



Association between Conversational AI Usage and Depressive Symptoms among Young Adults in West Bengal: A Cross-sectional Study

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Authors' contributions

This work was carried out in collaboration among all authors. Author TG collected the data, performed the methodology, and wrote the original draft of the manuscript. Author SS formatted the first draft, analyzed the data, and critically reviewed the manuscript. Author Ananya Ghosh analyzed the data and critically reviewed the manuscript. Author PG conceptualized the study and conducted the major review of the manuscript. Author Avradeep Ganguly performed the overall review of the manuscript. All authors read and approved the final manuscript.

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Abstract

Background: Conversational artificial intelligence (AI) tools have become increasingly integrated into the daily lives of young adults for educational, emotional, and productivity-related purposes. Despite growing reliance on these technologies, their psychological impact on youth mental health remains insufficiently understood.

Objective: This study aimed to examine the association between conversational AI usage and depressive symptom severity among young adults in West Bengal, India.

Methods: A cross-sectional online survey was conducted among 231 young adults aged 18–25 years using convenience and snowball sampling methods. Depressive symptoms were assessed using the validated Patient Health Questionnaire-9 (PHQ-9). Data regarding conversational AI usage frequency and usage purposes were also collected. Pearson correlation, simple linear regression, one-way ANOVA, and chi-square analyses were performed to evaluate associations between AI usage and depression severity.

Results: The mean PHQ-9 score was 11.0 ± 5.78 , indicating an overall moderate level of depressive symptoms among participants. ChatGPT was the most frequently used AI platform (71.86%). Pearson correlation analysis demonstrated a weak negative association between AI usage frequency and PHQ-9 scores ($r = -0.113$, $p = 0.086$), which was not statistically significant. Regression analysis similarly showed that conversational AI usage did not significantly predict depression severity ($R^2 = 0.013$). No significant differences in depression scores were observed across AI usage groups in ANOVA or chi-square analyses.

Conclusion: The findings suggest that conversational AI usage is not significantly associated with depressive symptom severity among young adults in West Bengal. While AI tools may support productivity and emotional engagement, they should not be considered substitutes for professional mental health care. Further longitudinal and qualitative research is needed to better understand the long-term psychological implications of AI-mediated interactions.

Keywords: Conversational AI; depression; PHQ-9; Young adults; mental health; digital health; Artificial Intelligence; cross-sectional study.

1. Introduction

Depression is one of the leading contributors to global disease burden and represents a major public health challenge among adolescents and young adults. According to the World Health Organization (WHO), depressive disorders are characterized by persistent sadness, loss of interest, impaired concentration, and reduced functional capacity. Young adults are particularly vulnerable due to academic stress, social transitions, financial uncertainty, and emotional instability.

Simultaneously, conversational artificial intelligence (AI) platforms such as ChatGPT, Gemini, and Character.AI have become increasingly integrated into everyday life. These systems are widely used for educational assistance, emotional expression, productivity enhancement, and companionship. The rapid accessibility and responsiveness of conversational AI have transformed the ways in which young individuals seek information, solve problems, and cope with emotional distress.

Although conversational AI offers several practical advantages, concerns have emerged regarding excessive emotional dependency, reduced social interaction, cognitive overreliance, and potential mental health consequences. Recent studies have explored AI-mediated companionship, trauma-informed computing, and the psychological risks associated with AI interactions (Chen et al., 2022; Luo et al., 2025; Chandra et al., 2025). However, evidence regarding the relationship between conversational AI usage and depressive symptoms among young adults remains limited, particularly in the Indian context (Lai et al., 2025, United Nations, N.d.).

West Bengal represents an important setting for such investigation due to the increasing prevalence of mental health disorders and widespread digital engagement among youth populations. Understanding whether conversational AI usage influences depressive symptom severity may help inform future digital mental health policies and ethical AI implementation frameworks.

Mental health disorders, particularly depression, have become a pressing global concern. Depression according to WHO is a common mental health condition characterized by persistent sadness and loss of interest in activities, (World Health Organization, 2025., Shumate et al., 2025) with the World Health Organization estimating over 264 million individuals affected in 2020. In the United States, the CDC reported that 8.1% of

adults aged 20 and older experienced depression in a given two-week period between 2017 and 2018 (Brody et al., 2025). Depression significantly impacts mental well-being, academic performance, and social relationships, increasing the risk of school dropout and suicidal ideation, especially among adolescents and young adults.

Therefore, the present study aimed to evaluate the association between conversational AI usage and depressive symptoms among young adults in West Bengal using the Patient Health Questionnaire-9 (PHQ-9).

1.1 Rationale of the Study

Young adulthood represents a critical transitional stage of life characterized by increasing independence, identity formation, academic and occupational responsibilities, and the establishment of interpersonal relationships. This developmental phase generally encompasses individuals between 18 and 25 years of age (Arnett, 2000). During this period, young adults are particularly vulnerable to psychological stressors and emotional instability, making mental health an important public health concern.

Simultaneously, the rapid integration of conversational artificial intelligence (AI) tools into everyday life has significantly transformed the ways in which young people communicate, seek information, solve problems, and cope with emotional challenges. Platforms such as ChatGPT, Gemini, and other AI-driven conversational systems are increasingly used for academic support, productivity enhancement, emotional expression, and companionship (Luo et al., 2025). While these technologies provide convenience and accessibility, concerns have emerged regarding their potential psychological implications, particularly among adolescents and young adults who engage with such systems frequently.

The relevance of this issue becomes particularly important in the context of West Bengal, where the prevalence of mental illness has been reported to be 13.07% (95% CI: 12.9–13.24), exceeding the national average of 10.56% (95% CI: 10.51–10.61). Furthermore, the prevalence of severe mental illness (2.32%) and suicide risk (1.75%; 95% CI: 1.68–1.81) in the state remains higher than the national average (Sarkar et al., 2023). These findings highlight the need to examine emerging psychosocial and technological factors that may influence youth mental health outcomes.

Recent literature has increasingly explored the relationship between digital technologies and psychological well-being. Studies have reported associations between excessive digital engagement, social media exposure, and depressive symptoms among young individuals (Chandra et al., 2025). In addition, Chen et al. (2022) proposed the concept of trauma-informed computing, emphasizing principles such as safety, trust, peer support, collaboration, empowerment, and intersectionality in the design of digital systems. Emerging evidence also suggests that certain forms of AI interaction may contribute to emotional dependency, social withdrawal, distorted trust dynamics, and maladaptive coping behaviors among vulnerable users (Huang et al., 2024). Concerns regarding emotional overreliance on AI systems and inappropriate AI-mediated responses during psychological crises have further intensified the need for empirical investigation.

Despite the growing integration of conversational AI into daily life, limited evidence exists regarding its psychological impact on Indian youth populations, particularly in relation to depressive symptoms. Therefore, the present study was undertaken to examine the association between conversational AI usage and depression severity among young adults in West Bengal. The findings of this study may contribute to the development of ethically informed AI-based mental health frameworks, responsible digital health policies, and future conversational AI interventions designed to support psychological well-being.

2. Objectives

2.1 Primary Objective

To evaluate the association between conversational AI usage frequency and depressive symptom severity among young adults in West Bengal.

2.2 Secondary Objectives

1. To identify the most commonly used conversational AI platforms among young adults.
2. To assess the primary purposes of conversational AI usage.
3. To compare depressive symptom severity across different AI usage groups.

2.3 Hypothesis

2.3.1 Null Hypothesis (H0)

There is no statistically significant association between conversational AI usage frequency and depressive symptom severity among young adults in West Bengal.

2.3.2 Alternative Hypothesis (H1)

There is a statistically significant association between conversational AI usage frequency and depressive symptom severity among young adults in West Bengal.

NOTE: Your current manuscript incorrectly labels hypotheses as H1 and H2.

3. Methodology

3.1 Research Approach and Research Design

The present study adopted a quantitative research approach using a cross-sectional online survey design to examine the association between conversational AI usage and depressive symptom severity among young adults in West Bengal. The study was designed to explore patterns of conversational AI engagement and their relationship with mental health outcomes using standardized psychological assessment and self-reported behavioral data.

Prior to data collection, the survey instrument underwent content and face validity assessment by two academic experts with doctoral qualifications in psychology and measurement and evaluation. The experts reviewed questionnaire items to assess relevance, clarity, and alignment with study objectives. Based on their recommendations, the final questionnaire and psychological assessment measures were refined.

3.2 Study Population and Sample

The study included 231 university students and working professionals aged 18–25 years from the southern region of West Bengal. Participants represented multiple academic backgrounds, including science, arts, commerce, legal studies, fine arts and performing arts, and applied sciences. Recruitment was conducted through academic networks and social media platforms.

3.3 Sample Size

Sample size estimation was based on the prevalence reported in Prevalence of Depression Among Young Adults: Evidence from a Cross-Sectional Study in a College in Peri-Urban South India (Johnson et al., 2022), where depression prevalence was reported as 31.1%.

Sample size was calculated using:

$$n = Z^2P(1-P)/d^2$$

where:

- n = required sample size
- Z = standard normal deviate (95% confidence interval)
- P = estimated prevalence
- d = allowable error (5%)

The calculated minimum sample size was 329 participants.

Data collection yielded 231 completed responses, resulting in a response rate of 70.2% and a non-response rate of 29.8%.

3.4 Sampling Technique

A convenience-based quasi-purposive sampling technique combined with snowball sampling was adopted. Initially recruited participants were encouraged to distribute the survey link within their peer networks to improve participation and increase sample diversity.

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

- Individuals aged 18–25 years
- Residents of West Bengal
- University students or working professionals
- Ability to provide informed consent
- Completion of survey questionnaire

3.5.2 Exclusion Criteria

- Participants outside the target age range
- Incomplete questionnaire responses
- Duplicate submissions

3.6 Data Collection Procedure

The finalized questionnaire was distributed through Google Forms. Data collection was conducted over 45 days. Participation was voluntary and responses were collected anonymously. Collected responses were cleaned, coded, and organized using Microsoft Excel before statistical analysis.

3.7 Study Instruments

Depressive symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9), a widely validated and internationally accepted screening instrument for depression based on DSM criteria for major depressive disorder (Yu et al., 2012). Recent evidence continues to support the reliability, psychometric robustness, and applicability of the PHQ-9 across diverse populations and age groups (Shaff et al., 2024; Köhler et al., 2023).

The PHQ-9 includes nine items scored using a four-point Likert scale ranging from:

- 0 = Not at all
- 1 = Several days
- 2 = More than half the days
- 3 = Nearly every day

Total scores range from 0–27:

- 0–4 → Minimal
- 5–9 → Mild
- 10–14 → Moderate
- 15–19 → Moderately severe
- 20–27 → Severe

Participants also completed a structured questionnaire assessing:

- conversational AI usage,
- frequency of interaction,
- AI platform type,
- and primary purposes of AI use.

3.8 Selection of Explanatory Variables

Explanatory variables were selected *a priori* based on the study objective of evaluating whether conversational AI engagement patterns were associated with depressive symptom severity.

Exposure variables included:

- frequency of AI use,
- conversational AI platform type,
- primary purpose of AI interaction.

These indicators were selected to represent accessibility, behavioral engagement, and interaction context. However, variables including duration of AI use per session, cumulative usage time, duration since adoption, emotional attachment, and interaction intensity were not captured and may represent potential confounding factors.

3.9 Statistical Analysis

Descriptive statistics were performed to summarize participant characteristics and AI usage patterns.

Inferential analyses included:

- Pearson correlation,
- simple linear regression,
- one-way ANOVA,
- chi-square testing.

These analyses were conducted to evaluate associations between conversational AI usage and depressive symptom severity.

3.10 Ethical Considerations

Participation was voluntary and anonymous. Electronic informed consent was obtained prior to participation and no personally identifiable information was collected.

3.11 Scope of the Study

This study focused on young adults aged 18–25 years residing in southern West Bengal and examined conversational AI usage in relation to depressive symptoms. Findings may not be generalizable to broader populations.

4. Results

The present study examined the relationship between conversational AI usage and depressive symptom severity among young adults in West Bengal. A total of 231 participants were included in the final analysis. Overall, the sample demonstrated a moderate level of depressive symptoms, with varying patterns of AI engagement observed across individuals. Descriptive and inferential analyses were conducted to explore whether differences in AI usage frequency were associated with variations in depression scores.

A total of 231 participants completed the study (response rate: 70.2%), with 98 non-respondents excluded from analysis. Among the participants, 61% (n = 141) were female and 39% (n = 90) were male.

4.1 Participant Characteristics

The majority of participants were from the science stream (68.03%, n = 157), followed by arts (15.54%, n = 36), commerce (13.03%, n = 31), law (3.03%, n = 7), and physical education (0.44%, n = 1). This distribution reflects a predominance of academically oriented respondents.

4.2 Depression Severity Distribution

The mean PHQ-9 score was 11.0 (SD = 5.78), indicating an overall moderate level of depressive symptoms within the study population. The variance was 33.75, suggesting moderate dispersion in depression scores.

Based on standard PHQ-9 categorization:

- Minimal (0–4)
- Mild (5–9)
- Moderate (10–14)
- Moderately severe (15–19)
- Severe (20–27)

The distribution demonstrates that moderate depression was the most prevalent category, while severe depression remained relatively low.

4.3 Patterns of Conversational AI Usage

A large proportion of participants reported using conversational AI tools, with 71.86% (n = 166) indicating use of ChatGPT, making it the most commonly used platform. Approximately 14.29% (n = 33) reported no AI usage.

Other tools such as Alexa, Siri, Gemini, and Perplexity showed comparatively lower usage frequencies.

Table 1. Distribution of conversational AI tools used by participants

Conversational AI Tool	Percentage (%)	Frequency (n)
ChatGPT	71.86	166
Alexa	6.93	16
Siri	6.93	16
Character.AI	5.63	13
Google Assistant	4.76	11
Gemini	4.76	11
Grok	1.30	3
Perplexity	1.30	3
Meta AI	1.30	3
Copilot	0.87	2
Claude	0.87	2
Blackbox	0.43	1
Bixby	0.43	1
Sonnet	0.43	1
DeepSeek	0.43	1
Do not use AI	14.29	33

The predominance of ChatGPT usage indicates widespread acceptance of generative conversational AI among young adults; however, subsequent inferential analyses demonstrated that platform preference alone was not associated with variation in depression severity.

4.4 Purpose of AI Usage

The primary reasons for AI use were:

- Educational purposes: 28.14% (n = 65)
- Curiosity/entertainment: 22.51% (n = 52)
- Psychological/emotional purposes: ~33.44% (combined categories including loneliness reduction, emotional expression, and mental health support)

This indicates that a substantial proportion of users engage with AI for emotional or psychological support, highlighting its relevance in mental health contexts.

Table 2. Reasons for using conversational AI among participants

Reason for AI Use	Percentage (%)	Frequency (n)
Strictly educational purposes	28.14	65
Curiosity and entertainment	22.51	52
To reduce loneliness or boredom	12.99	30
To express emotions without judgment	12.99	30
Mental health-related support	4.33	10
Decision-making assistance	3.46	8
Work improvement/productivity	3.46	8
Navigation (e.g., directions)	1.30	3
Do not use AI	2.16	5

Although educational purposes represented the most frequently reported reason for AI engagement, a notable proportion of participants reported emotional and psychological motivations. Nevertheless, these usage patterns did not translate into statistically significant differences in depressive symptom scores across groups.

4.5 Relationship Between Conversational AI Usage and Depressive Symptoms

Pearson correlation analysis revealed a very weak negative association between conversational AI usage frequency and depressive symptom severity ($r = -0.113$, $r^2 = 0.013$), indicating that increased AI usage was associated with a negligible reduction in PHQ-9 scores. However, this relationship was not statistically significant, suggesting the absence of a meaningful linear association between the two variables. Consistent with this finding, simple linear regression analysis demonstrated that AI usage frequency did not significantly predict depression scores ($R^2 = 0.013$, $F(1, 229) = 2.98$, $p = 0.086$). Although the regression coefficient was negative ($\beta = -0.155$), the model explained only 1.3% of the variance, indicating minimal predictive value.

Further group-based analyses supported these observations. One-way ANOVA comparing depression scores across AI non-users, less frequent users, and frequent users showed no statistically significant differences ($p > 0.05$), suggesting that varying levels of AI engagement do not influence depression severity. Similarly, chi-square analysis revealed no significant association between categorical AI usage levels and depression severity categories ($p > 0.05$). The distribution of participants indicated that the majority fell within lower depression categories regardless of AI usage patterns, reinforcing the conclusion that depression prevalence appears independent of conversational AI engagement within this sample.

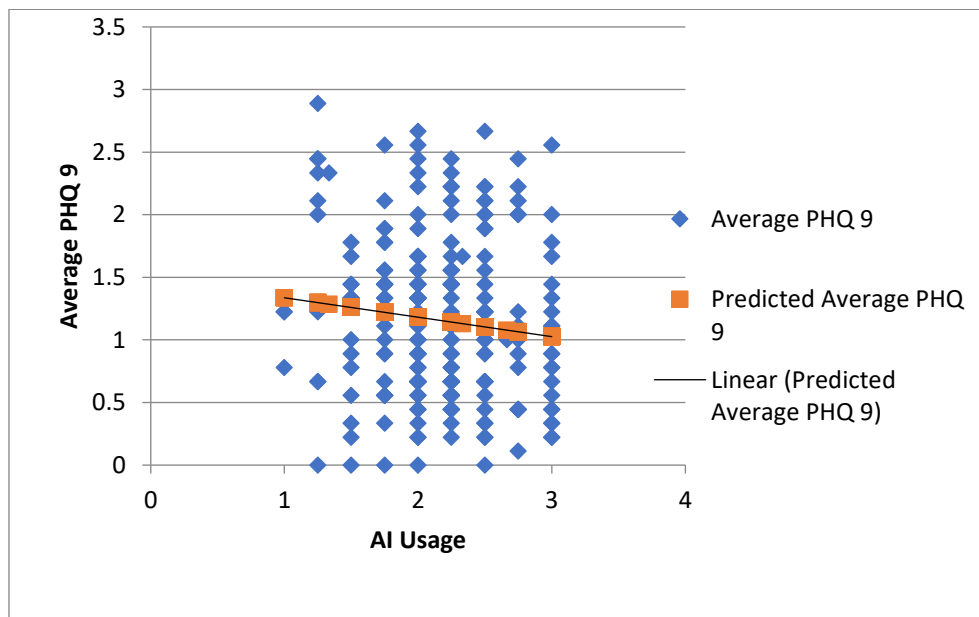


Fig. 1. Association between conversational AI usage frequency and depressive symptom severity

Scatter plot demonstrating the relationship between conversational AI usage frequency and PHQ-9 scores. Although a slight negative trend is visible, substantial dispersion around the regression line and low explanatory power ($R^2 = 0.013$) indicate that AI usage frequency contributed minimally to variation in depressive symptom severity and did not demonstrate a statistically significant predictive relationship.

Collectively, these findings suggest that observed differences in AI engagement patterns were insufficient to explain meaningful variation in depressive symptoms. The inferential analyses therefore indicate that conversational AI usage may represent only one component within a broader network of psychosocial determinants affecting mental health.

5. Summary of Findings

The present study investigated the relationship between conversational AI usage and depressive symptom severity among young adults aged 18–25 years in West Bengal using the PHQ-9 screening instrument. A total of 231 participants were included in the final analysis.

The findings revealed that ChatGPT was the most frequently used conversational AI platform among participants, with educational purposes representing the most common reason for AI engagement. A considerable proportion of respondents also reported using AI tools for emotional expression, reducing loneliness, and psychological support.

Statistical analyses, including Pearson correlation, simple linear regression, one-way ANOVA, and chi-square tests, consistently demonstrated no statistically significant association between conversational AI usage frequency and depressive symptom severity. Although a weak negative correlation between AI usage and PHQ-9 scores was observed, the effect size was negligible and lacked statistical significance.

The study therefore supports the conclusion that conversational AI usage, within the present sample, was not significantly associated with depression severity among young adults in West Bengal. These findings suggest that while conversational AI platforms are increasingly integrated into everyday life, their usage alone may not substantially influence depressive symptoms. However, responsible and balanced engagement with AI technologies remains important, particularly in emotionally sensitive contexts.

6. Discussion

The present study found no statistically significant association between conversational AI usage frequency and depressive symptom severity among young adults in West Bengal. Although a weak inverse relationship was observed, the effect size was minimal and lacked statistical significance. This finding suggests that conversational AI engagement alone may not meaningfully influence depressive symptoms and supports the perspective that depression arises through complex interactions among biological, social, academic, economic, and behavioral determinants rather than through isolated technology exposure.

6.1 Comparison with Existing Literature

The findings partially align with emerging literature suggesting that conversational AI may function primarily as a supplementary cognitive or emotional resource rather than an independent determinant of psychological outcomes. Studies examining AI-mediated emotional support have reported that users frequently engage with conversational systems for companionship, emotional expression, and stress management; however, direct evidence linking AI usage to depression remains inconsistent. Similar to the present findings, previous work suggests that AI interaction alone may not predict depressive symptom severity in the absence of broader psychosocial vulnerabilities.

6.2 Interpretation of Contradictory Evidence

In contrast to the present findings, some recent studies have suggested that intensive emotional reliance on conversational AI may contribute to psychological distress, social withdrawal, distorted trust dynamics, and maladaptive coping behaviors. These differences may arise from variations in study population, intensity and purpose of AI use, outcome measures, and sociocultural context. Importantly, many studies emphasizing psychological risk examined emotionally dependent or clinically vulnerable populations rather than general community samples such as the present cohort.

Another possible explanation is that participants in the current study primarily reported educational and productivity-related use rather than prolonged emotional engagement, potentially reducing the likelihood of observing negative psychological outcomes.

6.3 Implications of the Present Study

The present study contributes preliminary empirical evidence from India regarding conversational AI and mental health among young adults. Unlike many existing studies that focus conceptually on AI ethics or emotional dependency, this study quantitatively examined depressive symptom severity using a standardized screening instrument (PHQ-9). The findings indicate that conversational AI usage should not automatically be interpreted as a psychological risk factor and emphasize the importance of considering broader contextual determinants of mental health.

Collectively, these findings suggest that the psychological impact of conversational AI may depend less on exposure frequency alone and more on the quality, purpose, emotional intensity, and broader psychosocial context of AI interaction. Contrary to growing concerns that AI engagement may inherently worsen psychological well-being, the present study did not demonstrate a statistically significant association between conversational AI usage frequency and depressive symptom severity among young adults. These findings provide preliminary empirical evidence from an Indian context and indicate that conversational AI engagement alone may not constitute an independent determinant of depressive symptoms. Instead, mental health outcomes should be interpreted within a broader framework incorporating behavioral, social, and contextual influences. Nevertheless, given the evolving nature of AI-mediated interactions, future longitudinal and multidimensional studies incorporating temporal exposure measures, emotional dependency, and interaction patterns are necessary to clarify potential causal relationships and long-term psychological effects.

Conversational AI may complement—but should not replace—professional mental health care and human interpersonal support systems.

7. Conclusion

The present study investigated the association between conversational AI usage and depressive symptom severity among young adults using the validated PHQ-9 instrument alongside a structured AI usage questionnaire (Yu et al., 2012). Multiple statistical analyses, including chi-square tests, one-way ANOVA, Pearson correlation, and simple linear regression, were conducted to examine differences in depression scores across AI usage groups and to evaluate the relationship between AI interaction frequency and depression severity.

Across all analytical approaches, no statistically significant association was observed between conversational AI usage and depressive symptoms. Group-based analyses further demonstrated that depression scores did not significantly differ across gender, family type, academic stream, or levels of AI engagement. Correlation and regression analyses revealed only a negligible relationship between AI usage frequency and PHQ-9 scores, with AI usage accounting for minimal variance in depression severity.

The consistency of findings across multiple statistical methods strengthens the reliability of the study results and supports the conclusion that conversational AI usage, in isolation, does not significantly influence depression severity among young adults. Although conversational AI may serve educational, productivity-related, and emotional support functions, it should not be considered a substitute for professional mental health care. These findings contribute important preliminary evidence for the development of ethically informed AI-based mental health systems and future policy frameworks regulating the use of AI in psychologically sensitive contexts. Future longitudinal and qualitative research is recommended to better understand the long-term psychological impact of AI-mediated interactions among youth (Lai et al., 2025).

8. Limitations

Several limitations should be considered when interpreting these findings. First, the cross-sectional design prevents causal inference regarding the relationship between conversational AI usage and depressive symptoms. Second, exposure variables were limited to frequency of use, AI platform type, and self-reported usage purpose.

Additional factors such as duration of AI interaction, cumulative exposure, emotional dependency, interaction quality, and prior mental health status were not assessed and may influence outcomes. Third, self-reported responses may introduce recall and reporting bias. Future studies should employ longitudinal designs with more comprehensive behavioral and psychosocial measures.

9. Future Directions

Conversational AI is rapidly evolving toward more emotionally responsive and personalized systems capable of supporting mental health and well-being. Future research should focus on understanding the long-term psychological effects of AI-mediated interactions through longitudinal and multidisciplinary approaches (Thakkar et al., 2024). At the same time, ethical concerns including data privacy, algorithmic bias, informed consent, and emotional dependency must be carefully addressed through transparent regulatory frameworks and rigorous validation processes (Alberca-González & Fernández-Jiménez, 2025). Although AI has significant potential in mental health care through personalized support and real-time monitoring, it should complement rather than replace human empathy and professional therapeutic relationships. Therefore, the future integration of AI in mental health must remain ethically grounded, clinically validated, and human-centered (Ni & Jia, 2025).

Consent

Participation was voluntary and anonymous. Electronic informed consent was obtained prior to participation and no personally identifiable information was collected.

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Disclaimer (Artificial Intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

Competing Interests

Authors have declared that no competing interests exist.

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