

# Transforming aged care with virtual reality: How organisational culture impacts technology adoption and sustained uptake

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## Abstract

**Objectives:** Virtual reality (VR) is not a common leisure activity in aged care, despite pilot studies demonstrating its value as a tool to combat inactivity and loneliness. This study investigated the organisational enablers and barriers to sustained uptake of VR among aged care staff and organisations, who may lack familiarity or confidence with the technology.

**Methods:** Creative methods were adopted to co-design and develop a VR implementation toolkit tailored specifically for aged care staff. Three aged care homes in South-East Queensland participated, with 15 residents and seven staff engaging in up to four VR sessions facilitated by the research team. Participant observation of the VR sessions was complemented by interviews with aged care staff and residents.

**Results:** Guided by Normalisation Process Theory, a reflexive thematic analysis identified four key themes: (1) Positively Appreciating the VR Experience, (2) Staff VR Champions and the Importance of Personal Use and Experimentation with VR, (3) Management Support and (4) Technical Challenges.

**Conclusions:** Our results indicate benefits and challenges of VR use in aged care, offering valuable insights into the factors that can lead to the long-term success of VR-based leisure activities for aged care. Providing time and resources for a VR champion to experiment and learn about the technology is critical. The development of an online implementation toolkit, based on our learning from this project, also provides aged care stakeholders with the evidence-based resources needed to ensure the successful implementation of VR-based leisure programs.

## KEYWORDS

carers, homes for the aged, implementation toolkit, residential aged care, virtual reality, workforce

## 1 | INTRODUCTION

Too many aged care residents, in Australia and globally, are lonely, bored and inactive<sup>1,2</sup> Australia's recent Royal Commission into Aged Care Quality and Safety<sup>3</sup> 2021 reported that well-established issues such as depression, anxiety and loneliness have been further exacerbated since the onset of the COVID-19 pandemic in 2020. Residents too often spend their days '*doing nothing, sleeping and waiting*',<sup>4(p.778)</sup> with residents in one study memorably lamenting that the leisure activities on offer were so similar that the '*same cards always won at bingo*'.<sup>5(p.542)</sup> Residents desire and deserve more novel, engaging and intellectually stimulating leisure activities aligned to their unique interests, experiences and skills—helping ensure daily life is interesting and exciting, rather than mundane and monotonous.<sup>6-8</sup>

Technology-based leisure activities, specifically immersive virtual reality (VR) experiences, provide one potential solution. Researchers have deployed VR in aged care, where residents wear special head-mounted displays and enter immersive rooms to virtually visit different countries and places (e.g. The Louvre or Eiffel Tower in Paris), surround themselves with animals or nature,<sup>9</sup> enjoy adventures (hot air ballooning and bungee jumping), engage in interactive games and favourite hobbies (table tennis, golf and bowling)<sup>10</sup> and even virtually visit childhood homes.<sup>11</sup> For residents with significant mobility challenges, virtual experiences—especially during a pandemic—have the potential to expand access to a range of experiences, which may improve quality of life. This small and growing body of research has demonstrated that residents are enthusiastic about VR-based activities and that it is feasible to deploy in aged care<sup>10</sup>; yet, to date, VR is not routinely offered in aged care, often stuck in demonstrator or pilot project mode.

One potential barrier to adoption is that while it can be relatively easy to seed VR technology into residential aged care, organisational barriers such as constrained resources (specifically the skills, interest and availability of staff), limited access to information technology expertise and support, limited awareness of, or expertise in, VR systems and decision-making hierarchies that prioritise clinical care over resourcing leisure activities, can prevent its long-term success.<sup>12,13</sup> The aim of this study, therefore, was to understand the organisational facilitators and barriers that enable and restrict the successful *ongoing* implementation of VR-based leisure activities in aged care. Specifically, the project team introduced VR technology into three aged care homes and supported staff to run VR-based leisure activities over a period of 2 months. We then

### Policy Impact

With the recent Royal Commission into Aged Care Quality and Safety emphasising the importance of quality care, these findings regarding virtual reality (VR)—based leisure activities and a practical implementation toolkit are extremely significant, offering a tangible strategy and steps for management and staff to enhance the day-to-day experience and quality of life for residents.

### Practice Impact

These findings have significant practice impact, illustrating in a very tangible and engaging way (1) the opportunity, value and challenges of implementing virtual reality (VR) into aged care; and (2) providing care staff with specific guidance and step-by-step instructions—a 'how to' guide—so that they have the confidence to experiment with VR in aged care. The use of creative methods, from digital stories to illustrations and photographs, all freely available on the project website, has direct practice benefit.

monitored whether the care facilities continued with the VR activities once the researchers left.

Conceptually, the research was guided by May's Normalisation Process Theory (NPT),<sup>14</sup> an action theory increasingly used by health-care implementation researchers to identify, characterise and describe the mechanisms necessary for changing a system. This means understanding how new practices and technologies (such as VR) might become routinised (normalised) in the real-world setting of aged care. New interventions must operate within existing systems, and their ongoing and successful adoption depends upon the cooperation, engagement and leadership of individuals, social networks and organisations. The organisational culture of a workplace, its values, norms and practices, intertwine to impact if and how new technologies might be implemented, embedded and integrated into practice, with NPT identifying four key domains: coherence (change makes sense to all), participation (how people are involved), action (who does this work) and monitoring (the intervention has value). As such, guided by a NPT frame, this paper explores the organisational enablers and barriers that impacted the sustained rollout of these VR sessions by comparing the implementation of the programs across the three diverse aged care residences.

## 2 | METHODS

### 2.1 | Study design and setting

This project deployed a multiple qualitative case study approach,<sup>15</sup> which enabled a cross-case analysis of the factors driving differences and similarities between the participating residential aged care (RAC) homes. Three small- to medium-sized Australian homes in South-East Queensland (two in Brisbane and one on the Gold Coast) participated, recruited through word-of-mouth and professional networks, a non-probability convenience sampling approach. The diversity of the participating RAC (which differed in size, location and organisational priorities) enabled a nuanced and comprehensive understanding of the commonalities, differences and patterns influencing sustained VR adoption. Facility 1 was a not-for-profit 51-bed in a 20-year-old building; the other two facilities were newer for-profit providers—Facility 2 (one of 3 RACs) opened in 2019 with 150 beds, while Facility 3 (one of 40 RACs) opened in 2018 with 96 beds. Each facility nominated one staff member (the leisure coordinator) as the key contact to be the VR experience liaison, who invited residents to participate in facilitated VR sessions.

### 2.2 | Participants and data collection

The research team designed the participant sessions to include the VR experience liaison from each facility and a manageable number of participants per session (4–8) using a minimum of two *Oculus Quest 2* head-mounted VR devices. Each aged care facility arranged recruitment of residents, with the only eligibility criteria being that people needed cognitive ability to participate—so, for this first study, we excluded those with a formal diagnosis of dementia. Residents were encouraged to invite family members to participate in sessions as well, if they were interested, but no families participated.

Table 1 shows that across the three facilities, a total of seven staff participated, plus 15 residents: seven men and eight women, ranging in age from 69 to 91 years. Typically, four to eight residents participated in each session, held in lounge rooms and, in one facility, a theatre. The VR sessions (approximately 90 min) were originally planned for a weekly schedule over 4 weeks in 2021. Due to COVID-19 and gastrointestinal outbreaks, facility lockdowns meant that four resident VR session times occurred in Facility 1 and 2 over 2 months, and there was only one resident VR session in Facility 3.

A scaffolded VR training experience was developed to provide key steps in preparing the participants and their environment for a safe VR experience. Instructional

TABLE 1 Virtual reality staff training and participant sessions, including participant demographics.

Facility	Location	Session	Date	Staff no.	Activity/location	Residents	Age	Gender
1	Suburban Brisbane	Staff1	18/08/2021	5 staff	Online staff Meeting			
		Staff2	31/08/2021	5 staff inc. 1 Manager	Online staff meeting			
		T1	13/09/2021	1 staff	Lounge Room	7 residents	77–94	4F, 3M
		T2	20/09/2021	1 staff	Lounge Room	10 residents	77–94	6F, 3M
		T3	27/09/2021	1 staff	Lounge Room	10 residents	77–94	6F, 4M
		T4	21/10/2021	1 staff	Lounge Room	8 + 2 observers	77–94	4F, 4M
2	Outer Brisbane	Staff1	16/08/2021	1 manager	Phone call			
		T1	23/08/2021	1 manager	Face to face			
		T2	21/09/2021	1 staff	Theatre			
		T3	27/09/2021	1 staff	Theatre	3 residents	69–90	3M
		T4	22/10/2021	1 staff	Theatre	4 residents	69–90	1F, 3M
		Staff1	15/10/2021	4 staff inc. 1 Manager	Conference room			
3	Gold Coast	T1	18/10/2021	5 staff inc. 1 Manager	Conference room	1 resident	83	F

images developed by an illustrator (Figure 1) were used to help communicate the expected behaviours and guidelines for VR sessions. Staff participated in an initial meeting and VR training session to experience the device in each aged care venue. Subsequent sessions included the residents, and while the initial set-up was performed by the research team, the VR experience liaison was encouraged to co-lead the VR session.

The first sessions started with the *First Steps* game, designed to guide inexperienced VR users on the *Oculus Quest 2*, allowing staff and residents to become accustomed to the hand controllers and the 360-degree VR environment. Applications (VR games/environments) were chosen to ensure residents could be seated for the experience, reducing the requirement for standing or excessive movement. The sessions allowed each participant to control their VR experience preferences, with subsequent sessions tailored around goals set by residents. The selected VR applications were available for purchase via the Oculus device, and low-to-medium cost options (0–\$20AUD) were preferred. Most requests from participants were travel experiences, with the initially selected applications (*Wander*, *Alcove*, *Rapid Fire* and *Fruit Ninja*) designed to demonstrate the wide capability of VR. A minimum of two *Oculus Quest 2* headsets were used for each session, with the VR experience intended to be broadcast to on-site large-screen televisions using a Google Chromecast device.

At project completion, one VR headset was donated to each facility. A follow-up session with each facility 8 weeks later identified that only one of the three facilities had continued with an embedded VR program in its leisure activity programs. In what follows, we identify the factors that are likely to have contributed to this uneven experience.

Sessions were video-recorded, using a DJI osmo pocket camera. Reflexive notes were written after each session and interviews conducted with staff and residents after the last session. The Queensland University of Technology Human Research Ethics Committee approved the project (#4216), with written informed consent obtained from each participant, who nominated their own pseudonym and consented to published images and videos.

## 2.3 | Analysis

Qualitative data from the interviews were analysed using a two-stage approach. First, data were analysed inductively using a reflexive thematic approach.<sup>16</sup> Second, deductive analysis was conducted based on the four key analytical concepts of the NPT theoretical framework: coherence, cognitive participation, collective action and reflexive monitoring.<sup>14,17</sup> Transcripts were coded to identify commonalities and clusters across the data. Clusters were interpreted through the NPT theoretical framework to depict participants' acceptance, use and integration of VR. Four key themes were identified and are outlined in the following section with supporting descriptions and quotations (see summary in Table 2). In addition, the findings informed the development of a VR Toolkit for Aged Care, designed to support all aged care facilities in rapidly and effectively assessing the relevance of VR for their context and introducing VR activities in a safe and supportive way. The Toolkit outcome associated with each theme has been included in Table 2 and is also reported in the results.

## 3 | RESULTS

### 3.1 | Coherence—Theme 1: Positively appreciating the VR experience

Staff and residents across all three facilities were extremely positive about the VR experience, with residents quickly adapting to the immersive environments and gaining confidence in using the hand controllers. All showed high engagement with the content, and upon experiencing one VR travel experience, many participants requested to visit other locations or engage in activities such as desert trekking, hot air ballooning or animal safaris.

Staff reported that residents were very excited about participating, with one man asking every day:

“are they coming?”



FIGURE 1 Example of illustrations communicating best virtual reality practices in aged care guidelines. Illustrator: Simon Kneebone.

TABLE 2 NPT framework and analysis of themes informing virtual reality (VR) toolkit outcomes.

NPT Theoretical framework <sup>14</sup>	Key themes	Toolkit outcome
Coherence—how participants make sense of new things or practice.	Theme 1: Positively Appreciating the VR Experience	Careful consideration of factors including hardware, VR app selection, space requirements and safety is needed when introducing new users to VR to ensure a positive experience.
Cognitive Participation—the support work needed to implement and sustain a change in practice.	Theme 1: Staff VR Champions and the Importance of Personal Use and Experimentation with VR	Identifying staff as VR champions and providing them with time to experiment and learn about VR is imperative to make sense of VR.
Collective Action—the work needed to deliver the intervention or innovation.	Theme 3: Management Support	It is vital to have support from management to identify a VR champion and provide them the time to implement VR in leisure programs.
Reflexive Monitoring—the work to identify the benefits, costs and ability to adapt the intervention or innovation to local context.	Theme 4: Technical Challenges	Aged care organisations need to consider and update network infrastructure prior to the implementation of VR leisure programs.

As one staff member noted after the first session with eight residents:

Absolutely loved it today! Alfie was in heaven – he loved it! June did the First Steps game.

Another example was a 91-year-old participant who was keen to visit his childhood home of Tasmania, to walk the streets during the Sunday market. He was amazed by the quality of VR, capturing the changes to a place he knew from memory—explaining that:

Life is a mystery... this visualisation was better than my imagination... it changed so quickly!

### 3.1.1 | Toolkit outcome 1

The first part of the toolkit refers to the technology, the spatial requirements, safety assessment and the need to find the right kinds of VR applications (apps) for the residents to use and make sense of. These aspects are all critical factors that need to be considered when deciding how and when to introduce and implement VR with aged care residents. A careful approach is necessary to select the right kind of VR hardware, which will be easy for residents and staff to use. The use of space and setting up the area for the VR are critical aspects of creating a safe environment for users. The quality and ease of use of the VR apps inform the experience of VR users. Demonstrated by the comments from our users, it was clear that when residents are introduced to VR with careful attention to their safety, well-being, capacities and environment, they can have high levels of engagement and good experiences using it.

### 3.2 | Cognitive participation—Theme 2: Staff VR champions and the importance of personal use and experimentation with VR

Another factor that improved the chances of success in the programs was the ability of staff VR champions to first familiarise themselves and experiment with the VR equipment and experiences. Prior to this project, none of the staff across the three aged care facilities had used VR. While all staff undertook basic training in the use of the devices and training materials were provided, some staff champions took additional time to experiment and understand the potential of VR-based activities. After this period of experimentation, the staff member emailed the research team saying:

Just want you to know that the headsets are all set up and ready to go! Downloaded Alcove and had a go at some of the games, it's amazing! I even went to visit my hometown!

In contrast, feedback from staff VR champions at other facilities suggested that their limited experience and engagement with the devices may have impacted the roll-out of the program. This is reflected in the following feedback provided by a staff member at the beginning of the program:

I ran a session all by myself, and it was a bit hard but still could manage to take Heather to Alaska, Keith on a helicopter and Rita to Africa. It was a short session, but I had five residents that attended.

### 3.2.1 | Toolkit outcome 2

This toolkit outcome emphasises the importance of identifying staff VR champions who are enthusiastic about the potential for technologies like VR to contribute to the well-being of residents. Moreover, it is vital that these staff members are given the opportunity to experiment with VR themselves prior to rolling out VR-based activity programs with residents as this will allow them to draw on personal experience when describing the potential of VR-based activities. Recently published research investigating the role that staff play in facilitating VR enrichment programs in aged care settings further supports this finding.<sup>18</sup>

### 3.3 | Collective action—Theme 3: Management support

While all three aged care facilities were keen to participate, the degree of practical support and engagement with VR varied significantly (as shown in Table 1). Only at one facility (location 3) did the general manager participate in the initial staff training. This proved to be significant as the manager was able to immediately allocate resources to free up time so staff could focus specifically on delivering the VR project. For example, instead of her regular care activities, the next day, the personal support worker ran seven residents through various VR experiences. The residents' reactions were overwhelmingly positive, and she immediately emailed the research team to say:

Thank you for giving me the opportunity to see the enjoyment on their faces and allowing them to experience this.

The personal support worker very clearly became the VR staff champion needed for successful program delivery. Staff champions are necessary for success, but not sufficient. The two other facilities also identified staff champions, but they had limited ability to dedicate time to understanding the needs of the program due to a lack of direct engagement and support from management. This reinforces recent findings that management endorsement and leadership of new activities is essential.<sup>19</sup>

### 3.3.1 | Toolkit outcome 3

A clear outcome from theme one is the importance of management engagement and support for ensuring that the nominated VR champion has the time and resources

necessary to implement a VR-based activity program. Moreover, the reflections from the research team highlight the less tangible impact of management engagement; that it conveys to staff that the program has legitimacy and support as a part of the broader leisure program. This appeared to provide additional momentum in location 3, which was able to fully integrate the VR-based activity program into its activity program at the end of the trial period.

### 3.4 | Reflexive monitoring—Theme 4: Technical challenges

While the findings above illustrated how some factors contributed to the success or failure of the programs implemented at the different aged care facilities involved in this study, there were implementation challenges that impacted all programs. This related to the technical challenges, at both the individual and organisational levels, that presented real barriers to implementation.

One such challenge related to logging into and registering the VR headset. As the *Oculus* VR headsets chosen for the study are owned by Meta (previously Facebook), staff were required to associate their personal Facebook account with the device to log in. Requiring a personal Facebook account created difficulties in an institutional setting. For example, one facility had strict firewall rules for Facebook or social media access on staff accounts and work devices. The Wi-Fi network also blocked access to Chromecast and this meant that despite many attempts, we were unable to 'cast' the current users' VR experience to a nearby TV screen. This presented additional challenges for staff conducting the program as they were not able to 'see' what the resident was seeing in their VR headset, presenting challenges when trying to troubleshoot issues. One concrete example of this related to some residents experiencing issues seeing the menus in the VR display, a problem related to the viewing angle which can easily be solved by repositioning the headset strap. However, as the staff could not see the issue, this necessitated them taking the headset off the resident so they could recalibrate. Issues like this affected the user experience of the VR activity.

Another organisational challenge related to the difficulty accessing Wi-Fi. Security confirmations for login credentials for the VR devices needed Wi-Fi internet connections that had public access, something that was often not available in the aged care facilities. Even when public Wi-Fi was available, network settings tended to 'block' the 'unknown' VR headsets. For these reasons, it was difficult to set up many of the VR-based activities while 'on site' without an on-site network manager to assist. Staff and researchers were also unable to use their personal devices

to assist with set-up as these devices were excluded from the aged care facilities network. One of the only ways to address these challenges was to set up many of the applications and settings prior to visiting facilities.

### 3.4.1 | Toolkit outcome 4

The technical challenges detailed in theme three highlight the important role that network infrastructure plays in enabling VR-based activity programs. These challenges have also been identified in similar evaluations of VR in aged care.<sup>10,11,12,18</sup> To address these challenges, a key outcome that informs the online implementation toolkit developed in response to our study is the need for aged care organisations to consider network infrastructure carefully prior to implementing VR-based programs. This is vital to ensure that staff and residents can easily access the Wi-Fi infrastructure necessary to support VR-based activities in an efficient and effective manner.

## 4 | DISCUSSION

This study, with its unique focus on the organisational enablers and barriers to sustaining VR across three different aged care settings, provides critical insight about why VR (despite its potential) is not yet a common leisure activity in aged care. First, what mattered most was the visible commitment of senior leadership. Case Study Site 3 received no training sessions with the research team and residents, but from the first briefing, believed in the value of the project so much that they immediately pulled a staff member 'off the floor' to run VR sessions with residents the very next day. Such visible commitment and resourcing from the beginning enabled this facility to sustain VR, whereas the other two case study sites had not independently run a session since the research project team left.

The larger organisational size of Case Study Site 3 may have been positively influential here. They expressed a desire to be a sector leader in care innovations, whereas the other two smaller RAC were perhaps more focussed on 'business as usual' and the day-to-day routine. Future work is needed to explore how nuanced dynamics of market brand, commitment to innovation and alignment with strategic priorities might collectively influence the adoption and sustainability of technology adoption in aged care.

Aged care staff are busy, and staffing was a key barrier. As with any initiative, the main challenge of this project was that running VR activities 'pulls staff off the floor'. Therefore, it is important to consider other ways to engage VR champions beyond relying on existing staff. Two

of the facilities that took part in this project were looking at how to engage families and activate volunteers as VR champions. They considered involving secondary school students who may be able to facilitate VR sessions for residents as part of the voluntary service component of volunteering schemes they undertake (e.g. the Duke of Edinburgh Award). This is an approach that warrants further examination to better understand what mechanisms are available to increase the number of VR champions in aged care facilities.

## 5 | CONCLUSIONS

This study has demonstrated that, with relatively little support or training, VR can be implemented into aged care very quickly and with positive impact. Yet, two things are needed: (1) supportive senior management, willing to invest in purchasing the technology and allocating staff time for implementation; and (2) a staff champion, interested in experimenting with VR. Importantly, building internal staff capacity and support and identifying other potential VR champions requires opportunities to experiment with the technology and manage the unique technical challenges of delivering VR experiences to residents in institutional settings, including attention to network infrastructure. Despite some technological challenges, including being able to cast and share the experience, all staff and residents greatly enjoyed the VR sessions, which promoted laughter, sharing, reminiscence and connections.

Our future work will explore virtual VR training sessions and VR for residents with dementia. For now, our freely accessible online toolkit ([research.qut.edu.au/agedcarevr](https://research.qut.edu.au/agedcarevr)) provides tangible instructions to support others in experimenting with VR in aged care, helping make daily life in aged care more interesting for residents.

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## CONFLICT OF INTEREST STATEMENT

No conflicts of interest declared.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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