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The Role of Staff in Facilitating Immersive Virtual Reality for Enrichment in Aged Care: An Ethic of Care Perspective

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ABSTRACT

Immersive virtual reality (VR) is being used as an enriching experience for people living in residential aged care, or nursing homes, where care staff play a critical role supporting clients to use VR. In HCI research concerned with technology use in aged care, however, the role of formal caregivers has received limited attention. We conducted interviews with 11 caregivers working in care homes that have implemented VR as part of the social program offered to residents. Our findings highlight tensions between the opportunities created by the immersive VR experience and the risks and challenges full immersion presents for people in aged care. In this paper, we draw on an ethics of care framework to make visible the care practices involved in facilitating VR in aged care homes, highlighting the care required to ensure that older adults experience benefits when using immersive VR, while risks and challenges are carefully managed.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**.

KEYWORDS

Aged Care, Aging, Virtual Reality, Ethics of Care

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1 INTRODUCTION

Immersive virtual reality (VR) has recently been introduced in aged care settings to provide enriching and recreational experiences for people living in care homes [8, 48]. Residential aged care homes, also known as nursing homes, function as home and care facilities for residents, and as workplaces for care staff. Despite efforts by aged care organisations to maintain a busy calendar of scheduled social activities, care homes can be lonely and unstimulating places in which to live [44]. People living in aged care typically have complex care needs, including dementia, frailty, and sensory and mobility impairments [19, 34]. In many care home environments, there can be limited opportunities for residents to leave the home or to take part in activities they previously enjoyed. For this reason, there is growing interest in the potential for immersive VR to provide people in aged care with opportunities to travel virtually, to 'leave' the care home environment, and to take part in new experiences [1, 37, 52, 53, 65].

However, using technology to provide meaningful and enjoyable experiences in aged care is not straightforward. Technologies like VR need to be introduced carefully and with sensitivity to the needs of care home residents [8, 55, 66]. Care home staff can play a crucial role here, supporting their clients to use the technology and providing encouragement to ensure clients have a positive experience [41, 49, 62]. Despite this, the critical role that care staff play in mediating technology-based experiences in aged care homes has received limited attention in the Human-Computer Interaction (HCI) literature. Much HCI research in aged care settings involves the designer-researcher in designing and trialling new technologies [e.g. 23, 24, 29, 41, 43]. Furthering this work by understanding how care staff weave new technology-based experiences into their care practices, can help to inform the design and deployment of better technology-mediated enrichment experiences for aged care residents in the future.

In this paper we examine the experiences of care staff who use immersive VR with older adults living in aged care. We conducted interviews with 11 staff members working across seven residential aged care homes in Australia. The homes are part of one organisation that has implemented VR in the social program offered to residents. In this implementation, VR use is facilitated by staff employed in the "lifestyle team", responsible for managing the lifestyle

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program, or social activities, offered in aged care homes. By examining an authentic deployment of commercial VR in aged care, we focus on understanding the real-world experiences of staff tasked with deploying VR in their care homes. In making sense of our interview data, we use the concept of “care ethics” [9] to highlight that individual care practices, and considerations of care, were central when interviewees reflected on their experiences of using VR with aged care residents. A care ethics perspective enables us to recognise the negotiations around care practices that are required when new technologies are introduced in aged care—in addition to the practical and usability issues often highlighted by HCI research (e.g., [66]). This perspective allows us to understand how staff work with the tools provided, and in the context of their own ethic of care, to create enriching experiences for aged care residents, and helps in identifying barriers to effective long-term deployment of technology in this complex and sensitive setting.

This paper makes two contributions to the growing body of HCI research concerned with the design and use of immersive VR with older adults. First, drawing on our interview data, we identify conflicts between the benefits and challenges of using fully immersive VR as an enrichment experience in aged care, highlighting that the immersive quality of VR presents a double-edged sword. On the one hand, the fully immersive experience can provide the sensation of virtually “travelling” to another place; care staff see considerable value in this as a means of escape and enrichment for residents who have limited opportunities to leave the care home. On the other hand, the immersive quality of VR introduces intractable challenges that create barriers for its effective use in aged care homes. Full immersion can be frightening, and care staff cannot always monitor a person’s reaction to the VR experience because the head-mounted display (HMD) occludes vision of the person’s eyes.

Second, our analysis reveals the care work required to ensure that aged care clients experience benefits when using immersive VR while risks and challenges are carefully managed. Our informants described how they took care to offer personalised VR experiences for individual residents and to monitor residents’ experiences, thus enacting a personal “ethic of care” [58] in their approach to deploying VR as an enrichment experience. In this paper, we draw on Tronto’s [57] framework of an ethic of care to make visible the care practices involved in facilitating VR in aged care homes and identify lessons for future deployments of technology for enrichment in aged care. Below, we describe the notion of care ethics and introduce Tronto’s framework, before discussing related HCI research on the use of technology for enrichment in aged care. We then present our study, detailing the findings of a thematic analysis of our interview data that revealed opportunities and challenges associated with using immersive VR in aged care, followed by a discussion that interprets our findings through an ethic of care lens.

2 CARE ETHICS

Care ethics has recently emerged as an interpretive lens used by some HCI researchers [e.g. 56], although it has received considerable discussion and varied interpretation over the past three decades, making it difficult to clearly define [39]. At its core, however, is the notion that care is a central part of human life that reflects our nature as relational beings: we care for others, and need

to be cared for by others, throughout our lives [57]. The notion of an “ethic of care” originates in feminist scholarship, notably Carol Gilligan’s manifesto against the prevailing view that superior moral reasoning involves applying a set of abstract, formal rules, requiring a neutral, disconnected, point of view [26]. Gilligan argued that ethics is instead “a problem of care and responsibility in relationships rather than as one of rights and rules” [26, p. 73]. For Gilligan, “the logic underlying an ethic of care is a psychological logic of relationships, which contrasts with the formal logic of fairness that informs the justice approach” [26, p. 73].

That is, an ethic of care replaces abstract moral reasoning with a relational approach where moral judgements are made based on care with and for others. An ethic of care “requires continual dialogue and negotiation to establish needs and how they should best be met” [9, p. 19]. Care is therefore relational. It is also situated: caregiving takes place in different contexts, and these contexts will shape what it means to provide effective care. In some contexts, such as aged care, care recipients are vulnerable and highly dependent on the care they receive. In these settings, caregiving is a central and essential activity and its absence results in neglect. In other settings, care is embedded in everyday practice and may not be immediately visible or recognised as care.

2.1 Care Ethics in HCI Research

In HCI, researchers have drawn on care ethics to make visible embedded acts of care in settings where caregiving is not necessarily the core focus of activity. For example, Light and Akama [33] examined three case studies of participatory design work to show how participatory design evokes a politics of care. Other authors have used ethics of care to examine how people care for “things” in the home [32], how hackerspace community members care for each other [56], and how community activists enact democratic care practices in collaborative data work [38]. In the latter example, Meng et al. [38] conducted an ethnographic study focusing on a civic data activist who initiated a grassroots project. Drawing on Tronto’s philosophy of a caring democracy, Meng et al. showed how the activist paid attention to the needs of his neighbours and took responsibility for addressing these needs through his collaborative data work. Similarly, Toombs et al. [56] conducted an ethnographic study that examined acts of care within a hackerspace community. They found that while some caregiving acts were explicit, others were covert and implicit. Covert-implicit care included, for example, when community members listened attentively as other members talked obsessively (or “geeked out”) about their favourite topics. These were acts of care that only the caregiver could see: “If the care-receiver were to recognize such an act, it would diminish its effectiveness.” [56, p. 634].

In contrast, providing care is a central function in aged care homes, where caregiving is more likely to be overt and explicit, although this does not mean that the care provided in these settings is always good quality care. To date, an ethic of care perspective has been absent from HCI research examining the design and use of technology in aged care, although HCI researchers have drawn on related concepts such as personhood, recognition, person-centred care, and psychosocial care, in examining the value of technology for providing enrichment in later life [e.g. 21, 41, 49, 61].

2.2 Care Ethics in Aged Care

Social gerontologists have used the notion of an ethic of care to examine practices in aged care homes, where providing care is a core function. The quality of that care, however, can vary substantially and as noted above, its absence results in neglect. In many parts of the world, care staff are overstretched and under-resourced, providing care to people with a range of complex needs within organisational settings that prioritise efficiency over personal care [19, 30]. In Australia, where this research was conducted, the quality of aged care has been under considerable scrutiny in the past two years, with a Royal Commission investigating high profile reports of abuse and neglect in aged care homes [25]. In fact, the quality of care provided in residential care homes has been a cause for concern around the world for several years [36]. Despite this, research suggests that care staff often want to genuinely care for their clients but feel pushed into providing poor quality care; that is, their motivation to provide person-centred care conflicts with the priorities of the organisation [39]. This speaks to a tendency to overlook the voices and expertise of care staff. Within care organisations, “there is a general lack of acknowledgment of the moral work of caring that occurs within formal care work” [30, p. 1].

In our study, we identified the ‘moral work of caring’ as a key element of good practice when implementing VR in aged care. We initially set out to examine care staff perspectives on the use of VR in aged care to identify the opportunities and challenges that VR provides in this setting. In analysing our data, however, we became sensitised to the importance of the practices staff enacted in their attempts to ensure VR experiences were meaningful and enjoyable for the people under their care. An ethic of care perspective draws attention to these practices and highlights the relational work involved in using technology for enrichment in aged care. That is, introducing technology into aged care requires attending to, and responding to, the individual needs of the people being cared for, and a care ethics perspective helps to make this explicit. To understand care in the context of using VR for enrichment in aged care, we draw on the ethic of care framework set out in Joan Tronto’s (1993) book *Moral Boundaries* [57]. In this book, Tronto identifies four phases of care, aligning each with a principle in her framework of an ethic of care. We describe this framework briefly as follows.

2.3 Tronto’s Framework for an Ethic of Care

In Tronto’s depiction of care, the first phase of care is *caring about*, or noticing the need for care. This aligns with the ethical principle of attentiveness: “If we are not attentive to the needs of others, then we cannot possibly address those needs. By this standard, the ethic of care would treat ignoring others - ignorance - as a form of moral evil.” [57, p. 127].

The second phase of care, *taking care of*, requires the ethical principle of responsibility. Taking care of involves “assuming some responsibility for the identified need and determining how to respond to it... [It] involves notions of agency and responsibility in the caring process” (p. 106). If someone notices the needs of other people (caring about) but does not take responsibility for addressing those needs, then an ethic of care has not been met.

To meet this responsibility, the caregiver must enact the third phase of care, *care giving*. This requires the principle of competence

and raises questions about what counts as good care. It means that the need for care has only been met if good care has been provided:

“Intending to provide care, even accepting responsibility for it, but then failing to provide good care, means that in the end the need for care is not met. Sometimes care will be inadequate because the resources available to provide for care are inadequate. But short of such resource problems, [it is] necessary that the caring work be competently performed in order to demonstrate that one cares” [57, p. 133].

This principle clearly aligns with concerns about the quality of care provided in aged care homes, discussed above. But how is competency in caregiving assessed? In the fourth phase of care, attention shifts to the care recipient and to *care receiving*. This evokes the ethical principle of responsiveness: “if we are going to measure the effects of our care, then we need to know what has happened, how the cared-for people or things responded to this care, and what we might do next” [59, pp. 5–8].

Tronto’s four phases of care suggest that care should operate in a well-integrated linear process. However, Tronto notes that this is an ideal, rather than a reality, and that “disruptions in this process are useful to analyze.” (p. 109). This ethic of care framework helps make visible the care practices involved in using technology for enrichment in aged care. However, as we discuss later, it also helps us to identify when the technology — in this case immersive VR — conflicts with, or challenges, ethics of care principles.

3 TECHNOLOGY FOR ENRICHMENT IN LATER LIFE

Our investigation of immersive VR in aged care builds on a growing body of HCI research that aims to support social and emotional enrichment in later life. This work includes ethnographic studies in aged care homes [22, 23, 35], frameworks and guidelines about designing for social connectedness and enrichment in later life [18, 21, 63], and co-design and field trials of new technologies, both in residential aged care [13, 17, 24, 29, 41, 43, 49] and community settings [7, 62, 64]. In Gaver et al.’s [23] early work in this area, the “Photostroller” — a mobile device used to display photographs in communal areas within an aged care home — helped to spark conversation and created a sense of connection to the outside world: “it provides the pleasure of exploring the world’s complexity and richness, a pleasure as essential to older people as it is to any of us.” [23, p. 1766]. This observation — that older people, like others, need opportunities to explore the world’s complexity — can help to explain why there is now an emerging interest in the use of immersive VR in aged care.

3.1 Immersive VR for Older Adults

Immersive VR involves using a headset to enter a computer-generated virtual environment, creating a believable illusion and sense of presence within the virtual world [1]. While wearing the headset, the user is no longer able to see their physical surroundings, but only the 3D virtual environment, which they can explore by moving their head or body. In some systems, hand controllers can be used to manipulate and interact with the virtual environment. The immersive nature of VR has led to growing interest in its value for

use in a range of therapeutic settings, where it can be used to provide distraction, relaxation, or realistic simulation of challenging environments for therapeutic purposes [51].

Prior work on the design and use of VR experiences with older adults includes participatory research with groups living outside of care settings [5, 6, 28], and evaluation studies examining VR use in residential care homes [8]. Some of this research has focused on using VR to support reminiscence [4, 65]; to create opportunities to “leave” the care home and take part in activities that would be otherwise difficult [28, 52]; or using VR as a diversional tool to help manage behavioural symptoms associated with dementia [12, 48, 50].

While there is emerging research exploring social VR experiences with older adults [4, 6, 7], in most cases VR is used as an individual activity, especially in aged care where it has been deployed to provide diversion and relaxation, and to reduce apathy [12, 48, 50]. For instance, Baker et al. [8] conducted a trial of interactive VR with five residents of an aged care facility, who used carefully selected VR activities which they could interact with using hand controllers. Some participants found the VR activity to be more appealing than group activities offered in the care home. They valued the individual nature of the VR experience and enjoyed being able to engage with content that was tailored to their interests. Similarly, Vanden Abeele et al. [1] trialled a VR experience with older adults, including participants living in aged care and people living independently (that is, not in a care home). Like other prior research, the study showed that participants valued using VR to travel, both for the purpose of visiting places that triggered memories, and for enabling them to “see places they otherwise would not be able to see anymore.” [1, p. 14]. Drawing on their findings, Vanden Abeele et al. recommended that designers of VR experiences should respect the diversity of older adults and tailor immersive VR experiences to align with people’s diverse interests.

While this research highlights opportunities for using VR for personally meaningful enrichment — both within care settings and with older adults living independently — research also points to several challenges and barriers to effectively using VR in aged care. Common usability problems include physical discomfort caused by the weight of the headset, eye strain and nausea, and difficulty navigating through the virtual world — especially when the user is in a wheelchair or otherwise confined to a seated position [1, 66]. In addition, the immersive VR experience can be frightening, and some experiences can trigger unpleasant memories or phobias [1].

Further challenges relate to the involvement of care staff as facilitators of VR activities. To date, in most evaluation trials of VR in aged care, the VR sessions have been facilitated by members of the research team, rather than by aged care staff [e.g. 1, 8, 12, 48, 50, 65]. However, technology-based programs that are to be implemented on a longer-term basis will require active support and facilitation from caregivers [60]. A recent survey conducted with staff using VR in aged care suggests that sustaining a VR program within care homes is challenging due to the complexity of the care environment and the need for staff to undergo training [54, 55].

3.2 Challenges of Using Technology in Aged Care Homes

Introducing technology into care home settings requires careful consideration of staff time and availability, especially if the technology is to be used beyond the confines of a research trial. Many HCI studies conducted in aged care point to the need for technology-based activities to be carefully facilitated. For instance, Gerling et al. [24] conducted a trial of motion-based video games in two care settings: an independent-living seniors centre and a high-needs care home facility. They found that while those in the independent-living centre were able to continue the gaming sessions without facilitation, those in the residential care facility needed ongoing support from staff. This finding reflects the fact that many people living in aged care are frail, are in the later stages of old age, and may have dexterity issues that can impair their ability to use game controllers and other interfaces [43]. Therefore, care staff may unintentionally act as ‘gatekeepers’, excluding some residents from using technologies because of concerns about residents’ cognitive abilities [14].

Reflecting on their experience of conducting Internet workshops with aged care residents, Muller et al. [42] argued that “‘parachuting’ ICT into a care home is unlikely to have the desired effects since issues of the institutional framework, professional practice, family rights and responsibilities and so on will all be relevant” (p. 2640). Instead, they advocate for “engagement on the part of both researchers and participants” [42, p. 2640]. This argument is valid, yet it overlooks the possibility that researchers are not always responsible for introducing technology into care homes. Many IT companies and start-up organisations are introducing technologies into residential care homes [20]. These technology companies may appear to ‘parachute’ technology into care homes, and little is known about the experiences of staff and residents when new technologies are introduced.

There is a need, then, to expand the focus within HCI so that we can better understand what happens when technologies are introduced outside of the context of a research trial. To date, much HCI research in aged care involves introducing and evaluating bespoke prototypes [e.g. 23, 29, 41, 43, 50]. To extend this work, further research needs to examine the challenges care staff face when deploying technology that their employer has purchased from an IT company in order to provide innovative enrichment activities in the care home.

In this paper, we are interested in understanding the role of care staff beyond merely providing access to technologies; we want to understand how care staff facilitate technology-mediated activities. When these activities aim to provide enrichment or improve wellbeing, the role of the care staff is likely to become crucial in ensuring the success, or otherwise, of the program. There is, then, a need for further research in this area, especially with regard to the ongoing use of immersive VR in aged care, given that immersive VR presents opportunities for enrichment while also introducing significant challenges [51]. There is also a need to understand the broader social and ethical issues associated with using VR in residential

care settings, including the challenges that care staff face when they facilitate VR activities with residents. Our research aimed to address this gap by investigating care staff perspectives on their experiences of using VR as part of the lifestyle, or activities, program in residential aged care.

4 METHOD

We conducted an interview study with staff members working at seven different aged care homes in Australia. All homes were part of one organisation, which we refer to here as Pearl aged care (a pseudonym). In 2019, Pearl had deployed Oculus Go VR headsets to all their aged care homes, to be used as part of the activities offered to residents. We were invited by Pearl to conduct an evaluation of this program, which was to comprise interviews with staff members, followed by ethnographic field studies to observe the VR program in use at selected homes. The planned research, however, was cut short by the COVID-19 pandemic; due to restrictions at our study site, we were unable to conduct observations or interviews with aged care clients to gain insight into their experiences. Our analysis therefore focuses on interviews with the care staff about their experiences of trialling VR with their clients. The research received approval from the University of Melbourne's ethics committee.

4.1 Research Setting

For context, Pearl aged care is a large privately run aged care provider that operates approximately 80 residential care homes, located in metropolitan and regional settings across Australia. The residents of Pearl homes are typical of residential aged care in Australia, with many aged in their 80s and 90s and beyond, and most requiring significant care. Many aged care homes have dedicated “memory support units” for residents with advanced dementia, but interviewees also described residents who did not have significant cognitive impairments but who had other care needs, including limited mobility. The care provided in residential care homes includes help with dressing, washing, and toileting; provision of meals and support with eating if required; clinical care; and social support in the form of an activities program and diversional therapy. In Australia, especially in metropolitan areas, many aged care residents are from culturally and linguistically diverse backgrounds. In one of the Pearl homes we visited, for instance, there were residents from 19 nationalities at the time of the interview. While aged care residents are typically aged over 80, some Pearl homes also cater for younger people with disabilities. One interviewee described the diversity of residents as follows: “It’s not just the elderly, it’s different disabilities, vulnerabilities. Some are very high functional, some are not. Some communicate quite well, some don’t communicate at all. Some have a zest for life, some suffer from anxiety, depression, and other disorders. So a range of people.”

Within each Pearl care home, specialist staff employed in the lifestyle team are responsible for running the leisure activity programs, which aim to engage all residents in fulfilling activities. The organisation uses a range of digital technology, including VR, within the activity programs to broaden residents’ horizons, provide entertainment, and maintain social connections.

In 2019, Pearl aged care purchased a batch of Oculus Go headsets for each of its residential care homes across Australia. The headsets

formed part of an enrichment program in which lifestyle staff were given access to 22 different commercial VR apps. The VR apps were chosen by Pearl to provide entertainment and socialisation, and to alleviate agitation and aggression among their residents. Examples of apps included games such as *Bait!* (a fishing simulator) and *Merry Snowballs* (a VR snowball fight); meditation apps such as *Calm Place*; and entertainment apps including *National Geographic* and *Wander* (an app that allows users to visit distant places in VR).

To facilitate the program within the Pearl homes, a group of lifestyle coordinators took part in a “train the trainer” program, which was organised by a technology company that introduced VR to the organisation. The coordinators then showed their colleagues how to use VR as part of Pearl’s lifestyle or activity program. After this point the care staff had free reign to decide which VR experiences to select for particular residents. The research team was not involved in the initial VR deployment, but was invited to investigate how staff and residents were experiencing VR after the program began.

4.2 Participants and Recruitment

Eleven staff members from seven Pearl aged care homes agreed to participate in the study. Four of the participating care homes (homes A–D) were located within the metropolitan area local to the research team, two were in country towns in regional areas outside of the city (homes E and F), and one home (G) was in a regional location in another part of the country. Of the eleven participants, nine were members of the lifestyle team (lifestyle coordinators, assistants, or diversional therapists) and two were general managers of the homes.

We recruited the participants using purposive sampling. We contacted care home managers and lifestyle coordinators at selected Pearl aged care homes, which were chosen because staff had undertaken training in the VR program and the homes had begun using immersive VR in their activity programs. Table 1 provides an overview of the participants.

4.3 Data Collection

We conducted in-depth semi-structured interviews with participating staff members at the seven Pearl care homes. Data collection took place from September to November 2019. One or two members of the research team visited each home (except Home G) to conduct the interview in person. The Home G interview was conducted via Zoom. Although the care home visits did not include observations of residents using VR, each visit allowed us to gain some insight into the character and complexity of each care home environment.

Each interview lasted approximately one hour and included in-depth discussion about participants’ experiences of using VR with their care home residents. In Homes C, D, F, and G, two participants were interviewed together; the remaining three participants were interviewed individually. Prior to each interview, we reassured participants that their anonymity would be protected, especially in any reports back to the organisation’s management, and explained that we were interested in hearing both positive and negative experiences with the VR program so that Pearl could improve the program in the future. It was important that participants felt comfortable sharing their experiences honestly, as there was a risk that they may

Table 1: Overview of participants.

Pseudonym	Gender	Age	Role	Years worked in aged care	Confident using technology?	Pearl Home
Andrew	M	45–54	Lifestyle coordinator	8	Very	A
Brendan	M	35–44	Lifestyle assistant	8	Very	B
Catherine	F	20–34	Lifestyle assistant	10	Very	C
Carol	F	45–54	Lifestyle assistant	9	Somewhat	C
Diana	F	55–64	General manager	1	Very	D
David	M	35–44	Diversional therapist	3	Somewhat	D
Esther	F	35–44	Lifestyle coordinator	28	Very	E
Faye	F	55–64	Lifestyle coordinator	15	Very	F
Frank	M	20–34	General manager	10	Somewhat	F
Greta	F	55–64	Lifestyle coordinator	10	Somewhat	G
Gayle	F	45–54	Lifestyle assistant	5	Somewhat	G

have been concerned about their experiences being shared with the organisation’s management. We found no evidence, however, that participants were reticent about sharing; all interviews yielded rich, detailed insights about both the opportunities and challenges of using immersive VR in aged care.

The interview questions were developed by the research team, following consultation with Pearl aged care about their goals for the research. After completing a brief demographic questionnaire, interviewees were asked some background questions about their role and the residents in the home they work in, and then more in-depth questions about their experience of the VR program. The pre-set questions were deliberately open and simple, allowing the conversation to evolve and giving space for us to ask follow-up questions to gain further insight into the experiences that our interviewees shared. The questions were not informed by Tronto’s care ethics framework, as this was applied after the data collection period. The main questions we asked were: *How well do you think the VR activities work with residents? Are there any specific VR environments/games that you think work best? Any that don’t work? How do different kinds of residents respond to VR? In your experience, what are the main challenges to using the VR activities with residents? What are the main benefits when residents use VR? Do you have any strategies to help residents feel comfortable using the VR system? What advice would you offer to other aged care homes that may be using VR with residents for the first time? If you could design the ideal activity for improving residents’ lives, what would it be?* As these were semi-structured interviews, we asked follow-up questions as required to seek clarification and gain deeper understanding of participants’ experiences. Example follow-up questions included: *When VR is added to the weekend program, does that involve family members? Were there risks of people falling out of their chair? You mentioned that individualised approach - how do you make sure that the experiences that are offered are suitable?*

4.4 Analysis

Each interview was audio-recorded and transcribed into a written record. Participants were given a pseudonym, and we also replaced client names with pseudonyms in the transcripts. We conducted an inductive thematic analysis of the interview data. For practical

reasons, the initial analysis was conducted by the first and third authors, who each reviewed a set of transcripts to identify the positive aspects of the VR program, difficulties participants had experienced, and aspects of the program that could be improved. Findings from this initial analysis were included in a report provided to Pearl aged care. The report was then shared with the project team for discussion about the key themes for inclusion in an academic paper. Following this initial process, the first author conducted an in-depth reflexive thematic analysis [10, 11]. This involved re-reviewing all transcripts, discarding some initial themes, and combining and amplifying others. Through this process, it became apparent that the opportunities and challenges participants identified usually related to the immersive nature of the VR experience, and that care staff had developed strategies for managing the risks associated with this immersion. The reflexive analysis, focusing on the immersive nature of VR, continued while we drafted the findings section of this paper, with discussion among the authors about where particular examples fit within the themes. In line with reflexive thematic analysis, the first author was primarily responsible for generating and describing the final set of themes [11].

5 FINDINGS

In this section we present the key themes we identified, categorised into opportunities and challenges of using immersive VR for enrichment in aged care, based on our participants’ experiences. Participants observed that immersive VR created opportunities for: 1) fostering joy through personalised engagement, 2) resurfacing memories through virtual travel, and 3) facilitating diversion and relaxation. The fully immersive quality of VR, however, introduced challenges: 1) it was highly realistic, and therefore frightening, for some residents; 2) the HMD was heavy and uncomfortable, requiring the need for workarounds to make VR accessible for some residents; and 3) significant care was required to facilitate the activity to ensure residents were comfortable and to monitor their experience. We discuss each of these issues, in turn, below.

5.1 Using Immersive VR in Aged Care: Opportunities for Enrichment

5.1.1 Fostering joy through personalised engagement. Our participants noted that the immersive quality of VR, with each individual

using a HMD to engage in the experience, meant that it was a more personalised and individual activity than other activities offered in the care homes. When entering a VR experience, the user becomes somewhat disconnected from their physical surroundings, especially when the virtual world includes both visual images and sound. This immersion makes it a very individual experience. Participants commented on how, for some residents, this individual experience was a welcome alternative to the group activities normally offered in aged care homes. For instance, Carol and Catherine (Home C) chose to include VR in a selection of activities provided to residents during visits to the residents' rooms:

[Carol]: *A lot of people get scared going into a big group activity. You know they come into a nursing home and you're out of your comfort zone with a room full of people or something. [With VR] we're going into their space, into their home, and just saying 'have a look at this. It's really cool'. It's a little bit more intimate in their room. Yeah rather than a big group activity, it's just a little bit more intimate.*

[Catherine]: *We're giving them that one-on-one time, which is really, really important. Very important.*

The participants from Homes E and G described similar approaches and benefits. Esther said she used VR in "room visits, one-to-one. That's where we'll use VR if they request it." In Home G, the individual VR activity appeared to foster substantial joy, especially for those who were bed-bound:

[Gayle]: *Those [residents] that do not attend activities regularly are the ones that really benefit from it. They love the idea of [Greta] going to the room and showing them something.*

[Greta]: *Their faces just light up. I can visit every floor and say hello and I don't get a reaction. But if I've got my cart with my five [VR] headpieces on it, and I come to the door, their faces just light up [...] I've got a couple that literally do not leave their bed. They have to be rolled and manoeuvred and can't move their heads too much. So just to be able to go somewhere on that virtual reality is just amazing for them.*

Participants shared anecdotes that revealed the joy some of their residents experienced when engaging with the VR program. For instance, during our visit to Home C, participants showed us a video they had recorded of a resident using VR to watch 'Henry', an animation that tells the story of a hedgehog celebrating his birthday. In the video, a female resident dances while seated and sings along to the music. Reflecting on the experience, Carol said:

[Lois] *has a diagnosis of dementia but she's still able to talk ... She was so engaged with Henry and what he was doing, and I didn't say anything. She just put it [the VR] on, and [Lois] knew that she had to move her head to see the video.*

To foster enjoyment, lifestyle team members tried to ensure there was a good match between the residents' interests and the VR experiences offered. Participants noted that it was important to create a personalised experience; that is, to select content that aligned with residents' personal interests and needs. As Faye said,

"We ask them which one they want and explain it to them to see what they would like". This approach — explaining to residents what the experience will be like and finding out what experiences they might be most interested in — links with notions of person-centred care [30]. While it may seem like a straightforward approach, David noted that it can be challenging to ensure an experience is fully personalised:

How do we individualise it for the people that are in that experience? We have to be quite neutral as trainers or people that are engaging people in VR. We can't take them on our journey [i.e., our preferred activity]. We have to allow them to promote their journey to us so we can be with them... And that's a difficult mind switch because the lifestyle departments in aged care, as far as I can see, are very much "sit and attend" programs... So if I'm somebody that is totally physically unresponsive and the person who I'm dealing with is unable to work out what my nonverbal communication strategies are, I end up being somebody that is a visual participator. [But] if they know who I am, I could actually be an active engager.

David's reflection highlights how caregivers can enact care ethics by designing experiences for and with the people they care for. In this way, the caregiver plays a role as designer of the personalised VR activity.

5.1.2 Resurfacing Memories Through Virtual Travel. Of all the VR experiences that Pearl aged care included in its program, the application Wander was seen by participants to be particularly valuable.

Wander uses data from Google Street View to enable the viewer to "teleport almost anywhere in the world" [46]. Participants saw value in Wander because it could be used to evoke individual memories and experiences. This aligned with the benefit of using VR for individual engagement and personalised experiences. Esther noted that Wander is person-centred: "it takes them wherever they choose to go."

Using Wander for virtual travel sometimes created opportunities for serendipitous reminiscence, bringing to light memories that residents had not previously shared with team members. In one example shared by Carol, a memory of a significant event in a resident's life was surfaced through her experience using Wander to "travel" to Venice:

[One resident] went on the boat to Venice and she liked that. That was good for her cause it clicked that she'd been to Venice on her honeymoon with her husband. So she has got really early onset dementia and she watched this video [on VR] and then she remembered that her and her husband had a honeymoon in Venice. But she couldn't tell you that, talking to her... So that was amazing to figure out... So she watched the video and said 'Oh I went to Venice with my husband on my honeymoon.' So that's [gone] straight into her care plan now because we didn't know that.

Similarly, Greta described a male resident who would normally shun group activities. Using Wander to travel virtually to Africa

led to a conversation about his real-world travel experiences as a younger man:

He's a single guy and he's travelled the world, and he's been there and done that, and he can get quite bored [here]. So I put it to him if he would be interested in it, spoke to the RN [registered nurse] to make sure that clinically, he was okay, that I wasn't going to upset anything for him and they just say, "Yes, give it a go. Try it," and it worked... He did the African one. And he actually remembered going to Africa, that he never had told me in the last five years that I've worked with him.

Reflecting on this experience, Home G participants noted that virtual travel served as a trigger for surfacing memories:

[Greta]: *He had a memory trigger... That he had previously been to Africa, that he had completely forgotten.*

[Gayle]: *That's right. It was something that actually triggered his memory way back when he was travelling. And that's probably one of the advantages of the virtual reality, especially when it triggers a memory like that.*

In this way, virtual travel in immersive VR extended the “biography work” that care staff engage in [42]. While virtual travel surfaced hidden memories serendipitously, participants also described using Wander in a more targeted and deliberate way to provoke reminiscence. The immersive quality of VR made it particularly valuable for this purpose. When using the VR headset to visit a place associated with past experiences, residents could feel like they were “really there”. When asked about the main benefits, Esther said:

It's great for reminiscence [...] It's a nice activity because you are taking them away, you're taking them right back to that place. If you use Wander, it's a really nice, valuable activity.

However, Esther also noted that because it is such an immersive experience, using VR for reminiscence can sometimes be emotionally challenging, for residents and caregivers. Reminiscence can, for instance, surface longing for one's earlier years or evoke memories linked with difficult life experiences. Esther shared an anecdote about a resident who became emotional after using VR to visit her childhood home:

Yeah we visit their street, their house, the area where they grew up. Although some of it may have changed, there's still a lot of images there that haven't. So yeah, we would go, "Can I have an address? Can I have your school and where was it?" We do a lot of googling on the Wander.

They love it, yeah. One lady got teary last week. She was so happy. It was a happy tear. But then you're thinking later when you walk away and your shift's finished, and you go home and you're thinking, I hope she's okay, because it really took her back to that time and she got a bit teary. Yep, they were happy tears, but if they're left with that all day, then... [breaks off]

This quote highlights the care involved in introducing VR to residents, and the nuanced empathy required from lifestyle team members when making sense of residents' responses. Was this “a

happy tear” or sadness? Did the resident really enjoy it? Did she need further support? Esther reveals here, too, that the care involved in facilitating the VR activity — and, likely, other activities in the home — does not end when the activity ends. Esther continued to mull over the resident's response after her shift had ended. This example suggests that enriching residents' experiences through VR may not just have recreational benefits, that is, fostering joy and wonder or diversion. It can also involve deeper engagement with memories and a reflection on one's life history.

5.1.3 Facilitating Diversion and Relaxation. Finding creative ways to provide diversion for residents — especially for residents with dementia — was an important part of the care provided by our participants. As noted in the examples described above, immersive VR appears to have the power to transport a person to another world, and to make them feel like they are really there. For this reason, it offers special advantages in residential aged care settings where residents' physical worlds are constrained. For Carol, being able to transport people away from their physical reality, even momentarily, was one of the main benefits of the VR program:

Well I suppose talking on the dementia level, that [VR] takes them out of their reality for a little while, which is probably a positive thing for a lot of them because their reality's not very nice. And that's part of our job, to make them feel happy in the moment with what we're doing and distracting them with something that interests them and something that they enjoy.

Brendan, too, described how VR offered an alternative world for residents to visit, fostering joy, enrichment, and relaxation:

Having the Virtual Reality program is an amazing way to give that resident an outlet to enjoy the world we live in and the good parts of the world that we live in, through a safe environment in which you sit down, relax and enjoy being in an environment, in an experience where they are able to escape if they'd like to.

VR also facilitated diversion from physical discomfort. Greta was surprised to discover that immersive VR could help with pain management:

Oh, I had never thought of it before it happened. I had a resident who had ... bruised her ribs, and she was very uncomfortable. She couldn't get comfortable lying down, she couldn't get comfortable sitting up. This week, I went in, and I said to her, "Would you like to [use VR]?" She goes, "Oh, no. I'm in so much pain. I don't think I could." And I said, "Well, let's just do a little one and it might take your mind off it." So, she said okay and so she - I can't remember exactly which one we had her do. Probably it was another Venice one. She'd been to Venice and it made her feel good... She finished it and she actually said to me that while she was watching it, she actually felt - she can't remember the pain she was in. It just made her relax. And she was absolutely in awe of it.

In this quote, Greta describes offering the VR activity to a resident who initially expressed disinterest in participating, because of her discomfort — “Oh no... I don't think I could”. Greta applies gentle

persuasion — “let’s just do a little one” — and the resident relents and agrees to give it a go. This example hints at a paternalistic approach to care: the care provider decides what will be ‘good’ for the care recipient. In discourse about care practices, paternalistic models of care are typically seen to be in conflict with person-centred care [e.g. 9, 47]. In choosing and designing activities that will suit individual residents, however, lifestyle team members may feel that they need to encourage residents to try new things; otherwise they would be limited to activities that are already known.

This example points to a tension in care ethics that can arise when technology-based activities are incorporated into the social program in aged care. Caregivers want to offer activities that will meet the needs of individual residents, but it may not be possible to predict how residents will react to, and experience, the new activity. The full range of benefits and challenges may not be known in advance, requiring an element of trial and error, which can be considered risky in an aged care environment. In this case, the risk paid off: Greta had not known prior to trying it out that VR could be effective as a pain management tool. However, participants also identified significant challenges and risks, which we discuss next.

5.2 Challenges and Risks of Using Immersive VR in Aged Care

5.2.1 *Being fully immersed - is it too real?* Arguably the most significant challenge for implementing VR in aged care is that full immersion in a virtual world can be frightening for some people [51]. When using VR via a head-mounted display, residents enter a moving 3D world. The person ‘inside’ the VR experience can no longer see their physical surroundings and will feel as though they can move within the virtual world. While this immersion appears to provide significant benefits, the flipside is that the immersion can sometimes feel “too real”, which can elicit fear or challenge residents’ perception of reality. In Home A, for instance, Andrew shared an anecdote about a resident who was worried she would become “sucked in” to the virtual world:

There’s one lady who started... But she’s done it for two minutes and she’s taken it out... She doesn’t have dementia; she doesn’t have a diagnosis of dementia. But what she has is, she comes from a very strict background where she does things differently. And so, her worry is that she’ll get sucked into the virtual reality world... She worried. She took it off and was like, “I’m not very comfortable” and then said, “I’m worried I might live there in the future.” ... she’s afraid that she will get sucked into it. And so, I have to give her emotional support and reassurances that that isn’t the reality in that thing. Because it is so immersive.

Other participants, when asked if there were any residents who should not use VR, noted that it would not be suitable for any residents who had experienced symptoms of psychosis or had difficulty distinguishing reality from fiction. For these residents, VR would likely cause confusion. Greta explained that, for some residents, the distinction between the real world and the world encountered through television was already tenuous:

[I wouldn’t use it with] people with hallucinations and people that can’t grasp the difference between reality

and make-believe. I mean some of our residents, I can’t even put the news on because if there’s a crash or something, they think it’s their family.

Similarly, Esther noted that there were some residents whose conditions meant it would not be suitable for them to participate in the VR program:

We’ve got a guy with a brain tumour; definitely not on him. And schizophrenia, so definitely not there. Severe alcohol dementia with severe behaviours, definitely not there. So there are some people we just would not — it’s just too risky to even try.

[Interviewer]: Can you say what’s risky about it?

[Esther]: *I’m worried that, and so are the nurses and rightly so — I’m worried that the difference between reality and what’s real and what’s not, just might freak them out... Might be a bit too much... You are right there [in VR]. You are right under the sea [for example], and if somebody cannot already in life differentiate what’s real and what’s not, or they’re paranoid, how can you put somebody in that situation... If they can’t give me an informed consent and unable to understand, I can’t do that to them.*

Here, Esther notes that being “right under the sea” could be too much for some residents, referring to one of the VR experiences that offers users the sensation of being underwater, floating in the sea and exploring sea life. While such an experience might be relaxing for some, it could be frightening for others to have close encounters with 3D images of sea creatures, or to feel as though they were trapped underwater. This experience would be especially challenging for those who had a particular fear of water [1], something which caregivers may not know about in advance — again emphasising the need for care in deployment. David reflected on the approach he took to make sure that the relaxation experiences offered to his residents did not trigger traumatic memories:

[I start by] checking with families. Because our relaxation program that we run here is on the beach, we make sure that no-one’s had any issues at the beach... And that’s quite a hard question to ask people. You know, has anyone you know, died at the beach? Because we have to be sure of that. [...] And we have exactly the same issue with doll therapy, because we don’t know who’s lost babies, you know, so we just have to handle it in that same sort of way.

This exchange reveals the preparation care staff needed to do before offering new activities to residents. To avoid triggering trauma, staff needed to investigate aspects of residents’ life histories that residents, and their families, may not have previously shared, nor wanted to share. In addition to this preparation, staff needed to carefully monitor residents’ reactions while they were immersed in the VR experience. Esther recounted two situations she had witnessed when residents had become frightened because the immersive 3D environment in VR made the experience feel so real. In one, a resident was watching an immersive Disney program, the Jungle Book, and “got the fright of her life because of the snake.” In the program, the 3D snake would “just pop up from behind”. In another example,

a resident who had prior positive experiences with the VR program was encouraged to use the hand controllers to explore the environment while immersed in the National Geographic travel program:

And he put himself on the Grand Canyon ... [He was] terrified! Had a panic attack. But he didn't tell me, he just said, "I've had enough" and off he went to his room, because he's quite independent and cognitive. It wasn't until a week later he came back and told me when I asked, did he want to have a go, and he said, "I can't." He's had a go since. I've sat with him, and we've done Wander...

These examples reveal that significant care is required to ensure residents feel comfortable when using VR. The immersive nature of VR gives rise to a need for guidance and care around "how the user *physically* experiences the story" [51, p. 183, emphasis added]. In some cases, as in the last example, it was not immediately obvious to the lifestyle coordinator that a resident had experienced a negative reaction. This highlights a substantial challenge in facilitating the VR experience: with the HMD covering the resident's eyes, it may be difficult to carefully monitor emotional responses. As discussed below, participants therefore took significant care when facilitating the VR activity and ensuring residents felt comfortable throughout.

5.2.2 Managing Physical Discomfort. Participants noted that some residents found the HMD to be uncomfortable and heavy to wear, and the hand controllers difficult to use. In some cases, this physical discomfort led residents to withdraw from participating in the VR activity. In response to this challenge, some participants adapted the way they introduced VR to residents.

In Home C, an experience with a resident who found the HMD too heavy to wear led the lifestyle team to take the straps off the HMD, so that it was not worn on the head but held over the face instead:

[Carol]: *So, we did have one lady, she put it on, but she felt it was just too top heavy for her head, yeah. Then we tried to make it tighter so that she sat up with it, but she just said, "take it off. It's too heavy for my eyes." Yeah, she couldn't hold her head up.*

[Catherine]: *That's why we took the straps off so that they could just manoeuvre on their own accord.*

[Carol]: *It just gives them that access of just moving it away if they want to... Just like a pair of binoculars, that's the easiest way to explain that's how you hold it. And then they can take it off at their leisure if they get sick of it.*

Another barrier for physical comfort is that immersive VR is known to trigger nausea in some people, especially those who are prone to experiencing motion sickness or vertigo. Because of this, residents were asked to sign a waiver before using VR, which led some to resist taking part in the activity. The expectation of physical discomfort and the potential for residents to experience nausea, meant that some lifestyle coordinators were quite careful in only providing the VR experience to residents for a few minutes at a time.

Residents also had some difficulty operating the hand controllers. As Greta observed, this created a significant barrier that made it difficult to use VR for interactive games:

I think it's called 'Bait' [the fishing game]. That is the only game one that I've actually tried. And it took me nearly an hour for this resident – who is quite computer [literate], he's got a computer in his room – to actually manoeuvre the controller to be able to use it as a fishing rod. That's the first and only time. It was too time-consuming to continue that with the other residents that were not capable of it.

As Greta notes, helping a resident to manage the hand controllers so that he could play the fishing game took a lot of time and attention, even though he was one of the more computer literate residents. This presents a challenge for care staff who, as noted earlier, want to provide one-on-one support and person-centred care but must also be mindful of their ability to support and respond to other residents in the home. As prior research has shown, a difficult tension for staff to navigate is choosing between personalised activities that meet the needs and interests of individual residents, and group activities that provide engagement and entertainment for a larger number of residents [17].

5.2.3 Caring for Residents During the VR Experience. The immersive quality of VR means care is required to support and guide someone through the virtual experience. Wearing an HMD, the user is cut off from their physical environment and cannot see the caregiver sitting with them. All the lifestyle team members we spoke to said they would stay close by and talk to residents throughout the VR activity, offering help and reassurance, sometimes through a physical pat on the shoulder or knee. However, they needed to be cautious not to break the "spell" of the immersive experience, which was difficult when the person experiencing VR could not see the facilitator:

[Greta]: *When it first starts, I always say, "All right, I'm here" and I'll touch their knee or their hand. But if I do that during the experience, they freak out because -*

[Gayle]: *It's disturbing*

[Greta]: *So, you don't – once it starts, I let them do it and they're on their own. Sometimes they'll say to me, "Are you still here?" and I'll go, "Yes, I'm still here." But I just let them know beforehand that if they need me, I'm here. I don't leave their side. If they don't like it, they just tell me, and I'll take it straight off. But I don't interrupt the actual experience, no.*

David described a similar tension between wanting to provide reassurance and not wanting to interrupt the immersive experience. For him, there was a danger of creating a sense of psychosis. When asked if he used any strategies to help residents feel comfortable while they were using VR, he said:

Touch. Soft communication. Yeah, all your positive points, the shoulder. If somebody is starting to become agitated and they start to shake their legs, there's nothing wrong with just [saying], "I'm here, I can see you sitting wherever you're sitting." And making sure that you're using

their first name, so they know that it's you they're talking to. That in itself has its own issues because if I'm talking and they can't see me, [they might think] "am I having a psychosis moment? That is challenging. Because they immediately will turn the head to the sound, but if you are not there..."

As noted earlier, with the HMD occluding the person's eyes, it can be difficult to ascertain whether the person is enjoying the VR experience. It was important that care staff were physically present and able to provide reassurance to residents immersed in the experience, but at times staff were unsure of how residents were responding to the experience. David noted that this was particularly challenging because immersive VR removed any opportunity to maintain eye contact with the resident:

Creating that environment when you are not in that world with people is extremely challenging because, you know, agitation, anxiety, and all of those can be displayed in completely silent ways. So, without having communication through eye contact, it's very difficult to know if they are frozen through terror or relaxed.

The care required to facilitate the VR experience meant that it was labour-intensive. Participants viewed it as a one-to-one activity, and it required a lot more attentive facilitation than group activities, as Diana observed:

The ratio of team members to residents in this type of exercise is far higher than what we would have in most of our other engagements. You know, you can have one of the lifestyle team members with 16 residents for instance. And of course, you wouldn't be doing that with the virtual reality exercise.

Participants put in a lot of work behind the scenes to address the challenges described above. For instance, some said they had taken the VR headset home to try out different applications before introducing the experience to residents. This not only helped them to become familiar with the equipment and the content available, but also gave participants the opportunity to experience the same enjoyment and reminiscence that residents had experienced when engaging in the VR program:

[Brendan]: *Our lifestyle coordinator, she actually asked me to take the Virtual Reality goggles home, use it at home, become familiar with it first. So that I was able to [become] familiar with it, feel comfortable [so] I know what to do and how to encourage the correct application of the paraphernalia.*

[Interviewer:] So you'd get yourself familiar with the equipment and with the environment?

[Brendan]: *Yes ... I became very familiar with it. Showed my wife – my wife enjoyed it as well. And I'll say one quick thing, when I did take it home, I used the Wander program and we actually went to Sacre Coeur in Paris. I almost proposed to her [there]. We were in Paris at the time. I was planning on proposing to her, but I showed her where I almost proposed to her and she was blown away by it.*

This exchange reveals that the labour required to ensure the program worked well extended beyond providing one-to-one support during the experience; lifestyle team members needed to be well-prepared and familiar with the equipment and applications on offer. This can be aligned with the notion of implicit yet overt care [56]: it was *careful*, but not an explicit caregiving act. As we discuss below, lifestyle team members' reflections about VR in aged care reveal that in designing and facilitating the VR activity, staff were enacting an ethic of care. However, immersive VR was a double-edged sword that introduced challenges that sometimes conflicted with this ethic of care, as we discuss next.

6 DISCUSSION

This study aimed to investigate how aged care staff manage and respond to a new technology-based VR activity, introduced as a way of innovating the lifestyle program offered by an aged care organisation. Departing from HCI research that focuses on designing and evaluating a bespoke intervention, our study focused on understanding the negotiations and reflections that care staff engaged in following deployment of a commercial technology in aged care homes.

In this section we return to Tronto's ethic of care framework [57] to consider how staff enacted an ethic of care while negotiating the opportunities and challenges that immersive VR presented for their vulnerable clients. Applying this care ethics lens to our analysis enables us to explore the complexities involved in introducing technology into care homes. Ultimately, we argue that it is not enough to simply 'introduce' new enriching technology-based experiences in care settings. We need to also consider the contexts in which the technology is being used and the role of key stakeholders, including formal caregivers, in creating an environment that enables effective and ethical ongoing use of technology for enrichment in aged care. Below, we discuss how interviewees enacted Tronto's four phases of care and the tensions they managed while doing this. For each phase, we highlight a lesson for future deployment of technology for enrichment in aged care.

6.1 Caring About

According to Tronto [57], the first phase of care involves recognising that a need for care exists, which requires attentiveness [57]. Our participants described their attempts to tailor the VR experience to individual interests and needs. To do this, they first needed to care about, and be attentive to, those needs. Interviewees spoke about residents' needs for personalised engagement and one-on-one activities. Immersive VR enabled care staff to offer this individual attention as an alternative to the group activities normally on offer in care homes. Staff recognised that some residents needed to experience adventure, to connect with the world outside the care home, to escape their "not very nice" reality, or to be distracted from physical pain. Immersive VR was not only effective for providing this distraction but was also valuable for initiating conversation between residents and care staff, in some cases facilitating new knowledge of residents' life histories through the surfacing of forgotten memories. VR sessions sometimes provoked serendipitous "biography work" [42]. When this happened, staff were able to add details to the residents' care plans, building

a richer picture of residents' lives and interests. In this way, the VR activity provided lifestyle staff with a new tool to expand their ability to be attentive of individual needs, to foster engagement in meaningful activities, and to cultivate a sense of belonging for residents.

This aspect of care work — that is, being attentive to individual needs and life stories — aligns with Foley et al.'s [21] framework of design sensibilities for designing with people with dementia, which emphasises that recognising and valuing the whole person is important in designing meaningful experiences. Their core argument — that designing meaningful experiences requires recognising the needs and values of the whole person — can also be applied to the work of care staff tasked with implementing new technologies in aged care settings, and clearly aligns with the value that participants saw in using VR for personal enrichment in aged care. A meaningful VR experience that sparks conversation and facilitates the sharing of life stories is likely to contribute to a sense of recognition and belonging that can often be lacking for residents in a care home. Through virtual travel, the VR activity also provided an opportunity for residents to explore “the world's complexity and richness” [23, p. 1766]. These opportunities for enrichment, however, were not due to the immersive qualities of VR alone. Achieving benefits from the VR experience required lifestyle staff to “care about” the residents and their needs.

Lesson 1: Reflecting the importance of caring about individual needs, our first lesson is to highlight that it is vital that any decisions about using new technologies in aged care should be based on a deep understanding of the needs and interests of individual people being cared for, which may require the involvement of caregivers in decisions about the technologies to be used. This lesson aligns with participatory design approaches and echoes findings from other recent HCI research that has highlighted the value of the knowledge care staff have of residents' interests for co-designing meaningful interventions [49], and the role of informal caregivers in ensuring the successful appropriation of videogame technologies for people with dementia [60]. Technology-based experiences need to align with the personal interests and needs of the people being cared for, and achieving this alignment requires awareness of, or attention to, those needs. In turn, this requires the active participation of caregivers and the time and space within the care setting to allow caregivers to determine individual needs.

6.2 Taking Care of

Having identified individual needs that could be met using immersive VR, staff members then had to design and introduce VR experiences that responded to those needs. In this way, they were “taking care of” the person's needs. In Tronto's framework, this phase of care involves “assuming some responsibility for the identified need and determining how to respond to it” [57, p. 106]. Taking responsibility for meeting the needs of residents meant that caregivers became *designers* of the VR experience, choosing VR experiences that best aligned with individual interests. Conversely, they also became *gatekeepers*, choosing not to introduce VR to those who they believed would incur harm when immersed in the virtual world.

Participants' implicit role as designers of the VR experience provides a point of contrast with HCI research on the use of technology

in aged care, which often focuses on bespoke technologies designed and introduced by researchers [23, 29, 41, 43]. The VR *applications* used in Pearl Aged Care's program were commercially available, so neither the research team, nor the aged care organisation, participated in designing the applications that were offered to residents. However, with access to a suite of VR applications, participants were able to tailor the *experiences* to individual interests and needs, in this way acting as designers of the experience.

It was only through the active involvement of care staff that residents were able to access personally meaningful experiences. Staff were enacting an ethic of care by designing and offering an experience that was personalised and individual, and that enabled residents to experience a momentary connection to the world beyond their home. We can see this care ethic most clearly in the reflection shared by David in Home D. He noted that staff members ought not to design experiences that *they* wanted to run (such as the “sit and attend” programs that are commonly offered in aged care) but should create the space for residents to “promote their journey” — or their preferred experiences — to staff, enabling staff to design activities that respond to the needs of individual residents. Unfortunately, however, residential care homes are often structured in a way that prioritises efficiency and standardised approaches to care. For residents who are not interested in group activities such as Bingo, there can be limited opportunities for meaningful engagement [44, 45], and research suggests that staff can feel frustrated at not being able to enact person-centred care [30].

Our findings show how immersive VR can be deployed as part of a person-centred care philosophy, but there are barriers to using it effectively and ethically with all residents. In enacting an ethic of care, staff not only created personalised VR experiences; they also took care to determine when VR would not be a suitable activity for the people under their care. Interviewees recognised that there were some residents for whom immersive VR would be too confusing, frightening, or confronting. Not offering VR to some residents, then, was seen as good care practice and responsible gatekeeping.

This need for “responsible gatekeeping” was prompted by the immersive nature of the VR activity. Immersive VR was a double-edged sword. Wearing the HMD and viewing a 3D world gave the sense of being in another place and a momentary sense of escape, yet it could also be frightening and confusing. Interviewees were asked if there were any residents who they would not offer the VR activity to, and all had a ready answer: they would not use VR with individuals who had difficulty distinguishing reality from fiction. This meant being protective of people with disorders such as schizophrenia or forms of dementia that caused hallucinations.

Lesson 2: Using technologies ethically and effectively for personal enrichment requires caregivers — or others tasked with facilitating the activity — to enact the dialogic and relational aspect of care ethics [9]. To be effective designers and gatekeepers of the VR experience, lifestyle staff had to negotiate with residents, family, and other professionals, such as clinical nurses, to ensure the chosen experiences would be appropriate for individual residents. It may not be sufficient, then, to understand or care about individual needs (Lesson 1). To meet those needs effectively, the caregiver needs to be able to shift between acting as designer and gatekeeper of the experience, deciding what kinds of experiences are appropriate for individual clients, and consulting with other stakeholders in

making those decisions. This again highlights the complexity of introducing technology into aged care homes and emphasises that a sociotechnical perspective is required to understand and improve the use of technology for personal enrichment in aged care.

6.3 Care Giving

Using VR to meet individual needs was not without its challenges. It was a labour-intensive process that involved explicit care giving, to ensure that residents were properly supported while they were immersed in the VR experience. The third phase of Tronto's framework, care-giving, "involves the direct meeting of needs for care. It involves physical work, and almost always requires that care-givers come in contact with the objects of care." [57, p. 107]. The moral dimension of care aligned with this phase is competence: "Making certain that the caring work is done competently must be a moral aspect of care if the adequacy of the care given is to be a measure of the success of care." [57, p. 133].

We can see staff enacting this phase of care in taking on a role as facilitators of the VR activity, in addition to their role as designers and gatekeepers. Facilitating residents' engagement with immersive VR required significant care. The staff we interviewed spoke of the work they undertook to, for example, make sure the person immersed in the VR experience knew the staff member was there and to provide a reassuring presence. In carefully facilitating the activity, staff engaged in "overt, explicit" care [56]. Interviewees described how they stayed nearby, provided reassurance through voice and touch ("I'm here"), and helped the resident to remove the VR headset when they had had enough.

This description of careful facilitation could be seen as situated and personalised care work. Staff members responded to the needs of individual residents by adapting their caregiving approach in response to the in-the-moment experiences of each client. This careful facilitation was necessary but also introduced two challenges. Firstly, it was labour-intensive, raising questions about the longer-term feasibility of using immersive VR in a busy aged care lifestyle program. Indeed, a key challenge for all technology-based enrichment activities in aged care is that they require staff time if they are to be designed and used in a way that responds to individual residents' needs. Residential aged care, however, is a complex environment where staff are catering to the needs of multiple residents with complex care needs [19]. It is not surprising that group activities may be preferred because they allow staff to cater to multiple residents at once [14]. Nevertheless, a key potential benefit of VR in aged care is that it does offer an individual activity; this benefit was emphasised by our interviewees and has been identified in prior research [8]. For this benefit to be realised, however, requires an investment of time and resources often not available in aged care organisations.

A second key challenge for care giving is that the immersive nature of VR made it difficult to effectively facilitate the activity without "breaking the spell" of the immersive experience. When residents were wearing the VR headset, care staff used touch to communicate (e.g., a pat on the knee or shoulder) and maintained conversation with the person who was using VR. This was necessary, but also meant the caregiver — who was not visible to the resident — was intruding into the world the resident was experiencing.

This risked causing confusion, distress, or even making someone fear that they might be having a psychotic moment, as one of our interviewees noted. This challenge again speaks to the double-edged sword of immersive VR in aged care: the immersive nature of the technology can make it enriching and meaningful, but also makes it challenging to facilitate effectively.

Lesson 3: Even when new technologies provide considerable benefits and opportunities for enrichment in aged care, their risks need to be carefully managed, which can be achieved through one-to-one facilitation. This care is particularly required when using technology such as immersive VR, which presents inherent risks [51]. Guidelines are beginning to emerge about the *design* of VR for older adults [1, 55], but guidelines are also needed for careful facilitation of VR in aged care homes. Facilitation is difficult because the caregiver is not usually immersed in the VR experience alongside the user, and it is more complex than ensuring the user knows where to turn their head or how to hold the hand controllers. In our study, staff provided careful facilitation because they felt an ethical imperative to make sure the technology worked in a way that was safe and person-centred, and which provided a personally meaningful experience. Guidelines on facilitating technology in aged care, then, should include consideration of the care work required to ensure a positive experience.

6.4 Care Receiving

The first three phrases of Tronto's framework focus on the work of the care giver. In the final phase, care receiving, attention turns to the care recipient. Tronto states:

"It is important to include care-receiving as an element of the caring process because it is the only way to know that caring needs have actually been met... But perceptions of needs can be wrong. Even if the perception of a need is correct, how the care-givers chose to meet the need can cause new problems... Unless we realize that the [person] cared for responds to the care received, we may... lose the ability to assess how adequately care is provided." [57, p. 108].

Here, immersive VR created intractable challenges for the lifestyle team members facilitating the activity. By virtue of its immersive nature, the VR headset made it difficult for staff members to know how those using VR were responding to the experience, especially when they were experiencing distress. Feelings of joy, on the other hand, were more noticeable, as evidenced by the example of a resident dancing and singing while watching a VR animation. In other cases, however, staff were unable to pick up on signs of distress that they would normally watch for, such as facial expressions, especially the look in someone's eyes. For one of our interviewees, this led to an encounter in which she did not realise that a man had experienced panic while immersed in the VR experience. The immersive nature of VR meant he felt like he was really standing at the edge of the Grand Canyon, sparking distress that was likely initiated by a fear of heights. This example raises a dual concern about the use of VR in aged care: the fully immersive nature of VR means it can be a highly realistic experience (and therefore sometimes terrifying) while also making it difficult to recognise when somebody has experienced distress.

In residential aged care, where the people being cared for are particularly vulnerable, there is a need to be especially cautious about introducing activities that can cause distress. However, as we have seen above, immersive VR can also spark moments of joy. It can provide personalised enrichment, an opportunity to “escape” the aged care home, and a chance to feel like one is really travelling to other parts of the world. Denying people opportunities to experience this enrichment, because of concerns about risk, could be seen as a threat to personhood arising from a paternalistic approach to care [21]. For Tronto, this is a key challenge in enacting an ethic of care: “care-givers may well come to see themselves as more capable of assessing the needs of care-receivers than are the care-receivers themselves” [57, p. 170]. This can lead to the gatekeeping role that care staff play, ensuring that the VR activity is only offered to those who they believe would benefit from the experience and who are considered least likely to experience distress.

Lesson 4: Designing enriching experiences for people who are otherwise disengaged and neglected by care home activities could be considered an act of care [45], but this needs to extend beyond design to include careful consideration of *how* the technology is experienced, and how it continues to be experienced, by the person being cared for. This lesson speaks to the value in HCI of doing field studies to examine technology use in real-world settings; we would argue that a similar approach could be adopted by care providers when introducing technology into their programs. Through a deep understanding of their client’s experiences with technology-in-use, caregivers can contribute to improving how we design and deploy technologies in aged care, where a respectful and empathetic approach is critical to ensure new technologies such as VR provide benefit without causing harm.

6.5 Lessons about Care Ethics in HCI Research

By applying a care ethics framework in this study, we not only identified lessons about effective care practices when implementing emerging technology for enrichment in aged care, but also learned about the broader value of employing care ethics in HCI research. As noted in Section 2, HCI researchers are beginning to embrace the care ethics perspective and there is increasing interest, more broadly, in care (see, for example, a recent workshop on the future of care work [31]). It aligns with the trend in the last decade towards critical and feminist perspectives in HCI [27]. However, to date, care ethics in HCI has primarily been applied in research settings where care is predominantly covert and implicit [56], rather than overt and explicit, as it is in aged care homes. It might seem an obvious fit to apply a care ethics framework to research settings where care is a core activity, so it is surprising that care ethics has not previously featured strongly in HCI research focused on aged care or other care settings. In fact, the care work involved in introducing technology to care settings is often overlooked in favour of identifying end-users’ experiences and the health or therapeutic benefits of technology. While such research is important, it can create a simplified view of the setting in which new technologies are introduced. A care ethics lens enables us to go beyond simple characterisations of the impact of technology on people receiving care, to help identify the different caring practices that are crucial for new technologies to be used effectively and successfully when deployed in complex care settings.

In this study, we focused on the benefits and risks associated with using immersive VR in aged care. Because VR is a demanding but rewarding technology, and its success depends on effective facilitation when used in care homes, the care ethics lens was particularly valuable for highlighting care practices. However, a care ethics lens could be equally applied to study other technologies used in aged care settings. Many technologies are now being deployed for social benefit in aged care, including video calls, which have become particularly common during COVID-19, with many jurisdictions and organisations applying restrictions to visitors in aged care homes [3, 16]. The complexity of the care environment means that even relatively common technologies, such as video calling tools, may be difficult to implement in aged care homes. Examining the use of video calling in aged care with a care ethics lens would help to make visible the care required to ensure that people can communicate successfully with family members in aged care when they are unable to visit. Beyond this, a care ethics lens could be applied to understand how staff members exercise care in the deployment of other technologies, such as social robots and tools for surveillance and monitoring, which may involve their own unique risks such as privacy [2] and threats to dignity [15].

In many other settings that are of interest to HCI, care ethics can be a valuable lens for putting a spotlight on care. We have already seen that care ethics has been used to gain insight into care practices in hacker communities [56] and in community activism [38]. With its emphasis on relational work and human connection, care ethics could be further applied in other settings where relationships and interactions between people play a crucial role in determining the success of technology-based interventions. For instance, a care ethics lens may be useful in research on the design and deployment of technologies for use in education and early childhood, healthcare, or in home-based and family care settings, such as supporting informal caregivers of people with dementia [e.g. 28].

There are many interpretations of care ethics available, and we chose to use Tronto’s framework because the four phases of care provided a good fit for interpreting our findings. We argue that this framework was useful for turning the spotlight on the importance of care practices and the care staff in making VR safe and enriching for the older people they were caring for. In prior research, much of this care work has been conducted by researchers who are often responsible for both introducing and evaluating the technologies being investigated. Drawing on a care ethics framework, in this paper we have emphasised a need to account for the perspectives and experiences of the people who will hold responsibility for administering the technology after its eventual deployment. We hope that this becomes a central focus of all future research examining the design and use of technologies in complex care settings.

6.6 Limitations and Future Work

A key limitation of this study is that we were not able to investigate how Pearl aged care residents experienced the VR apps included in the activity program. Instead, we have relied on staff members’ perspectives of those experiences. This is a consequence of the timing of the research, which was impacted by the COVID-19 pandemic. Prior studies, however, have explored older adults’ experiences with VR [1, 8, 28, 40, 65]. While these studies have typically

involved short-term trials of the technology in use, future research should aim to understand people's longer-term experiences with immersive VR, and other technology-based enrichment experiences, introduced into residential care homes.

A further limitation of the study is that our sample is relatively small and all participants worked for the same aged care organisation (albeit in different care homes). It is also likely a biased sample; care may have emerged as a key consideration in this research because the people we interviewed valued their role as caregivers. Nevertheless, we believe the insights based on our interviewees' reflections and experiences are highly valuable for understanding the care required for implementing VR in aged care homes.

7 CONCLUSION

In this paper, we have presented findings from an interview study that examined the role of caregivers, or staff members, in facilitating the use of immersive VR introduced as part of the activity program for people living in aged care. The interviews with lifestyle staff revealed they enacted a complex ethic of care while introducing VR to residents. Drawing on Tronto's [57] description of four phases of care, we can see that interviewees engaged in caring about, taking care of, and caregiving when selecting, introducing, and facilitating immersive VR experiences for aged care residents. The fourth phase, care receiving, was challenged by the immersive nature of VR. The VR headset made it difficult to carefully monitor how aged care residents experience the VR activity. Further, the immersive nature of VR was a double-edged sword that created conflict in interviewees' care ethics. On the one hand, immersive VR enabled staff to respond to residents' needs for enrichment, joy, and adventure; on the other hand, full immersion presented a risk of causing distress, which staff were not always able to identify and monitor. Adding to this complexity, staff had to negotiate their care practices within the sociotechnical context of the care home environment, where they attended to the diverse needs of individual residents whose complex health conditions meant VR was not always an appropriate choice of activity to offer.

Applying the care ethics lens to interpret our findings, we identified four key lessons for the careful use of technology for enrichment in aged care: 1) Technology deployment needs to be based on a deep understanding of individual needs; 2) Using technology effectively in aged care requires constant negotiation to assess needs and design and offer suitable experiences; 3) Technology-based experiences need to be carefully facilitated, with VR in particular requiring one-to-one facilitation; and 4) It is crucial to consider people's experiences with technology in an ongoing way. This is especially important in sensitive settings such as aged care, where there may be significant risks of causing harm, but also great opportunities to provide enrichment when introducing immersive VR that is appropriately tailored to individual interests and needs.

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