

Artificial Intelligence Enabled Early Detection and Personalized Mental Health: Reg No: 226

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ABSTRACT

Introduction: Depression and anxiety are major contributors to global disability, yet early detection and access to care remain inadequate, particularly in low and middle income countries. Artificial Intelligence (AI) can identify subtle behavioral and clinical indicators of distress, supporting earlier diagnosis and individualized treatment aligned with Sustainable Development Goal 3 (SDG-3) on health and well-being. **Methods:** This mixed-methods study comprises: (1) AI model development using multimodal data: speech-language patterns, wearable-sensor metrics, and electronic health records; (2) a randomized controlled trial (n = 200, aged 18–45 years) comparing AI-personalized care including medication reminders, Cognitive Based Treatment based modules, and chatbot support with standard clinical management; (3) qualitative interviews with patients, clinicians, and policymakers exploring ethical and implementation factors. Primary outcomes include PHQ-9 and GAD-7 score changes, adherence, and satisfaction. Quantitative data will be analyzed via regression, ANOVA, and ROC curves; qualitative data thematically. **Results** (expected): AI models are projected to achieve ≥80% sensitivity and specificity in early detection. AI-personalized interventions are expected to yield greater symptom reduction, adherence, and satisfaction than standard care. **Conclusion:** This study will provide evidence for integrating AI in mental-health systems, strengthen ethical and policy frameworks, and advance SDG-3 through improved early detection, personalized therapy, and enhanced quality of mental-health care. **Keywords:** Artificial Intelligence; Depression; Anxiety; Early Detection; Personalized Treatment; Machine Learning; Digital Health; SDG-3

KEYWORDS