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An Exploration of Exergaming for People Living with Dementia in Long-Term Care Settings: A scoping review

Abstract

The prevalence of dementia continues to increase globally and due to the nature of the condition more people are living in long-term care (LTC) settings to support their needs. As there is no current cure for dementia, a key focus within LTC is the provision of meaningful and therapeutic non-pharmacological interventions. Exergaming is a non-pharmacological intervention which combines exercise and digital gaming, and this review aims to explore exergaming and its impact on people with dementia living in LTC settings.

Searches were completed accessing CINAHL, PsychINFO, MEDLINE, PubMed and OVID. A thorough search strategy was applied to ensure the yielded results were applicable. Eighteen studies were selected with various methodological approaches and common themes were identified through the process of thematic analysis.

Through the analysis and synthesis of the literature it was found that exergaming has positive impacts on the wellbeing, physical health, cognition and social inclusion of people living with dementia in LTC settings. The importance of ensuring that interventions are person-centred resonated throughout the review, and a key aspect of exergaming is its adaptability which enables this.Exergaming is an innovative, non-pharmacological intervention for people living with dementia in LTC settings, and has several, proven multidimensional benefits. The feasibility, useability and the practicalities of implementation were critically explored and it can be recommended that further research is required to investigate these concepts. As the health and social care landscape becomes increasingly digitalised exergaming may become an important component in the treatment and care of people living with dementia.

Introduction

Dementia is a progressive and terminal illness for which currently there is no cure.[1-5] As dementia progresses it is expected that people living with the condition will experience a decline in their cognitive and physical functioning.[6] In the advanced stages of the condition, it can become challenging for the person living with dementia to remain at home, and they may require additional care and support within a long-term care (LTC) setting. However, literature has raised concerns about limited funding, resources and staff pressures in LTC settings.[7-9] Due to an aging population dementia prevalence continues to increase internationally and further demands on LTC settings are predicted.[4,10,11]

Research also identifies that people living in LTC settings are at increased risk of experiencing reduced quality of life and negative psychological symptoms, for example anxiety, depression, agitation, and social isolation.[10,12-16] As there is no current cure for dementia and pharmacological approaches to manage negative psychological symptoms can often come with a myriad of negative side effects, there is a strong global focus on improving and developing non-pharmacological interventions.[4,10]

Exercise is an example of a non-pharmacological intervention, and its positive effects on mental and physical health are well documented.[17-19] However, research states that exercise and physical activity can be limited within LTC settings.[21,22] Low levels of physical activity can be linked to a range of adverse outcomes, including physical health implications, increased frailty and negative psychological symptoms.[22-24] The lack of exercise and physical activity within LTC settings may be due to a range of barriers including accessibility, cost, staffing and personal motivations.[25-28]

Over the last few decades, the use of technology as an assistive tool and non-pharmacological intervention has increased in popularity, introducing numerous benefits within LTC.[29] Health and social care is becoming increasingly digitalised due to claims that technology can improve communication, accuracy, safety and accessibility for its users.[30,31] Research has also explored the use of technology in improving mood, providing companionship and social support, and reducing negative psychological symptoms for people in LTC settings.[31-33] It is predicted that as technology continues to develop, its role will become increasingly central to health and social care interventions and treatments.[30,34]

Exergaming is a non-pharmacological intervention which combines exercise and digital gaming. [35,36] It is a technological tool used to increase and promote physical activity and it has shown promising results in various health and social care settings.[34, 37-39] Exergaming makes exercise more accessible for people living with physical and mental disabilities and there is evidence to suggest that it could target the specific functional declines associated with dementia, such as mobility and cognition.[40-42] To explore the potential application of exergaming and its beneficial impacts for people living with dementia in LTC, an evidence review is warranted.

Methods

A scoping review methodology was used with the aim of providing a comprehensive summary and analysis of the existing evidence base, as well as identifying opportunities for future research, related to exergaming and dementia LTC settings. Scoping reviews are used when exploring a new or emerging topic such as exergaming as an intervention in health and social care. [43]

Search strategy and study selection

A comprehensive search of available evidence was conducted to identify studies relevant to the research topic. Five electronic databases were used: CINAHL, PsychINFO, MEDLINE, PubMed and OVID. The final search was performed on the 5th February 2025.

The search terms were derived from article titles and abstracts found during the scoping period. Synonyms and acronyms were evaluated for relevance and accuracy, and included if applicable, to broaden the results. Global differences in terminology, for example English and American spellings, were also considered. The search terms were reviewed by an Academic and Library Specialist, and used the following:

Terms relating to dementia: dementia OR alzheimer* OR cognition OR “cognitive impairment” OR “neurocognitive disorder*” OR “memory loss” OR “memory impairment” OR “cognitive dysfunction”

Terms relating to long-term care settings: “care home*” OR “residential care” OR “residential setting*” OR “nursing home*” OR “residential home*” OR inpatient* OR “care facilit*” OR “assisted living” OR “retirement home*” OR "care setting*"

Terms relating to exergaming: exergam* OR “digital gam*” OR “digital exercis*” OR “active gam*” OR Kinect OR wii OR “digital fitness” OR “gam* fitness” OR “video gam*” OR “interactive video*” OR “virtual reality” OR “active play” OR playstation OR Xbox

Limiters were combined, including date range and language, as per the inclusion and exclusion criteria to increase relevance and suitability of the search and results. Additional studies were also sourced through Google Scholar, Cochrane Library, the University of [removed] Library and handsearching.

Inclusion Criteria

A funnel structure was utilised to yield a broad range of literature and a comprehensive view of the topic. This was then gradually condensed to reach a more specific focus as demonstrated by the initial and additional inclusion criteria.

Initial inclusion criteria:

- All types of dementia, including sub-types and all stages of trajectory to ensure all people living with dementia are represented. No formal diagnosis is required due to geographical differences in diagnostic screening and rates.

- Participants must be residents of an LTC setting due to research topic.

- Study must be focused on exergaming intervention due to research topic.

- All methodological approaches due to lack of research as identified through the funnel structure and scoping period.

- All countries to allow for global perspectives.

Additional inclusion criteria:

- Must be focused around primary research, as opposed to secondary research.

- Peer-reviewed to improve overall reliability and accuracy.

- Published between 2004 – 2025 to allow for a broad and relevant range of research.

Exclusion Criteria

Studies were not included if they:

- Were published in a language other than English and no translation was available.

- Were study protocols.

- Presented limited findings.

- Not conducted in LTC settings.

- Did not involve participants with dementia or memory impairments.

- Were not related to exergaming.

Following the removal of duplicates the search strategy yielded 1,196 results. During the initial selection process the titles and abstracts of the studies were screened for relevance. A total of 68 studies were then full text screened for applicability. Utilising the inclusion and exclusion criteria, 18 eligible studies were identified as displayed in table 1.

Insert table 1

Data extraction and synthesis

The selected studies were analysed using the process of thematic analysis, as outlined by Braun and Clarke [44], which identified six common themes, as displayed in table 2.

Insert table 2

Results

As a result of the systematic search, selection of relevant literature and thematic analysis, six main themes have emerged. Each theme can be seen to be represented in at least nine of the studies, as displayed in table 2. Although each theme is discussed separately, they are interconnected and aim to provide a comprehensive understanding of the topic and should not be interpreted individually. The analysis and synthesis of the literature within each theme and the critical evaluation of the studies' methodological strengths and weaknesses aims to identify and produce a detailed view of the key issues in relation to the research question.

Wellbeing and Quality of Life Impacts

The studies evidenced that exergaming resulted in positive improvements in mood and wellbeing, which were found to be sustained following the intervention.[19,21,45-48] The identified positive impacts on wellbeing included feelings of: enjoyment [19,49-51], motivation [45,51,52], achievement [47], empowerment [19], comfort [49], and autonomy and independence. [53] Researchers also found that exergaming decreased symptoms of depression [46,47,52,54,55] and provided a distraction from negative thoughts and feelings. [19,47,48] Furthermore, exergaming was referred to as a meaningful and purposeful activity which created a sense of presence and normality.[21,50,53,55]

Participants commented that "it [intervention] definitely improves mood" [21(p14)] and "I love it and it makes me happy" [19 (p2048)]. Some researchers observed changes in facial expression, such as the residents smiling during the interventions.[52] In addition, positive impacts on staff wellbeing in supporting the exergaming interventions were also reported.[21,53] Ofosu et al[53] highlighted a sense of fulfilment and job satisfaction and linked this to further positive influences, such as increased staff responsibility and purpose. However, some negative emotions were found to be linked to exergaming, such as frustration and confusion with the technology. [51] Additionally, in comparing exergaming to traditional exercise and activities, there were no significant differences found and the levels of enjoyment were evidenced to be equivalent.[49,50,54]

Physical Health Impacts

Improvements in physical health such as gait, balance and strength were noted within several studies.[19,21,48,51,53,54,56-58] Participants commented on feeling 'fitter' [53,57], "physically a bit stronger" [21(p14)], and "more flexible" [22(p2047)]. However, whilst Gunst [53] found an improvement in pain complaints from residents, participants left another study due to pain caused by exergaming in the form of virtual cycling.[50]

A common discussion amongst the studies was the link between exergaming and reduction in falls.[19,50,51,53,54,56,58] Several studies highlighted that falls are more common in people living with dementia due to the changes in physical functioning and mobility.[19,50,56,58] Tobiasson et al[57] and Swinnen et al[19] observed that some participants within their studies reduced their use of assistive mobility equipment, for example frames and sticks, whilst engaging with the exergaming interventions. Additionally, participants within the Swinnen et al[19] study noted that "my walking got somewhat faster" and "my walking is starting to improve"[19(p2047)]. Interestingly, Ofosu et al[21] found no statistical differences in the participants' fears of falling following the intervention, and other studies did not exclusively investigate this concept. However, when considering the evidence around reduced use of assistive mobility equipment this may indicate the participant's increased confidence in their abilities and, thus, their reduced fear of falls.[19,58]

Four of the studies discussed the link between exergaming and improved cardiovascular fitness.[19,26,57,58] It was stated that there is an increased risk of cardiovascular disease in people living with dementia, which provided a rationale for exploring this concept. [46] Tobassion et al[57] observed changes in breathing and skin colour of the participants when engaging with the exergaming and suggested that this displays increased blood circulation and cardiovascular processes. Furthermore, participants commented "my stamina has improved" and "my respiration feels more regulated" [19(p2048)].

Researchers compared the benefits of exergaming to traditional exercise and Eisapour et al[49] concluded that the physical health impacts from both forms of exercise were equivalent. Furthermore, additional benefits of exergaming, suggested to be beyond the scope of traditional exercise, were presented, which included increased independence and improved choice.[46,55,57]

Cognitive Impacts

The findings from the studies in relation to the cognitive impacts of exergaming within dementia LTC settings were mixed. Some studies found that participants' cognition improved following the exergaming interventions.[48,52,54,58] More specifically improvements were noted in reaction time [58], attention, focus and concentration [19], and these cognitive improvements were reflected in the residents' comments, for example, "my concentration has improved tremendously since I have been coming here" [19(p2047)].

The findings from other studies present only minimal improvements in cognition [59], no increase in scores post intervention [47] and no statistical differences in comparison with control groups.[53] Ulbercht et al [59] who found only minimal improvements, suggested that if exergaming does not

improve cognition, it may be useful in stabilising it for people living with dementia. Investigations into the cognitive impacts led researchers to consider whether exergaming may be too cognitively demanding for those living with moderate to severe forms of dementia.[19,57,59] Furthermore, some studies highlighted that holistic approaches are more effective in improving cognition which requires focus on the physical, mental, social and cultural needs of the person.[19,47]

Social Impacts

The studies suggested that exergaming can provide a foundation for increased social interaction and stimulate verbal and nonverbal communication.[19,46,52,53,57,60] Several of the interventions were conducted in group settings which encouraged conversations [50,57,60], increased social circles and new opportunities to socialise.[19,47,53,57,60]

Researchers commented on how the social aspects of the exergaming interventions promoted the participants' personhood, autonomy and identity[47,60], and that it empowered them to be perceived as more than patients.[57] It also provided a platform for group and individual reflection, for example, about their gaming performance or opinions on the games.[57] Participants reported that they enjoyed the company of others and the interactions with the caregivers. [19,50] In addition, Yamaguchi et al[52] found that the caregivers' communication skills were also improved from assisting with the interventions, and Ofosu et al[21] highlighted the positive impact on therapeutic relationships between residents and caregivers.

Person-Centred Approaches

The studies highlighted that person-centred approaches are fundamental when providing support for people living with dementia as they protect the person's identity and improve the quality of their care.[50,53,55,57,59,60] Therefore, several of the studies emphasised the importance of involving residents and staff in the development process of the exergame interventions.[45,49-51,60] Participatory design and co-design methods were seen to be effective in creating engaging activities and increasing the acceptability of the exergames amongst residents.[45,49,51,60] Eisapour et al[45] suggested that knowledge from dementia specialist professionals may also be useful in increasing the success of the exergames.

Compared to traditional exercise, or activities, exergaming was suggested to be more versatile and adaptable.[60] It was proposed that traditional activities may be difficult for people living with dementia due to the cognitive and functional changes associated with the condition[49], whereas exergaming can be tailored to meet a range of needs and preferences and allows users to set their desired pace and goals.[46,49]

Ulvercht et al[59] found that the acceptance and engagement with the exergames relied on the person's preferences and interests. Some participants became frustrated and lost interest in the

exergames due to difficulties understanding the technology or the complexity of the task.[51,57] It is therefore essential that the exergaming interventions are tailored around the person's abilities and preferences to increase acceptability and enjoyment.[45,46,49-51,60] Researchers who made adaptations to the exergaming design, such as removing buttons and adjusting view, found increased usability and acceptance of the intervention.[55]

Barriers and Feasibility

Studies outlined that people with dementia living in LTC settings may experience numerous barriers in accessing traditional exercise and activities including: mobility difficulties[21,51,60], cognitive impairment[19,46], lack of motivation[56], lack of facilities[21], high cost of exercise programmes[21,46], and safety concerns.[19,45,50] There are conflicting findings amongst the studies about whether exergaming is also influenced by similar barriers. While there are some suggestions that exergaming is not limited by barriers[46,56,60], and can increase safety[19,50], reduce the risks around falls[56,60], and exposure to viruses.[46] Other researchers highlighted concerns including low accessibility for people with physical disabilities and cognitive impairment[50,53], and increased risk of infection due to challenges in cleaning the equipment.[60]

Many studies agreed that exergaming is a feasible addition to activities in LTC settings.[19,46,49,51,53,55,56] It is considered to be user friendly[49,51,55,60], accessible[56], affordable[50,51], portable[51,55], sustainable[50,58], and largely accepted by residents.[19,2146,56,60] Matsangidou et al[55(p435)] refers to exergaming as a "practical solution to exercise which can be deployed into real-world clinical settings". Additionally, due to the proposed adaptable nature of exergaming researchers extended its purpose beyond an enjoyable non-pharmacological intervention and suggested it may be useful for memory assessments and treatment.[45]

However, it was recommended that various aspects of the exergaming must be considered by the providers to ensure optimal success and effectiveness of the intervention. For example, attention must be paid to the internet connection of the setting[21], the potential increased time pressure on staff[50,59], and the availability of indoor space.[46] Furthermore, whilst exergaming is suggested to be low cost it was acknowledged that most LTC settings have extremely limited funds.[50,51,56,60]

Discussion

The results of this review indicate that exergaming can have a beneficial and positive impact on a person's wellbeing and quality of life [19,21,45-47], and has the ability to increase social interactions and stimulate conversations.[19,46,52,57,60] Various studies have concluded similar findings, for example Van Santen et al[61] conducted a study exploring exergames for people living with dementia at day-care centres, and positive effects on emotional and social functioning were highlighted. Due to the evidenced link between LTC and negative psychological symptoms [12,13, 15,16], offering interventions which directly target improvements in wellbeing and quality of life are fundamental.

Although within this review the cognitive impacts were inconclusive, broader literature provides evidence that exergaming can improve the cognitive function of people living with dementia and potentially prevent memory decline.[61-63] Research has also highlighted that exergaming provides cognitive stimulation which is a popular and effective non-pharmacological intervention for people living with dementia.[64] However, for the majority it is concluded that further research and longitudinal studies will provide a more accurate understanding of the link between exergaming and improved cognition.[61-63] Furthermore, studies have highlighted the importance of wellbeing, social and physical health in sustaining and improving cognition[65,66,] which interestingly parallel with the themes within this review.

The exercise element of exergaming demonstrated that compared with traditional exercise it produces similar positive impacts on physical health and may introduce additional benefits, such as independence and improved choice.[46,49,55,57,58] Similar studies have investigated exergaming as a rehabilitation tool for neurological and physical health conditions and have found numerous benefits including improvements in motor skills[67], mobility and strength.[42] Additionally, broader literature concludes the impacts of exergaming on physical health are sustainable, beneficial and positive.[34]

Another strength of exergaming is that it is versatile in nature and, unlike traditional exercise exergaming may be more easily adapted to the person's needs and preferences.[60] This is particularly important due to the evidence-base and focus around person-centred approaches in dementia care.[68] As acknowledged within the review, acceptability and useability were seen to increase if the exergames had been created with the person's preferences and interests as the foundations[45,49,60], which further provides evidence that focusing on the person-centred aspects of an intervention will improve its success.

For people with reduced mobility, who may find it challenging to participate in traditional exercise, exergaming is considered to be more accessible and could introduce new possibilities in maintaining, or rehabilitating, physical and mental wellbeing.[42,56,67,69] Exergaming aims to challenge barriers associated traditional exercise and be more accessible to people with physical or mental health conditions, however findings of this review suggest that exergaming may also be subject to similar barriers.[50,53,60] The barriers presented are mostly associated with risk of physical harm in the form of injury or infection.

Risk management and prevention is frequently discussed in health and social care in aim of maintaining safety and reducing harm.[70] However, it is recognised that too much focus on preventing risk can result in negative impacts on the person's quality of life due to the imposed restrictions on their choice and actions.[71] Nevertheless, health and social care professionals do have a duty of care to safeguard others from harm.[72] This review provides evidence that exergames may be safer than traditional exercise[19,50,56,60], and there is no indication that it poses a significant risk to users. However, as with any new intervention, personalised risk assessments are recommended.[73]

One study highlighted that the exergaming intervention had a positive impact on the therapeutic relationships between residents and staff.[21] Therapeutic relationships are built on factors including

mutual trust and respect, empathy and effective communication, and are found the improve health-related outcomes and the experience of care.[74] For people living with dementia, therapeutic relationships can be vital to receiving continuous quality and person-centred care and support.

Another interesting staff-related finding within the review are the observed impacts on staff supporting the exergaming intervention. It was suggested that exergaming could have a positive influence on staff wellbeing and one study highlighted the staff's experience of increased job satisfaction and fulfilment.[21,53] It is well documented that in health and social care, poor staff wellbeing is associated with medical errors and poorer quality of care.[75,76] In addition, the levels of staff absence, burnout and distress are reported higher in health and social care compared to other sectors. Thus, enabling staff to deliver person-centred interventions with clear benefits for their patients could have the additional value of improving their own wellbeing.[77,78]

The feasibility of exergaming, and the practicalities of implementation, were central to this review. It fits with the notion that, regardless of the effectiveness of an intervention, the resources must be available to input this and obtain the benefits. Due to the pressure on LTC settings and the limited resources[7,9,79], it is vital that the feasibility of exergaming is critically explored. The findings of this review were largely positive and it was agreed that exergaming is feasible, user friendly, accessible and affordable.[49-51,55,56,60] However, this review also found factors such as infection control, availability of space, internet connection and limited funding which must be considered, and the broader literature has highlighted that there is limited evidence regarding exergaming's affordability.[80]

Exergaming systems vary in cost, however they tend to require an initial investment for the equipment and additional maintenance or upgrade costs.[81] In terms of evidence around cost-effectiveness and affordability, it may be helpful to explore the broader health and social care systems and consider areas for cost savings such as falls prevention.

Strengths and limitations

Studies were identified by a rigorous search strategy and screening process. Most of the studies used a mixed method approach to collect data.[21,46,49-52,55,58,60] This allowed for diverse reflection and feedback from participants and provided a useful comparison of the outcome measures. For the studies which recorded research length, this ranged between three weeks[45], and twenty-four months[48], and number of participants involved ranged between six[45], and one hundred.[48] Unfortunately, some participants were excluded due to health problems, including advanced cognitive impairment. Within fifteen of the studies all the participants had a form of cognitive impairment, however diagnostic rates were not consistent and the level of impairment drastically varied. The remaining three studies opened their interventions to the whole LTC setting population which included residents without cognitive impairments.[53,59,60]

The term 'exergaming' has presented some challenges within this review. Although widely used in the literature, not all researchers have adopted this term, therefore despite a comprehensive and thorough search strategy it is possible that relevant studies were missed.

Recommendations

Despite identifying eighteen studies which investigated this topic, there is a clear and considerable lack of research exploring the impacts of exergaming within dementia LTC settings and an obvious need for further studies which research the longitudinal effects and the impacts on larger sample sizes.

There is a need for further research which investigates the affordability of exergaming for LTC settings. This is potentially a significant barrier due to limited funding and resources.[7,9,76] The cost-effectiveness of exergaming needs to be clearly and robustly outlined to create a compelling argument for its implementation. Furthermore, additional research into the cognitive impacts of exergaming would be advantageous. Current literature alludes to a link between exergaming and treatment and management of dementia which could be transformative for global dementia care.[61,62,83]

Within this review, several of the studies focused on creating unique exergames systems and evaluating the effectiveness of these.[45,46,49,51,55,60] Currently, the most popular and readily-available systems are focused around the general population and therefore may not be suitable for people living with dementia. As technology continues to evolve there is an open platform for developing further person-centred exergames systems designed around the specific needs of people living with dementia.

Due to the results of this review, it can be recommended that, if funding and resources allow, dementia LTC settings could implement exergaming as an additional, meaningful and therapeutic non-pharmacological intervention. To ensure optimal success LTC settings must ensure that the exergames are tailored to the person's preferences[45,46,49-51,60], and abilities and that detailed risk assessments are completed prior to implementation.[73] The LTC settings need to consider additional training, staff supervision and how to manage potential negative psychological and physical side-effects. LTC settings must also be committed to regular evaluation, review and adaption processes to ensure that exergames are appropriate and effective for their users.

Conclusion

There is currently no cure for dementia and, therefore, care and treatment is focused around the provision of effective and person-centred non-pharmacological interventions.[4] Exergaming is an innovative and technological nonpharmacological intervention which has many potential benefits for people with dementia living in LTC settings. The positive, holistic and multidimensional impacts on wellbeing, physical health, cognition and social inclusion are clearly evidenced throughout this

comprehensive review. Exergaming is seen to challenge stigmas and misconceptions, and target organisational and condition-related barriers to high quality care. Furthermore, due to its versatile and adaptable nature it can be developed into an effective, person-centred and accessible intervention which promotes independence, choice and identity for people living with dementia.

Further research would be beneficial in enhancing the understanding, and strengthening the evidence around exergaming. Nevertheless, within this review exergaming has demonstrated its potential to be an advantageous addition to activities in dementia LTC settings. In the future, as the technological and digitalised landscape of health and social care continues to develop, exergaming could be a key psychosocial intervention for people living with dementia in LTC.

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