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ABSTRACT

Artificial Intelligence Applications in Mental Health Care: A Systematic Review of Current Implementation, Benefits, Challenges, and Methodology Quality of Empirical Evidence

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I. INTRODUCTION

Artificial intelligence (AI) is increasingly applied in mental health care, yet empirical evidence on its implementation, effectiveness, and ethical dimensions remains fragmented. This systematic review maps AI tools used in mental health, synthesizes reported benefits and challenges, evaluates methodological quality, and identifies critical gaps to inform future research and policy, especially regarding transparency, equity, and ethical safeguards.

II. METHODS

We conducted a systematic review of studies on AI applications in mental health by searching five databases: PubMed, Scopus, Web of Science, IEEE Xplore, and PsycINFO. We used the PICO framework to construct search terms combining "AI," "mental health," "diagnosis," and "therapy." Inclusion criteria were peer-reviewed studies focused on AI in mental health screening, diagnosis, or intervention, while excluding non-English studies, duplicates, editorials, and conference abstracts.

We extracted data by categorizing studies according to the AI methods used, such as machine learning, natural language processing, and deep learning, and the mental health conditions addressed, including depression, anxiety, and schizophrenia. We also recorded study design types, such as randomized controlled trials and observational studies, along with outcomes like diagnostic accuracy and symptom improvement. Demographic details, including age, sample size, and region, were also documented. Findings were grouped into themes like diagnosis, symptom tracking, and treatment support for clear analysis.

To assess methodological quality, we used established tools, which are PRISMA for reporting review quality, ROBINS-I for non-randomized studies, RoB 2.0 for randomized trials, and GRADE to assess evidence confidence. Risk of bias was categorized as low, moderate, high, or critical, guiding interpretation of results. This approach ensured transparency and rigor in evaluating the strength of the included studies, providing a robust foundation for synthesizing findings and drawing conclusions.

III. RESULTS AND DISCUSSION

A. Dominant AI Techniques and Application Areas

Most studies used machine learning or NLP, employing models like SVMs and neural networks. Depression was the dominant target. AI tools were mostly applied in early detection, fewer supported treatment or real-time monitoring.

B. Reported Benefits and Common Challenges

Benefits included early symptom recognition, scalability, and round-the-clock support. However, challenges like biased datasets, opacity, and ethical risks were common. Patient or clinician feedback was rarely assessed.

C. Methodological Quality and Study Designs

Five studies met high-quality standards; most were moderate. Frequent issues included small samples and inadequate validation. Stronger designs, like RCTs and externally validated ML models, yielded more credible findings.

D. Future Research Priorities and Equity Concerns

Future research should prioritize real-world testing, cultural adaptation, and ethical evaluation. Despite frequent mentions, ethical risks were seldom empirically assessed. Underrepresented groups and LMICs remain largely excluded, signaling equity as a critical area for future AI research.

Figure 1 shows the study design distribution for included studies.

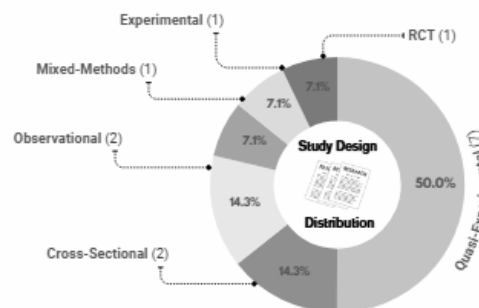


Fig. 1 A donut chart in distinct grey shades that separates Randomized Controlled Trial, Cross-Sectional, and Other designs.

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	35.3	29.6	15.0	55.0

Fig. 2 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.



Fig. 2 Map showing the geographic origin of the 14 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–4).

IV. CONCLUSIONS

AI tools show promise for early mental health detection, but their effectiveness and ethics remain unevenly studied. Methodological weaknesses and limited diversity hinder generalizability. Future work must emphasize real-world validation, ethical safeguards, and inclusion of marginalized groups to ensure trustworthy and equitable AI integration in global mental health care.

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