Key Stakeholders' Experiences and Perceptions of Virtual Reality for Older Adults Living With Dementia: A Qualitative Evidence Synthesis Protocol

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Abstract

Background: Technology is increasingly being used in dementia care as a means of non-pharmacological intervention. One such technology, Virtual Reality (VR) has shown to be a promising vehicle to deliver interventions for people living with dementia. The views of people living with dementia and key stakeholders must be considered to inform future research. There is a lack consensus regarding VR design considerations for this population which makes it difficult for researchers and practitioners to develop meaningful VR spaces. **Methods:** This qualitative evidence synthesis (QES) protocol aims to explore key stakeholders' experiences and perceptions of VR for older adults living with dementia. A systematic search will be conducted across six electronic databases. Forward and backward citation searching, and hand searching will identify additional articles. Two authors will independently complete title and abstract, and full text screening. Quality appraisal will be conducted using the CASP qualitative checklist. Included studies will be analyzed using a thematic synthesis approach. The GRADE-CERQual will assess the researcher's confidence in the findings. **Discussion:** This QES will constitute part of a larger project which aims to develop a VR social connecting space for older adults living with dementia. The findings will also add to the existing body of literature exploring VR in dementia care contexts. It is anticipated that this review will add to the momentum toward holistic design practices, resulting in usable and acceptable VR spaces for older adults living with dementia.

Keywords

qualitative meta-analysis/synthesis, methods in qualitative inquiry, qualitative evaluation, secondary data analysis, meta-synthesis

Background

The World Health Organization (2012) has cited dementia as a global health priority. Globally, the number of people living with dementia is set to rise to 152 million by 2020 (Prince, 2015). Technology is increasingly being used in dementia care as a means of non-pharmacological intervention (Lorenz et al., 2019). One such technology, Virtual Reality (VR) has shown to be a promising vehicle to deliver interventions for people living with dementia (Kim et al., 2019). VR integrates real-time computer graphics with a range of multi-sensory modalities aimed at "generating an illusion of an alternative reality: being located in a different place, or interacting with objects or characters that are not physically present in the real surroundings of the user" (Lécuyer, 2017, p. 20). VR has been applied to address a range of psychosocial aspects of dementia; namely, cognitive training, reminiscence therapy and exergaming (D'Cunha et al., 2019). In addition, VR has been applied in several dementia care contexts, both residential and community settings (Moyle et al., 2018).

Due to the emergence of technology use in dementia care, it is important to provide a means of synthesising previous work thus guiding future practice. Building on the momentum of person-centred care and holistic design principles, the views of people living with dementia and key stakeholders must be considered to inform future research and policymaking (Suijkerbuijk et al., 2019). Despite its diverse use, there is a lack of

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consensus on the design specifications and considerations for this population which makes it difficult for researchers and practitioners who wish to develop such technology (Kim et al., 2019). Therefore, this review aims to include key stakeholders' experiences and perceptions of VR technology use for older adults living with dementia, drawing on previous research. The synthesis aims to inform future VR development resulting in more accepted and usable design, reducing research waste and leading to more positive health and well-being outcomes for people living with dementia (Garcia et al., 2012). Through the incorporation of stakeholder's views and perceptions of VR in the development process of VR technology, there will also be economic implications as interventions will be fit for purpose leading to increased buy-in.

Objectives

This review aims to synthesize key stakeholders' experiences and perceptions of VR technology use for people living with dementia. The specific objectives are:

– To explore key stakeholders' experiences and perceptions, of using VR technology for older people living with dementia

– To identify the perceived barriers and facilitators to the use of VR technology for older people living with dementia

– To develop recommendations for the development of future VR experiences for older people living with dementia.

Method

Criteria for Considering Studies for Review

Type of studies: This QES will include qualitative studies which include methods such as interviews, focus groups and observational data. It will also include mixed-methods studies where qualitative findings are reported separately from quantitative findings. Due to the limited evidence in this area, there will be no year limit applied to the review.

Topic of interest: The included studies will focus on the experiences and perceptions of key stakeholders of VR use for people living with dementia. Studies will be included which examine virtual reality or virtual environments for people living with dementia. By Virtual reality (VR) we mean a technology which enables users to interact with a computer-generated virtual environment. This virtual environment may be a representation of a real-world scenario for example 360-degree videos using Google Earth or a simulated environment. It allows the user to become immersed in and experience the past, presence or future using computer-generated graphics (Mandal, 2013). "A virtual environment may be displayed on a head-mounted display, a computer monitor, or a large projection screen. Head and hand tracking systems are employed to enable the user to observe, move around, and manipulate the virtual environment" (Hodge et al., 2018, p. 1). Studies will be included if they satisfy the criteria established by Miller and Bugnariu (2016) which distinguishes between low, medium and high levels of immersion.

Stakeholders are defined as those with an interest or "stake" in an activity or its evaluation (Leviton & Melichar, 2016; Shadish et al., 1991). Their perspective may incorporate their opinions, attitudes, and evaluations (including acceptance and satisfaction; Ryan et al., 2018) while their experiences may relate to emotions, physical sensations (e.g., pain, discomfort), psychological factors (e.g., stress, mood), and pragmatic factors (e.g., routine activities; Ryan et al., 2018).

This review will include studies published in peer-review journals meeting review-specific eligibility criteria. The SPIDER (sample, phenomenon of interest, design, evaluation, research type) tool will be used to develop the research question. SPIDER was adapted from PICO to be used for qualitative and mixed-methods studies (Cooke et al., 2012).

Sample: Studies will be suitable for inclusion once they acknowledge that participants have a diagnosis of dementia of any stage, a formal diagnosis is not a requirement for this study. Types of dementia for inclusion may include Alzheimer's disease, Lewy body dementia, Vascular dementia, Frontotemporal dementia, Huntington disease, Pick's disease or Creutz-Jacob disease. Studies will be included if the mean age of people living with dementia is over 60. There is ambiguity in the literature surrounding what age constitutes an "older adult" (World Health Organization, 2015). The World Health Organization and other researchers in the field of gerontology contend that those 60 years and older are referred to as older adults (Halaweh et al., 2018; Harvey et al., 2013; World Health Organization, 2015). For studies which include people with and without dementia, it must be possible to separate the views of people living with dementia for data extraction purposes. Where this is not possible, the study will be excluded. Key stakeholders may include people living with dementia, informal or formal caregivers, care partners, family members, health and social care professionals or VR developers. If other suitable stakeholders are identified during the screening process, inclusion will be discussed based on their contribution to the dementia care area. Studies will be excluded if qualitative data is not collected from key stakeholders relating to the use of VR technology. If the participants have a diagnosis of mild cognitive impairment and no diagnosis of dementia the study will also be excluded.

Phenomenon of interest: The phenomenon of interest for this study is key stakeholders' experiences and perceptions of VR technology use for older people living with dementia. Studies will be included if they qualitatively discuss the views, perceptions or experiences of stakeholders on the use of VR in the results or discussion section of studies. Should the studies explore other outcome measures, it must be possible to extract the data required for inclusion. Data for extraction may include factors that may influence feasibility, acceptability, or usability

of virtual reality technology for people living with dementia. Studies will be excluded if they focus on VR use for the assessment or diagnosis of dementia. Virtual reality technology may be non-immersive, semi-immersive or fully immersive for inclusion as classified by Miller and Bugnariu (2016).

Design: Qualitative research methods must be utilized including interviews, focus groups or observational data. Should the study employ a mixed-method design, it must be possible to extract the qualitative data for inclusion. Quantitative studies and mixed-methods studies which do not allow for qualitative data extraction will be excluded. The review will exclude editorials, literature reviews and other secondary data. Those studies with no full text will also be excluded.

Evaluation: The evaluation must focus on the experiences and perceptions of virtual reality technology use for older adults living with dementia. This may encompass subjective data such as opinions, attitudes, and evaluations, emotions, physical sensations, psychological factors, and pragmatic factors (Ryan et al., 2018).

Research type: Qualitative studies will be included. Studies which include qualitative results that are reported separately will also be considered.

Search Methods for the Identification of Studies

Electronic searches: Several key databases will be searched for systematically. As this study spans across Health and Social Care research and Human-Computer Interaction, multidisciplinary databases will need to be searched to obtain relevant literature. Databases will include:

– Scopus
– Medline
– PsychInfo
– Compendex
– Cinahl
– AgeLine

These databases were chosen with an experienced Research Support Librarian in NUI Galway. These were chosen to capture literature from a wide variety of disciplines including health and social sciences, engineering, and informatics. See Appendix 1 for the MEDLINE search strategy. Separate search strategies will be translated for each database. All strategies will be provided in the appendix. There will be no limit applied to the publication date.

Searching Other Resources

Additional procedures will be used along with electronic database searching. Forward and backward chaining and handsearching will be used to identify potential research. Key authors of relevant papers will be contacted to identify articles that may not have been identified (Booth, 2016).

Grey literature: A grey literature search will be conducted via Google scholar and PROQUEST databases. The first 200 articles on Google scholar will be screened for eligibility. This will identify studies which are not indexed in the scholarly databases.

Selection criteria: Two reviewers (AF and DH) will independently complete 100% of title and abstract screening. Blinding will be turned on until the screening is completed by both reviewers. Full-text screening (100%) will be completed by two reviewers (AF and DH). AF will complete all forward and backward citation and handsearching. All data extraction and assessment of methodological limitations will be completed simultaneously by AF and DH. Review management software Rayyan will be used throughout the review process to ensure screening and selection are conducted independently. Any conflicts will be resolved through discussion with CH or DC. A table will be included in the review outlining the full text studies which were excluded along with a rationale for exclusion. A PRISMA flow diagram will illustrate the search results and screening process.

Language translation: For title and abstracts which are not published in English, translation software will be used to determine eligibility for inclusion. If the reviewer is unable to determine inclusion based on this, the full text will be retrieved. If the paper is unavailable for translation in a language it will be documented as "awaiting classification" to maintain transparency throughout the research process.

Sampling of studies: It is envisaged that there will be a small number of included studies. For this reason, sampling of studies may not be required. Once the final number of studies for inclusion has been determined, a sampling frame will be adopted if necessary such as a maximum variation purposive sampling using a three-step sampling frame (Ames et al., 2017; Houghton et al., 2020) This frame consists of establishing three key sampling criteria to allow for rich data retrieval that answers the specific review question (Ames et al., 2017; Houghton et al., 2020).

Data extraction: NVivo software will be used to facilitate data extraction and synthesis (Houghton et al., 2017). The researcher will extract data and findings in line with the guidance provided by Sandelowski and Barroso (2002), synthesizing findings with caution due to the diverse nature of the data collected and the reporting methods for qualitative research. Contextual and methodological information will be collated from the included studies through a data extraction form compiled in NVivo. This data will include the author, year, location, aims, design, methods of data collection, ethics (consent and capacity procedures), sample and sample size, participant attributes (dementia diagnosis, physical capabilities, technology experience, occupation), level of immersion, details of VR hardware (head mounted display used if applicable) and software, context of VR use, procedural aspects of VR use, data analysis procedures, results/findings (stakeholder quotes,

themes etc.). Qualitative data which relates to stakeholder's experience, perceptions, and views of VR use for people living with dementia will be extracted. The data extracted may include quotations from key stakeholders, themes and sub-themes established by the authors or observational data (Sandelowski & Barroso, 2002). Such data will be displayed in a "characteristics of included studies" table (Harris et al., 2018) enabling the reader to draw adequate conclusions from the data and avoid misinterpretations (Noyes et al., 2019).

Assessing the Methodological Limitations of Included Studies

Two researchers AF and DH will independently assess the methodological limitations for each study. The Critical Appraisal Skills Programme (CASP) qualitative checklist will be used which includes 10 questions addressing rigour, research methods, relevance, and research integrity. Studies will not be excluded based on quality however, the CASP tool will be used to comment on the quality of the included studies and to assess the confidence of the review findings. Where there is disagreement and discussion is warranted relating to quality appraisal, a third reviewer (CH or DC) will be consulted. The results of the CASP tool will be reported in the methodological limitations table.

Data Management, Analysis, and Synthesis

Details of all searches will be recorded. Search results will be inputted, and the corresponding PDF download will be attached to EndNote X9. Studies acquired through hand searching will also be recorded and inputted into Endnote X9. Rayyan data management software will be used for screening.

Qualitative evidence synthesis (QES) is considered appropriate as it will conclude several studies, taken them as a unit. This may strengthen the findings and guide future interventions (Houghton et al., 2016). The choice of method for this QES was guided by the RETREAT framework. Booth et al. (2018) identified seven considerations which determine the choice of methods including the review question, epistemology, time, resources, expertise, audience, and the type of data. Through the application of the RETREAT framework, thematic synthesis was considered an appropriate methodology for this proposal. It is likely due to the limited rich and thick data available and the broad topic area that an integrative approach will be taken to evidence synthesis. Thematic analysis will be performed as per the approach described by Thomas and Harden (2008). Thematic synthesis is considered appropriate to allow for a description and interpretation of the data to communicate the key design considerations for this population. Other approaches to QES such as meta-ethnography rely on a small number of studies which are closely related to develop a theory. Such an approach was not considered appropriate due to the nature of the data to be collected and the review aims (Booth, 2016; Flemming et al., 2019). There is also a lack of an established theoretical and conceptual framework to support the

empirical evidence, therefore framework synthesis was not considered appropriate (Booth et al., 2018). The novel and emerging area of VR use for people living with dementia lends itself to a descriptive element; the review aims to provide a description of the literature and derive some meaning from the studies.

Thematic analysis will comprise of three stages (Thomas & Harden, 2008). Stage one will consist of fully inductive line-by-line coding of the data. Stage two involves the development of descriptive themes where patterns between studies will be reviewed and themes developed. This stage will seek similarities and differences between data. Stage three will "go beyond" the descriptive themes that have been developed to produce analytic themes derived from the primary data. The findings will be synthesized across studies and their meaning will be interpreted with reference to the review question (Thomas & Harden, 2008). One reviewer (AF) will complete the analysis involving the other three reviewers at each stage of the process. NVivo software will be used to aid this process. The use of NVivo will be guided by earlier work exploring its use for qualitative evidence synthesis (Houghton et al., 2017). Using such software will strengthen the transparency and clarity of the review process as there is a clear trail from extraction to coding (Hennelly et al., 2018). Subgroup analysis will be considered based on the dementia care setting or level of VR immersion of the included studies. Other subgroup analysis may include the experiences and perceptions of stakeholders, as they are a diverse group and will have different expectations of the technology. The application of subgroup analysis will be determined based on the findings of the included studies.

Assessing our Confidence in the Review Findings

The "Confidence in the Evidence from Reviews of Qualitative research" (GRADE-CERQual) will be used to assess the researcher's confidence in the findings from the qualitative evidence synthesis (Lewin et al., 2015). GRADE-CERQual is a transparent method of assessing confidence in qualitative synthesis findings which facilitates the use of qualitative evidence to inform and shape policies and practice decisions (Lewin et al., 2018). This involves four key stages: methodological limitations, coherence, relevance, and adequacy of data, with equal weighting across components. Two reviewers (AF and CH) will rate each component as high, moderate or low confidence (Lewin et al., 2015). A summary table will detail the confidence of each component and an overall rating provided with an accompanying rationale.

Review Author Reflexivity

The research team will maintain a reflexive stance throughout the review process. They will be aware of both prospective and retrospective reflexivity and how both can influence the review process. Team meetings will facilitate discussions of progress and decision-making will involve all members of the research team. The members of the team are from clinical backgrounds

in Health Psychology (DH), Nursing and Midwifery (DC, CH) and Occupational Therapy (AF). All researchers have experience working with older adults in a research context. DC, CH and AF also have clinical and academic experience working with people living with dementia. DC has topic expertise of technology use to support the psychosocial wellbeing of people living with dementia. Two authors (CH and DC) have advanced knowledge and experience in the use of qualitative evidence synthesis, in particular thematic synthesis. It is important that team members are aware and observant of their predispositions ensuring that such predispositions do not skew the analysis or interpretation of data. A reflexive journal will be used throughout the review to document progress and supply transparency and rationale for the decisions made. A reflexive statement will also be devised and included in the results section, detailing how the research teams' positions influenced or altered the review.

Reporting

The ENTREQ guidelines (Tong et al., 2012) will be followed to adequately report the findings. A PRISMA-P checklist will guide reporting of the findings.

Dissemination of Findings

This review will be integrated into a larger study funded by Science Foundation Ireland (SFI) in NUI Galway. This study aims to inform the development of a VR social connecting space for older people living with dementia.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

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