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“More Than Just Holding The iPad”: Family Members’ Perspectives on the Work of Video Calling in Aged Care

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Video calls are increasingly being adopted to enable older adults living in long-term residential care facilities (aged care homes) to remain socially connected with friends and family. However, care home residents often require extensive support to participate effectively in video calls. Despite growing interest in examining the work involved in facilitating technology use in care homes, the role of caregivers—comprising family members and staff—in facilitating video calls has received limited attention. Drawing on data from a study of family members’ experiences in Australia, we analysed the essential work activities required to make video calls function in residential aged care. We show how video calling is underpinned by the development of relationships between families and staff, and how video calling requires considerable work in preparation, facilitation, and troubleshooting. We discuss how video calling systems for care homes might be designed to alleviate unwanted work, lowering the burden of call participation for residents, families, and care staff.

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

Additional Key Words and Phrases: Care homes, older adults, social connection, video calling

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1 INTRODUCTION

Information and communication technologies are increasingly being deployed to enrich the lives of older adults living in long-term residential care [66]. These facilities—also known as care homes—provide a home for older adults who have significant care needs and who can no longer live independently in the community. While moving into care may be necessary to uphold a person’s welfare during advanced old age, it has been recognised that care homes can be lonely places in which to live [41]. Residents typically have small social circles, few visitors, and limited social contact with family in the outside world [43]. Family members may be unable to visit regularly, whether because of insufficient time or geographical distance [11]. Issues such as frailty, mobility impairments, and profound health challenges can make it difficult for residents to leave the care home, further limiting their opportunities for social contact [66]. These issues have raised the need to consider how care home residents should be supported to remain in contact with loved ones who may be unable to visit in-person.

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Videoconferencing systems (hereafter, *video calls*) have been proposed as one approach to enabling communication between residents and their family [39]. Video calls enable two or more people to converse in real-time using audio and video feeds connected via the Internet [57]. Examples include FaceTime, Skype, and Zoom, along with social media and smartphone apps such as Facebook and WhatsApp, which have video calling as a native feature. By connecting care home residents with their families, video calls can enable residents to stay updated on life outside the care home and enjoy 'virtual visits' from relatives who are unable to attend in-person [60]. Recent years have seen the rapid adoption of video calls in care homes due to the COVID-19 pandemic, which required residents to isolate in their rooms and led to exacerbated rates of isolation and loneliness [9, 14]. During this time, video calls were used to enable communication between residents and their families when visits to the home were banned due to lockdowns [10, 26, 73].

Video calling has been studied extensively in Human-Computer Interaction (HCI) and Computer-supported Cooperative Work (CSCW), where research has documented its value across a variety of contexts and relationships [e.g. 2, 40, 53]. Yet there has been scant HCI research examining its use within care homes. This is problematic, as research in Gerontology has identified that mainstream video calling technologies are not well-suited to the aged care context [71]. While specialised video calling systems are increasingly being developed to make video calling easier for older adults [e.g. 15, 21], these systems may not fully respond to the needs of older people in aged care. Mass-market systems can be difficult for residents to use independently [35], meaning that caregivers—comprising family members and staff—need to become involved to support the participation of residents in video calling [39, 47]. However, there has been little interrogation of what this involvement requires, and what kinds of activities occur to support residents' participation. We argue that understanding these activities is essential because it can pinpoint opportunities to improve video calling technologies for care homes.

In this paper, we report an analysis of the cooperative work required to facilitate video calling in aged care. We draw on data from an Australian study that examined the experiences of family members who had been using video calls with older relatives living in care. This data includes direct accounts of work done by family members, and indirect accounts of work done by care staff to support the calls. Our analysis demonstrates that family members' relationships with care staff frequently underpin the success of video calls, enabling certain forms of work to occur. We show how work is required across the trajectory of the video calling experience, beginning with the careful selection of appropriate technology, through to arranging, staging, and scaffolding the call. The involvement of caregivers is integral to facilitating the participation of residents with impairments, particularly advanced dementia. Finally, caregivers engage in ad-hoc troubleshooting and recovery work to resolve technical problems that residents cannot fix by themselves.

This paper makes three contributions to the literature on technology for aged care homes. First, we provide a detailed understanding of work enacted by family members and staff to facilitate video calling within aged care. This expands existing understandings of the facilitation required when using technology in care homes [25, 65, 69]. Second, our analysis further develops the concept of facilitation work to support video calls [18], showing how work is distributed across time, space, and people—or 'convoys of care' [28]—when used to support communication between family members and relatives. Finally, we identify opportunities to improve the design of video calling systems for aged care, such that residents and families can have enriching conversations without placing additional burdens on care staff.

2 RELATED WORK

Our analysis extends prior research on (1) video calling in aged care, and (2) the work of facilitating technology within care homes. We briefly review literature from these areas to articulate our contribution to each one.

2.1 Video Calling in Aged Care

Researchers have long been interested in the potential for video calling systems to address social isolation and loneliness in aged care [70, 71]. This line of work can be traced back to the early 2000s, when a series of pilot trials was conducted to explore the feasibility of using 'videophones' for weekly communication between residents and their families [11, 22, 31, 47]. Videophones were systems that combined a landline telephone with a low-resolution video feed. The video was updated every few seconds, enabling both parties to see each other while talking.

More recent work has employed software-based video calling systems, such as Skype, to enable familial contact [42, 56, 59]. In one example, Tsai and Tsai [60] investigated the experiences of Taiwanese nursing home residents who used Skype on a laptop for weekly conversations with geographically distant family members. Video calls were found to be enriching for residents, enabling them to have fun and enjoy an experience akin to an in-person visit [60]. Other studies have replicated these findings and, in combination with research on videophones, show that residents and families derive a range of social and affective benefits from using video calls [45, 47]. These include "richer and more emotional conversations" compared to using the telephone [39, p.7] and a heightened feeling of social presence from seeing people on video [22]. Studies also suggest that long-term use of video calls can alleviate loneliness among residents [61, 62].

In addition to these benefits, there are considerable challenges that affect the implementation of video calls in care homes [39]. Low self-efficacy with technology is one challenge faced by many people living in aged care, due to their unfamiliarity with technology and limited exposure to new systems [42, 71]. A second challenge is that the hardware and software required for video calls can be difficult for some residents to use independently [35, 45]. Devices may too heavy for frail residents to hold for long periods, and touch-screen technology with complex user interfaces can be hard-to-use and confusing [8, 39]. Third, many residents have complex care needs [13]. Conditions such as sensory impairment, dementia, and Parkinson's disease are prevalent in aged care [29], compounding the difficulty of using commercial technology for video calls [42]. Finally, care homes often have poor Internet infrastructure [34, 48], leading to substandard calling experiences that can be frustrating for residents and families [10, 26, 34].

The aforementioned challenges mean that residents often require support with video calling. Within the literature, this support has typically involved care staff assisting residents during semi-controlled pilot trials [39]. In an early example, Sävenstedt et al. [47] tested the use of videophones between family members and residents living with dementia. They reported that the conversations "required the assistance of staff at the home in order to be meaningful" [47, p.216], but did not provide a detailed exposition of what this assistance looked like. Other studies have documented similar findings [26, 31, 59], though there was likewise minimal interrogation of what this work involves. It is also worth noting that most of these findings stem from studies managed by research teams [39], where researchers have been on hand to help resolve technical problems [e.g. 70]. Methodologically, this does not reflect the circumstances of real-world use, where support from researchers will not be available. In these cases, caregivers—comprising care staff and family members—may need to become involved with helping residents to fix problems with the technology.

Typically, the need for caregivers to help with video calls is seen as problematic given that the 'overhead' of managing technology increases the burden on care staff [42, 71], who are known

to be dealing with high workloads in addition to responding to physical care needs [70]. In the present analysis, we contribute a more detailed understanding of the work that is performed to support video calls, with a view to identifying opportunities for unwanted work to be alleviated by design. This encapsulates considerations related to the video calling hardware and software, and an understanding of how video calling systems should be designed for the aged care context.

2.2 The Work of Technology Facilitation in Care Homes

Our investigation of video calling builds on a growing body of work focused on studying the use of technology in care homes [25, 58, 65] and improving the design of technology for the aged care environment [17, 19, 38]. This literature argues that technology can support social, cognitive and emotional enrichment for people in care [66], but has shown that technology requires careful work—typically in the form of facilitation from staff and other carers—when deployed in care homes [6, 39, 65]. Muller et al. [38] highlighted the risk that technology will be "parachuted" into a care home setting and expected to function expediently. In reality, the complexity of the aged care environment, along with the profound challenges that many residents are living with, means that technologies need to deployed carefully to ensure residents receive the intended benefit.

Current understandings of the work involved in facilitating technology in care stem from studies investigating the use of new technologies for enrichment. Examples include computer games [20, 23], virtual reality (VR) [65, 72] and assistive robots [25, 69]. These systems are intended to improve the quality of care and alleviate burdens placed on caregivers [1, 52], yet research has shown that caregivers are deeply involved in facilitating these technologies. In these cases, facilitation has been studied with a view to understanding how caregivers negotiate the balance between benefits and risks, and has resulted in a better understanding of the ways that facilitation is carried out. Gerling et al. [20] conducted a three-month deployment of motion-based video games in care homes. They observed that care staff became involved with helping residents move to game rooms, setting up the game system, guiding them safely through the game sessions, and switching between games [20]. Hornecker et al. [25] studied how a lifting robot was integrated into care practices between residents and caregivers. They found that the robot-assisted lifting process required manual, verbal, and emotional actions from the caregivers, as well as proactive cooperation from the residents. Studies by Zhao et al. [72] and Waycott et al. [65] examined how care staff support residents in using VR. The latter study argued that caregivers enact an 'ethic of care' by using various techniques to ensure safe delivery of the VR. These included spending time to consider what kinds of experiences suit particular residents, through to providing emotional reassurance while the VR experience was in progress [65].

Collectively, these studies show that different kinds of work are needed, encompassing hands-on support through to emotional work in ensuring residents experience the technology safely. Some of this work may be enriching, but other aspects can be an unwanted burden [7]. However, less is known about what kind of work is required to make video calling function well, beyond the acknowledgement that support has been needed during fixed-term research trials [39]. This is because video calling has not received as much attention as VR, robots and video games, despite being a more established and straightforward technology. Our research contributes a better understanding of the work involved in video calling based on real-world experiences. We extend the literature by revealing how family members and care staff work to overcome barriers associated with video calling within the context of care homes.

3 METHOD

The analysis presented here is part of a larger project investigating the use of technologies for enrichment within residential aged care. In this paper, we focus on the work involved in facilitating

video calls within care homes as part of this larger initiative. We draw on data from an interview study conducted in Australia. The study aimed to investigate the experiences of family members who had been using video calls with relatives in aged care before, during, and after the COVID-19 pandemic, which involved widespread lockdowns that prevented face-to-face visits. In the conversations, participants shared their perspectives on the benefits and challenges of using video calls with institutionalised relatives and, in so doing, discussed various activities that were needed to make the calls successful. Our analysis focuses on these activities in depth, interpreting them as a form of care work that is conducted through cooperative relationships with formal care staff at the home. All procedures in the study received approval from our University's ethics review committee.

3.1 Participants and Recruitment

Participants were 18 adults (15 women, 3 men) between the ages of 20 and 76 years (mean = 48, SD = 17.3). Table 1 lists the participants using pseudonyms along with the relatives they discussed and the technologies they used for the video calls. The skew towards women in our participant group may be a result of self-selection bias [44] but more likely reflects the gendered distribution of labour in unpaid elder care, where "caring responsibilities are most often passed to female family members" [24, p. 677]. In other words, one would expect to have a greater number of women in a study such as ours, given its focus on real-world experiences.

Of the 18 participants, 17 lived in Australia, in the state of Victoria. One lived in New Zealand but was an expatriate who used video calling to communicate with her family living in an Australian aged care home. All had experience of using video calls with older relatives.

We recruited participants through our university's internal staff mailing list and noticeboards, through advertisements placed on Twitter and LinkedIn, and through word of mouth. Our adverts stated we were looking for people to discuss their experiences of using video calls to communicate with family members living in aged care. Participants were self-selecting and were given a $30 gift voucher for participation. We used Malterud et al.'s notion of information power [30] to guide our data collection and recruitment processes. Specifically, we ceased recruiting after interviewing 18 participants because the lead researcher felt that the data contained sufficient information power to address the initial aim of the study (to understand experiences of video calling in aged care), because we had high sample specificity (family members of people in aged care), and because the participants had shared rich experiences, indicating strong quality of dialogue [30].

We asked participants about their relatives in care to further understand their use of video calls. Although the relatives did not participate in the study directly, we provide details on these persons to contextualise the conversations. All of the people in care were living in residential aged care facilities, i.e. long-term institutional care. A total of 22 people were mentioned, with 4 participants talking about using video calls with multiple relatives (see Table 1). Of the people discussed, 17 lived in Australia and 5 lived in care homes abroad (2 in USA, 2 in Japan, and 1 in Italy). Their reported ages ranged from 69 to 98 years (mean = 84, SD = 7.3).

Of the 22 persons in care, 18 were described as having at least one health condition or impairment that affected their use of video calls. These issues are pertinent to our findings, as the work of facilitating video calls was sometimes about accommodating these conditions. Eight people were described as having dementia (2 moderate, 4 advanced). Two were living with Progressive Supranuclear Palsy (PSP), a disorder that causes loss of balance, difficulty moving and speech impairment. Two residents had lost the ability to speak and were reliant on non-verbal communication. Other conditions that were reported to make video calls challenging included hearing loss, vision impairment, arthritis, and physical paralysis of the hands or arms.

Table 1. Participant characteristics and details of the relatives they discussed.

Pseudonym	Relative(s) discussed	Relative's age (years)	Relative's impairments affecting video calls	Video calling software used	Video calling hardware used
Alison[a]	Mother	80	Advanced dementia	Zoom	iPad
Ben[b]	Father	83	N/A[c]	Facebook Messenger	Kindle Fire
Charmaine	Father	75	PSP[d], non-verbal, and slightly deaf	FaceTime and Zoom	Laptop and smartphone
Deborah[b]	Mother	86	Advanced dementia	Zoom	iPad
Elaine	Father	69	Left-side paralysis because of stroke	Facebook Messenger	Laptop
Fiona[b]	Mother	78	Moderate dementia	Facebook Messenger	Smartphone
Gloria[a]	Husband	82	PSP	Zoom	iPad
Hannah	Grandmother and grandfather	75 and 84	Vision impairment and noticeable cognitive decline (grandmother)	WhatsApp	Smartphone
Irene[a]	Mother	90	Dementia	Zoom	iPad
Jackie[a]	Mother	88	Advanced dementia, non-verbal, and cannot use her hands	Zoom	iPad
Katherine[a]	Mother	98	Deafness and vision impairment	Zoom	Laptop, iPad and smartphone
Luca[a]	Father	90	Moderate dementia and frail with limited mobility	FaceTime	iPad and smartphone
Margaret	Mother and father	86 and 87	Dementia (mother) and cognitive impairment and memory problems (father)	Zoom	Laptop
Nicole[a]	Mother	92	Dementia, non-verbal, and limited mobility	Zoom and FaceTime	Laptop and smartphone
Olive	2 great-aunts	91 and 94	N/A	FaceTime and Facebook Messenger	Smartphone
Paul	Grandmother	84	Deafness and rheumatoid arthritis	Zoom	iPad and smartphone
Quinn[b]	Grandmother and grandfather	74 and 77	Deafness (grandmother)	Skype	Laptop
Robin[a]	Grandmother	87	Advanced dementia	FaceTime	iPad and smartphone

[a]Denotes that video calling was a new activity adopted only after the onset of the COVID-19 pandemic.
[b]Denotes that the participant's relative or relatives lived in an aged care facility outside Australia.
[c]N/A: not applicable.
[d]PSP: Progressive Supranuclear Palsy.

3.2 Procedure

Participants enrolled in the study by emailing the first author. We sent each person a Plain Language Statement and a consent form, which participants signed and returned over email. We conducted the interviews using Zoom videoconferencing software. The interviews lasted 19–47 minutes (mean = 32, SD = 9). All were audio recorded with participants' consent.

The interviews were semistructured and involved asking open-ended questions to understand participants' experiences. Example questions included: *Can you start by telling me a bit more about how you've been using video calling to stay connected with your relative? What have the main benefits been in terms of using video calls? Have you faced any difficulties? You mentioned that your relative has [health problem]. How does that affect their use of video calling?* In responding to these questions, the participants discussed the work that was involved in the calls and described the work of care staff. We asked follow up questions to understand these issues in more detail. Examples included: *Is there anything you've had to do to make sure the video calls work properly in the care home? How do you overcome the challenges you mentioned earlier? You mentioned that the staff are sometimes involved in the calls. Could you tell me more about that?.*

3.3 Analysis

Recordings of the interviews were transcribed and combined with notes taken by the interviewer. We analysed the data using Braun and Clarke's 6-phase approach to reflexive thematic analysis (TA) [3, 5]. For the present paper, the aim of the analysis was to make sense of, and subsequently interpret and describe, the different kinds of work enacted over the trajectory of the video calling experience. This included work done by family members and by care staff, based on direct and indirect accounts shared by the participants.

The first author led the analysis and the other authors gave input at different phases. A single analyst is typical in reflexive TA, which positions the researcher's interpretation as central to generating meaning from data and hence values the researcher's subjectivity as an analytical resource [4]. The first author of this paper is an experienced HCI and CSCW researcher who is sensitised to the way that technologies can require coordinated and cooperative work from the people who encounter them. The researcher has conducted fieldwork in Australian care homes, and so has an understanding of the complexity of aged care and the challenges faced by people living there. The researcher brought these perspectives and experiences to the data, informing the interpretation in ways that may be different to those who do not have the same experience. The analysis was discussed with other team members, who include an early-career researcher in HCI, a mid-career researcher with a background in social work, and a senior researcher with over 10 years' experience of HCI research involving older adults, including those living in aged care.

The first author conducted the analysis as follows. In phase 1, which involved familiarisation, the transcripts were read in Microsoft Word. Interesting passages were highlighted and initial ideas and interpretations were noted using comment functionality. In phase 2, the data was imported into NVivo and was coded by the first author using an inductive, data-driven approach. Transcripts were coded at the sentence level, with codes used to capture key ideas. Some codes were semantic, reflecting surface-level ideas in the data, whereas others were latent, capturing initial interpretations [5]. In phase 3, the codes were assembled into initial candidate themes using NVivo and by sketching thematic maps. The analysis was discussed with the second author, who also read through all the data, sense-checked interpretations and reviewed the candidate themes.

At this point, the researchers had become sensitised to the work involved in facilitating the video calls, so the first author extracted segments of data relevant to this topic into a separate NVivo project and coded these again, separately, from the rest of the data. This enabled us to begin

delineating and organising the different forms of work discussed by the participants, in terms of where the work typically arises during a video call. We then classified these kinds of work into 4 initial categories (equivalent to themes as an outcome of reflexive TA).

In phase 4, the first author discussed the initial categories with the other authors. We subsequently developed two main themes: one to highlight the crucial role of relationships between families and staff in underpinning successful video calls, and a second to encapsulate the different kinds of work enacted by caregivers to support video calls. After the first author had suggested a structure for the findings section, the third and fourth authors provided comments that helped refine the ideas. The fourth author also read through all of the coded data extracts and wrote the first version of the findings, which the other authors iterated. The following section presents the outcomes of our analysis using illustrative examples from the data. We refer to participants using pseudonyms (see Table 1). Pseudonyms are also used when referring to care staff mentioned by participants.

4 FINDINGS

Here we describe four kinds of work that were involved in video calls. *Relationship work* highlights participants' efforts to develop cooperative relationships with care staff as a foundational activity for successful video calls. *Preparation work* characterises the acts of choosing suitable technology, scheduling the calls, and ensuring that equipment was properly arranged to suit their relative's capabilities. *Facilitation work* arose when making and receiving calls, adjusting the video calling equipment, and scaffolding the participation of residents with impairments. Finally, *troubleshooting and recovery work* ensured that calls ran smoothly by resolving technical problems.

4.1 Relationship Work

Our analysis revealed that relationships between family members and staff were often crucial to making video calls successful. Many participants described developing relationships with specific staff members, which they leveraged when trying to video call into aged care. Ben, for example, who was living in Australia and connecting with his father in a care home in the United States, had invested time to find the right staff members who would be able to help with the video calling:

> It took a while to identify a couple of the nursing staff who both are willing and can find the time every now and then to actually help him do calls. And so far, the only ones we've been able to do is when I'm calling him and they answer for him.

A further challenge was that Ben had to schedule calls around the availability of these staff members, with a 15-hour time difference to consider. The time difference meant that a convenient time for him might fall at a difficult time for the care home, such as during the night shift. For Ben, calling during the night shift meant limited availability of those staff who were willing to help:

> They have fewer staff at night, because the residents are all asleep, so it's a little harder to get someone who will go helping. Plus, there's two specific nursing staff who both work during the day, who are very attuned to this issue, and I have a Google Voice number, so they can send me messages from the U.S. to a U.S. number. I have individual relationships with them, and they're very interested in making sure the residents can stay connected with their family.

Margaret, who lived in New Zealand and was connecting with her parents in an Australian care home, also described the importance of relationships with supportive staff members. Margaret previously had support from other family members who were able to visit the care home and initiate the video call. After the onset of the COVID-19 pandemic, staff had to take over with providing support for video calls. Following this transition, Margaret described leveraging her relationship with the lifestyle coordinator at the home to ensure the calls could keep running:

> We were lucky that the lifestyle manager at the aged care facility, I've established quite a good relationship with her, and she facilitates the Zoom. I send her a Zoom invite. She takes her laptop into mum and dad's room and we have a weekly get-together on the Zoom. Also, I get to find out a little bit about her as a person. Then I can tell mum and dad about what she does, and that has improved their relationship because Terry [the lifestyle manager] has got some interests that are similar to mine.

In this case, the individual relationship with a key staff member was necessary for the call to occur. The value of establishing the connection with a staff member, however, went beyond enabling the call to take place. For Margaret, the lifestyle coordinator was part of the care network for her parents, and the coordination work around the video calls provided an opportunity to build rapport with a key member of the care network.

Another participant, Deborah, who was also communicating with a parent in an international care home, described how a staff member named Emma facilitated the calls and got to know details about the family. This was important so the staff member could provide emotional and cognitive scaffolding to ensure Deborah's mother could participate in the conversation:

> Before starting the conversation with me, [Emma] reminds my mother who is she talking about. 'Now, I'm going to talk to your daughter, the eldest one. The one who lives in Australia.' So she calls me with my nickname, which is very emotional. And she knows many things about our family.

It was crucial for interviewees to be able to build relationships with individual staff members who they knew would be able to help facilitate the video calls, rather than relying on help from whoever was available at the time. This was because the support offered by different staff members varied considerably. One interviewee, Charmaine, reported that some staff openly admitted to not being able to support video calling because they lacked confidence in using the technology. This issue has been identified in previous studies [42, 71]. In Charmaine's case, she recalled an instance where there was something wrong with her father's smartphone, but the staff were reluctant to help because they were not familiar with the technology.

Other participants talked about what would happen in cases where the staff members they normally relied on were not available. For instance, Ben recalled how his father went into a special ward after contracting COVID-19. This meant that he no longer had access to support from the staff he knew, causing things to change:

> The main challenge there was that the staff who were in that one weren't the staff who I had relationships with, so it was actually a little harder to call him. Because they [the staff I normally spoke with] were then in the non-COVID wings of the care facility. And the others, some of them were quite good at answering, some of them had their own challenges and didn't quite know how to answer as well, so I'd either get an audio call or a call back the next day or after the shifts were changed.

Relying on specific individuals is a risk given high staff turnover in care homes (which is also a known barrier to successful implementation of video calls [71]). For Gloria, who was connecting with her husband who lived in a local aged care home, it was important to connect with familiar staff members because they knew her husband. This was difficult to maintain, however, because there were often new staff members who did not have the level of familiarity she needed in order for the video call to work:

> One or two of them I have [developed a relationship]. So, I tend to try and gravitate towards them, but the other girls are all new, or the men, whoever might be nursing

> him or caring for him. And I just find it very difficult. They're caring and I know they look after him as best they can, but some of them just don't know the case.

Taken together, these experiences show how cooperative relationships between family members and staff were often essential to underpin successful video calls. Participants invested time into developing relationships with staff members who were known to be helpful, technologically literate and knowledgeable about their family members. They subsequently planned their video calls around the availability of these staff, because they had found that calls were more difficult when these staff were not on hand. This highlights how the social connectivity enabled by the video call was underpinned by an additional activity—that of developing a cooperative relationship with care staff. This finding may not have been witnessed in previous studies due to the availability of research staff to facilitate the deployment, and therefore provides insight into the work required to ensure that video calls run smoothly when used in the real-world setting.

4.2 Preparation Work

As shown in the previous section,video calling was often reported to be contingent on successful collaboration between family members and professional caregivers. This collaboration included advanced preparatory work, to which both parties contributed.

4.2.1 Choosing Appropriate Technologies. Of the 18 participants, 10 had purchased devices for their relatives to use at the care home, rather than relying on the home to provide equipment. It is well-known that the ergonomics of mass-market video calling systems do not usually meet the accessibility needs of people living in aged care [8, 31, 50]. Participants had considered this issue when choosing video calling technologies that they felt would be suitable for their relatives who were unfamiliar with digital technology, or who had difficulty using devices like laptops or touch-screen tablets due to age-related impairments.

Factors such as screen size, keyboard design and the perceived complexity of the user interface affected decisions about which technologies to use. Paul described how his grandmother was living with arthritis, which made it difficult for her to use keyboards. Recognising this, Paul's family had purchased an iPad, which was easier for his grandmother to use:

> [Arthritis] makes it hard for her to use her fingers, so anything that's small buttons is hard for her to do. So say if she had her camera switched off, it's a small little button in the corner of the screen she's got to press, it might be a bit difficult. And it's normally a problem on the iPhone and stuff, where the keyboard is tiny, but she doesn't have that problem. She's got a really big phone we got her, and we've jacked up the size of the keyboard on her iPad. So you work around it.

Ben talked about the decision to buy his father an Amazon Kindle Fire for video calling:

> One consideration was if he drops it, how much does it cost me to replace it? The Fire, because it's heavily subsidized by Amazon, it's not terribly expensive. Two was the screen size seemed about right, in that it's not so big that it's quite heavy. But it's big enough that it seems like it's easy to hold onto and easy to see. And I tested it on the facility's Wi-Fi network, and it had no problem connecting, stayed connected, had a good signal, easily made video calls, no problem. So that's what it came down to.

This quote reveals that Ben, who was connecting with his father internationally, had gone out of his way to ensure his chosen device would work well. In some places, aged care facilities do not have good Internet connectivity [26, 34], as it has until recently been considered a non-essential tool for supporting residents' wellbeing. To address this, some participants had purchased Wi-Fi dongles to ensure that their relatives would have a sufficiently stable connection for a video call.

Participants described how they chose software systems that would be easy for their relatives to use, trying to lower the complexity involved and considering what types of actions were needed. Even though video calling is a mature technology in comparison to emerging communication platforms like VR, contemporary applications like Skype and Zoom still require fiddly operations (such as adding and navigating lists of contacts, or sharing hyperlinks for meeting rooms). Simply put, they are not as straightforward as the telephone, which many participants' relatives knew and had previously used. However, preferences for video calling platforms varied. Paul noted:

> Zoom is fairly straightforward because you can send a text message with the link and all she has to do is click the link. As long as she's already signed into the app, it'll open the video straight up. You don't have to go and find the app or anything.

Hannah, another participant, preferred WhatsApp because Zoom did not work easily in the care home due to security measures:

> What happened was they first got trained to use Zoom and then Zoom incorporated another feature that you need to put in a password. It wasn't letting people go in just with the link and they were unable to find it with that whole heap of information you get with the Zoom invite. And then, when they removed that, when you just press the link and you can join the meeting, I think you had to download the Zoom app onto your laptop. So, it was just too hard for them. We thought WhatsApp is much easier.

4.2.2 Scheduling the Call. Participants recounted how their relatives in care were not able to arrange video calls for themselves, either because they found the technology confusing or because health impairments prevented them from manipulating the device. This, again, highlights the role of care staff, as Katherine noted:

> Staff involvement is crucial. I mean, you need to send them the [Zoom] invitation. They need to accept it. [My parents] have difficulty doing that.

Margaret told us about how, when calling her parents, she used her relationship with the lifestyle manager, Terry, to carefully coordinate the call:

> There's no way I could reach [them] without that facilitator. What [Terry] does is she waits for me to send her a Zoom invite. She opens the Zoom meeting on her laptop and takes it from her office down to mum and dad's room. I always schedule the meetings for the end of the day. Terry leaves her laptop with mum and dad with Zoom running, and then they just close the lid on the computer when we're finished. Terry comes and picks it up from them the next morning.

As noted in the previous section, working directly with an individual staff member to arrange Zoom calls provided an opportunity for Margaret to expand her collaboration with her parents' caregivers. Margaret provided a detailed description of how this partnership evolved:

> What will happen is, I send her the invite, and I start the meeting. She's often in her office when we start the call. Occasionally, she'll make a comment about mum and dad, where they're at or what's happening. Not too often though. Because I send her the invites via email, I might make a comment about something I've noticed about mum and dad, and she'll respond to that, so it has opened up more of an email conversation about mum and dad with Terry.

In other cases, the care home was responsible for scheduling the calls. For residents whose mood varied, care staff would handle the call and make it at a time when the resident was amenable to conversation. For example, Deborah, whose mother had advanced dementia, said:

> I can't call her [my mother]. They call me when she's okay. It depends on the moment, on her mood, you know? Because it depends on the day. We know that sometimes in the morning she's very down, she isn't active. She doesn't respond properly, she's a bit confused. So on these days they avoid to call us.

4.2.3 Arranging the Equipment. Beyond scheduling the call, caregivers needed to ensure that the equipment could be managed by the care home resident. Older people in residential aged care are often frail or become easily tired. In addition, it was difficult to ensure the device was positioned correctly so that participants could see their relative. Care staff had to become involved in manipulating the camera to ensure the older adult remained in the picture. For instance, Deborah described the role of the carer who facilitates the video call for her mother:

> Deborah: Yeah, she [the carer] holds the tablet.
> Interviewer: Can you tell me more about that? How does that work?
> Deborah: Not too perfect, because she can't always put the tablet in the right position. So I have to ask her to move it right or left, it depends. My mother, sometimes she moves, so I can't see her properly, and vice versa, of course.

The need for camera positioning has been considered in previous studies, where video calling systems have been modified to make angling the camera over a person's bed easier [70, 71] or to alleviate the need for people to hold the tablet for long periods [8, 42]. According to our participants, some care homes had tried to overcome the awkward camera angles and the need for staff to stand holding the device. This was achieved by using furniture in the home as a platform for the camera, as described by Gloria when talking about her husband:

> He's in an armchair usually. The iPad goes on the meal trolley. The meal trolley's kept clear. He's got a bedside table and he's got bedside drawers and another chest of drawers, but he can't get to them because he can't walk. So, it's just the armchair and then his bedside table and then the bed.

Similarly, Luca, whose father had been in hospital, described a trolley that had been customised by staff at the facility so that they could wheel it between wards to enable video calling without effort from the residents.

> They put the iPad in the room next to his bed, they face it towards him, he can see me. They say, 'Look, talk to your father', and then they would usually leave the room. Sometimes I couldn't see him properly, I could see perhaps half of his body from his neck up, or he'd be at a distance. It probably looked like the trolley was at least two feet or three feet away from him.

To make the video call successful, the physical arrangement of the devices needs to be taken care of, otherwise people cannot see who they are talking to. In another example, Katherine described the work family members did to make the environment comfortable for doing video and telephone calls:

> She's got a telephone by her bed and we've sort of set it up so that she's got a big chair next to her bed as well. My brother took in a great big, long extension cord. It's behind her bed so she doesn't trip over it and she can sit in the chair with the telephone on her bed and be comfortable while she's talking to us.

These cases reveal how considerable work was involved in preparing for video calls, ranging from selecting technologies that were suitable for residents to use, through to setting up the device in a comfortable location and ensuring that the camera was angled correctly. This work has not been highlighted in previous studies, likely because the majority were semi-controlled trials in which the deployment was facilitated by the research team. Our analysis suggests that work is needed before

calls even take place, and shows that this work is typically handled by family members. After that, staff at the care home are needed to help with call scheduling and arranging of the equipment. This work appears to be essential for ensuring that calls work well by enabling participants to see each other and working around residents' health impairments.

4.3 Facilitation Work During the Call

4.3.1 Initiation: Making and Answering the Call. As well as purchasing equipment, scheduling calls, and arranging the equipment to be conducive for effective video calling, participants needed to collaborate with care staff to initiate the calls. This involved following a set of steps to ensure a successful calling experience. For instance, some participants spoke of using familiar communication technologies, such as the telephone, to send a message alerting their relative in care that they were ready to make a video call. Relatives, or care staff, could then get the appropriate application ready. Olive described following this process for one relative in a care home:

> We got one aunt set up on a desktop for the video calls. What we do with her is we send her a message saying, 'We're going to video call you now', and she goes to her desktop. There are speakers there, and she knows how to turn the volume up.

Participants described how care staff were responsible for either making the call to family members or answering the call when families were trying to call into the home. Charmaine described how her father, who was non-verbal and had hearing loss, could occasionally answer calls for himself, but typically needed the support of care staff. Again, this involved following a sequence of steps—alerting staff to the need to get the resident's computer ready for a video call:

> I think sometimes if we call and it wakes up his computer and he can click answer, he will. He's not as good at starting a call from FaceTime on his computer. It's just got more steps I think to get it open and get it working. Sometimes now we'll actually call on our phone and get one of the nurses to go to his room and help him wake up his computer and tell him that we're about to call. And so when we call, then he can answer and then we can see him. So he needs more assistance with that.

Charmaine also talked about what could happen if problems arose at the start of a call, and explained that support was needed to help her father resolve difficulties:

> If there's any problems with it though, then it's a problem unless there's somebody else there to help him. And also making sure that the volume's loud enough on his computer as we did connect some speakers, but unless they automatically come on, then that was another step that complicated things because he is quite deaf. And if he doesn't have his hearing aids in, then he can't hear what we're saying to him.

4.3.2 Adjusting and Operating the Equipment. Sometimes residents were able to operate the technology independently. Staff members were able to set up the technology and leave the room, to conduct other duties. However, participants reported that after staff had set up the call, they sometimes stayed to facilitate in different ways. In some cases, their participation was peripheral. Some participants described how, once the call was initiated, staff would hang around 'in the background' or complete other tasks while 'keeping an eye on' the family member. The absence of staff at the resident's end risked giving rise to problems during the call. Robin said that after initiating the call:

> They might go check on someone else, who's sitting as well, or might quickly, not run off, but there's something they're doing in the background. So they're not always monitoring the call, which is hard, because she might press something, or she might mute it, and you're like, 'Oh no, we need someone to help'. She's hung up accidentally

> once. And then she's also just, she can't hear it, and we're like, 'We need to turn the volume up', but she doesn't know how.

However, the presence of staff who were not deeply involved sometimes led to awkwardness because the conversation was not private. Alison felt that knowing someone else was there was "always a little bit uncomfortable, but there was really no other option".

In comparison, there were situations where the carers were more heavily involved in running the technology, with some residents needing considerable support from staff. For Jackie, staff had to physically hold the device up for her mother who had advanced dementia and limited movement:

> The staff had to hold the iPad because she's in a chair and she's leaning back and she can't move her head. So at one stage, my sister said, 'I don't want to see the ceiling anymore,' which wasn't very nice, to the person. [...] So the staff were trying to hold the iPad at a certain angle for half an hour, so we could just talk at mum and try and trigger some memories. I think that was difficult. They're standing with it above her and they're angling it. Because the poor girls, it was really hard for them... You know what it's like holding an iPad in your hand for half an hour and trying to get the right angle.

Conscious of the staff labour required to make the video calls work, Jackie decided to abandon the calls. This example illustrates how difficult it can be to ensure video calling provides a meaningful connection between family members and residents.

4.3.3 Scaffolding Communication for Residents with Dementia. The involvement of caregivers in facilitating the video call was particularly crucial for residents with advanced dementia. Three participants discussed this, revealing that carers played an integral role in making these conversations work. Participants said their relatives had difficulty in comprehending what was happening during the video call. For example, Alison described the confusion her mother experienced because video calls often show a 'self-view' image in the corner of the screen, along with a video of the other people on the call:

> Seeing her own face freaked her out completely. That's something, I guess, to consider for dementia patients. The little picture of this person she didn't recognize in the corner that she was just staring at the whole time.

To address the challenges of using video calling to communicate with someone with advanced dementia, Irene suggested that a third person could support the conversation, helping to manage the resident's confusion. Irene described how valuable it was when staff members attended to the resident and mediated the conversation, drawing attention to the role of third parties in scaffolding the conversation:

> Having a conversation with an elderly person who has dementia and you not being there with them in the environment, this is a very challenging thing to do, to maintain a meaningful conversation. So bringing staff members into that because they're there and they can see what's happening for that individual and they can tell you about what she's done in the day or whether it's raining outside or whatever, then that actually is often helpful.

As discussed in Section 4.1, participants' relationships with specific carers were integral to facilitating conversations. These carers were essential if the relative had problems recognising people due to their dementia. Deborah discussed the role of a specific carer, Emma, in supporting her mother, who lived in Italy. Deborah highlighted a range of techniques used by Emma to support her mother's participation. As noted earlier, Emma was responsible for holding the tablet but her actions went beyond simply pointing the device in a particular direction. Deborah described how

Emma used cues and memory triggers to help her mother understand who was in the conversation. For example, Emma began each call by reminding Deborah's mother who they were talking to:

> [She would say] 'Now we're going to call your eldest daughter. Do you remember Lily?' This is my nickname.

The participant's nickname was a memory trigger that helped Deborah's mother to realise who she was talking to. Deborah described how Emma continued this approach by guiding her mother's attention back to the call when her attention drifted:

> Sometimes when my mother is not concentrating on the call. She reminds her, 'You know, we are talking about Lily. Come on, come on. Don't look there, look here.' She helps a lot, that's very good.

Highlighting the importance of the carer's skill in guiding the call, Deborah described an occasion when Emma was on vacation. During this time, the video calls were less successful, as a different carer had to facilitate them:

> Emma was away for about four weeks, and there was another person, Sarah, but she was completely different. So these conversations were useless. My mother was completely distracted by other things. Sarah wasn't able to put us in communication. I think you need a person who knows how to put people in communication in this condition. Sarah was very... Well, she didn't do anything at all.

As we saw in Deborah's example, part of the work in these cases was keeping the resident's attention on the call when they did not fully comprehend the experience. Similarly, Irene talked about the way some staff gently interacted with her mother to keep her focused on the video call. Irene said that the staff members' actions helped to keep her mother "calm and engaged". When asked why, she said:

> I think they were just stroking her arm, it was beautiful. It was very tactile and very simple. She focused more on the conversation. Because part of the manifestation of her dementia is that she may perseverate on something and just go, 'Where is so-and-so?', or 'When am I going home?' Or something like that. So yeah, that was particularly good.

This quote reveals a different approach to managing the attention of the resident through gentle touching and tactile engagement. This is similar to the behaviours recounted by participants in Waycott et al.'s study of VR in aged care, where facilitators used gentle touches to reassure residents during immersive experiences [65].

Collectively, these cases provide considerable depth in terms of understanding the role of carers in facilitating calls, moving beyond surface-level descriptions in the extant literature [47]. Moreover, these cases reveal that support from family and staff extends well beyond the work of positioning the camera, and includes emotional reassurance and communicative prompting to keep residents' attention focused on the call. This work appears to be essential for residents with severe communication impairments, helping to ensure that they remain focused on the conversation and supporting comprehension of who they are talking to.

4.4 Troubleshooting and Recovery Work

The final set of work activities involved resolving technical problems and helping residents to recover from troubles with the software. The complexity of video calling software for this cohort meant that, if problems arose with the video calls, participants' relatives were not typically able to resolve it by themselves. Margaret explained that this was complicated by the rapid introduction of

video calling into aged care during the COVID-19 pandemic, and by residents' unfamiliarity with the terminology used when discussing video calls:

> We haven't had time to have someone from the family sitting next to him to show him where all the menus are. When we say to him, 'Unmute,' because he'll accidentally touch something, we say, 'there's a thing down the bottom, press that.' He can't find it. Because we say, 'Look for the icon,' and it's all language that we're used to, but he still struggles with.

Most participants were using off-the-shelf systems. They had attempted to simplify the technology by removing unnecessary apps and software. However, there were still times when mistakes occurred and the resident was unable to fix the error. Gloria had set up her husband's iPad in Guided Access mode, which causes the device to remain locked on a single app. She reported that her husband would sometimes press the device too many times during his attempts to use it, causing the app to drop out. This required intervention from a family member to fix. Gloria's example also highlights the issue of touchscreens and buttons that lack tactile feedback, which meant that problems could arise with accidentally pressing the wrong buttons.

In other cases, app updates were noted as a particular problem for the residents. It is common for app providers to remotely update their software, which can change the user interface and cause apps to become logged out. Participants noted these changes were confusing for their relatives and were challenging to resolve. For example, Paul said:

> If it logs out or it updates, it'll set us back. That's been the main problem. She has to stay logged into the app or otherwise it's ground zero again. So yeah, sometimes the app will update and then it logs everything out, and then it's back to square one.

Because of this, Paul and his family had created a password book containing login details, which he gave to his grandmother for reference. This again shows investment of time and effort into careful preparation for video calls, knowing that problems could arise.

The importance of relationships between family members and care staff again came to the fore when resolving technical problems. Participants described leveraging their relationships with staff, often calling the care home on the telephone during the video call, so that they could draw the attention of staff to the problem. Elaine described this challenge:

> Sometimes they've had to troubleshoot. If for some reason, something seems wrong with his computer, then we would move to just talking on the phone. And so like I explained before, we would have to call in and yeah, you would get whoever's on duty and then they would bring the phone to his room and tell him who's calling. So they really had to be the sort of middleman when his laptop wasn't working.

Jackie described a similar challenge, except in this case a staff member was with the resident but did not realise they needed to let people in to the Zoom room:

> [My sister will] ring the number of the care home to say... 'We can't get into the Zoom meeting. We want to be in the Zoom meeting. Could you let us in?' Then somebody will have to run down and say to the girl who was doing it. 'Could you please let these people in?' So obviously they didn't understand the technology of wait rooms.

As this example demonstrates, care staff were not always able to use the technology in the way family members expected. Other participants spoke of this challenge, including Gloria who said that managing the technology was normally the responsibility of other staff—typically the lifestyle team, or activities coordinators—and was not the remit of the nursing staff who had to help with this activity during COVID-19 lockdowns:

> I think a lot of the staff don't know what to do, the nursing staff have got no idea. They've got their lifestyle staff that look after the technology side of it. So, it makes it quite difficult if the nurses don't know, or the carers don't know what to do. I think training for all of them would help. But if they do have such a big staff turnover, I can imagine it would be hard to train everyone up each time.

WiFi connectivity was also an issue, as has been noted in previous studies [26, 34]. Olive had found that this could only be fixed by collaborating with care staff:

> It's not been the interface as much as it's been there's been a problem with the internet. Either when the broadband was being installed or something goes wrong with the modem, so it's more at that level that staff have been involved.

Some cases involved working with the older person over the phone to resolve problems. This has been recognised as challenging in recent work [49, 68]. Paul described his approach to resolving the problem of Zoom logging itself out after an update:

> It was difficult, but obviously it was doable. You just be patient and bring it up on your own laptop so you can look at what you're trying to tell the person to do. We got someone else's laptop and started trying to make a Zoom account from scratch.

These cases further demonstrate the effort required of staff and family members in making video calls work, but in this instance, efforts are focused on overcoming technical problems. Such problems have been identified as a key barrier to the implementation of video calls in aged care [39]. Our analysis suggests that, in real-world use, technical barriers are overcome through active collaboration from staff and family members, again showing how the use of video calls is contingent upon cooperative work from these groups.

5 DISCUSSION

This study aimed to investigate the ways that family members and care staff enact different kinds of work to support video calling for older adults living in aged care. Video calling is a relatively simple and well established technology, yet our study shows that considerable work is required on the part of family members and staff to underpin the success of this technology. The primary reason this work is undertaken is to navigate the challenges of deploying technology in aged care, but it is also a reflection of the misalignment between mass-market applications, residents' capabilities, and the care needs that these residents are living with. In this section, we discuss how the care work we uncovered in this study was coordinated and distributed across time, space, and networks (or "convoys" [28]) of caregivers. We then consider design implications for ensuring video calls can be used more effectively and efficiently in care homes in future.

5.1 The Work of Video Calling in Care Homes

A key contribution of this study is to highlight the sheer range of activities that are undertaken to make video calls 'work' within the aged care setting. Our analysis makes these activities visible and highlights their importance when navigating a challenging situation involving relatives (aged care residents) with significant care needs. We view these work activities as a response to the inherent challenges of deploying commercial video calling tools in residential aged care. Previous work, such as a study of Skype in an Australian care home by Moyle and colleagues [35], has shown that video calling is challenging for care home residents. Similarly, earlier research has shown it is difficult for residents with cognitive impairments, such as dementia, to successfully participate in a video call without the support of care staff [47]. The work undertaken by caregivers reflects their attempts to overcome these issues and make sure that video calls can be successful. Our analysis shows that this work occurs, in different forms, for care home residents with a variety of needs,

not just those with advanced cognitive impairments. Further, the care work is distributed over time—not just in the moment of the video call—and is coordinated across space and among the networks of people involved in the care. We discuss these three types of distributed work below.

5.1.1 Distributed Across Time. This study brings some clarity to the finding that caregivers are needed to make video calls operate successfully in care homes. Prior work has acknowledged that technology requires careful facilitation when introduced in a care context [37, 46, 65], and previous studies have hinted at the role played by caregivers when facilitating video calling [e.g. 47]. However, much of this prior research has focused on the facilitation required in-the-moment, at the time when technologies are being actively used to support care. Waycott et al. [65], for example, highlighted the facilitation required to ensure that care home residents had a positive experience when using immersive VR for personal enrichment, noting in particular the care work required during the VR experience. Other studies focusing on video calling have similarly highlighted in-the-moment care required to overcome specific challenges as they occur [e.g. 35, 57]. Much of this prior work has involved introducing video calling for fixed-term research trials. These studies, then, have not examined the work required to implement video calls without the support of a research team. In contrast, our study shows that work begins well before calls take place, and that caregiver involvement is needed at all stages of the experience.

In our study, interviewees revealed that the work required to make video calling work is distributed across the trajectory of the experience. Different activities are required at different points in the trajectory, but all may be construed as forms of care. Interviewees noted that this care work sometimes begins well before calls occur and involves selecting technologies that balance concerns including cost, resident needs, family requirements, and the constraints of the care home. In some cases, participants chose the technology themselves, taking into account concerns around usability, comfort, and connection with the facility's WiFi network. This was most apparent in the example shared by Ben, who described the process he followed to ensure he chose the right device for his father.

Because our interviews were with family members rather than staff members, we have fewer insights into the decisions made within the care homes about which technologies and applications to use for video calling. However, interviewees revealed other work involved in preparing for the calls, including setting up the equipment, using available furniture to make the equipment more accessible, scheduling the call, and making sure the resident was ready to take the call. We are also missing insights about the work that might take place after the call ends. Given the preparatory work involved, particularly in getting residents ready for the call, we can speculate that there was some after-care work required too, such as removing the device, reassuring residents, and redirecting their attention to other activities if required.

In-the-moment care was also important. This took various forms, from holding the devices at an appropriate angle so that family members could see their relative on the video call, to being an active participant in the conversation, ensuring the resident understood what was happening and encouraging the resident to take part. Even those who were not actively involved in the conversation often stayed nearby during the video calls so that they could respond to any challenges encountered. Like other studies [37, 46, 65, 66], this reveals the time and attention required by caregivers to ensure that technologies work well in aged care settings. Some of this work, such as scaffolding the conversation, may be considered a crucial part of the overall care provided and would align with notions of person-centred care [16]. Other in-the-moment activities, however, are likely to be experienced as a burden and would be difficult to sustain in resource-limited care homes.

We suggest that there is an opportunity to alleviate some of the work required by caregivers through design innovations that target certain forms of work, especially those that are more 'onerous' and involve operation and positioning of the equipment. These forms of work are problematic because they add to the burden of an already overstretched workforce. There is an important need to address feelings of isolation in care through video calls, yet this may meet resistance if technologies are not appropriately designed for the setting and if they demand more work from care staff. Some design suggestions have been made in prior studies. One example is a 'Skype on Wheels' device in which a tablet is attached to a movable stand, such that it can be positioned over a bed [71]. Another, albeit more expensive, solution is to use a telepresence robot, which enables remote family members to reposition the camera [33, 36] and alleviates the need for families and staff to hold the equipment. However, none of our participants had been exposed to such solutions. We suggest there is a need to translate the benefits offered by these tools into more practical artefacts, a point we return to later in the Discussion.

5.1.2 Distributed Across Space. By its nature, video calling is distributed across space [2]. Indeed, in the context of aged care, video calling has been positioned as a tool for 'care at a distance' for family members who are unable to visit the care home routinely [63]. During the COVID-19 pandemic, this sense of distance between family members expanded to include people who lived close enough to visit regularly before the pandemic, but were temporarily unable to visit due to lockdowns. For these participants, video calling provided an important outlet for families to continue participating in the care of older relatives [26]. However, this was not always effective, as we saw with the example of Jackie who had to abandon using Zoom to connect with her mother because it was too difficult to overcome the challenges of video calling a relative with advanced dementia.

In contrast, for some participants, video calling was an established practice for alleviating the distance between family members who lived in different countries. We saw examples of care and connection supported by video calling that took place between Australia and New Zealand, Italy, and the United States. With many families now distributed across the world, technologies such as video calling are crucial for supporting what has come to be known as "transnational care" [67].

Foundational CSCW work, such as the study by Morgan Ames and colleagues [2], has clearly demonstrated that video calling enables family members who are physically distant to feel a sense of connectedness. Like our study, Ames et al. revealed that the success of family video calling depends on different kinds of work and coordination performed by the video call participants. Their study, however, was conducted in the context of the family home and although it did include video calling between grandparents and younger relatives, it did not involve video calling to connect with people living in residential care.

The residential care setting adds a layer of complexity to the notion of care distributed across space. From the coordination work that participants described, we can see how the care work required to support residents took place not just at the bedside of the resident, but also in the central nurse's station or caregiver's office, or in semi-public spaces such as a hospital ward. It was in the resident's room, however, that the primary care work was reported to take place. This being both an intimate and private space—"home" for the resident—and a place of work for caregivers added to the complexity. Participants spoke of caregivers staying close by during the video calls, so they would be on hand to offer support if needed. This work of disappearing into the background but hovering nearby was both a necessity and a hindrance, creating a sense of awkwardness and a loss of privacy for family members. It could also have had implications for the kinds of conversations that took place. It would have been difficult, for example, for participants' relatives to speak freely about their experiences in the home if a staff member is close by.

5.1.3 Distributed Across People. Our findings clearly show that successful video calling required care work that was distributed across networks of caregivers, including family members and care staff. Indeed, formal caregivers appear to play a central role in the instrumentation of video calling within aged care, which some participants acknowledged and greatly appreciated. Some described the strong bond they had developed with care staff, giving a sense that the staff and family members were partners in a care network. This was particularly the case for Margaret, who described how she came to learn more about the staff member, Terry, while coordinating calls with her parents, and for Deborah, who developed a strong appreciation for the scaffolding that Emma provided to ensure Deborah's calls with her mother were successful.

These observations align with the concept of "convoys of care" introduced by social gerontologists to describe the relationship between formal and informal care providers in elder care [28]. This relationship makes a crucial contribution to the quality of care. It is not a static relationship, but is rather "dynamic, evolving, person- and family-specific and influenced by a host of multi-level factors" [28, p. 15].

In later research, Kemp et al. conducted interviews and observations with care home residents and family members and revealed three main convoy types: cohesive, fragmented, and discordant [27]. Similarly, our study shows examples of cohesive care networks, and examples of fragmented and discordant care. In addition, breakdowns occurred when trusted staff members were not available. This could happen because the staff member was away (as discussed by Deborah), because the timing of the call did not align with the staff member's shift (as discussed by Ben), or if the resident was moved to a different ward (also discussed by Ben). In other cases, however, participants had not been able to find staff members they could rely on to support the video calls, or were reliant on the support available at the time of the call, which could vary. Gloria, for instance, said that staff members did the best they could to care for her husband but did not have the level of familiarity she felt was required to support the video calling.

Coordination work sometimes involved other family members too. Jackie described the work her sister did to ensure the camera was correctly pointed at their mother, with her sister telling the staff member that she did not "want to see the ceiling anymore". This example revealed possible tensions between Jackie and her sister, with Jackie noting her sister's request was not "very nice" and acknowledging that it was "really hard" for staff members to do the work they did. Here we see potential breakdowns not only between the family carers and staff carers, but also within the family care network.

Prior work in CSCW and HCI has highlighted the importance of networks of care in healthcare settings, suggesting that technologies should be designed to support these care networks [32] and highlighting how shared care work can change when new technologies are introduced into the care setting (e.g., [51]). Our study emphasises the contributions that different members of the care network make to the work required to support and enable video calling with residents in aged care. This extends the findings of studies of family video calling (e.g., [2]) by bringing attention to the convoys of informal and formal caregivers involved in this work. Our findings also suggest that the role of a 'formal' caregiver may involve developing close relationships with residents and their family members, which could potentially challenge the "boundary work" often required of care providers when managing the care relationship [64].

Our research provides an expanded understanding of the labour required to make video calls work in the context of residential aged care. It is easy to assume that video calling would be a simple technology to use within a care context, given its widespread proliferation. Commercial applications such as Zoom seem relatively easy to use. However, we have shown that substantial and variegated forms of work are required to ensure the smooth operation of video calls in care

homes. This is important for thinking about the design of video calling systems for the care context, which is crucial as one potential way of tackling isolation among care home residents [41].

5.2 Design Implications

By highlighting a range of care activities involved in facilitating video calling, we have shown that the work involves both valued care activities (e.g., scaffolding the conversation to connect with family members) and less valued activities (e.g., holding the devices). Commercial video calling products, while widely available, are clearly not fit-for-purpose in residential aged care. To alleviate some of the less valuable work that staff have to do when manipulating the equipment, there is a need to design video calling systems better suited to the context in all aspects.

There are already some screen-based standalone systems that offer simplified video calling, including Amazon's Echo Show and the Meta Portal. In addition, there are systems designed for older users, such as Grandpad [21] and ElliQ [15], both of which include video calling functionality. These systems may help to alleviate some of the work required by participants in our study, such as by automatically panning the camera or by simplifying the user interface. However, they have not yet become mass-market technologies around the world, and were not specifically designed for aged care homes; instead, they were designed for use by older adults living independently. This means that they may remain unsuited to the needs of people with frailty or complex care requirements. We see an opportunity to design a video calling system that draws on the innovations within existing systems but which is highly usable and ergonomically appropriate for residential aged care. We highlight three key considerations: interface accessibility, hardware requirements, and the need for the technology to automatically respond to changes in a person's movement. These are *individually* addressed by some existing tools but could be *collectively* tackled by a purpose-built system. We detail each one as follows.

5.2.1 Accessibility. First, it is clearly important to attend to the accessibility of video calling software and hardware. Devices need to designed so that they can be operated independently, as much as possible by the person living in the care home. Some features that could be considered here include one-touch operation to make a call (that is, avoiding URL links or the need to download software, and ensuring there is only one step involved in initiating a call). This could mean installing a device dedicated to video calling, which has no icons for other applications. Another approach might be to use voice activation, negating the need for fiddly operations. The companion robot ElliQ [15], for example, can make video calls to family and friends based on voice commands. However, this would still be a partial solution given that many care home residents are living with communication impairments. Future solutions should therefore provide a range of accessibility features to enable video calling for residents who have different requirements.

Further, our findings show that the video self-view, which is often standard in video calling applications, can cause confusion for people with dementia. While self-view can usually be turned off, it may be better to not have this feature at all, removing the need for a caregiver to change the settings. An example of this can be seen in the video calling app Dossy [12], which removes the self-view from the video and provides a simplified calling experience for older adults.

5.2.2 Hardware requirements. As this study shows, space considerations are important when using video calling in aged care. Residents might have limited ability to move to accommodate themselves to the device. They may also be bedbound or seated in a low position, making it difficult to position a device in front of them. A dedicated device could be designed to be fixed in place or to be moved into position as required. Assistive robots combined with video calling features may be useful here, as they could be designed to be stationary or mobile if the situation changes. Telepresence robots

can also support ease of camera positioning, though their high cost (ranging from around $2,000 [55] to $12,000 and above [54]) may be prohibitive to widespread adoption.

Currently, tablet devices are more common, and may remain so given that families likely want devices that work within their preferred ecosystem (such as when buying an iPad to use FaceTime). If tablet devices continue to be used, consideration may need to be given to not only the form factor of the device, but also any additional furniture or accommodations that may be required to ensure the device is accessible within the space in which it is being used. This may mean creating specialised supports to enable positioning over beds and armchairs, similar to the Skype-on-Wheels design tested in an earlier study [71]. It might also mean creating tablet devices that are lightweight and easy for frail older people to hold in their hands, like the Grandpad [21].

5.2.3 Responding automatically. One of the challenges participants in this study faced was troubleshooting when things went wrong, and coordinating with care staff if they needed extra support (such as when a family member was stuck in the waiting room of a Zoom call). Sometimes participants faced barriers that seem relatively easy to fix but that had a big impact on the quality of the video call experience. For example, participants spoke of their relatives moving position, so they were no longer visible on the video. This could be addressed through technology that is currently available, such as Apple's Centre Stage and Amazon Echo Show, which automatically zoom in on the person's face, lessening the need for repositioning. There may be other opportunities to design technology that automatically responds to changes in the call, including the use of artificial intelligence to detect and respond to problems as they occur. However, this would require further research to ensure it is sensitively designed to address the resource-intensive manual care work that is considered to be of low value, rather than attempting to replace the more valuable relational and person-centred care work.

5.3 Limitations and Future Work

We acknowledge three limitations with our study. First, our findings cover work done by family members and staff, but our analysis is based only on data from family members. This means we rely on indirect accounts of staff activities that may be incomplete. A second limitation is that we rely only on interview data rather than direct observations of people's behaviour around video calls. This limitation could be addressed through ethnographic studies conducted in aged care settings [cf. 58], paying special attention to the behaviours around video calling to provide further evidence of the work involved [18]. Lastly, this study focuses on the experiences of people living in Australia and New Zealand, most of whom had relatives living in Australian aged care. Our findings are not guaranteed to transfer to other countries where long-term care is organized differently. However, we expect that similar work may be required from family and carers in circumstances where improved video calling systems are not in place, given that the underlying issue (a lack of fit between users' capabilities and mass-market technology) is likely to be the same.

6 CONCLUSION

This paper reported an investigation of the work activities conducted by family members and staff during the use of video calls in aged care. Video calling has the potential to provide crucial opportunities for social contact in care homes, which are known to be lonely places for residents [41]. We have shown that video calling worked well in some cases, but only with the support of "convoys" of care, and that video calling required work distributed across time, space, and people.

While all forms of work associated with technology are costly in terms of time and resources, not all of this work is resented. In some ways, the opportunity for care staff and families to become involved in the use of video calls is beneficial, because it appears to contribute to the development

of caring relationships between families and care providers. On the other hand, some forms of work associated with video calling consume staff time for no clear benefit, such as the work of 'holding the iPad', troubleshooting technical problems, or resolving the confusion that can arise from complex interfaces. Future work is therefore needed to ensure video calling devices and applications are fit-for-purpose for use in residential aged care, to ensure residents are able to maintain meaningful connections with family members and friends outside the home.

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