

BMJ Open Facilitators and barriers to using virtual reality and augmented reality and its impact on social engagement in aged care settings: a scoping review protocol

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ABSTRACT

Introduction Increasingly more studies are being conducted on the use of virtual reality (VR) and augmented reality (AR) in aged care settings. These technologies can decrease experiences of loneliness which is especially important during the COVID-19 pandemic. With the growing interest in using VR/AR in care settings among older adults, a comprehensive review of studies examining the facilitators and barriers of adopting VR/AR in these settings is needed. This scoping review will focus on facilitators and barriers related to VR/AR in care settings among older adults, as well as the impact on social engagement and/or loneliness.

Methods and analysis We will follow the Joanna Briggs Institute scoping review methodology. We will search the following databases: CINAHL, Embase, Medline, PsycINFO, Scopus and Web of Science. Additional articles will be handpicked from reference lists of included articles. Inclusion criteria includes articles that focus on older adults using VR or AR in aged care settings. Our team (which includes patient and family partners, an academic nurse researcher, a clinical lead and trainees) will be involved in the search, review and analysis process.

Ethics and dissemination We will be collecting data from publicly available articles for this scoping review, so ethics approval is not required. By providing a comprehensive overview of the current evidence on the strategies, facilitators, and barriers of using VR/AR in aged care settings, findings will offer insights and recommendations for future research and practice to better implement VR/AR. The results of this scoping review will be shared through conference presentations and an open-access publication in a peer-reviewed journal.

INTRODUCTION

Social isolation and loneliness

Social connection is a basic and essential human need, but the COVID-19 pandemic has brought about much social isolation and loneliness among residents living in care settings such as long-term care (LTC).¹ Even prior to the pandemic, social isolation is a serious concern among residents.² While there are many definitions of social isolation, it is generally referred to as a lack of social

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This scoping review will examine the barriers and facilitators of adopting virtual reality (VR)/augmented reality (AR) in aged care settings, as well as map the literature on the potential benefits of VR/AR on decreasing loneliness.
- ⇒ A patient partner was involved in the preparation of this scoping review protocol, maximising the clinical relevancy of this protocol.
- ⇒ This scoping review will follow the Joanna Briggs Institute methodological framework.
- ⇒ Review will only include literature that was published in English, and only hand-picked grey literature will be included.
- ⇒ Strategies for implementing VR/AR outside of care settings will not be captured.

contacts and relationships³ Loneliness is related to social isolation and is defined as a subjective feeling due to a lack of quantity and/or quality of ones' social network or relationships.⁴ Both loneliness and social isolation can lead to many mental health issues, including depression and suicide,⁵ as well as an increase in certain types of health and social care utilisations.⁶ Confinement and restrictions on visitations during the COVID-19 pandemic have increased residents' feelings of anxiety, isolation and loneliness, creating new or exacerbating pre-existing physical and mental health concerns (eg, depression, loneliness, cognitive decline, frailty and mobility issues).⁷ Therefore, it is more important than ever to develop and implement new ways to overcome loneliness and improve the well-being among residents in these care settings.

Augmented reality and virtual reality technology to decrease loneliness

Technology such as virtual reality (VR) and augmented reality (AR) has shown promise in enhancing residents' well-being and

decreasing loneliness.⁸ VR has existed since the 1980s in various forms, but due to the advent of recent technologies (eg, Microsoft HoloLens; Oculus Quest), the immersive VR/AR environment is now both portable and consumer-friendly, leading to different uses in care settings among residents. VR uses computer-simulated graphics in real time to allow users to experience an immersive digital environment, while AR is an enhanced version of the real physical world using computer graphics in real time.⁹ Users of VR and AR may wear hardware such as headsets, hand controllers, and/or wearable haptic devices, with the programme being controlled by an external smartphone or computer. The primary benefit of VR/AR over other technologies (eg, a flat screen television, tablets) is the subjective experience of immersiveness or 'being there'.¹⁰

A Canadian feasibility study found that it is safe and feasible for older adults with varying levels of cognitive and physical impairments to be exposed to VR, with reports of positive feedback and increased relaxation after usage.¹¹ Another VR programme (VR Forest) was found to improve pleasure and alertness among residents with dementia in an Australian care home.¹² In addition, AR has also been used to improve balance in older adults.¹³ Finally, engaging in shared experiences through VR technology can decrease loneliness, social isolation and depression among LTC residents,¹⁴ which is especially important during the current COVID-19 pandemic. Overall, the use of VR/AR may be useful to meet psychosocial needs, increase pleasure, improve mental health and well-being of people living in care settings,^{12 15} and offers a possible way for residents in care settings to safely engage with others, incurring physical and mental health benefits.

Study objective

As outlined above, there is growing interest in using VR and AR among care settings especially to promote social engagement and decrease loneliness; therefore, a comprehensive review that provides evidence on how best to adopt VR/AR across settings is needed. Current research focuses on enhancing innovative designs and usability, and there is a lack of research probing into the preferences and requirements of older adults using VR/AR¹⁶ and how this technology may decrease loneliness. This research gap is noteworthy because understanding the facilitators and barriers (eg, user needs and resources) is essential to ensure the readiness of adopting new interventions across multiple settings.¹⁷ This scoping review is designed to review the facilitators and barriers of implementing VR/AR in care settings, and the impact of this technology on social engagement and/or loneliness.

A preliminary search found a few reviews related to VR/AR and older adults, but none with the purpose of collating the facilitators and barriers of using VR/AR in care settings. For example, Appel *et al*¹⁸ conducted a scoping review on the current state of research using

VR for people with dementia. Another systematic review identified studies exploring the use of VR in older adults.¹⁹ Our review will be specific to aged care settings as we would like to know the facilitators and barriers of adopting VR/AR technology in these settings, which are different from home settings. We will also be more comprehensive in our review by including all older adults residing in care settings, since VR/AR can benefit people without dementia as well. Furthermore, Dermody *et al*²⁰ conducted a systematic review on the role of VR among community-dwelling older adults. Their aim was to evaluate the effectiveness of VR. Finally, Carroll *et al*⁹ completed a scoping review to explore how VR/AR technology is being used with older adults and to examine whether consistent terminology of VR and AR is being used across studies. The purpose of our review differs from that of the above reviews in that we aim to determine the factors related to adopting VR/AR in care settings, and to identify barriers and facilitators. Additionally, we would like to explore the impact of VR/AR on social engagement and/or loneliness in these settings. In our next study, we will be conducting an evaluation study to explore LTC resident experiences of using VR/AR technology. As part of our efforts to implement VR/AR most effectively for our study, conducting this scoping review will inform strategies for adopting VR/AR in aged care settings, which remains a gap in previous reviews. Our scoping review will also elucidate more specific research questions for future research.

Review questions

1. What are the facilitators and barriers in adopting group VR/AR in care settings for older adults?
2. What is the current evidence on the impact of VR/AR on social engagement and/or loneliness?

METHODS

Our scoping review will be conducted using the Joanna Briggs Institute (JBI) methodology.²¹ A scoping review is useful for: identifying the conceptual boundaries of a topic, examining emerging evidence and providing a broad overview of a topic^{22 23}; therefore, a scoping review is appropriate for the above review questions. Our review will be conducted between March and August 2022.

Inclusion criteria

See online supplemental file 1 for details on inclusion and exclusion criteria of articles.

Types of participants

This review will consider studies that include older adults aged 65 or older who are living in care settings. Articles that include residents along with care home staff and/or family will also be included.

Concepts

We will include studies that focus on the use of VR and/or AR. These systems need to produce an immersive

experience for the users (eg, creating a life-like environment through a head-mounted device and could be manipulated by the user).

Articles will address at least one of the following areas of adopting VR/AR: barriers, facilitators, social engagement and/or loneliness. Barriers are defined as any factors (eg, resources, practice culture, policies) that ‘impede the implementation of, or adherence’ to the use of VR/AR in the practice setting (Feyissa *et al*, p5).²⁴ Conversely, facilitators are factors that promote ‘the implementation of, or adherence to’ the technology (Feyissa *et al*, p5).²⁴

To meet the objective of articles addressing social engagement and/or loneliness, they would need to discuss how VR/AR enabled the user to interact and engage with others, or discuss peripherally related issues such as impacting mood, feelings of isolation and anxiety, social visits and connections.

Finally, we will not include articles that were published more than 5 years ago, because VR/AR technology has evolved significantly in the last 5 years. We want to capture updated and current information on the facilitators, barriers and social engagement impact of this technology.

Context

In terms of context, we will include studies that are situated in aged care settings such as (but not limited to) LTC and assisted living settings.

Types of evidence sources

A wide range of studies (eg, randomised trials, descriptive studies) will be included, as well as user experience reports.

Search strategy

We follow JBI’s three-step search strategy:

Initial search

A preliminary search by the first author (FT-M) was conducted in collaboration with a university librarian from the University of British Columbia. The search was conducted in CINAHL. Keywords, Medical Subject Headings, index terms, titles and abstracts were analysed to identify search terms and keywords appropriate for the purposes of this scoping review. See online supplemental file 2 for our CINAHL search strategy.

Full search

In our full review, we will use the terms: (“older adult*” or geriatric* or elder* or aging or aged or senior* or “older people*”) AND (“virtual realit*” or “augmented realit*”) AND (“residential facilit*” or “nursing home*” or “long term care” or “long-term care” or “homes of the aged”). We will use those search terms in the following databases: CINAHL, Embase, Medline, PsycINFO, Scopus and Web of Science. Google will be searched for grey literature (eg, other articles that are not indexed in library databases) using phrases such as “virtual reality in aged care settings” OR “virtual reality in long-term care” OR “augmented reality in aged care settings” OR “augmented reality in

long-term care”. No restrictions were set regarding the publication date upon the initial search. We will continue to work with a librarian in our full review to refine the search strategy and ensure that all key articles will be captured.

Reference list search

Reference lists will be checked for any additional articles that meet our inclusion articles.

Evidence selection

We will use the reference management tool, Mendeley, to organise all references and articles selected for our review. Identified articles will be uploaded onto Mendeley, and duplicates will be removed.

We will engage in pilot testing of the above search strategy, using the following steps:

1. A random sample of 15 titles/abstracts will be selected.
2. The review team will screen these articles using the eligibility criteria.
3. Team members will meet to discuss any discrepancies, adjusting the eligibility criteria and/or search strategy accordingly.
4. The review team will start screening the remaining articles after at least 80% agreement is achieved.

After pilot testing, two review team members will first screen the remaining articles’ titles and abstracts for relevancy according to our eligibility criteria. All disputes will be resolved through a discussion with a third team member until consensus is reached. The full text of these articles will then be read by at least two researchers to confirm inclusion; reasons for exclusion will be recorded.

Data extraction

See online supplemental file 3 for our data extraction instrument. Extracted data will include specific details about the article, facilitators and barriers to VR/AR technology, and the impact of VR/AR on loneliness. Additional categories relevant to answering the review questions may be added as we review the articles. Extracted data will be conducted by two researchers, and any disagreement between the reviewers will be resolved through a discussion with an independent third reviewer.

Analysis of the evidence

We will present the extracted data and results in a table, with the purpose of mapping the existing literature on the facilitators and barriers of VR and AR technology, and the impact of this technology on social engagement and/or loneliness.

Presentation of the results

A narrative summary will be used to accompany the tabled results, with themes to organise the results. We expect that both qualitative (eg, how VR/AR impacts loneliness; the specific facilitators and barriers of adopting VR/AR) and quantitative data (eg, number of mixed-method articles) will be presented in our full review. We will use the PRISMA-ScR (Preferred Reporting Items

for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) reporting guidelines²⁵ to structure our full review.

Patient and public involvement

A patient partner (JM) was involved with preparing this scoping review protocol, including refining the research priorities and review questions. Involvement of a patient partner maximises relevancy of this work to clinical care. Additional patient and family partners will continue to work with the review team to complete the scoping review. In particular, they will be actively engaged in the reading of the included articles and extracting of data, as well as being involved with data synthesis and analysis.

ETHICS AND DISSEMINATION

Research ethics approval is not required for scoping reviews since we extracted data from publicly available articles. This scoping review will be submitted for publication in an open-access journal, and results will be presented at conferences. We will also disseminate a one-page infographic of our review findings to make findings accessible to a wide audience. For example, we will share findings through staff huddles and meetings with local care homes. Overall, we anticipate that the findings will be useful in providing evidence-based guidance to implement VR/AR in future practice and research.

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Contributors FT-M developed the research protocol and methods; she also drafted and edited the entire manuscript. JM helped to refine the research questions and study methods and made important contributions to the editing of the manuscript. LH is the primary investigator and contributed to the revising of the manuscript.

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Competing interests None declared.

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