International Journal of General Practice Nursing, 2025, Volume 3, No Special
https://ojs.bbwpublisher.com/index.php/IJGPN
ISSN Online: 2981-9423
ISSN Print: 2981-9415

Video Games in Dementia Health Management: A Scoping Review of Current Evidence, Challenges, and Future Directions

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Abstract: Dementia is a clinical syndrome caused by pathological changes in the brain. It is primarily characterized by cognitive decline, behavioral disturbances, and personality changes, all of which severely impair patients' quality of life. As global populations age and the prevalence of dementia rises, the demand for long-term care has intensified. This situation places a significant physical and psychological burden on families and creates substantial socioeconomic pressure, establishing dementia as an urgent public health priority. In response, video games have emerged as a valuable non-pharmacological tool in dementia health management. Recognized for their low cost and non-invasiveness, they demonstrate considerable potential in improving cognitive function, early screening, alleviating behavioral symptoms, and health education. This article systematically reviews the existing evidence for video games in dementia health management, examines challenges such as clinical standardization, senior adaptability, and technology integration, and proposes future directions. These include establishing standardized frameworks, optimizing game design, and expanding application scenarios. The aim is to provide a reference for integrating video games into the holistic and standardized management of dementia.

Keywords: Dementia; Video games; Health management

Online publication: December 31, 2025

1. Introduction

Video games, defined as all interactive games operated on electronic device platforms such as mobile phones, computers, and tablets, have garnered attention due to their potential to improve brain structure and enhance cognitive functions [1]. They integrate an array of media formats, such as video, audio, and text. Despite the prevalent perception of video games as being associated with addiction and potential declines in visual and neurological health, emerging evidence suggests that their controlled use can serve as a viable tool for health promotion [2].

As a chronic syndrome, dementia is defined by the progressive deterioration of cognitive functions, the

emergence of behavioral abnormalities, and a decline in daily living skills [3]. The disease not only leads to the progressive deterioration of memory, language, and executive functions in patients but also imposes a substantial caregiving burden and economic pressure on families. Traditional interventions for dementia, such as memory game cards and jigsaw puzzles, suffer from limited effect. Patients cannot meet their personalized rehabilitation needs. Therefore, with the development of digital technology, video games can become a new intervention tool for dementia health management due to their interactivity, fun, and quantifiability. Recently, multiple studies have proved the effectiveness of video games in the health management of dementia. The findings of a retrospective study by Zheng *et al.* demonstrated that gaming can effectively enhance cognitive abilities, improve coordination, and alleviate behavioral and psychological symptoms in individuals with dementia [4]. Another research has indicated that video games can serve as an effective tool to improve cognitive and executive functions in the elderly and dementia patients. As a non-invasive intervention, they present a promising alternative to conventional treatments by offering enhanced safety, convenience, and cost-effectiveness [5].

2. Application of video games in dementia health management

2.1. Cognitive function screening

Early screening and monitoring of cognitive function are crucial for dementia prevention. Traditional dementia-related screening relies heavily on paper-and-pencil tests and face-to-face assessments [6]. Globally, the diagnosis of cognitive impairment typically involves an initial evaluation by general practitioners or professionals trained in formal scale assessments, followed by a series of complex clinical examinations conducted by specialists to confirm the diagnosis. This process is cumbersome, time-consuming, and resource-intensive.

As an innovative tool, video games are being utilized in the field of cognitive screening and monitoring. As early as 2015, a research team led by Dr. Sonia Valladares Rodríguez from the University of Vigo in Spain initiated the development of a game suite named “Panoramix” [7]. This game suite comprises seven mini games designed to assess specific cognitive functions, such as “Episodix” for evaluating episodic memory, “Attentix” for testing attention, and “Executix” for assessing executive functions. The research team found that integrating video games with machine learning technology shows significant potential for the early detection of dementia and may eventually be incorporated into clinical management practices as a diagnostic tool [8].

Similarly, an Austrian company has developed a video game system named “Cogniplat” aimed at detecting mild cognitive impairment in older adults [9]. This system includes 14 games that comprehensively evaluate key cognitive domains such as visuospatial skills, recognition, attention, language ability, working memory, perception, and executive functions, making it well-suited for preliminary dementia screening.

In China, notable progress has also been made in this field. In 2022, the Shanghai Mental Health Center, in collaboration with a technical department, developed a gamified screening tool for the public called the “Thoven Cognitive Self-Assessment” (TCSA). It is the first two-step progressive touchscreen-based cognitive assessment tool and shows good accuracy in detecting both clinically diagnosed mild cognitive impairment (MCI) and dementia. This tool employs a tiered screening model, consisting of an initial screening phase of approximately three minutes to rapidly identify at-risk individuals, and a comprehensive screening phase lasting about eight minutes. Its assessment covers multiple dimensions, including language, orientation, calculation, memory, and attention. Participants can self-administer the test on their mobile phones, making the process both user-friendly and engaging. To date, this tool has been promoted across multiple communities and has undergone corresponding

reliability and validity testing. Participants in this study reported that taking MMSE was as boring as taking an exam, while TCSA was more interesting, just like playing a game [10].

2.2. Cognitive function improvement

Video games serve not only as a form of entertainment but also play a significant role in enhancing cognitive function. A controlled study involving adults aged 60 and above found that older adults with video game experience showed higher activation in certain brain regions compared to those without such experience. Brain MRI studies further support that regular video game players exhibit increased activity in specific brain areas [5], indicating that appropriate engagement with video games may positively influence both behavioral performance and neural activation in the elderly. Thus, video games show promise as an effective tool for improving cognitive abilities in older adults.

He also proposed that long-term video game training can alter functional connectivity in the brain and enhance corresponding cognitive skills. She further conducted experiments exploring how different types of video game training affect brain plasticity, demonstrating that distinct forms of training lead to varied changes in cognitive plasticity [11]. In a Korean study, a group of older adults with mild cognitive impairment underwent a four-week video game intervention, which resulted in significant improvements in their cognitive function [12]. Therefore, future research should further investigate the mechanisms behind the cognitive benefits of video games while continuously refining training approaches to better utilize their potential value.

2.3. Promotion of physical fitness

In dementia care, improving patients' physical fitness can enhance their quality of life and may also help slow disease progression. As a result, motion-sensing video games are increasingly being incorporated into rehabilitation programs for dementia patients [13]. Compared to conventional video games, exergames—which blend physical exercise with interactive digital environments—offer greater entertainment value, interactivity, and safety. Patients can individually adjust the intensity of gameplay according to their abilities, enabling personalized physical activity that supports both physical and mental well-being.

Yun reviewed evidence regarding the effects of exergames in people with dementia, highlighting that such games can assist in reducing body fat, increasing muscle mass, strengthening bones, improving physical function, and alleviating frailty. Notably, they also support cognitive domains such as attention, concentration, memory, and reaction speed, making them an excellent form of comprehensive exercise [14]. In one research initiative, a Multi-sensory Rehabilitation Interactive Game System (MRIGS) was designed specifically for older adults with dementia. By integrating video games with multi-sensory rehabilitation activities, the system helps users exercise motor functions. It employs a grip-assist device along with visual, auditory, and tactile stimuli to deliver integrated multi-sensory training [15].

2.4. Mitigation of behavioral and psychological symptoms

Behavioral and psychological symptoms of dementia—including apathy, agitation, depression, and anxiety—are common and deeply challenging for patients and caregivers alike. In this context, non-pharmacological interventions are increasingly turning to video games as a viable therapeutic tool. The value of video games in managing psychological symptoms lies partly in their ability to foster deep engagement and immersion. By capturing and sustaining attention, gameplay can help distract from distressing stimuli, reduce agitation, and

channel behavior into structured, goal-driven activities within a virtual setting [16].

Moreover, through customized sensory input and opportunities to experience achievement, video games offer a flexible and personalized approach to mitigating neuropsychiatric symptoms in dementia. That said, such interventions must be applied with care. It is essential to monitor and adjust both the duration and intensity of gameplay, as excessive use could lead to adverse physical or psychological effects [17]. Therefore, while video games represent a promising complementary therapy, their implementation should be carefully individualized and supervised.

2.5. Dementia awareness and health education

While public understanding of dementia has improved significantly in recent years, access to formal health education on the condition remains limited, and misconceptions and social stigma persist in certain populations [18]. For those living with dementia and their families, developing effective self-care strategies has become an increasingly pressing challenge. In this context, video games are emerging as an innovative tool for public health education. A notable example is the "Dementia Awareness Game," developed by researchers in the United Kingdom to foster more positive public attitudes toward dementia. Designed with accessibility in mind, each gameplay session lasts approximately 90 seconds. Players follow a predetermined path, responding to dementia-related questions that assess their knowledge, attitudes, and perceptions. Correct answers earn points, with bonus rewards available upon route completion. Participants can also share scores on a platform or compete with friends [19]. The game has been trialed internationally, and empirical studies indicate a statistically significant improvement in public attitudes toward people with dementia after gameplay [20].

In parallel, gamified digital platforms are being designed to educate individuals with dementia directly. A South Korean team created a smartphone application that delivers health management knowledge through interactive learning and self-assessment tools. Users receive performance rankings that encourage them to achieve progressively higher health objectives [21]. Such health-oriented video games hold potential for broader implementation in community health centers and clinical settings, helping both the public and patients deepen their understanding of the condition in an engaging and scalable manner.

3. Challenge and future directions

3.1. Technological improvement: Integration of VR/AR devices

Traditional video game design was primarily limited to video, audio, or text. The features available to users were also relatively limited. The deep integration of video games with advanced technologies is set to be a major trend in the coming years. VR/AR technologies are expected to enhance the capacity for personalized adaptation in gaming. By utilizing real-time cognitive and physiological data from patients, future systems could dynamically adjust training difficulty and content to deliver precise interventions [22]. The immersive nature of VR/AR will be further leveraged to create familiar life scenarios or rehabilitation settings, reducing cognitive load and improving engagement in training. Additionally, multisensory interaction technologies—including haptic feedback and voice guidance—will continue to evolve, enriching the gaming experience while boosting rehabilitation outcomes.

3.2. Standards development: Establishing unified clinical rules

The application of electronic games in the field of dementia health management remains a relatively emerging topic. There is currently a lack of uniform clinical standards for video game-based health interventions. Moving

forward, efforts should be devoted to establishing consistent protocols covering game design, intervention duration, and target user groups. More large-scale clinical trials will be essential to clarify the effects of various types of video games on dementia patients at different disease stages and to uncover the underlying intervention mechanisms. At the same time, standardizing the regulatory review and approval process for video game-based digital therapeutics will be crucial to facilitate clinical acceptance and broader adoption of high-quality intervention tools.

3.3. Network expansion: Extending to community and family

At present, old people are not interested in video games. They perceive games as having only an entertainment function and are thus unaware of the health-promoting effects. It is necessary to promote video games in communities and families, enabling people with dementia and their families to understand the benefits of video games for health management. The application of video games will extend beyond clinical settings into communities and households, forming an end-to-end service chain that includes screening, intervention, and management. In the future, patients could be prescribed video game-based interventions to facilitate their rehabilitation training within their respective communities. Moreover, promoting the distribution of video game intervention tools in remote areas, supported by primary healthcare networks, will be instrumental in ensuring fair and accessible cognitive health services [23]. Also, for caregivers, specialized video games or interactive modules can be developed to alleviate stress and improve caregiving skills, ultimately fostering a collaborative health management ecosystem that involves patients, caregivers, and medical institutions.

3.4. System adjustment: Focusing on elderly-friendly design

Numerous studies have demonstrated that people with dementia, especially older individuals among them, face barriers in using electronic devices—such as limited technological literacy, poor hand-eye coordination, and difficulty navigating user interfaces [24]. This poses significant challenges to the popularization of electronic game-based health interventions, as device accessibility is a prerequisite for the effective implementation of such rehabilitation tools. Addressing the digital divide among older adults is essential for widespread adoption. Future game designs should incorporate age-friendly adaptations—such as simplified user interfaces and assistive features—to reduce barriers to use.

4. Conclusion

In conclusion, video games are a versatile and engaging non-pharmacological tool in dementia health management. Evidence supports their applicability in cognitive screening, cognitive and physical enhancement, symptom management, and health education, offering a cost-effective and scalable complement to traditional methods. However, the field faces challenges, including a lack of standardized clinical protocols, the digital divide among older adults, and the need for more robust validation. For video games to transition from promise to practice, future efforts must prioritize establishing evidence-based guidelines, optimizing elderly-friendly designs to ensure accessibility, and deeply integrating technology like VR/AR for personalized care. Ultimately, by addressing these challenges and expanding applications into communities and homes, video games can be effectively integrated into a holistic, standardized framework for dementia care, ultimately improving patient outcomes and quality of life.

Disclosure statement

The author declares no conflict of interest.

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