ACHSM Asia-Pacific Journal of Health Management

REVIEW ARTICLE

FROM ALGORITHMS TO EMPATHY: EMOTIONALLY INTELLIGENT AI COMPANIONS IN ELDER MENTAL HEALTH CARE: A SCOPING REVIEW

*Monika Sharma, Richa Chauhan**

Jaypee Business School, Jaypee Institute of Information Technology, Noida, India

*Correspondence: richachauhan1986@gmail.com

ABSTRACT

BACKGROUND

The increased mental illness of the older individuals caused by loneliness, memory loss, and the absence of an emotional support system require innovative solutions. This review examines the ways in which emotional intelligence would be implemented in virtual companions to assist in improving mental health outcomes in elder care centres.

OBJECTIVE

The primary goal of this study is to examine the current applications and theoretical principles in order to understand how the emotionally intelligent virtual companions can enhance the traditional eldercare through appropriate emotional assistance.

METHODS

The PRISMA-ScR guideline was used to conduct a scoping review. Peer-reviewed literature published between 2010 and 2026 was identified from the Scopus, Web of Science, and PubMed databases. Studies that talked about emotional intelligence, virtual companions, mental health outcomes, or the design or implementation of eldercare services were included. A total of 32 studies were included using a PRISMA-ScR–guided scoping review approach. The data was organized using the themes to identify common ideas and patterns in how virtual agents are used to help older people's mental health.

RESULTS

The results show that there are six main themes: Emotional Responsiveness, Conceptual Frameworks, Psychological Outcomes, Usability and Acceptance, Ethical/System Integration, and Health System Integration. The results show that virtual companions with emotional intelligence may help older people feel less lonely (e.g., most studies reported short-term reductions in loneliness, though effect sizes varied across heterogeneous study designs"), improve their mood, and make them more mentally strong. Major limitations in the current collection of studies are: most studies are small, short-term, and heterogeneous, which limits generalizability as well as the precluded meta-analysis.

CONCLUSION

This paper emphasizes the possibility of emotionally intelligent virtual companions as an aid in mental healthcare for the elderly. It describes the relevance of uniform conceptual models, thorough research, and moral requirements of the creation of emotionally intelligent virtual companions which displays a flourishing and emerging front for innovations that can better present-day methods of provision of elder mental health treatment. They need to be properly introduced into

health-care systems, but the introduction must be backed by the cautious interpretation of the existing data, well-defined ethical standards, and the robust long-term scientific and economic analysis.

KEYWORDS
emotional intelligence, mental health, elder, elder care services, virtual companion

INTRODUCTION

One of the most recent and the most critical demographic trends of the twenty-first century is population aging. This creates numerous issues for global healthcare systems. Physical illnesses become more common as individuals grow old, but with that there is emerging evidence that mental and emotional health issues, such as loneliness, depression, and cognitive loss, are equally damaging to older people health [1]. This demonstrates that older people still require interventions that can be raised up and that benefit them. For example, loneliness is linked to an increased risk of death, heart disease, and cognitive decline. As a result, fixing these issues has become a high priority for public health [2, 3].

Emotional intelligence (EI) generally refers to the capacity to perceive, interpret, and regulate one's own emotions as well as those of others.[4]. In eldercare, interventions that improve emotional awareness and regulation have shown promise in reducing depressive symptoms and increasing life satisfaction [5]. However, it is still difficult to use EI-based programs in real-world eldercare settings because of staffing issues, scalability issues, and differences in caregiver training.

New developments in artificial intelligence (AI) offer a new way to close this gap. AI-powered virtual companions that can understand and respond to users' emotions can provide individualized emotional support [6]. Emotional intelligence, when applied to artificial intelligence systems, does not include subjective emotional experience or consciousness, because it was initially described as a human cognitive-emotional capacity. Instead, EI-informed AI refers to a functional and design-oriented application of emotional intelligence concepts, such as emotion identification, affective response development, and adaptive interaction based on emotional cues from users. These agents can be chatbots on a screen, voice assistants, or real-life social robots. They are made to read users' emotions and change their responses based on what they see [7, 8]. Research on AI prototypes such as the 'Ryan' robot suggests that emotion-aware systems may improve mental health and subjective well-being in elderly people suffering from depression and dementia [9,10]. Existing reviews indicate that AI-powered virtual companions are associated with decreased loneliness and perceived improvements in emotional well-being among older persons, mainly in short-term and exploratory research [6,12].

This field is still new, though. Different types of empirical studies use different methods, such as randomized controlled trials and exploratory qualitative designs, and they often have small sample sizes and short durations [13]. Also, the current conceptual frameworks for EI-informed virtual agent design are not standardized or rigorously validated. Cultural adaptation of these systems is rarely discussed, even though there is evidence that culturally appropriate emotional expressions are important for caregiver interactions [14,15]. The term "emotionally intelligent AI" is used in this review to refer to systems that simulate empathic responsiveness using affective computing techniques rather than having human-like emotional capacities a distinction that is widely debated in the social robotics and ethics literature [15,17]. Ethical discussions about data privacy, emotional dependency, and the authenticity of AI companionship are also new, which means that these are important issues that need to be looked into before they can be used more widely [16,17].

Mental health issues go beyond taking care of the elderly and are closely linked to how systems are set up to be helpful and emotionally responsive. These results highlight the need to incorporate the concept of emotionally intelligent design into technologies, which strive to enhance the psychological well-being, e.g., by creating virtual companions that help the elderly.

To address these issues, this paper reviews peer-reviewed articles on virtual emotionally intelligent companions applied in the elderly care. The key aims of the study are:

- To explore the extent of empirical and conceptualizing research, which has explored the EI-integrated virtual companions in senior mental health care with consideration of how their study designs and purposes vary.
- To define and outline the current conceptual models that guide the integration of the elements of emotional intelligence in the design of virtual agents.
- To investigate ethical, usability and system-integration issues that have been documented to be pertinent in real-life situations involving eldercare.
- To present major opportunities and challenges in the future study, such as the improvement of methods and the creation of policy-relevant recommendations.

By integrating perspectives from gerontology, affective computing, psychology, and ethics, this study examines emotionally intelligent virtual companions in terms of their reported benefits, limitations, and opportunities for further refinement.

Such information is necessary to health care administrators, aged care facility managers and policymakers who may wish to incorporate some emotionally sensitive technology solutions to the eldercare systems.

Considering the emergent and cross-disciplinary character of the emotionally intelligent virtual companions in elderly mental health care, the available literature is very heterogeneous which incorporates exploratory trials, qualitative research, conceptual framework, and pilot applications. To accomplish this a scoping review methodology was chosen to provide a systematic mapping of the breadth, nature and gaps in the current body of evidence, not to provide an estimate of pooled intervention effects or make conclusive statements about effectiveness.

METHODS: SCOPING REVIEW DESIGN

This study used a scoping review technique based on the PRISMA Extension for Scoping Reviews (PRISMA-ScR) framework [18]. The primary goal was to collect peer-reviewed research on emotionally responsive virtual companions for older individuals, with a special focus on mental health outcomes and elder healthcare service contexts. The review looked at how to make, operate, and evaluate virtual agents with emotional intelligence (EI) features.

SEARCH STRATEGY

A complete literature search was done using some major electronic databases to identify interdisciplinary and high impact studies. The search was restricted to articles which were published between 2010 and 2026; The date range (2010–2026) was selected because key methodological and technological advances in affective computing—particularly artificial emotional intelligence, emotion-aware socially assistive robots, and virtual companions—began to emerge and mature after 2010, enabling their application in eldercare settings [10,14].

Boolean operators (AND/OR) were used to connect the main objectives of the paper which are:

1. AI Companions/Robots
2. Emotional Intelligence/Affective computing
3. Older people/adults

DATABASE SEARCH STRATEGIES

Scopus:("emotional intelligence" OR "affective computing" OR "emotional responsiveness" OR "emotion-aware AI") AND ("AI companion" OR "virtual companion" OR "digital companion" OR "social robot" OR "humanoid robot" OR chatbot OR "AI assistant") AND ("older adults" OR elderly OR "older people" OR ageing OR gerontology OR "geriatric care") Web of Science: TS=("emotional intelligence" OR "affective computing" OR "emotion-aware AI" OR "empathic AI") AND TS=("virtual companion" OR "AI companion" OR "social robot" OR "conversational agent") AND TS=("older adults" OR elderly OR ageing OR gerontology) PubMed[MeSH] : ("Artificial Intelligence" OR "Affective Computing") AND ("Emotion Recognition") AND

("Aged" OR "Older Adults") AND ("Companion Robots" OR "Conversational Agents" OR "Virtual Assistants"). Searches were conducted between January 2025 and August 2026 and were limited to peer-reviewed English-language publications.

ELIGIBILITY CRITERIA

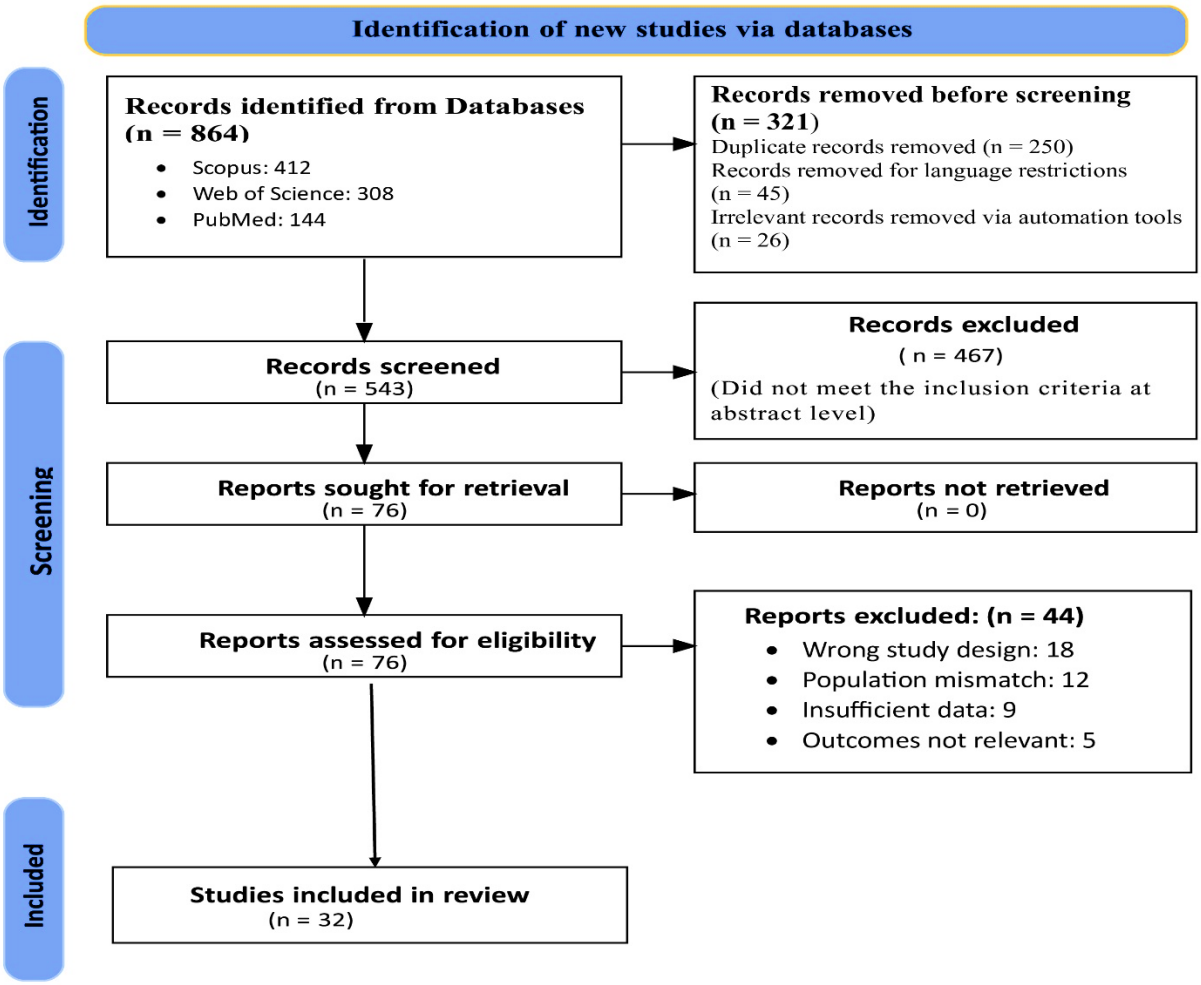
TABLE 1: INCLUSION AND EXCLUSION CRITERIA FOR STUDY SELECTION

Inclusion Criteria	Exclusion Criteria
Provided conceptual frameworks, experimental results, or qualitative insights relevant to elderly care	Focused solely on technical or engineering aspects without user-centred evaluation
Focused on virtual agents, chatbots, or robots integrating emotional intelligence for use with older adults (aged 60 years)	Did not report findings in relation to mental or emotional health
Addressed outcomes related to mental health, loneliness, emotional well-being, or social connectedness	Were not in English, or were opinion pieces or articles without any evidence

STUDY SELECTION PROCESS

After finding 864 publications (Scopus: n=412; Web of Science: n=308; PubMed: n=144), 321 records were removed before screening (Duplicate records removed: n=250; Records removed for language restrictions: n=45; Irrelevant records removed via automation tools: n=26). Two independent reviewers then looked at the titles and abstracts of the remaining 543 articles. Following full-text assessment of 76 articles, 44 reports were excluded (wrong study design: n=18; population mismatch: n=12; insufficient data: n=9; outcomes not relevant: n=5). Ultimately, 32 studies met the inclusion criteria and were included in the scoping review. The differences in selection were addressed, as recommended by scoping reviews [18], either through discussion or by seeking assistance from a third party. A comprehensive study-level evidence-charting table summarizing key characteristics for all 32 included studies is provided as Supplementary Material.

FIGURE 1: PRISMA-SCR FLOW DIAGRAM SHOWING THE STUDY SELECTION PROCESS FOR THE SCOPING REVIEW [18].



DATA EXTRACTION AND ANALYSIS

A standard data extraction form to collect the following information was developed: the study's goal, the type of virtual companion, the sample population, the emotional intelligence features used (like recognizing emotions and giving empathetic feedback), the outcome measures (like loneliness scores and affective response), the study design, and the main results. Emotional intelligence concepts were identified and analyzed in terms of functional application (e.g., emotion recognition, empathic dialogue, adaptive feedback) rather than just psychological qualities. Narrative synthesis and thematic categorization were used to look at the data. The studies were put into groups depending on the type of design (qualitative, quantitative, or mixed-method), the platform (robotic, voice, or text-based), and the outcome categories (emotional well-being, cognitive engagement, or user satisfaction). A lot of attention is given to the conceptual frameworks that guided the construction of these themes. Data extraction was conducted independently by two reviewers, and discrepancies were resolved through consensus.

QUALITY APPRAISAL

Of the 32-research considered, 18 were empirical intervention or observational studies, which were evaluated using the relevant JBI critical evaluation procedures. Rather than assigning overall categorical quality scores, the JBI appraisal was used descriptively. Small sample sizes, limited intervention durations, reliance on self-reported outcomes, lack of blinding, and short follow-up periods were among the most common methodological drawbacks. Conceptual articles and past reviews were not subjected to strict quality assessment, but were used to inform theoretical framework and context interpretation. Quality evaluation results influenced the careful interpretation of findings but did not decide study exclusion, which is according to the scoping review approach [18,20]. A formal review procedure (e.g., PROSPERO) was not registered because the major goal of this scoping review was to map concepts, evidence types, and research gaps rather than analysing intervention effect sizes.

RESULTS

For synthesis and interpretation, included studies were divided into three broad categories: (1) empirical intervention studies (randomised and quasi-experimental designs), (2) qualitative and observational studies investigating user experiences and perceptions, and (3) conceptual papers and prior reviews that informed design frameworks, ethical considerations, and system-level implications. Empirical studies were the primary source of effect-related interpretations, while qualitative and conceptual works provided contextual and explanatory insights, in accordance with scoping review methodology and evidence review recommendations [18,19].

STUDY DESIGNS AND METHODOLOGIES

The 32 studies that were considered showed a broad methodological context.

1. Randomized Controlled Trials (RCTs): A small number of studies examined emotionally responsive AI companions through controlled experimental designs [8,43,44].
2. Pilot, Cross-sectional, and Survey studies: A large portion of the literature utilized pilot studies, cross-sectional designs, and surveys (e.g., PLS-SEM) to explore user acceptance, ease of use, and emotional supportiveness [10, 31, 32, 40, 41].
3. Qualitative and Case studies: Interviews, qualitative frameworks, and long-term case series provided a detailed description of the experiences of older adults as they used chatbots and social robots in home-care settings [7, 15, 17, 27, 28, 36, 37, 38].
4. Prior reviews and evidence syntheses: Numerous systematic and scoping reviews have comprehensively examined AI companions, chatbots, and socially assistive robots [6, 12, 13, 14, 22, 29, 35, 42].
5. Conceptual / theoretical papers: Previous work on foundation models, participatory design, and ethical frameworks provided the conceptual base for interpreting engagement and addressing issues like deception and data privacy [16, 24, 26, 34].

Geographically, studies were conducted across North America, Europe, and East Asia, reflecting a diverse research context.

THEMATIC ANALYSIS

The data have been thematically organized and presented in tables in order to emphasise key features such as emotional responsiveness, conceptual frameworks, psychological outcomes, usability and acceptance, ethical considerations, and health system integration. A meta-analysis was not performed due to heterogeneity in research designs, evaluations, and intervention types, in accordance with scoping review methodology and reporting guidelines [18,19]. Across studies, emotionally intelligent behaviour was operationalised through affective computing mechanisms such as sentiment analysis, vocal tone recognition, facial expression analysis, and rule-based or adaptive empathic response generation [7,10,15].

TABLE 2.1: EMOTIONAL RESPONSIVENESS

Virtual Companion Feature	Effect/Outcome (Specific Data)	Study Type
Voice-based emotional AI	Reported reductions in loneliness scores over a short-term intervention period, measured by using the UCLA Loneliness Scale [8, 12]	Randomized Controlled Trial/ Experimental
"Ryan" social robot with multimodal emotion detection	Reported increases in user engagement and perceived mood improvement among older adults with dementia [9,10, 31]	Pilot/Experimental study
Conversational AI providing empathic responses	Users reported better emotional comfort and support [11, 30, 34]	Observational/User study

Note: Reported results are study-specific findings and should not be considered as pooled or generalisable effect estimates.

TABLE 2.2: CONCEPTUAL FRAMEWORKS

Model/Framework	Key Elements / Application in Design
Mayer–Salovey Emotional Intelligence model	Provides core EI components—emotion perception, understanding, regulation—used for designing emotionally intelligent companions [4]
Social-Robot Relationship-Building	Explains user attachment, trust formation, and long-term acceptance of companion robots [15]
Affective computing + self-regulation	Hybrid framework combining affective computing with self-regulation theory to guide dialogue management and emotional feedback [7]

Note: In the studies that were included, emotional intelligence models were primarily employed as conceptual or functional design frameworks to inform emotion-aware system behavior, rather than as representations of human emotional cognition.

TABLE 2.3: PSYCHOLOGICAL OUTCOMES

Outcome	Effect/Change (Specific Data)	Study Design
Loneliness	Most studies reported short-term reductions in loneliness scores over intervention periods ranging from 4 to 12 weeks, although outcome measures and effect magnitudes varied across studies [8, 10, 12, 13, 22, 23, 33]	RCTs and quasi-experimental trials and Literature reviews
Depression & Anxiety	Several studies reported short-term improvements in depressive and anxiety-related symptoms as measured by geriatric mental health scales [10, 11, 22, 41].	Pilot and observational studies
Emotional Well-being	Participants reported feeling less alone, more empathetic, and better after interacting with the agent [7, 15, 17, 23, 32, 37]	Qualitative interviews/user reports
Social Interaction & Cognition	Exploratory findings suggested modest changes in social interaction and cognitive engagement; however, results were inconsistent and not statistically robust [10,31]	Pilot study

TABLE 2.4: USABILITY AND ACCEPTANCE

Factor/Metric	Observation / Findings
Adoption Rate	Most studies reported moderate to high levels of user uptake and sustained engagement, influenced by factors such as age, digital literacy, and platform design [11, 24, 32,39]
Platform Preference	Voice-based agents were more accepted than robotic platforms (due to ease of use and lower cost) [12,13]
Emotional Expressiveness	Social robots exhibiting human-like emotional cues (gaze, gesture, empathic communication) fostered stronger user attachment [15]

TABLE 2.5: ETHICAL/SYSTEM INTEGRATION

Aspect	Details / Example
Data Privacy	Use of sensitive emotional profiles by companions raises user privacy concerns (requires safeguarding emotion data) [16, 17, 27, 28]
Emotional Dependency & Authenticity	Risk that users may form emotional dependence or be deceived if AI companions are perceived as sentient; underscores need for transparency, user control, and informed consent [16, 17, 27, 28]
Human Oversight	Older adults prefer AI support with human involvement rather than full automation [11]

TABLE 2.6: HEALTH SYSTEM INTEGRATION

Integration Strategy	Description	Examples/Findings
Medication Reminders and Monitoring	Virtual companions embedded in home-care systems to remind users of medication and monitor health status. [6, 31, 34].	Joy TV companions were designed to prompt medication adherence and monitor health metrics through integration with caregiver platforms.
Supplement to Human Support in Home Care Packages	Pilots integrated virtual companions to fill emotional gaps when human caregivers were unavailable. [11, 13, 31, 34].	Initial studies noted reduced caregiver burden and improved adherence to routines when EI-based virtual agents were used as supplemental tools in home-based eldercare settings.
Preliminary Outcome Evidence	Preliminary implementations show potential for emotional and behavioral engagement; nevertheless, evidence is mostly qualitative or exploratory, with little long-term or economic evaluation [13].	While qualitative feedback is positive, no studies provided full-scale economic analysis or long-term outcome data to justify system-wide integration.
Workflow Enhancement Potential	EI companions have been proposed as a tool that might reduce burnout among staff by automating routine emotional check-ins and referrals, though this requires prospective evaluation. [6,13].	Systems capable of monitoring emotional status could escalate care alerts, potentially reducing emotional labour on clinical staff.
Barriers to Integration	Lack of policy, infrastructure, and trained personnel to manage AI agents in eldercare settings [6].	Yang et al. highlighted that without caregiver training and digital infrastructure, system-level adoption of emotionally intelligent companions remains difficult.
Scalability and Cost-effectiveness	No current large-scale trials with cost-benefit assessments; needed to validate widespread implementation [11,13].	Although promising in pilot phases, broader studies with financial and clinical outcomes are essential before health systems can adopt these tools on a large scale.

DISCUSSION

STATEMENT OF PRINCIPAL FINDINGS

This scoping review combined findings from 32 studies on emotionally intelligent virtual companions in elder mental health care. Across multiple reviews and pilot interventions, emotionally responsive virtual companions were linked to short-term improvements in loneliness and depressive symptoms, though study designs, outcome measures, and effect magnitudes varied significantly, and many long-term studies showed mixed results [8, 10, 12, 22, 23, 33]

In addition, qualitative narratives backed up these quantitative advantages, with users saying that they had a real emotional connection, their mood improved, and they felt more capable of doing things when they interacted with sympathetic virtual agents [7, 27, 36, 37]. However, preliminary dementia trials indicated promising indicators of more social interaction and a little cognitive gain, although these results were not statistically significant [10].

Many of the research studies that were included used parts of Mayer and Salovey's EI model, like emotion perception, understanding, and regulatory feedback, to help develop the system [4, 15]. Technology acceptance models indicate that factors such as perceived empathy, ease of use, and user optimism influence the adoption of emotionally intelligent technologies [13]. Across the reviewed literature, recurring ethical concerns were identified, particularly in relation to data privacy, emotional dependency, and the potential for deception arising from simulated empathic behaviour [16, 17, 27,

28]. The first projects of integrations such as voice-based agents in a home-care system suggest they may have potential for the improvement of the workflow; however, there is scanty information on the cost-efficiency and scaling challenges in the long run [6, 11, 13].

CONCEPTUALISING EMOTIONAL INTELLIGENCE IN AI SYSTEMS

The idea of emotional intelligence has long been considered to be a human cognitive-emotional skill that implies emotional awareness, knowledge, and management [4]. In a system based on artificial intelligence, though, EI is usually deployed as a functional or symbolic design characteristic and not as a psychological characteristic of the system under consideration [7,15]. The AI systems mentioned in this review are emotionless, but reproduce affectively responsive behaviour, through affective computation techniques, which is also important in limiting the anthropomorphic interpretations and unrealistic expectations of AI behaviour [15,17].

Some of this researche involved some popular models of EI, such as Mayer-Salovey model, to make a choice in terms of system design [4,7]. Such applications primarily used EI models as design heuristics that enable the organisation of processes, such as emotion recognition, response selection and adaptive interaction, rather than offer statements about the machine-based emotional cognition [7,15]. The simulated empathy raises the question of authenticity, transparency and emotional dependency ethically and discusses the importance of not trying to deceive users into thinking AI companions are human beings [16,17].

STRENGTHS AND WEAKNESSES OF THIS REVIEW

The inclusion of interdisciplinary coverage of the research is one of the strengths of this review because the research study in the domain of gerontology, affective computing, psychological, and ethics are covered and considered, and both empirical and conceptual research are taken into consideration. Compared to the earlier test that was mainly concerned with technical performance or viability, this synthesis can be able to test design structures, usability issues, incorporation of health-system and any other reported mental health outcome such as loneliness. In that way, the review adds to the previous literature on AI efficacy, including that by Yang et al. (2025) [6], since the study specifically targets the implementation of emotionally intelligent strategies to design and ethical and systemic barriers to implementation. In addition to it, the fact that the studies included in the Scopus journals are ranked in the Q1-Q4 category, and the PRISMA-ScR recommendations are adhered to makes the review process more transparent and publicized. In the case, the quality appraisal of the methodological methods was used to support evidence-informed interpretation with the help of JBI tools in case empirical data were used [20].

Nevertheless, some limitations are to be taken into consideration. Many of the included RCTs and pilot studies included small samples (mostly less than 60 participants), brief-intervention periods (4-12 weeks) and no or limited, long-term follow-up. The observed effect sizes can be, therefore, partially attributed to novelty effects and not long-lasting positive changes in mental health outcomes. Furthermore, in comprehensive systematic reviews evaluating interventional designs, effect sizes tend to be lesser or inconsistent due to methodological heterogeneity and a high risk of bias [6,21,22].

MEANING OF THE STUDY

Based on the findings of this scoping review, emotionally intelligent virtual companions may have the potential to serve as an addition of supplementary services to the existing elder mental health and aged care services [6,13]. The technologies are to be viewed as the emerging tools that could hold some value in terms of providing health management, but not as the established or independent care solutions [16,17]. It has some initial signs of potential usefulness in terms of assisting to ensure emotional engagement and continuity of care - particularly in the environment that is affected by workforce constraints the existing body of research is too young to warrant extensive implementation until further research is conducted to confirm these results [6,13,17].

The co-design solutions with the older adults, caregivers, and clinicians, therefore, are likely to be the key to meaningful adoption and realize the virtual companion capabilities, which are being aligned with the actual care processes and emotional objectives. Simultaneously, ethical AI use, emotional authenticity and data protection education of employees will be needed in order to support safe deployment. At the policy level, regulatory/governance framework policies

addressing transparency, informed consent, emotional boundary management and data protection should take precedence and be integrated with mental health and broader digital health policies. Collectively, these findings highlight implications for health management practice, including the need for digital literacy development, clearer implementation guidance, and the careful integration of EI-based technologies into existing aged care workflows [6,11,13].

The virtual companions can also be used in the face-to-face therapy at the health system level to ensure that the people are engaged emotionally between therapy sessions. One such instance is that trust can be developed through the use of caring speech agents that will encourage people to embrace remote behavioural health services, especially among patients of advanced age that live in rural areas or underserved communities [11,13].

Any managerial or policy adoption of emotive intelligent virtual companions, in turn, must be preceded by properly designed pilot programs to be developed with older adults, care givers and clinicians and any systematic analysis of the outcomes, the costs and ethical implications [6, 16,17].

RESEARCH GAP AND FUTURE RESEARCH

Although the first results in this direction are promising, there are multiple gaps in the research that should be filled in before the introduction of emotionally intelligent virtual companions becomes an ethically viable solution. Majority of studies that are in place are of short duration and thus, there is no enlightenment on whether benefits observed are achieved over time or fade away by repetition. The future research would then be benefited by better conceptualizations of how emotional intelligence elements are connected to particular AI capabilities and mental health results. It is also evident that because of the extensive use of samples in Western nations and East Asia, the cross-cultural research is necessary, especially in low- and middle-income settings, to learn more about the differences in the expression of emotions, communication patterns, and social norms among older adults.

The necessity to create ethical frameworks in collaboration with stakeholders and test them with the assistance of the user-centred design research is proposed, even though the ethical concerns are under-researched, especially, when it comes to the emotional dependency. In addition, outcome measures are not the same in all studies, and it is not an easy task to compare the outcome, this is why more standardised methods of assessment ought to be discussed, including ecological momentary assessment and real-time engagement measures. Finally, the AI autonomy should be compensated with the right human supervision in future systems, e.g. human-in-the-loop designs, however, the aspects related to adaptive learning systems (e.g. bias and transparency) should be considered.

References

1. Courtin E, Knapp M. Social isolation, loneliness and health in old age: a scoping review. Health & social care in the community. 2017 May;25(3):799-812.
2. Gardiner C, Laud P, Heaton T, Gott M. What is the prevalence of loneliness amongst older people living in residential and nursing care homes? A systematic review and meta-analysis. Age and ageing. 2020 Aug 24;49(5):748-57.
3. Boss L, Kang DH, Branson S. Loneliness and cognitive function in the older adult: a systematic review. International psychogeriatrics. 2015 Apr;27(4):541-53.
4. Salovey P, Mayer JD. Emotional intelligence. Imagination, cognition and personality. 1990 Mar;9(3):185-211.
5. Delhom I, Satorres E, Meléndez JC. Emotional intelligence intervention in older adults to improve adaptation and reduce negative mood. International Psychogeriatrics. 2022 Jan;34(1):79-89.
6. Yang Y, Wang C, Xiang X, An R. AI applications to reduce loneliness among older adults: A systematic review of effectiveness and technologies. InHealthcare 2025 Feb 20 (Vol. 13, No. 5, p. 446). MDPI.
7. Rodríguez-Martínez A, Amezcua-Aguilar T, Cortés-Moreno J, Jiménez-Delgado JJ. Qualitative analysis of conversational chatbots to alleviate loneliness in older adults as a strategy for emotional health. InHealthcare 2023 Dec 27 (Vol. 12, No. 1, p. 62). MDPI.

8. Yen HY, Huang CW, Chiu HL, Jin G. The effect of social robots on depression and loneliness for older residents in long-term care facilities: A meta-analysis of randomized controlled trials. Journal of the American Medical Directors Association. 2024 Jun 1;25(6):104979.
9. Abdollahi H. Artificial Emotional Intelligence in Socially Assistive Robots. University of Denver; 2023.
10. Abdollahi H, Mollahosseini A, Lane JT, Mahoor MH. A pilot study on using an intelligent life-like robot as a companion for elderly individuals with dementia and depression. In2017 IEEE-RAS 17th International Conference on Humanoid Robotics (Humanoids) 2017 Nov 15 (pp. 541-546). IEEE.
11. Lee HS, Wright C, Ferranto J, Buttimer J, Palmer CE, Welchman A, Mazor KM, Fisher KA, Smelson D, O'Connor L, Fahey N. Artificial intelligence conversational agents in mental health: Patients see potential, but prefer humans in the loop. Frontiers in Psychiatry. 2025 Jan 31;15:1505024.
12. Boumans R, van de Sande Y, Thill S, Bosse T. Voice-enabled intelligent virtual agents for people with amnesia: systematic review. JMIR aging. 2022 Apr 25;5(2):e32473.
13. Marziali RA, Franceschetti C, Dinculescu A, Nistorescu A, Kristály DM, Moșoi AA, Broekx R, Marin M, Vizitiu C, Moraru SA, Rossi L. Reducing loneliness and social isolation of older adults through voice assistants: literature review and bibliometric analysis. Journal of medical Internet research. 2024 Mar 18;26:e50534.
14. Momand Z, Chan JH, Mongkolnam P. Immersive Technologies in Virtual Companions: A Systematic Literature Review. arXiv preprint arXiv:2309.01214. 2023 Sep 3.
15. De Graaf MM, Allouch SB, Klamer T. Sharing a life with Harvey: Exploring the acceptance of and relationship-building with a social robot. Computers in human behavior. 2015 Feb 1;43:1-4.
16. Berry EC, Sculthorpe NF, Warner A, Mather JD, Sanal-Hayes NE, Hayes LD. A scoping review of the feasibility, usability, and efficacy of digital interventions in older adults concerning physical activity and/or exercise. Frontiers in aging. 2025 Apr 11;6:1516481.
17. Berridge C, Zhou Y, Robillard JM, Kaye J. Companion robots to mitigate loneliness among older adults: Perceptions of benefit and possible deception. Frontiers in Psychology. 2023 Feb 21;14:1106633.
18. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, Moher D, Peters MD, Horsley T, Weeks L, Hempel S. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Annals of internal medicine. 2018 Oct 2;169(7):467-73.
19. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group* T. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Annals of internal medicine. 2009 Aug 18;151(4):264-9.
20. Munn Z, Barker TH, Moola S, Tufanaru C, Stern C, McArthur A, Stephenson M, Aromataris E. Methodological quality of case series studies: an introduction to the JBI critical appraisal tool. JBI evidence synthesis. 2020 Oct 1;18(10):2127-33.
21. Bemelmans R, Gelderblom GJ, Jonker P, De Witte L. Socially assistive robots in elderly care: a systematic review into effects and effectiveness. Journal of the American Medical Directors Association. 2012 Feb 1;13(2):114-20.
22. Gou W, Lefebvre F, Yang T, Recours R, Yang J. Effectiveness of AI-based conversational and socially assistive agents in older adults: a systematic review and meta-analysis. BMC geriatrics. 2026 May 7.
23. Guevara J, Fernandez M, Balbuena J, Arroyo D, Davila M, Arce D. The role of socially assistive robots for the improvement of quality of life in elderly people: A systematic review. IEEE Access. 2025 Dec 31;14:2431-50.
24. Luan B, Li Y. How smart companions reshape psychological well-being in later life: the role of artificial intelligence technology in mental health during senior years. BMC Public Health. 2026 Jan 21;26(1):609.
25. Irfan B, Kuoppamäki S, Skantze G. Recommendations for designing conversational companion robots with older adults through foundation models. Frontiers in Robotics and AI. 2024 May 27;11:1363713.
26. Liu J, Hao F, Back KJ, Aman AM, Zhang C. Silver travel in golden age: how virtual travel guided by GenAI-enabled avatars boost well-being for older adults. Journal of Travel & Tourism Marketing. 2025 Mar 24;42(3):267-81.
27. Peng Y. Developing an ageing adaptable emotional virtual human: an AI-based approach. Informatics for Health and Social Care. 2026 Jan 9:1-1.
28. Portacolone E, Halpern J, Luxenberg J, Harrison KL, Covinsky KE. Ethical issues raised by the introduction of artificial companions to older adults with cognitive impairment: A call for interdisciplinary collaborations. Journal of Alzheimer's Disease. 2020 Jul 21;76(2):445-55.
29. Hung L, Zhao Y, Alfares H, Shafiekhani P. Ethical considerations in the use of social robots for supporting mental health and wellbeing in older adults in long-term care. Frontiers in Robotics and AI. 2025 Mar 31;12:1560214.

30. Chen XS, Wen W, Choi S, Andrade FC, Mejía ST. The utilization of Artificial Intelligence-based conversational agents on mental health care for older adults: a scoping review. Aging & Mental Health. 2026 Apr 23:1-9.
31. Pita MA, Fantinato M, Hung PC. An integrated social robot and virtual assistant solution to support medical management for older adults. Expert Systems. 2025 Sep;42(9):e70112.
32. Jegundo AL, Dantas C, Quintas J, Dutra J, Almeida AL, Caravau H, Rosa AF, Martins AI, Pacheco Rocha N. Perceived usefulness, satisfaction, ease of use and potential of a virtual companion to support the care provision for older adults. Technologies. 2020 Jul 25;8(3):42.
33. Li H, Pan W. Dual-path and threshold mechanisms of AI agents in elderly emotional support: linking social engagement and cognitive load to loneliness reduction. Interactive Learning Environments. 2026 Mar 13:1-23.
34. Wolfe BH, Oh YJ, Choung H, Cui X, Weinzapfel J, Cooper RA, et al. Caregiving Artificial Intelligence Chatbot for Older Adults and Their Preferences, Well-Being, and Social Connectivity: Mixed-Method Study. J Med Internet Res. 2025;27:e65776. doi:10.2196/65776
35. Luu Thi Thu H, Le Thi Khanh L, Nguyen A. Barriers to AI Chatbot Adoption Among the Elderly: A Scoping Review. International Journal of Human–Computer Interaction. 2026 May 21:1-20.
36. Haque MR, Rubya S. An overview of chatbot-based mobile mental health apps: insights from app description and user reviews. JMIR mHealth and uHealth. 2023 May 22;11(1):e44838.
37. Wang Y, Tang H, Zhang J, Wang Y, Liu X. Aging with AI companionship: the role of artificial intelligence in enhancing the mental wellbeing of older adults. Frontiers in Public Health. 2026 May 1;14:1725763.
38. Nagata Y, Satake Y, Yamazaki R, Nishio S, Ishiguro H, Ikeda M. Case report: A five− case series of 18− month home use of a conversational companion robot for psychological support in older people with mild cognitive impairment or late− onset psychosis. Frontiers in Psychiatry. 2026 Jan 20;16:1700340.
39. Shin SJ, Moon KY, Kim JY, Jeong YG, Lee SY. Human-centred perspectives on artificial intelligence in the care of older adults: AQ methodology study of caregivers' perceptions. Behavioral Sciences. 2025 Nov 12;15(11):1541.
40. Treder MS, Lee S, Tsvetanov KA. Introduction to Large Language Models (LLMs) for dementia care and research. Frontiers in dementia. 2024 May 14;3:1385303.
41. Imkome EU, Soonthornchaiya R, Lakanavisid P, Deepaisarn S, Wongpatikasereeb K, Suebnukarn S, Matthews AK. Ai-aun chatbot: A pilot study on the effectiveness of an artificial intelligence intervention for mental health among Thai older adults. Nursing & Health Sciences. 2025 Jun;27(2):e70093.
42. Shu W, Zhou Y, Sun E, Deng L, Ye X. Embodied Intelligence Applications in Health Care Populations: Scoping Review. Journal of Medical Internet Research. 2026 Jun 12;28:e83871.
43. Robinson H, MacDonald B, Kerse N, Broadbent E. The psychosocial effects of a companion robot: a randomized controlled trial. Journal of the American Medical Directors Association. 2013 Sep 1;14(9):661-7.
44. Murayama H, Takase M. Evaluating the effectiveness of digital social robots in reducing loneliness among community-dwelling older adults in Japan: Randomized controlled trial and qualitative analysis. JMIR aging. 2025 Oct 22;8(1):e74422.

SUPPLEMENTARY MATERIAL: CHARACTERISTICS OF THE INCLUDED EVIDENCE (N=32)

No.	Author/ Year	Study Design	Sample (n)	Setting	AI / Virtual Companion	Emotional / Affective Functions	Outcomes	Principal Findings
1	Yang et al. (2025)	Systematic review	N/A	Older-adult care/community	AI applications / virtual companions	Emotional support, companionship	Loneliness	AI applications showed potential to reduce loneliness, although technological and systemic barriers remained.
2	Rodríguez-Martínez et al. (2024)	Qualitative study	NR	Older adults	Conversational chatbot	Adaptive/empathic responses	Loneliness, emotional health	Participants reported feeling less alone and experiencing emotional benefits following interaction with conversational chatbots.
3	Robinson et al. (2013)	Randomized controlled trial	40 randomized; 34 analyzed	Residential care facility	PARO companion robot	Social interaction, companionship, responsive interaction	Loneliness, depression, quality of life	Significant reduction in loneliness compared with the control group. The robot also stimulated conversation and social interaction.
4	Abdollahi et al. (2017)	Pilot/experimental study	NR	Elder-care/dementia care	"Ryan" social robot	Multimodal emotion detection, responsive interaction	Mood, engagement	Reported increased engagement and perceived mood improvement among older adults with dementia and depression.
5	Lee et al. (2025)	Observational /user study	NR	Mental-health context	Conversational AI	Empathic responses	Emotional comfort, support	Users perceived potential for emotional support but preferred human involvement in mental-health care.
6	Boumans et al. (2022)	Systematic review	N/A	Older adults with amnesia	Voice-enabled intelligent virtual agents	Conversational/emotional support	Cognitive and memory support, acceptance	Identified applications and acceptance of voice-enabled intelligent agents for older adults with amnesia.
7	Marziali et al. (2024)	Literature review/bibliometric analysis	N/A	Older adults	Voice assistants	Emotional/social support	Loneliness, social isolation	Identified potential for voice assistants to reduce loneliness and social isolation.
8	Momand et al. (2023)	Systematic literature review	N/A	Older-adult/virtual-companion contexts	Immersive virtual companions	Emotional and social support	Social connection	Explored immersive technologies and virtual companions for emotional and social support.
9	De Graaf et al. (2015)	Qualitative/exploratory	NR	Social interaction context	"Harvey" social robot	Gaze, gesture, emotional/social cues	Attachment, relationship-building	Human-like social cues supported attachment and relationship-building with the robot.

10	Olumide (2024)	Critical review	N/A	Loneliness/emotional-support context	AI/virtual companions	Emotional support, companionship	Emotional support	Highlighted potential benefits alongside ethical and functional concerns surrounding AI companionship.
11	Berridge et al. (2023)	Qualitative/perceptual	NR	Older-adult companionship	Companion robot	Emotional/social support	Loneliness, perceived benefit, deception	Identified perceived benefits of companion robots while highlighting risks of emotional deception.
12	Guevara et al. (2026)	Systematic review	121*	Elderly care	Socially assistive robots	Emotional/social support	Quality of life, loneliness, depression	Reviewed evidence suggesting benefits of socially assistive robots for quality of life and psychological outcomes.
13	Luan & Li (2026)	Cross-sectional study	NR	Later-life/AI companionship	AI smart companions	Emotional/social support	Psychological well-being	Examined relationships between AI technology perceptions, usage demand and psychological well-being.
14	Irfan et al. (2024)	Participatory/co-design study	28	Older-adult context	Conversational companion robot	Empathy, personalization, engagement	Loneliness, well-being	Older adults wanted robots to express empathy, personalize interactions and provide active engagement.
15	Liu et al. (2025)	Empirical study	NR	Older-adult virtual travel	GenAI-enabled virtual avatars	Emotional engagement, supportive interaction	Well-being, confidence	Virtual travel experiences guided by GenAI avatars enhanced well-being and confidence.
16	Peng (2026)	Theoretical/design exploration	N/A	Ageing/healthcare	Age-adaptive emotional virtual human	Empathic support, adaptive interaction	Emotional/health support	Proposed an ageing-adaptable virtual human capable of empathetic support and health-related reminders.
17	Portacolone et al. (2020)	Ethical/conceptual analysis	N/A	Older adults with cognitive impairment	Artificial companions	Simulated companionship/emotional interaction	Ethics, autonomy, privacy	Highlighted concerns regarding deception, surveillance, informed consent and social isolation.
18	Hung et al. (2025)	Qualitative/conceptual synthesis	NR	Long-term care	Social robots	Emotional/social support	Loneliness, well-being, ethics	Identified ethical concerns including consent, equity, substitution of human care and infantilization.
19	Chen et al. (2026)	Scoping review	12*	Older-adult mental-health care	AI conversational agents	Emotional support, conversational interaction	Mental-health outcomes, acceptance	Most included studies reported positive acceptance/usefulness while identifying barriers to implementation and interaction.

20	Pita et al. (2025)	Pilot study	7	Older-adult medical/home-care context	Integrated social robot + virtual assistant	Social/emotional interaction	Well-being, medical management	Participants generally completed medical-management tasks and basic conversations, although interaction challenges occurred.
21	Jegundo et al. (2020)	Survey	46	Older-adult care provision	Virtual companion	Emotional/social support	Usefulness, satisfaction, ease of use	Participants reported high usefulness and ease of use; care providers viewed the companion as a supplementary tool.
22	Li & Pan (2026)	Empirical study	90	Older-adult emotional support	AI agents	Emotional support, social engagement	Loneliness, social engagement, cognitive load	AI-based interaction was associated with reduced loneliness, increased social engagement and lower cognitive load.
23	Karegoudra et al. (2025)	Mixed-methods evaluation study	28 older adults (aged 65–84 years)	Elderly care	Caregiving AI Chatbot (voice-based conversational agent)	Social support, virtual companionship, reducing social isolation and loneliness	User preferences, technology adoption, well-being, social connectivity	Older adults identified appointment/medication reminders (89.3%), emergency assistance (78.6%), and health monitoring (75.0%) as top desired AI features. Voice-based conversational AI acted as a key tool for daily routine management and emotional companionship.
24	Luu et al. (2026)	Scoping review	17*	Older-adult chatbot adoption	AI chatbot	Emotional trust, personalization	Adoption barriers	Identified barriers involving physical condition, interaction design, technology literacy and emotional trust.
25	Haque & Rubya (2023)	App-description/user-review analysis	NR	Mobile mental-health apps	Chatbots	Personalized/human-like interaction	Mental-health support, safety	Users valued personalized interactions but identified poor crisis identification as an important concern.
26	Wang et al. (2026)	Qualitative study	NR	Older-adult AI companionship	AI companions	Emotional/social support	Mental well-being	Autonomy, ease of use and competence were associated with better mental well-being.
27	Nagata et al. (2026)	Five-case series	5	Home care	Conversational companion robot	Conversational/emotional support	Psychological support, satisfaction, usability	Eighteen-month home use showed high satisfaction and usability, although standardized psychological outcomes were mixed.

28	Shin et al. (2025)	Q methodology	NR	Older-adult care/caregiver context	AI-based care technologies	Emotional support	Caregiver perceptions	Identified distinct caregiver perspectives regarding acceptance and improvement of AI in older-adult care.
29	Treder et al. (2024)	Survey/overview	NR	Dementia care/research	Large language models	Conversational/emotional assistance	Well-being, usability, ethical concerns	LLMs were viewed positively, while bias and data privacy were important concerns.
30	Imkome et al. (2025)	Pilot experimental study	44	Older-adult mental-health context	"Ai-Aun" chatbot	Emotional support, conversational intervention	Mental health, satisfaction	Mental-health outcomes differed between groups after intervention, with reported satisfaction and efficacy.
31	Shu et al. (2026)	Scoping review	83*	Healthcare populations	Embodied/socially assistive robots and virtual agents	Emotional/social interaction	Healthcare outcomes	Mapped applications of embodied intelligence in healthcare, including humanoid and virtual agents.
32	Murayama & Takase (2025)	Randomized controlled trial + qualitative analysis	73 randomized; 68 completed	Community-dwelling older adults living alone	BOCCO emo humanoid social communication robot	Empathetic communication, emotional support, psychological connection, social interaction	Loneliness, psychological well-being, depression, self-rated health	Loneliness decreased significantly more in the intervention group (DID −3.1; 95% CI −5.9 to −0.4), while psychological well-being improved (DID 1.9; 95% CI 0.1–3.7). Qualitative findings indicated emotional support, psychological connection, social interaction and cognitive/mental stimulation.