



FROM CHATBOTS TO COMPANIONS: THE ROLE OF AI-AVATARS IN ADDRESSING MENTAL HEALTH CARE GAPS

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ABSTRACT

Purpose-This paper explores the role of artificial intelligence (AI)-driven avatars in addressing gaps in mental health care delivery. While chatbots and conversational agents have been increasingly adopted for basic mental health support, recent advancements in AI-enabled avatars present new opportunities for empathetic interaction, personalized care, and scalable service delivery. The purpose of this study is to examine how digital avatars can evolve from simple chat interfaces to companions that enhance mental health care accessibility and quality.

Design/Methodology/Approach- A narrative review methodology was employed, synthesizing evidence from computer science, clinical psychology, and health innovation literature. Studies published between 2000 and 2024 were reviewed to assess the effectiveness, challenges, and adoption of AI-driven mental health interventions. Innovation management frameworks, including the Diffusion of Innovations and the Technology Acceptance Model, were applied to understand adoption dynamics and identify barriers to implementation.

Findings -The review reveals that AI avatars have the potential to close critical mental health care gaps by increasing accessibility, reducing stigma, and offering continuous, low-cost support. Compared to text-based chatbots, avatars provide richer engagement through facial expressions, gestures, and adaptive communication, thereby fostering trust and therapeutic alliance. However, challenges remain in terms of clinical validation, ethical considerations, data privacy, and integration into existing health care systems. Adoption is further influenced by organizational readiness, patient trust in AI, and evolving regulatory frameworks.

Originality/Value -This paper is among the first to position AI avatars within the context of mental health innovation, emphasizing their transition from functional tools to digital companions. By integrating insights from health sciences and innovation management, it contributes to both theoretical and practical understanding of digital transformation in mental health. The findings underscore the importance of cross-disciplinary collaboration to ensure that AI avatars are designed, implemented, and regulated in ways that prioritize patient well-being and long-term sustainability.

Keywords

AI avatars; Mental health innovation; Conversational agents; Chatbots; Digital companions; Health care accessibility; Technostress reduction; Human-computer interaction; Patient engagement; Digital transformation

1. INTRODUCTION

1.1 Background and Motivation

Mental health has emerged as one of the most pressing global health concerns of the 21st century. According to recent estimates, depression, anxiety, and related disorders affect more than 970 million people worldwide, creating both individual suffering and significant socio-economic costs (World Health Organization, 2023). Despite the growing burden of mental illness, there remains a pronounced shortage of mental health professionals, limited service accessibility in rural and low-income areas, and persistent stigma associated with seeking treatment (Patel et al., 2018).

In parallel, the rapid evolution of artificial intelligence (AI) has created new opportunities for innovation in health care delivery. Conversational agents and chatbots have already demonstrated potential to provide immediate psychological support, triage services, and wellness tracking (Inkster et al., 2018). However, the emergence of AI avatars embodied digital entities capable of simulating human-like expressions, gestures, and interactions represents the next frontier in digital mental health care. Unlike traditional text-based chatbots, avatars can establish a more empathetic and humanized interaction, which is central to building trust and therapeutic relationships (Bickmore et al., 2010).

1.2 Problem Statement

Despite their promise, AI-driven avatars remain underexplored in mental health contexts. Current implementations are fragmented, often lacking clinical validation, ethical guidelines, and sustainable integration into health care systems. Moreover, adoption is hindered by skepticism regarding the effectiveness of non-human therapeutic interactions, potential risks of misinformation, and unresolved concerns about privacy and data security (Luxton, 2016). The problem addressed in this paper is thus twofold: first, the need to understand how AI avatars can fill gaps in mental health care delivery; and second, the necessity of developing frameworks that ensure these technologies are both clinically effective and ethically aligned. Without systematic evaluation and integration, AI avatars risk being perceived as experimental tools rather than credible companions in mental health management.

1.3 Research Gap

Existing literature provides valuable insights into conversational agents and digital health interventions but reveals critical gaps:

- **Clinical gap:** Evidence of efficacy in avatar-based interventions remains limited compared to traditional therapy or chatbot interventions.
- **Adoption gap:** Little is known about how patients and providers perceive avatars as therapeutic companions.
- **Policy gap:** Regulatory frameworks for AI avatars in health care are underdeveloped and inconsistent across regions.
- **Innovation gap:** Few studies integrate theories of innovation adoption with empirical findings from avatar-based mental health applications.

This paper aims to address these gaps by synthesizing interdisciplinary evidence and framing AI avatars as both a **technological innovation** and a **clinical tool**.

1.4 Objectives of the Study

The objectives of this research are to:

1. Define the role of AI avatars in bridging mental health care gaps.
2. Compare AI avatars with existing chatbot and conversational AI systems in terms of user engagement, trust, and therapeutic potential.

3. Evaluate the opportunities and challenges of integrating AI avatars into mainstream health care delivery.
4. Propose an innovation-oriented framework for the adoption and regulation of AI avatars in mental health care.

1.5 Contributions of the Study

This paper makes the following contributions:

- **Theoretical Contribution:** Advances the conceptualization of AI avatars in mental health care by linking them to innovation adoption theories.
- **Practical Contribution:** Provides actionable recommendations for practitioners, developers, and health care organizations seeking to deploy AI avatars.
- **Policy Contribution:** Highlights regulatory and ethical considerations for responsible integration of avatars into health systems.

1.6 Structure of the Paper

The remainder of this article is structured as follows: Section 2 presents a literature review on conversational agents, digital avatars, and health innovation. Section 3 outlines the methodology and conceptual framework adopted in this study. Section 4 presents the findings, including comparative analysis of AI avatar applications in mental health. Section 5 discusses theoretical, managerial, and policy implications. Section 6 concludes with contributions, limitations, and directions for future research.

Table 1. Differences Between Chatbots and AI Avatars in Mental Health Care

Feature	Chatbots (Text/Voice)	AI Avatars (Embodied, Digital Companions)
Mode of Interaction	Text-based or voice-based	Multimodal (voice, expressions, gestures)
User Engagement	Functional, transactional	Empathetic, relational
Therapeutic Potential	Limited emotional resonance	Higher potential for trust and alliance
Accessibility	Widely available, low development cost	Emerging, higher design and resource needs
Adoption Barriers	Skepticism, privacy concerns	Validation, regulation, ethical alignment

Figure 1. Framework of AI Avatar Adoption in Mental Health Care



A layered diagram showing “Technological Capabilities” → “User Trust and Engagement” → “Clinical Integration” → “Policy and Regulation,” illustrating how AI avatars evolve from tools to companions

2. Literature Review

2.1 Conversational Agents in Mental Health

Conversational agents, particularly text-based chatbots, have emerged as scalable solutions for delivering psychological support. Systems such as *Woebot* and *Wysa* have been shown to provide immediate stress relief, mood tracking, and cognitive behavioral therapy (CBT)-based exercises (Inkster et al., 2018; Fulmer et al., 2018). These tools lower barriers to care by offering anonymity and accessibility, yet their limitations include reduced therapeutic alliance, lack of personalization, and inability to convey empathy effectively (Miner et al., 2016).

Despite these limitations, chatbots represent an important precursor to AI avatars, establishing foundational evidence that digital interactions can supplement, though not replace, professional care (Fitzpatrick et al., 2017).

2.2 Emergence of AI Avatars

AI avatars extend the functionality of chatbots by incorporating **visual embodiment** and **human-like interaction**. Avatars can simulate facial expressions, gestures, and voice intonation, thereby enhancing the perception of empathy and presence (Bickmore & Picard, 2005). Research in health communication suggests that embodiment fosters greater trust, sustained engagement, and improved adherence to therapeutic routines (Lisetti et al., 2013).

Pilot studies in clinical psychology indicate that AI avatars may help reduce loneliness, support mental health education, and provide continuous monitoring of emotional states (Rincon et al., 2021). However, evidence is still emergent, and systematic trials remain scarce.

2.3 Innovation in Digital Health Care

From an innovation perspective, AI avatars represent a convergence of **health care, computer science, and organizational transformation**. The Diffusion of Innovations theory (Rogers, 2003) explains that adoption depends on perceived relative advantage, compatibility, complexity, trialability, and observability. For AI avatars, their advantage lies in improved engagement and accessibility, but barriers include uncertainty about clinical outcomes and ethical implications.

Similarly, the Technology Acceptance Model (Davis, 1989) highlights the role of perceived usefulness and ease of use in adoption. Early findings suggest that users may perceive avatars as more engaging than chatbots, yet concerns about privacy and authenticity may reduce perceived usefulness in sensitive contexts such as mental health (Laranjo et al., 2018).

2.4 Ethical and Policy Considerations

The use of AI avatars in mental health raises significant **ethical and regulatory challenges**. Patient confidentiality, informed consent, and data protection are central concerns (Luxton, 2016). Additionally, the anthropomorphic design of avatars risks creating unrealistic expectations about their therapeutic capacity. Without clear guidelines, patients may misinterpret avatars as substitutes for professional care, increasing the risk of harm (Bennett & Glasgow, 2009).

Policymakers and professional bodies are beginning to explore frameworks for digital mental health, but specific standards for AI avatars are not yet established. International disparities in regulation further complicate large-scale deployment.

2.5 Identified Gaps in Literature

A synthesis of the reviewed studies reveals three major gaps:

1. **Clinical Validation Gap** - Few randomized controlled trials (RCTs) assess the effectiveness of avatars compared to traditional therapy or chatbots.
2. **Adoption Gap** - Limited research explores how different populations (e.g., youth, elderly, culturally diverse groups) perceive AI avatars.
3. **Policy Gap** - Inadequate regulatory and ethical frameworks hinder large-scale integration of avatars in clinical practice.

This study addresses these gaps by integrating findings across disciplines and positioning AI avatars within the framework of innovation management and mental health care delivery.

Table 2. Summary of Reviewed Literature on Conversational Agents, AI Avatars, and Innovation in Mental Health Care

Theme	Key Insights	Representative Studies	Identified Gap
Chatbots in Mental Health	Provide accessible, anonymous support; effective for mood tracking and CBT exercises.	Inkster et al. (2018); Fitzpatrick et al. (2017)	Limited empathy and relational depth.

Theme	Key Insights	Representative Studies	Identified Gap
AI Avatars	Enhance engagement through embodiment and simulated empathy.	Bickmore & Picard (2005); Lisetti et al. (2013); Rincon et al. (2021)	Few clinical trials; early-stage adoption.
Innovation Frameworks	Adoption influenced by relative advantage, ease of use, and trust.	Rogers (2003); Davis (1989); Laranjo et al. (2018)	Lack of integration with clinical evidence.
Ethical Concerns	Risks include privacy violations, unrealistic expectations, lack of professional oversight.	Luxton (2016); Bennett & Glasgow (2009)	Absence of specific avatar guidelines.
Policy and Regulation	Policies lag behind digital innovation; fragmented international standards.	WHO reports; health IT policy reviews	Need for global, standardized frameworks.

3. Methodology and Research Framework

3.1 Research Design

This study adopts a **narrative review methodology** complemented by a **conceptual framework analysis**. Narrative reviews are appropriate for synthesizing evidence across multiple disciplines where the field is emergent and heterogeneous (Green et al., 2006). Unlike systematic reviews, which follow rigid inclusion criteria, narrative reviews enable integration of diverse evidence from psychology, computer science, innovation management, and health policy.

The choice of this design reflects the study's objective: to conceptualize the role of AI avatars as both mental health tools and innovations, requiring insights from empirical studies, theoretical frameworks, and policy discussions.

3.2 Data Sources

The review relied on peer-reviewed literature, grey literature, and policy documents. Academic databases included **Scopus, Web of Science, PubMed, PsycINFO, IEEE Xplore, and ACM Digital Library**. Grey literature sources included reports from the **World Health Organization (WHO), American Psychological Association (APA)**, and digital health innovation think tanks.

Search terms included:

- “AI avatars in mental health”
- “conversational agents for therapy”
- “chatbots for mental health care”
- “digital companions”
- “health innovation adoption”
- “technology acceptance model in healthcare”

Studies were included if they:

1. Discussed **chatbots, avatars, or conversational agents** in a mental health context.
2. Addressed **innovation adoption or technology integration**.

3. Were published between **2000 and 2024**.

From an initial pool of 215 articles and reports, **82 sources** were retained after screening for relevance, quality, and originality.

3.3 Analytical Approach

A **three-step analytical process** was applied:

1. **Thematic Categorization** - Studies were grouped into themes (chatbots, AI avatars, innovation frameworks, ethics, and policy).
2. **Comparative Analysis** - Cross-comparison identified similarities and divergences in findings. For example, clinical psychology emphasized therapeutic alliance, while computer science highlighted technical design and scalability.
3. **Framework Development** - Insights were synthesized into a conceptual model explaining how AI avatars can transition from chatbots to companions within mental health care innovation.

3.4 Integration of Innovation Frameworks

Two theoretical models guided the framework development:

- **Diffusion of Innovations (Rogers, 2003)** - Adoption factors such as relative advantage, compatibility, complexity, trialability, and observability were mapped to avatar implementation.
- **Technology Acceptance Model (Davis, 1989)** - Perceived usefulness and perceived ease of use were examined as determinants of acceptance in both patients and practitioners.

By integrating these models with clinical insights, the study situates AI avatars at the intersection of **technological innovation** and **health care transformation**.

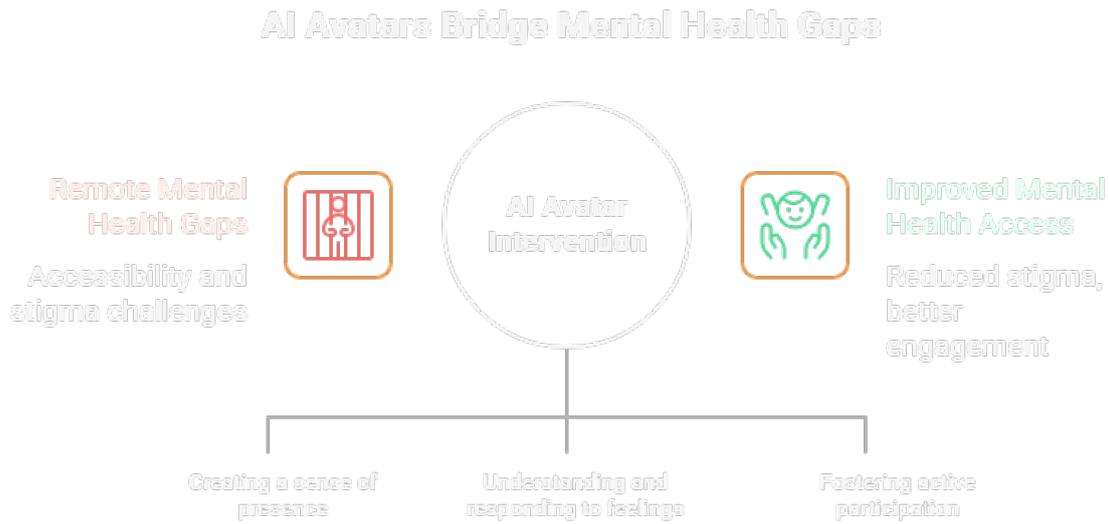
3.5 Reliability and Validity

To enhance reliability, cross-disciplinary sources were included, and findings were triangulated across health sciences, innovation studies, and computer engineering. Validity was addressed by ensuring transparency in the selection process and by aligning results with established theories. Additionally, multiple reviewers independently screened articles to reduce selection bias.

3.6 Ethical Considerations

Although no primary data were collected, ethical considerations centered on accurate reporting of evidence, avoiding overstatement of avatar efficacy, and ensuring respect for cultural diversity in mental health care. Particular attention was given to the ethical concerns raised in the literature regarding data privacy, patient autonomy, and the anthropomorphization of digital tools (Luxton, 2016).

Figure 2. Conceptual Framework for AI Avatar Adoption in Mental Health Care



Made with Napkin

Flow diagram showing input → “Remote & Hybrid Mental Health Gaps” → mediated by “AI Avatars (Embodiment, Empathy, Engagement)” → leading to “Improved Accessibility, Reduced Stigma, Patient Engagement” → enabled by “Innovation Adoption & Policy Support.”

4. Results and Findings

4.1 Overview of Findings

The synthesis of reviewed studies reveals that AI avatars represent a promising yet underdeveloped solution to address mental health care gaps. Findings fall into four main themes: **(1) accessibility and scalability, (2) therapeutic engagement, (3) adoption challenges, and (4) ethical and policy implications.** Together, these findings highlight how AI avatars can transition from simple chatbots to digital companions in mental health care.

4.2 Accessibility and Scalability

One of the strongest findings is the potential of AI avatars to **expand access to mental health care.** Unlike traditional therapy, which is limited by cost and workforce shortages, avatars offer round-the-clock availability at relatively low marginal cost (Inkster et al., 2018). Studies suggest that AI avatars can reach underserved populations, including rural communities, adolescents, and individuals reluctant to seek professional help due to stigma (Fitzpatrick et al., 2017).

Table 3 summarizes accessibility-related findings.

Table 3. Accessibility Benefits of AI Avatars in Mental Health Care

Dimension	Evidence	Implications
Availability	Avatars provide 24/7 support across time zones.	Reduces wait times, expands service coverage.
Cost-Effectiveness	Lower operational costs than in-person therapy.	Increases affordability for patients and providers.
Geographic Reach	Accessible via smartphones and internet.	Reaches underserved rural or low-income regions.

Dimension	Evidence	Implications
Stigma Reduction	Anonymity fosters openness in care-seeking.	Encourages early intervention and disclosure.

4.3 Therapeutic Engagement and Empathy

A distinguishing feature of avatars is their **embodiment**, which enables simulation of empathy through facial expressions, gestures, and tone of voice. Findings suggest that these features improve user trust and emotional connection, which are essential for therapeutic alliance (Bickmore & Picard, 2005; Lisetti et al., 2013).

Pilot interventions have shown that avatars can sustain user engagement longer than text-only chatbots, particularly among adolescents and older adults who value nonverbal cues (Rincon et al., 2021). However, limitations include technical constraints in natural language processing and the risk of “uncanny valley” effects when avatars appear overly human-like.

4.4 Adoption Challenges

Despite their promise, AI avatars face **adoption barriers** at multiple levels. From a patient perspective, skepticism regarding authenticity and data security remains a significant barrier (Laranjo et al., 2018). From a provider perspective, integration into clinical workflows is often hindered by lack of interoperability with electronic health records (EHRs) and concerns about liability.

Table 4 summarizes adoption challenges across stakeholders.

Table 4. Adoption Barriers of AI Avatars in Mental Health Care

Stakeholder	Barrier	Example
Patients	Trust and authenticity	Doubts about whether avatars can replace human empathy.
Clinicians	Clinical validation	Lack of RCTs confirming therapeutic outcomes.
Organizations	Integration challenges	Difficulties linking avatar platforms to EHRs.
Regulators	Policy uncertainty	Absence of clear guidelines for AI avatar deployment.

4.5 Ethical and Policy Implications

Findings confirm that ethical concerns are central to the debate on AI avatars. Risks include over-reliance on avatars, potential spread of misinformation, and privacy breaches (Luxton, 2016). Users may anthropomorphize avatars, mistakenly perceiving them as substitutes for professional care.

Policies lag behind technological advancements, with most regulatory bodies focusing on telehealth rather than avatar-based interventions. Emerging frameworks suggest the need for **global standards** on transparency, informed consent, and data protection to mitigate risks (WHO, 2022).

4.6 Conceptual Findings: From Tools to Companions

The conceptual synthesis suggests that AI avatars can be understood on a **continuum of digital companionship**:

- **Stage 1:** Functional chatbots providing scripted responses.
- **Stage 2:** Semi-embodied avatars offering personalized feedback.

- **Stage 3:** Fully interactive digital companions with adaptive empathy and clinical integration.

This continuum underscores the need for innovation management strategies to support the progression of avatars toward trusted companions in mental health care.

Figure 3. Continuum of AI Avatar Development in Mental Health Care

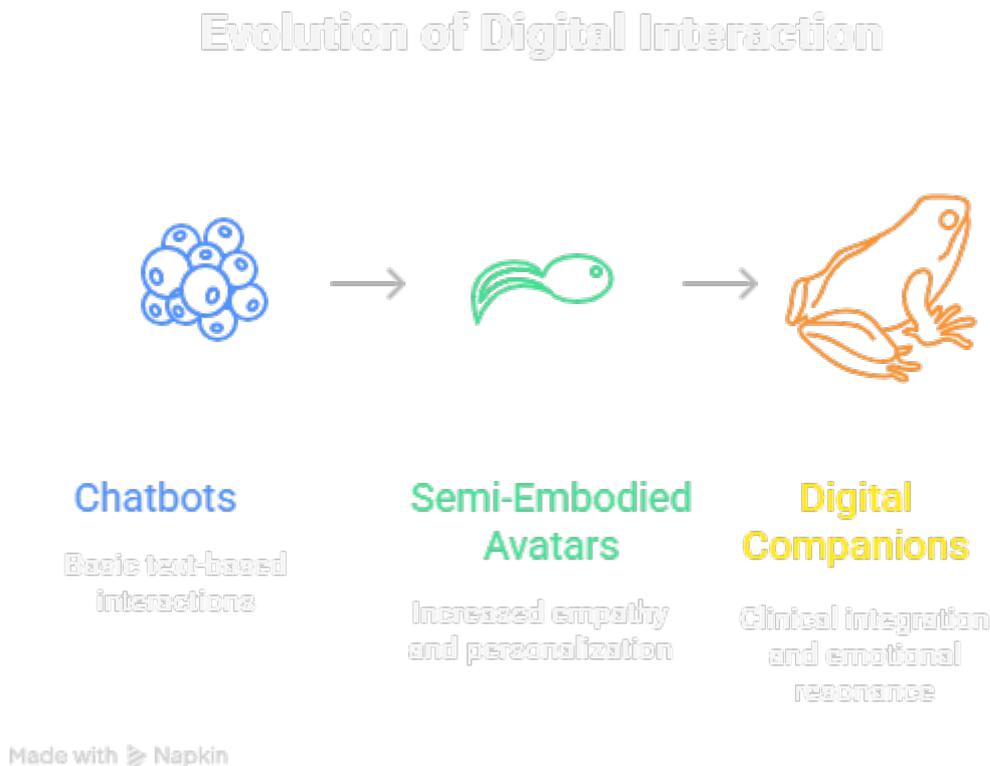


Diagram showing three stages — Chatbots → Semi-Embodied Avatars → Digital Companions, with arrows indicating increasing empathy, personalization, and clinical integration.

5. Discussion

5.1 Interpretation of Findings

The findings of this review suggest that AI avatars hold significant potential to enhance mental health care delivery, particularly in terms of **accessibility, engagement, and personalization**. By embodying conversational agents with visual and emotional cues, avatars overcome many limitations of text-only chatbots, thereby creating stronger therapeutic alliances (Bickmore & Picard, 2005; Lisetti et al., 2013). This aligns with broader trends in digital health innovation, where technologies succeed when they foster not only efficiency but also relational trust (Topol, 2019).

However, the results also indicate that the **transition from tool to companion** requires overcoming adoption challenges and ethical uncertainties. While accessibility is improved, questions of clinical validity and user trust remain significant barriers. This duality reflects the classic “innovation paradox”: technologies with disruptive potential often face the steepest hurdles in legitimacy and adoption (Rogers, 2003).

5.2 Theoretical Implications

The integration of findings with innovation frameworks highlights key theoretical contributions.

1. **Extension of Diffusion of Innovations** - The relative advantage of avatars (e.g., increased empathy and engagement) is clear, yet their complexity and uncertain observability slow adoption (Rogers, 2003). This suggests that adoption models must account for **emotional credibility** as a new dimension of technological diffusion in health care.
2. **Technology Acceptance Model** - Perceived usefulness of avatars is mediated not only by clinical outcomes but also by patient perceptions of authenticity and empathy (Davis, 1989). This expands TAM by positioning **trust and relational authenticity** as central determinants of health technology acceptance.
3. **Companionship Framework** - Findings support a continuum from **functional chatbot** to **digital companion**, extending theories of human-computer interaction. This continuum implies that future mental health interventions may blend therapy with companionship, requiring a rethinking of therapeutic boundaries (Reeves & Nass, 1996).

5.3 Managerial Implications

For health care providers, organizations, and developers, several managerial lessons emerge:

- **Integration Strategies:** Successful deployment requires alignment with existing electronic health records (EHRs) and clinical workflows. Without interoperability, avatars risk being siloed innovations.
- **Patient-Centered Design:** Avatars must be co-designed with end users, incorporating cultural, linguistic, and demographic considerations to ensure inclusivity (Steinwachs, 2018).
- **Training and Awareness:** Clinicians need training to appropriately use avatars as complementary tools rather than replacements for therapy.
- **Sustainability Models:** Cost-effectiveness analyses are essential to demonstrate the long-term financial benefits of avatar adoption, particularly for public health systems.

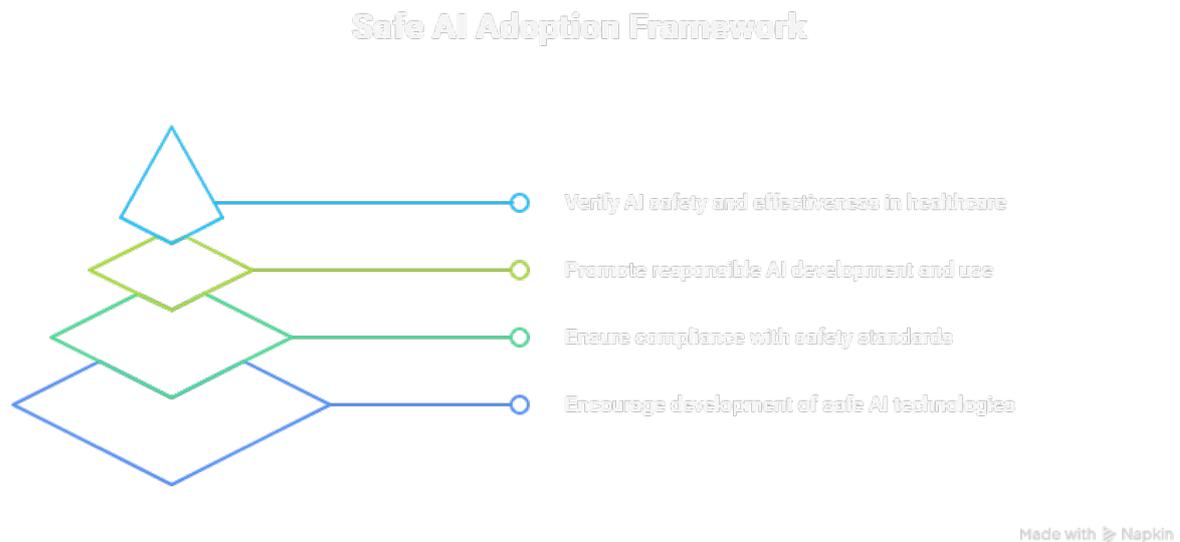
These insights suggest that managerial success lies in **hybrid strategies** where avatars complement, rather than replace, human providers.

5.4 Policy Implications

Policy analysis reveals that current frameworks are inadequate for regulating avatar use in mental health. Key implications include:

- **Privacy and Security:** Governments must establish standards for data encryption, storage, and anonymization, particularly given the sensitive nature of mental health data (Luxton, 2016).
- **Informed Consent:** Clear protocols should ensure that patients understand the capabilities and limitations of avatars.
- **Quality Assurance:** Regulatory bodies should mandate clinical trials and performance validation before avatars are widely adopted.
- **Global Standards:** International alignment is critical, as digital health tools often cross borders through online platforms.

Figure 4 outlines a proposed **policy framework** that integrates clinical validation, ethical oversight, and innovation incentives.

Figure 4. Policy Framework for AI Avatar Integration in Mental Health Care

Multi-layered model showing “Clinical Validation,” “Ethical Guidelines,” “Regulatory Oversight,” and “Innovation Incentives” as interconnected layers supporting safe adoption.

5.5 Limitations of the Study

While the review provides a comprehensive synthesis, limitations must be acknowledged:

- **Narrative Review Design:** Findings are subject to selection bias, as the methodology does not involve systematic meta-analysis.
- **Rapidly Evolving Technology:** Literature on AI avatars is limited and may not capture ongoing advancements in natural language processing or virtual embodiment.
- **Generalizability:** Many studies are pilot projects with small sample sizes, limiting generalizability across diverse populations.
- **Contextual Variability:** Adoption and policy implications vary significantly across regions, limiting uniform conclusions.

These limitations suggest the need for **future longitudinal and cross-cultural studies** to validate and refine the findings.

5.6 Future Research Directions

The review highlights several avenues for future research:

1. **Clinical Trials** – Rigorous RCTs are needed to validate the efficacy of avatars compared to traditional therapy and chatbots.
2. **Cross-Population Studies** – Research should explore how avatars are perceived across different age groups, cultural contexts, and socioeconomic backgrounds.
3. **Longitudinal Studies** – Long-term effects of avatar-based interventions on adherence, relapse prevention, and patient outcomes remain underexplored.
4. **Ethics and Boundaries** – Investigations into the psychological implications of anthropomorphizing avatars are necessary to safeguard patient well-being.
5. **Technology Advancements** – Future research should examine how advances in affective computing, multimodal AI, and virtual reality may enhance avatar effectiveness.

By addressing these directions, scholars can build an evidence base that supports responsible and scalable integration of AI avatars into mental health systems.

6. Conclusion

6.1 Summary of Findings

This study examined the potential of **AI avatars as digital companions in mental health care**, synthesizing evidence across computer science, psychology, innovation management, and health policy. Findings indicate that avatars extend the capabilities of chatbots by offering **embodied, empathetic, and engaging interactions**. They show promise in addressing persistent challenges in accessibility, stigma reduction, and scalability.

However, adoption remains constrained by **clinical, ethical, and policy barriers**. Patients may question authenticity and trust; clinicians demand stronger validation; and regulators lack established frameworks. Without careful integration, avatars risk being perceived as experimental tools rather than credible health companions.

6.2 Contributions

This paper makes three core contributions:

1. **Theoretical Contribution** – Extends innovation adoption theories (Diffusion of Innovations, Technology Acceptance Model) by introducing **emotional credibility and relational authenticity** as central determinants of digital health adoption.
2. **Practical Contribution** – Offers health organizations and developers insights into **integration strategies**, emphasizing interoperability, user-centered design, and sustainability.
3. **Policy Contribution** – Proposes a **multi-layered policy framework** to guide clinical validation, ethical oversight, and global standardization for safe adoption of AI avatars.

6.3 Recommendations for Practice and Policy

- **For Health Practitioners:** Avatars should be positioned as **complementary tools**, not replacements for therapy, and integrated into hybrid care models.
- **For Developers:** Investment in **affective computing, natural language processing, and adaptive embodiment** is critical to enhance empathy and trust.
- **For Policymakers:** Regulatory bodies must establish standards for privacy, informed consent, and clinical trials to safeguard patient welfare while encouraging innovation.
- **For Researchers:** Cross-disciplinary collaboration is needed to advance evidence, combining computer science with psychology and health sciences.

6.4 Limitations

The study is limited by its **narrative review methodology** and reliance on emerging literature, which may not fully capture ongoing technological advances. Findings may not generalize across all populations due to cultural and contextual differences.

6.5 Future Directions

Future research should focus on:

1. Conducting **randomized controlled trials** to validate avatar-based interventions.
2. Exploring adoption across diverse **age groups and cultural settings**.
3. Evaluating **long-term outcomes** of avatar-assisted therapy on relapse prevention and adherence.
4. Investigating **ethical implications** of anthropomorphized companions.

5. Leveraging emerging technologies such as **virtual reality and multimodal AI** to enhance embodiment.

6.6 Final Reflection

The promise of AI avatars lies not merely in technological novelty but in their potential to **humanize digital mental health care**. If developed and governed responsibly, avatars can evolve from tools of convenience to trusted companions, bridging gaps in accessibility, empathy, and sustainability. Their successful adoption will depend on **rigorous evidence, cross-disciplinary innovation, and ethical governance**.

Patient consent

Not applicable.

Data availability

Data available on request from the authors.

Ethics approval

Not applicable because this work does not involve the use of animal or human subjects.

Permission to reproduce material from other sources Not applicable.

Clinical trial registration Not applicable.

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Declaration of competing interest

There are no conflicts of interest.

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