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A study on the application of digital media interaction technology in the emotional healing of the elderly population

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Abstract: Population aging has led to an increase in emotional health problems among the elderly, while traditional healing methods are often limited by time and space constraints and lack personalization. To address these issues, this study systematically analyzes five digital media and interactive emotional healing technology models: virtual reality, artificial emotional companionship, multimedia reminiscence therapy, somatosensory interactive movement therapy, and remote social interaction therapy. Through its investigation, the study revealed three core findings: (1) Multimedia reminiscence therapy has the strongest evidence base, supported by a large number of randomized controlled trials (RCTs) and meta-analyses, as well as the best cost-benefit ratio, with equipment costing between $500 and $3,000. It has become the gold standard for non-pharmacological interventions. While virtual reality has a significant anxiety-reducing effect, it is limited by its high cost, ranging from $5,000 to $15,000, and low accessibility, with urban coverage of less than 5%. Use of immersion and interactive emotional accompaniment is effective and significantly reduces anxiety. (2) Digital technology breaks through the temporal and spatial limitations of traditional healing through immersive experience, an intelligent adaptation mechanism, and a continuous feedback mechanism.(3) The five modalities are in a complementary relationship, and the optimal healing effect comes from a multimodal combination customized according to an individual's condition. Depending on their resource levels, the study provides tiered deployment strategies. Specifically, high-resource organizations integrate virtual reality and artificial intelligence; communities prioritize interactive multimedia and somatosensory interactions; and families adopt a low-cost solution combining tele-socialization and reminiscence therapy. This research has several limitations. First, the synergistic effects of multimodal combinations have not been validated using large samples. Next, the digital divide and cultural adaptation issues in less-developed regions have not been fully explored. Decision-support tools should be developed in the future to guide the selection of technological options with a focus on improving accessibility and designing for rural areas.

1. Introduction

Aging populations around the world have made emotional health issues among the elderly more prominent. Problems such as loneliness, anxiety, and depression have seriously affected their quality of life. Access to traditional emotional healing methods is limited due to the unequal distribution of necessary resources, making it difficult to meet the rapidly growing demand. Digital media interaction technology provides new opportunities for solving this dilemma. Through this study, we aim to systematically categorize the applications of virtual reality, artificial intelligence, multimedia recall, physical interaction, and tele-socialization in emotional healing for the aging population. This analysis will reveal the mechanisms and therapeutic value of these applications, providing theoretical references and practical guidance for the development of a digital geriatric mental health service system.

2. Conceptual Framework and Methodology

2.1 Research Approach

Utilizing a narrative review approach, this study examines the application of digital media interaction technologies in emotional wellness programs for older adults. Narrative reviews integrate interdisciplinary literature and emerging technological trends to shed light on innovative applications that have not yet been systematically evaluated in the rapidly evolving field of digital health. Despite limited available empirical evidence, this approach enables researchers to make conceptual inferences based on technological features and theoretical mechanisms. By doing so, they lay a theoretical foundation for subsequent empirical studies and systematic evaluations. Compared to systematic reviews with strict, predefined inclusion criteria, narrative reviews are better suited for exploring the benefits of various technological solutions in complex social settings, particularly when the technology is in its infancy and the research methods are diverse.

2.2 Literature Search Strategy

To capture the accelerated development of digital health technologies in the wake of the epidemic, the literature search covered the time range from January 2023 to December 2026 and included four major databases: Web of Science, PubMed, IEEE Xplore, and China Knowledge Network (CNN). To develop the search strategy, three core concepts were identified: terms related to the geriatric population, types of digital media interaction technologies, and emotional and mental health outcome indicators. Studies were prioritized based on their empirical nature, technology assessment reports, and innovative applications published in high-impact factor journals. In addition, gray literature was searched to capture the latest industry practices. Emphasis was placed on selecting literature that highlights the innovative nature and feasibility of technology applications, especially digital healing programs that have completed proof-of-concept or small-scale clinical trials. This ensures the framework is both forward-looking and practical.

2.3 Analytical Framework Development

Based on the dual dimensions of technological media characteristics and psychological healing mechanisms, the analytic approach was developed. By analyzing technology application scenarios in the literature in depth, five core technology paths were identified:1. Immersive environment construction by virtual reality;2. Continuous emotional support by artificial intelligence;3. Memory activation by multimedia content;4. Physical and mental linkage by somatic interaction;5. Social

empowerment by remote platform. The different paths correspond to specific theoretical bases for emotion regulation. Examples include virtual reality therapy, which is derived from exposure therapy and the positive thinking stress reduction principle; and reminiscence therapy, which is rooted in life review theory and narrative psychology. Integrating human-computer interaction design principles and geropsychology knowledge, the framework forms a complete logical chain from technology development to healing effects[1]. This provides a practical, conceptual tool for interdisciplinary collaboration and product development.

2.4 Limitations of the Approach

This study's narrative review has two inherent limitations: the subjectivity of literature selection, which may affect the thoroughness of the conclusions, and the inability to quantify the overall effect size of technological interventions through meta-analysis. Since the five-domain framework for this study was based primarily on published success stories and technical white papers, there may be some publication bias; negative results or failures were less frequently reported. Even though the search strategy covers major databases, it may still overlook small-language literature and unindexed innovative applications. The framework's generalizability is limited because most existing studies focused on older adults in high-income and urban areas. Its applicability to resource-poor areas and culturally diverse contexts needs further validation. To overcome these limitations, future studies should employ rigorous, systematic evaluation methods and conduct multicenter, controlled studies to generate high-quality, evidence-based findings.

3. Analysis of Emotional Characteristics and Healing Needs of Elderly Groups

3.1 Emotional health status of the elderly population

Problems with emotional health faced by the elderly are characterized by complexity and diversity. As physiological functions naturally begin to decline with age, the elderly often experience varying degrees of deterioration in emotional regulation, cognitive function, and social adaptability. According to the World Health Organization (WHO), approximately 14% of adults aged 60 years and older live with mental disorders, among which depression and anxiety are the most common emotional health conditions affecting older adults. In addition, a global meta-analysis reported that the prevalence of depressive symptoms among older adults reached 35.1%, indicating that emotional distress has become a widespread issue within the aging population (https://www.who.int/news-room/fact-sheets/detail/mental-health-of-older-adults?utm_source=chatgpt.com) [2]. Declining physical health is not the only cause of this emotional distress. It is also related to other factors, such as changing social roles, the death of family and friends, and marginalization in the digital age. While the traditional medical intervention system often focuses on treating physical diseases, it lacks systematic attention to older adults' psychological problems, such as mood swings, loneliness, and a lack of existential value. Because of this, the emotional health needs of older adults have been neglected for a long time.

3.2 Characteristics of Psychological Needs of the Elderly Group

Elderly individuals have significantly different psychological needs than younger people. Psychologically, the elderly have a strong desire for nostalgic experiences, reflection on the meaning of life, and connections with people of different ages. In order to confirm their self-worth and build the integrity of their life narratives, they need to recall their past experiences. Rather than seeking companionship in terms of quantity, social needs are driven by the pursuit of high-quality

relationships. In particular, older people are more inclined to engage in in-depth conversations with peers who are familiar with their experiences. Older people also look forward to forming emotional connections with younger generations. People should not overlook the need for cognitive stimulation. Regularly engaging in moderate intellectual challenges and exploring new things can slow cognitive decline and improve quality of life. When it comes to staying active, older adults need to strike a balance between safety and adaptability. They should maintain an adequate amount of exercise while taking into account their physical limitations. This multidimensional psychological need forms the basis for the use of digital media and other interactive technologies in emotional mental health support interventions.

3.3 Limitations of traditional emotional healing methods

Emotional healing for the elderly has long relied on traditional methods, such as community and group activities in elder care facilities and in-person counseling. However, these methods have obvious limitations that have become apparent in practical applications. The World Health Organization (WHO) has noted that approximately 16% of people worldwide struggle with loneliness, and the elderly are at high risk for social isolation[2]. Surveys of people aged 50 to 80 in the United States revealed that approximately 37% of older people experienced significant loneliness, and 34% were socially isolated [3]. The elderly who are mobility-impaired or long-term homebound find it more difficult to participate in fixed-time, fixed-location offline activities, and the uneven distribution of rural and urban medical resources further limits the coverage of psychological services. On the other hand, traditional healing methods lack personalized support. A Chinese study of 6,664 people ages 65 and older found that 12.67% experienced social isolation, and those in socially isolated groups were 1.77 times more likely to experience depression than ordinary elderly people [4]. Additionally, long-term loneliness increases the risk of cognitive decline. According to a related study, the brain volume percentage of older adults in the low-socialization cohort was 67.3%, lower than the 67.8% observed in the high-socialization cohort [5]. Without real-time emotional monitoring and dynamic feedback mechanisms, traditional healing models have difficulty detecting and intervening in psychological problems in a timely manner. As a result, they have difficulty meeting the growing emotional health needs of the aging population.

3.4 The necessity and feasibility of digitalized healing

Through digital media and interactive technology, the elderly population can transcend the constraints and find emotional healing. Given the current state of necessity, the structural contradiction between the aging demographics and the supply of traditional medical resources continues to grow. China's population over the age of 60 is projected to exceed 280 million by 2025, yet the growth rate of professional mental health service providers remains far below the growing demand. Large-scale replication and remote service allow digital means to break geographical limitations and ensure the wide coverage of high-quality healing resources[6]. Signals indicating feasibility are positive. The popularity of intelligent terminal devices among the older population is increasing year by year, and age-friendly technologies, such as voice interaction and large icon interfaces, have lowered the usage threshold. Physiological sensing technology has matured to the point where it is possible to quantitatively monitor emotional states. Using multimodal data, machine learning algorithms can identify emotional pattern fluctuations and trigger personalized interventions. An improved cloud computing infrastructure supports large-scale data processing and content distribution, providing a technical basis for low-cost, high-efficiency digital healing services.

4. Emotional Healing Application Modes of Digital Media Interaction Technology

The study constructed a conceptual framework (see Figure 1) to systematically present the link between the five digital healing modes and the emotional needs of older adults. With a focus on the core emotional needs of older adults—anxiety relief, loneliness reduction, cognitive activation, social connection, and self-efficacy enhancement—the program is organized into five technology modes, with arrows indicating the main intervention paths. Using this framework, we can understand the logic behind technology selection. Acute feelings of anxiety lead to the preference of virtual reality. Persistent loneliness is best addressed with a combination of AI companionship and remote interactions. For cognitive decline, multimedia recall is the most effective solution. Frustration with functional deterioration requires somatosensory interaction intervention.

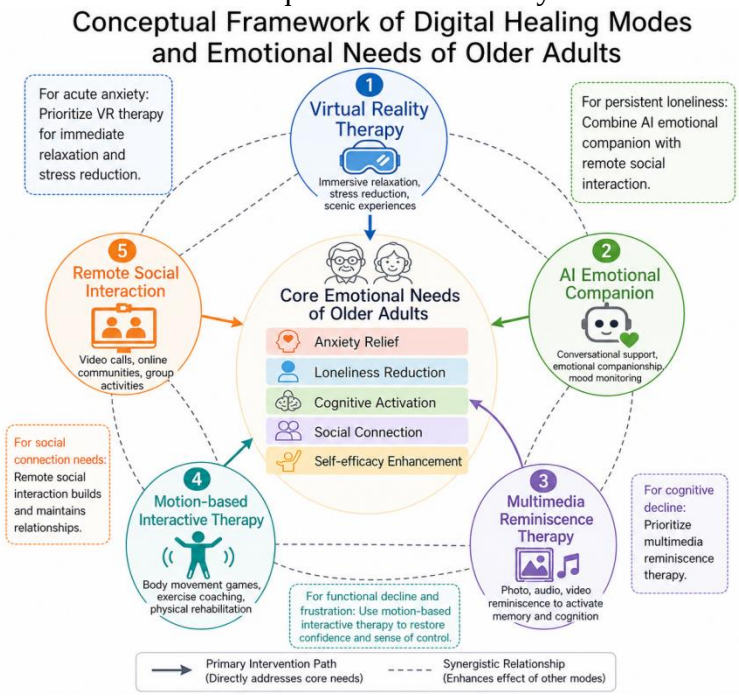

Figure 1: Conceptual framework of digital healing model and emotional needs of older adults

4.1 Virtual Reality Healing Mode

With virtual reality technology, an immersive three-dimensional environment is constructed to provide customized emotional regulation scenarios for the elderly. A head-mounted display device and spatial auditory system can simulate natural landscapes, historical scenes, or personalized memory spaces. Using dynamic rendering technology, the system shows the elderly the details of leaves swaying in the wind as they walk through the simulated forest. To achieve the best relaxation effect, the synchronized sounds of birdsong and running water are optimized by psychoacoustic algorithms. Through visual reconstruction, virtual reality can recreate familiar streets or former residences from the youth of elderly and limited-mobility patients to evoke positive emotional memories[7]. This technology uses a low-latency rendering engine to reduce vertigo and simplifies the interaction interface to focus on point selection and voice commands, thus avoiding the need for complex joystick operation. A physiological monitoring module collects real-time data on heart rate variability and skin response. Dynamic scene parameters adjust according to emotional arousal levels, and the system automatically switches to a calm environment when anxiety indicators rise. This forms a closed-loop, adaptive healing system.

4.2 Artificial Intelligence Emotional Companionship Model

Equipped with natural language processing and affective computing technologies, the artificial intelligence-driven virtual assistant provides continuous emotional support. Trained on a large-scale dialogue corpus, the deep learning model can recognize emotional tendencies in the speech of the elderly and generate empathetic responses. Equipped with speech recognition, semantic understanding, and sentiment analysis components, the system adjusts its dialogue strategy when negative emotional triggers are detected. Rather than simply providing comfort, it listens and offers companionship. By constructing a personalized memory bank, the virtual assistant can remember the user's life events and preferences. In subsequent interactions, the assistant can actively engage in conversation about matters of concern, creating a sense of long-term companionship[8]. Supporting voice dialogue, text chat, and emoticon input, the multimodal interaction interface offers a comprehensive communication experience. Coupled with a haptic feedback device, it simulates physical contact, such as a handshake or a tap, with vibration mode. Adopting a localized handling of sensitive information, the privacy safeguard mechanism only uploads de-identified emotion indicators to the cloud for model optimization, balancing the dual demands of service quality and data security.

4.3 Multimedia Reminiscence and Nostalgia Healing Model

Utilizing a multimedia content management system, digital reminiscence therapy activates long-term recall and promotes positive emotions. It is based on the idea of creating a digital archive of one's life history. It integrates scanned old photos, recorded home videos, and audio diaries into a timeline interface. This interface automatically labels people, places, and events using image recognition technology[9]. Positive emotional content is dynamically filtered using intelligent recommendation systems that analyze users' browsing patterns and emotional feedback data. This helps avoid triggering traumatic memories. Collaborative editing enables family members to add annotations and stories from afar, turning personal memories into a shared digital legacy. Through historical news clips, classic movies, and popular music, the Time Context Library provides materials that help create a collective memory. These materials help seniors construct meaning by placing their personal experiences in a socio-cultural context. With its large touchscreen and simplified gestures, interaction design allows users with visual impairments to smoothly navigate content. The technology's accessibility ensures healing is universally accessible.

4.4 Somatic Interaction and Movement Healing Model

Using motion capture and immediate feedback mechanisms, somatosensory interaction transform physical activity into an effective way of emotional regulation and promote the physical and mental health of the elderly. Composed of depth cameras and inertial sensors, the non-contact monitoring technology can accurately track body movement trajectories and digitize the interactive teaching content of traditional health-improving techniques, such as taijiquan and eight-duanjin. Using skeletal animation, the virtual trainer on the screen demonstrates standard movements. As the user performs the movements, the system compares their posture to a reference template and provides real-time feedback through visual annotations and voice prompts to guide corrections. Using a gamification design strategy transforms boring rehabilitation training into an entertaining experience. Older adults can control a virtual character to pick fruit or hit targets by waving their arms. Points are earned for completing tasks, which stimulates motivation for continuous participation. This exercise intensity adaptive algorithm adjusts the difficulty of the task and rest intervals according to heart rate monitoring data and historical performance records[10]. It does so

to prevent injuries caused by overexertion. Data visualization dashboards present daily activity and progress curves in graphical form. Quantitative feedback strengthens the elderly's perceived self-efficacy. The sense of achievement gained from exercise transforms into positive emotional experiences.

4.5 Remote Social Interaction Healing Mode

By lowering the threshold of social interaction and enriching the forms of engagement, the tele-socialization platform alleviates the loneliness and social isolation of the elderly. With intelligent beauty and light compensation algorithms, video calls improve the visual experience for elderly users, enhancing their social confidence. Hearing-impaired groups can also enjoy clear call quality thanks to noise reduction and echo cancellation technologies. Virtual communities build interest groups and discussion forums. A matching algorithm recommends potential social partners to users based on their geographical background, professional experience, and hobbies. The algorithm reduces the psychological burden of interacting with strangers. Asynchronous interaction functions support voice messages and short videos, allowing the elderly to engage in social activities at their convenience, free from the constraints of real-time online interaction. Designed for intergenerational connection, the module creates tasks and collaborative games for sharing between parents and children. In these activities, young family members team up with older relatives to complete virtual trips or knowledge quizzes through the application. This technology-mediated interaction creates a new type of emotional bond within the family. Equipped with a social behavior analysis engine, the system monitors interaction frequency and the intensity of emotional expression. The engine actively pushes activity invitations or caring reminders when it spots signs of social withdrawal. This preventive intervention mechanism transforms passive services into active care.

4.6 Cross-sectional comparative analysis of the five healing models

Significant differences exist among the five digital healing modalities in terms of technological maturity, implementation cost, suitable population, accessibility, evidence base, and strengths and weaknesses (see Table 1). Though virtual reality healing devices cost between $5,000 and $15,000 and have a city coverage rate of less than 5%, several randomized controlled trials support their anxiety-relieving effects. Commerically available artificial intelligence (AI) emotional companionship costs between $50 and $200 per month. Although this technology is suitable for elderly people living alone, the evidence base is weak, and privacy protection mechanisms need improvement. With costs ranging from $500 to $3,000, multimedia reminiscence therapy is the least expensive option. It can be implemented by caregivers and has been confirmed by numerous meta-analyses to be significantly effective in patients with early to mid-stage cognitive impairment. These results make multimedia reminiscence therapy the gold standard for non-pharmacological interventions. By contrast, somatosensory interactive devices, which cost between $2,000 and $8,000, are designed to enhance participation in rehabilitation through gamification; however, patients with severe balance disorders should be excluded. Social healing via remote technology is highly accessible and relies on existing smart gadgets, so no additional investment is required. Although several studies have confirmed its effectiveness in alleviating loneliness, the digital literacy threshold limits its promotion in rural areas.

Through horizontal comparison, it is evident that the five models are complementary. High-resource healthcare institutions can utilize virtual reality and artificial intelligence. On the other hand, community senior centers should prioritize multimedia reminiscence and somatosensory interaction. Meanwhile, individual families are well-suited to low-cost solutions that combine

tele-socialization and family reminiscence. For optimal healing, a customized multimodal combination is necessary, taking into account individual health status, cognitive ability, and financial resources. To this end, future research should explore synergistic intervention effects, develop decision-support tools to guide health care providers in selecting adapted technological solutions, and focus on improving accessibility and designing culturally appropriate solutions for less developed regions.

Table 1 Multidimensional comparison of five digital healing models

Dimension	Virtual Reality Healing	AI Emotional Companionship	Multimedia Reminiscence Therapy	Somatosensory Interaction Healing	Remote Social Interaction Healing
Technology Readiness	TRL 7-8 Clinical trial phase	TRL 8-9 Commercialized application	TRL 9 Mature technology	TRL 8 Widespread application	TRL 9 Mature technology
Implementation Cost	High 5,000-15,000 CNY/set Content development 100,000-500,000 CNY	Medium-High 50-200 CNY/month Customization 200,000-1,000,000 CNY	Low-Medium 500-3,000 CNY Family self-implementation	Medium 2,000-8,000 CNY Content library 50,000-300,000 CNY	Low Utilize existing devices Minimal cost
Target Population	Moderately healthy seniors Exclude severe cognitive impairment Motion sickness patients	All populations Especially for isolated seniors Those retaining verbal abilities	All populations Especially for early-to-moderate cognitive impairment patients	Moderate-to-high functioning seniors Exclude severe balance disorder patients	All populations Especially for socially withdrawn and distant families
Accessibility	Low Requires dedicated facilities Urban coverage <5%	Medium Requires smart devices and internet connection	High Home/community easy implementation	Medium-High Requires dedicated space Remote guidance available	Extremely High No geographic limitations Low device barrier
Evidence Strength	Medium-Strong Multiple RCTs Moderate sample sizes	Weak-Medium Few RCTs Mostly pilot studies	Strong Numerous RCTs Multiple meta-analyses	Medium Moderate-quality RCTs Smaller sample sizes	Medium-Strong Multiple observational studies Quasi-experimental designs
Key Advantages	Immersive experience Controllable environmen Physiological closed-loop regulation	24-hour companionship 25-Personalized memory bank 26-Multimodal interaction	Activates positive memorie Family co-participation Optimal cost-effectiveness	Mind-body integration Gamification motivation Quantified feedback	Breaks geographical isolation Asynchronous flexibility Intergenerational connection

5. Conclusion

Interactive digital media technology has paved the way for innovative approaches to emotional healing for the elderly. Using virtual reality, artificial intelligence, multimedia recall, somatic interaction, and telecommunication, we can address the emotional needs of the elderly from different aspects. This technology breaks through the spatial and temporal limitations of traditional methods and enhances intervention efficacy through personalized adaptation and real-time feedback mechanisms. The following four areas should be the focus of future research: (1) Researchers should perform a multicenter randomized controlled trial with a sample size of at least 500 to verify the synergistic impact of multimodal combinations, focusing on the cognitive protective effect of "virtual reality + multimedia reminiscence" on individuals with mild cognitive impairment. (2) Future studies should institute a longitudinal tracking study lasting more than three years to evaluate the long-term influence of continued usage on the rate at which depression symptoms are alleviated, social participation, and quality of life. Researchers should establish a standardized efficacy assessment scale. (3) Researchers should design adaptability studies for specific groups, such as the rural elderly, the elderly with special needs, and the elderly from ethnic minorities. They should develop a simplified version with a low cost and a low digital literacy threshold. (4) The field needs to establish a system of technical indexes that includes quantifiable criteria such as interaction response latency (less than 100 ms), suitability of content and culture, level of privacy protection, and accuracy of fall-risk warnings. The advancement of artificial intelligence and sensing technology will make digital therapeutic solutions an important part of active aging strategies.

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References

[1] Che Had N H , Alavi K , Akhir N M ,et al. Enhancing Well-being in Older Adults: Exploring the Impact of Paid Companionship Services Through Outdoor Mobility and Activity Engagement[J].Malaysian Journal of Medicine & Health Sciences, 2025, 21(4).DOI:10.47836/mjmhs.21.4.17.

[2] World Health Organization. Reducing Social Isolation and Loneliness Among Older People[EB/OL]. World Health Organization, 2025. https://www.who.int/activities/reducing-social-isolation-and-loneliness-among-older-people.

[3] Donovan N J , Blazer D . Social Isolation and Loneliness in Older Adults Associations With Cognitive Decline and Mortality[J]. JAMA Psychiatry, 2020, 77(10):990-991. DOI:10.1001/jamapsychiatry.2020.1055.

[4] Zhang Y , Liu M , Chen H ,et al. The Associations of Social Isolation With Depression and Anxiety Among Adults Aged 65 Years and Older in Ningbo China[J]. Scientific Reports, 2024, 14(1):69936. DOI:10.1038/s41598-024-69936-w.

[5] Leigh-Hunt N , Bagguley D , Bash K ,et al. An Overview of Systematic Reviews on the Public Health Consequences of Social Isolation and Loneliness[J]. Public Health, 2017, 152:157-171. DOI:10.1016/j.puhe.2017.07.035.

[6] Peng R , Chang J , Zhu Y ,et al. Unlocking the Power of Peer Support in Digital Use and Digital Health Interventions for Older Adults: A Scoping Review[J].Journal of Advanced Nursing, 2026, 82(1):162-173.DOI:10.1111/jan.16963.

[7] Yang H , Zhong Q , Han B ,et al. Effects of reminiscence therapy for loneliness in older adults: a systematic review and meta-analysis[J].Age & Ageing, 2025, 54(5).DOI:10.1093/ageing/afaf136.

[8] Oe H , Morishita E , Weeks K ,et al. Reminiscence Therapy in Elder Care: Awakening Life Histories through Digital Narratives[J].Health Economics & Management Review, 2025, 6(4).DOI:10.61093/hem.2025.4-06.

[9] Pu Y , Zhang G , You S ,et al. Reminiscence therapy delivery formats for older adults with dementia or mild cognitive impairment: A systematic review and network meta-analysis[J].International Journal of Nursing Studies, 2025, 168.DOI:10.1016/j.ijnurstu.2025.105085.

[10] Ni P , Wang F , Liu L ,et al. Effects of Reminiscence Therapy for People Living With Cognitive Impairment and Their Caregivers: A Systematic Review and Meta-Analysis[J].Journal of the American Medical Directors Association, 2026, 27(1):105978.DOI:10.1016/j.jamda.2025.105978.