial intelligence into the diagnosis and treatment of Eating Disorders (EDs) marks a significant advancement in mental health care, with the potential to improve access, personalization, and clinical outcomes. Across the reviewed literature, AI technologies have consistently shown promise in

enhancing the accuracy and efficiency of ED screening, risk prediction, and treatment delivery. These systems are particularly effective when leveraging multimodal data inputs such as self-reports, social media content, neuroimaging, and biometric signals [14,13,17].

Machine learning algorithms have enabled early identification of disordered eating behaviors, often outperforming traditional screening tools in sensitivity and scalability [7,12]. In particular, chatbots and AI-driven digital platforms have emerged as promising tools for prevention and self-management, offering accessible psychoeducation and emotional support while maintaining user engagement [9,11]. These interventions align with the principles of patient-centered care by offering flexible, low-barrier options for individuals who may be reluctant to seek traditional treatment [5,15].

Beyond prevention, AI is increasingly employed in supporting treatment planning and monitoring. Systems that synthesize clinical notes, biometric data, and patient feedback have enabled dynamic and individualized care pathways, contributing to more precise and adaptive interventions [6,8]. The potential to integrate AI into clinical decision support systems—assisting with diagnosis, comorbidity detection, and relapse prediction—may ease the burden on clinicians and improve consistency across care providers [16,18].

Despite these advantages, the literature highlights critical limitations and areas of concern. Many studies remain in the pilot or experimental stage, with limited real-world validation. Small, homogeneous sample sizes and lack of external testing restrict generalizability [3,19]. Clinicians and community participants also express ambivalence about AI in clinical contexts, citing doubts about its ability to replicate human empathy and relational depth—an essential component of therapeutic alliance in ED treatment [8,10].

Ethical issues are among the most pressing challenges. Data privacy and security are recurrent concerns, particularly as AI systems often rely on sensitive and deeply personal information [12,16]. Bias in training data, lack of explainability, and inadequate regulation further complicate implementation. For instance, underserved or marginalized populations may be misrepresented or misclassified by models trained on narrow datasets [1,16]. Moreover, concerns persist that premature reliance on AI could erode the clinician's role or be misused in settings with limited oversight [11,15].

## Limitations

This review was limited by its narrative methodology and the absence of a formal quality assessment of included studies. While the review aimed to be comprehensive, the selection was limited to English-language peer-reviewed sources, potentially omitting relevant research published in other languages or grey literature. Furthermore, the heterogeneity in study designs and AI applications made direct comparison across findings challenging. As many studies are exploratory in nature, the evidence base remains dynamic and subject to rapid evolution.

## Future Research

Future work should prioritize large-scale, longitudinal studies that test AI applications in real-world ED clinical settings. Randomized controlled trials evaluating the efficacy, safety, and long-term outcomes of AI-supported interventions are urgently needed.

Research should also explore how AI can enhance, not replace, the therapeutic relationship, particularly in emotionally sensitive domains like eating disorders. Greater inclusion of diverse populations in AI training datasets will help mitigate bias and improve generalizability. Finally, interdisciplinary collaboration is essential to develop ethical, explainable, and human-centered AI tools that clinicians and patients alike can trust and use effectively.

## Conclusion

Artificial intelligence is rapidly reshaping the landscape of eating disorder care, offering new avenues for early detection, personalized treatment, and scalable support tools. This review highlights the diverse ways AI is being applied across the ED continuum from predictive screening using machine learning algorithms to therapeutic interventions delivered through chatbots and decision-support systems. The collective findings suggest that AI holds meaningful potential to complement traditional care and improve outcomes when thoughtfully implemented [20,21].

However, this potential is not without limits. Technical, ethical, and clinical challenges remain, including concerns about data quality, algorithmic bias, patient privacy, and the risk of depersonalization in care delivery. The literature also reveals a lack of robust real-world evaluations and limited engagement with diverse populations, underscoring the importance of cautious and inclusive development.

Moving forward, the integration of AI into eating disorder services must be guided by the principles of patient-centered care, transparency, and clinical collaboration. With continued research, interdisciplinary input, and ethical oversight, AI can evolve from a promising innovation into a reliable tool that meaningfully supports both patients and practitioners in the fight against eating disorders.

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