# Understanding Older Adults' Participation in Online Social Activities: Lessons from the COVID-19 Pandemic

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Restrictions arising from the COVID-19 pandemic have limited opportunities for older people to participate in face-to-face organised social activities. Many organisations moved these activities online, but little is known about older adults' experiences of participating in those activities. This paper reports an investigation of older adults' experiences of participating in social activities that they used to attend in-person, but which were moved online because of strict lockdown restrictions. We conducted in-depth interviews with 40 older adults living independently (alone or with others). Findings from a reflexive thematic analysis show that online social activities were important during the pandemic for not only staying connected to other people but also helping older adults stay engaged in meaningful activities, including arts, sports, cultural, and civic events. Online activities provided older adults with opportunities to connect with like-minded people; share care, encouragement, and support; participate in civic agendas; learn knowledge and develop new skills; and experience entertainment, distraction, and mental stimulation. Our participants had diverse perceptions of the transition from in-person to online social activities. Based on the findings, we present a taxonomy of multi-layered meaningful activities for older adults' digital social participation and highlight implications for future technology design.

CCS Concepts: • **Human-centered computing;** • **Collaborative and social computing**

**Additional Key Words and Phrases:** Older adult, older people, technology, social activities, social participation, social engagement, COVID-19, pandemic

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## 1 INTRODUCTION

Researchers and policymakers recognise that social participation is crucial for healthy and active ageing [6, 19]. However, taking part in face-to-face social activities is not always possible. We have recently witnessed the drastic effects of the COVID-19 pandemic on people's social lives. To reduce the spread of the virus, many countries introduced stay-at-home orders and lockdown restrictions, which made it difficult for people to engage in face-to-face conversations and social


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activities [10, 30]. Recent studies have shown that during the COVID-19 pandemic, older people are experiencing reduced quality of life and increased risks of social isolation and loneliness due to limited social contact and interaction with people [10, 31, 38, 67]. In order to protect the social and mental well-being of older people, it is important to find alternative ways to meet their social needs during challenging times.

Communication technologies such as social networking sites and video conferencing tools have provided valuable opportunities for people to stay connected and communicate with each other during the pandemic [9, 59]. Due to restrictions on face-to-face social interaction, many activities, events, and social clubs had to move their face-to-face meetings online. This pushed many older adults to adopt new technologies to continue to participate in the social activities they used to attend [25, 56]. However, digital tools can provide a poor replacement for some group activities [56], and it is unclear how well different online activities meet the social needs of older adults. While past research on older adults' online social interaction mainly focused on those who were already active members of online communities (e.g., [12, 24]), the pandemic provides opportunities for researchers to capture the experiences of older adults who previously had little online social interaction but were motivated to use online technologies during COVID-19. It also creates opportunities to understand perceptions and expectations of online social interaction from both the perspective of older people who are willing to participate in online social activities and those who are not. This can inform good future practice for the design of online social platforms for older adults [2].

In recent years, there have been calls in CSCW and HCI for researchers to adopt more holistic approaches to designing for older people, going beyond standard accessibility or 'senior-friendly' considerations [29]. It has been argued that more attention should be paid to the uniqueness of older adults' long histories of using technology and their generational perspectives on the social context and communities in which they live [29, 50]. In this paper, we followed this call by focusing not only on the technological aspects of participating in online activities, but more on the social aspects of older adults' participation in online activities in the context of the pandemic and the difficulties of enjoying a rich social life while being forced to stay at home.

In this study, we examined older adults' experiences and perceptions of their participation in online social activities during the COVID-19 pandemic, focusing on the following research questions: What types of online social activities did older adults participate in during COVID-19? What can older adults achieve from participating in these activities? How do older adults feel about the transition from attending in-person activities to online ones?

To investigate the questions above, we conducted in-depth interviews with 40 independent-living older people in Victoria, Australia, where the main city of the state, Melbourne, experienced some of the longest periods of lockdown in the world, accumulating more than 260 days under strict restrictions [13]. Our primary findings were that:

- During the pandemic, different communication technologies and social media platforms were used creatively by older adults to sustain various types of social activities that used to take place in person, including arts, sports, cultural, and civic events.
- Participation in online social activities provided older adults with the opportunity to connect with like-minded people; share care, encouragement, and support; participate in civic agendas that inform decision-making; learn new things and develop skills; and experience entertainment, distraction, and mental stimulation.
- Participants had diverse views on the transition from in-person social activities to online ones. Some felt that online social activities lack personal, intimate, and incidental

interactions, and that online social activities were more rigid and difficult to manage. Others thought that online social activities were more convenient and easier for people to express themselves. Besides, when transferring in-person activities to online platforms, specific types of social activities worked better than others.

This paper contributes to the literature in three ways. First, this study offers nuanced findings in the context of the COVID-19 pandemic, extending previous research on technology use for socialisation among older adults. Our findings shed light on how social participation for older people is multi-layered and not just about connecting people, but about connecting people with activities, hobbies, and interests. To illustrate this, we present a taxonomy of four types of meaningful social activities for older adults' digital social participation. Second, we provide insights into older people's experiences of participating in both in-person and online social activities on the same topics, which can help us identify the factors that affect older adults' experiences of digital social participation. Third, we identify ways that future online activities can be better designed to support the social participation of older adults.

## 2 RELATED WORK

This study builds on past research on older adults' digital social participation and the use of technology by older adults for socialisation during COVID-19.

### 2.1 Digital Social Participation in Later Life

Social participation is an important determinant of healthy ageing and is associated with mortality and quality of life among older adults [33, 34]. In the literature on ageing, social participation usually refers to how actively a person takes part in the activities of formal and informal groups in society [35]. Participating in social activities is particularly important for older adults, as their social circles tend to shrink due to reasons such as retirement, bereavement, and health-related factors [64]. Information and communication technologies (ICTs) can provide opportunities for older people to take part in various types of social activities virtually and distantly. This can be particularly helpful for people with limited mobility, those who live in areas with limited resources for social activities, and those who are reluctant to interact with people face-to-face [5, 52].

Previous work on social participation of older people through technology mainly focused on the emerging forms of technology that can support virtual participation [7, 14], the inclusive design of online systems for social participation [44, 53], factors that can affect technology adoption and resistance [39, 40, 43], solutions to overcoming digital literacy barriers [3, 60], and the digital divide between technology users and non-users [56, 57].

There is also a growing body of research exploring older adults' preferences and perceptions of digital social participation [6, 8, 17, 22]. For example, Pfeil et al. conducted a study that involved 31 interviews and explored older adults' perceptions on different aspects of social support in offline and online settings [45]. They found that some older people were reluctant to talk about their problems to other people offline, but the concern did not exist when disclosing information about themselves online. However, there were concerns about misunderstandings and inappropriate behaviour occurring more often in the online environment. Our research resembles Pfeil et al.'s study in that we also examined older adults' preferences for online social interaction and factors that could affect their experiences, but their research did not explore older adults' participation in online social activities. We extended that study by interviewing people who

participated in online social activities that used to take place in person. This further helped us understand what types of activities are more suitable to be organised face-to-face and what works better online.

Hope et al. [26] conducted a qualitative study in 2014 that explored older adults' communication preferences and values related to the use of social media. They found that older adults have concerns with using online social media, including the time required for participation, expectations of reciprocity, content irrelevance and privacy. Their findings also revealed the importance of 'materiality' in older adults' communication, as older adults tend to share physical artefacts such as printed newspaper articles and crossword puzzle clippings with their social contacts. The present research also aims to understand older adults' preferences and perceptions of interacting with others online, but it differs from Hope et al.'s study as we focused more on how older adults used online technology to sustain the activities that they used to attend face-to-face when physical interactions were restricted during the pandemic.

### 2.2 Studies on Ageing and Technology during COVID-19

Existing studies on the use of technology by older adults during COVID-19 mainly focus on digital contact tracing [1, 65], telehealth adoption [15], digital literacy [51], digital and social exclusion [55, 56], social support [42], virtual volunteering [62], and experiences of autonomy [41]. Most of these studies are large-scale quantitative studies. Richards et al. [49] conducted a study that explored how older adults adapted their behaviours across multiple modalities to keep connected with others in person and online during the pandemic. They found that many older adults learned new ways to use technology for connectedness, such as how to text, use video calling, or order products online. They also found how older adults mixed digital with physical artefacts in their virtual connection, and what older adults value when experiencing infrastructural breakdowns, including seeking intimate interactions, staying updated and avoiding isolation, improved access and consistent connection to community, and authentic, natural, and realistic interactions.

Alharbi et al. [1] conducted an online survey with 397 older adults' families to understand older people's uses of mobile tracking applications during the COVID-19 pandemic. They found that most older users required help from others to use pandemic tracking applications, which means that they were more reliant on others during the pandemic. They also identified that some older adults found it difficult to read texts or understand how to use the technology. Haase et al. [25] conducted an online survey with 400 older adults to assess the barriers and facilitators for older adults to engage in web-based socialisation. They found barriers to older adults' uses of technology, including a lack of access, a lack of interest, and physical barriers; and facilitators that can support older adults' technology uses, including prior knowledge of technologies, reliance on others, technology accessibility, and social motivation. While these quantitative studies provided a valuable overview of older adults' technology uses, there is still much to learn about their individual experiences and opinions.

A recent CSCW paper by Sin et al. [56] used a qualitative approach to explore older adults' adoption and use of social technologies during the COVID-19 pandemic. They found that the pandemic surfaced new barriers to technology adoption by older people, such as limited access to in-person technology support and limited opportunities for digital participation due to age-related discrimination. They also explored the digital divide during the pandemic, finding that while many older adults crossed the divide and became savvy technology users, those on the other side of the divide felt frustrated, anxious, and alienated. Our study was in a similar context to Sin et al.'s research. However, rather than focus on the adoption of technology and digital exclusion,

we are more interested in what older adults can achieve from participating in different types of online social activities and factors that can affect their experience of digital social participation. Our paper extends Sin et al.'s research and adds new insights to the understanding of older adults' individual experiences of using technology for socialisation during the COVID-19 pandemic.

## 3 METHOD

This study aimed to explore older adults' experiences of participating in online social activities during the COVID-19 pandemic and their perceptions of the transition from in-person to online activities. We conducted in-depth interviews with 40 older adults living independently in Victoria, an Australian state where social interactions were greatly impacted by the COVID-19 pandemic due to strict stay-at-home orders and lockdown restrictions. All research protocols and procedures were approved by the university's human research ethics committee.

### 3.1 Research Context

The data were collected between October and December 2021 in Victoria, Australia. Participants were experiencing stay-at-home orders and lockdown restrictions during the period, which means that they could not move around freely. At the beginning of the data collection period (interviews 1-11), the lockdown restrictions were strict for those in Melbourne: citizens only had five essential reasons to leave their homes (access to food and supplies, exercising for up to two hours, care or caregiving, authorised work or education, and vaccinations). Face masks were mandatory both indoors and outdoors; shopping and exercise were restricted to within 5 kilometres of one's residence; private and public gatherings were not permitted; and visitors to the home were not allowed [46, 47]. These restrictions were gradually lifted from the end of October. The rest of the interviews (interviews 12-40) were conducted when the restrictions began to ease, and interview questions were slightly adapted to the situation. It is also important to note that we recruited participants from both metropolitan and regional areas, and the restrictions in metropolitan areas were much stricter.

### 3.2 Participants and Recruitment

Our participants were 40 older adults (32 women, 8 men) living in Victoria, Australia. The age of participants ranged from 65 to 84 years (M= 73.9 years, SD= 5.8 years). We used purposive sampling to recruit adults aged 65 years or older, living independently in their own homes, and who felt as though their social life had been affected by the pandemic. All participants responded via email with their expression of interest in participating in the study, meaning that they had at least a basic level of digital literacy (i.e., they knew how to use a computer or smartphone). Participants received a $20 gift voucher as compensation, except for one who declined the voucher because he wanted to volunteer freely for the study.

We sent recruitment information to different city councils (including metropolitan and rural areas), some of whom included the research information in newsletters delivered to local citizens. We also recruited participants from social groups and organisations that involve senior members, such as the University of Third Age (U3A, an Australian University aimed at older adults), Daughters of the West (a local community group open to women only), and Probus clubs (local social clubs for retired people). Some participants were recruited from a program run by the Australian government called *'Be Connected'*, which provides digital skills training courses for senior citizens.

Our participants were from different nationalities, including Australian, Asian, South African, European, and Indian. Eight participants were living in regional areas, and 32 participants were living in metropolitan areas. According to the regional socio-economic index (SEIFA), the postcodes we collected from the questionnaires show that our participants were from varied socio-economic backgrounds, with some coming from areas of lesser socio-economic advantage and others from areas of greater socio-economic advantage [4]. Just over half of them were living alone (n=21); 18 participants were living with their partner, and one was living with (adult) children. Eighteen participants were married, eight participants were widowed, eight participants were divorced, three participants were separated, and three participants had never been married. Participants' experiences of using communication technologies during the pandemic varied. More details about each participant are included in Appendix A.1.

### 3.3 Procedure

Following approval from our university's ethics committee, we collected informed consent and demographic data through an online questionnaire before participants took part in the interviews. Participants were first asked to read an information sheet that provided information about the study purpose and procedures, their rights to withdraw, and the confidentiality of the research data. They were then asked to read and sign a consent form that gave researchers the permission to collect data and record the interviews in audio form. Following this, participants answered questions about their demographic information, including age, gender, ethnicity, living area (postcode), marital status, and the types of technology they had used during the pandemic.

We conducted in-depth interviews in a semi-structured format so that we had the flexibility to adjust research questions according to individual situations. Due to the circumstances of the COVID-19 pandemic, all interviews were conducted remotely over phone or video calls (using Zoom). Twenty participants chose to take part in the interview by phone, and 20 participants were happy to use Zoom for the interview. All interviews were conducted in English, audio-recorded, and transcribed into written records for later analysis. Each interview lasted approximately 30-40 minutes and included an in-depth discussion about participants' life experiences during the COVID-19 pandemic. Participants were asked to describe the impacts of COVID-19 on their life, digital devices and applications they used, and social activities they had been taking part in during the pandemic.

### 3.4 Analysis

We analysed the interview transcripts using reflexive thematic analysis, a commonly used qualitative analysis method that values the importance of the researcher's interpretation of the data [63]. We followed Braun and Clarke's six-stage analysis process [16]. We first read through the transcripts of interview data (phase 1), and then we adopted an inductive approach to coding the data, producing 467 codes (phase 2). Example of codes include "lack of personal contact", "Zoom convenience", "interest-based social groups", and "technical issues". After that, we began clustering codes into candidate themes and had discussions on whether they could provide an overall account of the data (phase 3). Phases 4-6 involved consolidating and refining the themes among the authors in a collaborative and iterative way.

The analysis was led by the first author, with other members of the research team involved in reading a sample of transcripts (4 each) and discussion around theme names and content. In the group analysis process, we aimed to achieve richer interpretations of meaning rather than

attempting to achieve consensus of meaning, as guided by the principles of reflexive thematic analysis [11]. We describe the key themes below in the findings section.

## 4 FINDINGS

We first provide an overview of how communication technologies and other artefacts were appropriated creatively to sustain various types of social activities that previously took place in person. We then report the roles and benefits of online social activities, including (1) connecting with like-minded people; (2) sharing care, encouragement, and support during difficult times; (3) participating in civic agendas that inform decision-making; (4) learning knowledge and developing new skills; and (5) entertainment, distraction, and mental stimulation.

In addition, we present participants' varied perceptions about the transition from in-person to online social activities, including that (1) online social activities lack personal, intimate, and incidental interactions; (2) online social activities are more rigid and difficult to manage; (3) online social activities are more convenient and easier for people to express themselves; (4) online tools work better for specific types of social activities.

### 4.1 How Communication Technologies Were Used to Support Social Activities

All our participants were experiencing or had experienced strict lockdown rules and stay-at-home orders at the time of the interview, which means that many social activities they used to participate in had to be curtailed. To cope with this situation, many organisations started to facilitate virtual alternatives to those activities by using communication technologies and digital tools creatively. Our interviews captured a wide range of activities older adults participated in during the pandemic, including art activities such as ballroom dancing, line dancing, tango, band rehearsal, choir rehearsal, and painting; sports activities such as attending yoga classes, Zumba, and gym training; crafting activities such as patchwork quilting; civil activities such as being committee members in a council or organisation; cultural activities such as attending lectures, seminars, or courses; and entertainment activities such as playing games with family and friends. Participants used different communication technologies and social media platforms, including Zoom, Skype, Facebook, and YouTube, to participate in those social activities. Devices they used include tablets, desktop computers, laptops, and smartphones. These platforms and devices were used creatively by our participants to support their participation in social activities.

First, videoconferencing platforms such as Zoom were the most commonly used digital systems among our participants when transferring offline social activities to online platforms. Although all participants said they were familiar with Zoom, many of them only became aware of it during the pandemic. For example. P31 said that she learned how to use Zoom during COVID-19, and she hadn't used a camera for ages before the pandemic happened. Our participants said that they usually received a link to the activity session through email or messaging tools, and then they would join the meeting by clicking on the link and opening the application on their desktop or laptop computers. Many participants enjoyed using Zoom to connect with others, saying that "I wished I'd started those Zoom meetings earlier" (P38) and "it links us up together" (P40). However, this process was not entirely straightforward for all participants. Joining in video conference requires technology setup and preparation, so many participants asked their family or local librarians for help, but some were not able to figure out how to make it work. P34 said: "A lot of my friends haven't been able to get onto Zoom. You'd have people that were there that could have, but they couldn't see [how]…". This aligns with Sin et al.'s study that digital exclusion

could happen during the pandemic with some older adults disconnected from their communities [56].

Second, many participants attended activities delivered through social media platforms, including Facebook and YouTube. P13 used her smartphone to participate in an event about posting and sharing pictures of roses on Facebook during the lockdown, which was organised by a gardening group that she used to meet regularly. She said: "it was more of a question-and-answer type thing or showing the beautiful roses you're growing". This shows how social media was used to keep members of a social group connected during the pandemic. P36 described her experience of rehearsing in a band through YouTube on her desktop computer during the pandemic: "Our band conductor pre-recorded the rehearsals on YouTube. After the meeting or whenever it was convenient for us, we'd go to the YouTube rehearsal and play along with the music." This examples shows how existing activities could be sustained through alternative strategies supported by digital platforms. In addition, some participants used messaging tools such as WhatsApp on smartphones to exchange information related to online social activities, as recounted by P2: "We have a walking group chat on WhatsApp. We post photos. We post meeting times and where we're going to meet. If anything's wrong, we check up on each other". These examples show how different social media platforms were integrated with video conferencing tools in the preparation and organisation of social activities.

Third, to replicate the whole experience of attending in-person activities, we found that some online activities were supported by material and physical artefacts. For example, P7 met other members of a quilting group every morning and evening through Zoom on her computer during the lockdown. Before the meetings, all members received a package that contained fabric and other quilting materials and delivered to their homes. In the morning meetings, they would ask questions like, "has anybody got a piece of fabric this big, because the shop's shut". They then worked at their own home individually, and they met again in the evening to present their work to others and leave and receive comments. She said, "we would go on Zoom at 5 o'clock in the afternoon and everybody would show what we've done during the day and talk about it. "Oh, that's nice!" and "How did you do that?" That was terrific!". Similarly, P5 shared that when she participated in a painting group activity organised by the local council, she received a starter package that contained little paints and a paintbrush. She drew things on paper during the day and then shared them with other members of the group at Zoom meetings. These examples show that using physical and material objects in online social activities can contribute to a sense of ongoingness that social relationships and clubs are being maintained and not drifting apart due to the restrictions. They can also create a sense of co-presence by allowing older adults to collaborate with others on the same project while staying at home.

### 4.2 The Roles and Benefits of Participating in Online Social Activities

From the interviews, we found that participating in online social activities could provide many benefits for older adults, especially during the COVID-19 pandemic. In this section, we describe different roles that online social activities were playing in our participants' lives and what benefits they were receiving from participating in these activities.

*4.2.1 Connecting with like-minded people.* Many participants participated in interest groups to connect with their personal passions and hobbies during the pandemic. Activities organised by these interest groups provided our participants with the opportunity to connect with like-minded people. P34 connected with a family history group through Zoom meetings during the lockdown.

She explained, "We have a speaker who talks about different things in the family history line of how you can look up things on different records. It's very interesting to be able to hear about other people's family history."

Similarly, P7 connected with members of a book group through Zoom meetings. She said the following:

> "When it comes time for the discussion of the book that we're reading, we all get on. The convenor sends around a list of questions, and each person gets to lead the discussion on this particular question, so we each have a question. The convenor tells us when time's up and it's time to move onto the next question. That works really well."

Participating in interest-based social activities also helped our participants to meet new like-minded people. P4 loves to sew in her free time. During the pandemic, P4 found a group that was making scrubs for hospital staff. She felt happy that being a member of the group kept her busy with a meaningful activity - making scrub hats during the lockdown:

> "I love to sew, so I found a group that was making scrubs for hospital staff. So I just got busy and was in my sewing room every day making scrubs. And this time I'm making scrub hats. That kept me in touch with what other people were doing, but also got me in touch with the person coordinating this volunteer job to make scrubs, for hospital staff." (P4)

When asked about how she discovered the group, she said:

> "I saw a post on my sewing group that somebody, a nurse had put in a request to say, "Anybody who can sew, we'd love some hats". I responded to that, and I've been making them, and I've reached out to another couple of community groups, a COVID testing clinic I've delivered some there yesterday. So I just sort of kept going with it and making them for other areas now. But it all started from a thing on Facebook."

This example shows that our participants turned their passion into new activities in response to the pandemic, and they used a previously unfamiliar (and hence new to the user) technology to achieve it. These activities not only helped them to maintain the continuity of previous social relationships but also provided opportunities for them to form new relationships with like-minded people.

*4.2.2 Sharing care, encouragement, and support during difficult times.* During the long lockdown period, many participants experienced negative emotions and feelings, including "very lonely" (P14, P18, P34), "frightened" (P2), "disturbing" (P32), "very isolated" (P5, P32), "frustrating" (P20), "desperate to see people", "debilitating", "being locked inside was very depressing" (P34), and "hate being stuck inside" (P5). P20 said that "COVID is just like a black cloud that's always on the horizon. We're always waiting for the next thunderstorm." P24 described his feeling of helplessness during the lockdown period:

> "Here I am, sitting by myself having dinner. I'd rather be having dinner out and about with my family or friends. I watch television or programmes on my hard drive. But that's not life. That's just passing time. That's like moving wallpaper. It's not life. And I like to be amongst people. I'm a gregarious person, not a hermit."

Some participants were discouraged by the news updates about COVID-19 that appeared in the media. P2 said:

> "I get so sick hearing about it, and I get depressed about the case numbers and the deaths. I think it's really affected our lives so much and made us all frightened, frightened to hug each other, frightened to catch up with friends and fearful of catching the virus. I feel like I'm a bit of a different person."

During this time, uplifting encouragement and support from others became extremely important. P15 described her experience of meeting people in local church groups every fortnight over Zoom and how they cared for each other in the community:

> "We share information about friends who might be sick, or we had friends who died in that time. And if they did, we could only see their funeral via Zoom. And then we'd have a Bible study together, and usually we had supper together. I made things, went around just before we were to start, put cakes in their letter boxes, and then at the end told them that we'd have supper."

Similarly, P8 described her experience of caring for other people in a community group by doing daily phone call check-ins:

> "I will ring half a dozen people just to catch up and see if they're okay. And then somebody else, another day, will ring me and say, "Are you okay? How's things going?" And a lot of people don't even use their mobile, so you have to ring the home phone. We keep up, and we keep in touch, make sure nobody's getting depressed or get no money or whatever. But yeah, basically old-style."

The provision of care, encouragement, and support also came from family members. P27 shared her experience of participating in her grandchildren's birthday party over Zoom. Before the birthday party, her daughter arranged delivery of self-cooked birthday cake slices and treats to all family members through Uber, so they could all share them together during the party. She said:

> "It was good to see everyone together. I put up balloons on my monitor and had a nice birthday display, just to make it a bit interesting for the kids… They went around the group to offer messages to the kids for their birthday. Each one had a turn to offer their greetings as well."

Similarly, P26 shared her experience of attending online birthday parties with her family during COVID:

> "The family was very kind. They organised a Zoom birthday party for me, and they organised a voucher so I can order things from the restaurant. They can deliver the food to me, but I have to warm it up or something, or I can go and pick it up, something like that, to celebrate my birthday."

The above examples of sharing food, having regular check-in calls, and celebrating special moments together show how older adults used online technology to share care, encouragement, and support for each other. This echoes Pfeil et al.'s research that online communication can provide deep emotional support, empathy, sympathy, caring, and love for older people [45]. These uplifting experiences could foster cohesion within community groups and families and help people get through difficult times during the pandemic.

*4.2.3 Participating in civic agendas that inform decision-making.* In the interviews, we found that some participants used communication technologies to connect to community groups on social and political agendas. They used digital platforms to collect resources and exchange information that could inform decision-making. For example, P12 was part of a local group that gathered monthly to propose measures to keep the town tidy and neat. During the pandemic, they met regularly on Zoom to continue the discussion. Ideas gathered from the meetings were sent to the council and eventually helped to improve the appearance of the local streets. She said:

> "We gather monthly to promote various forms of trying to keep the town tidy and neat. There's an award, which [our town] won this year for the seventh time. They were winners in so many categories, which gave them the top points. But it's just, to promote people to pick up rubbish and keep the town tidy. And we do have some contact and influence on the council to tell them, "This street looks terrible, and you need to do this, you need to do that."

This example shows the use of online conferencing tools for making contributions to the development of their local community and society. In early 2020, there was a disastrous bushfire crisis in Australia, and many citizens living in Victoria were seriously affected. Since COVID-19 started to spread shortly after the fires, P32 described her experience of connecting with members of a bushfire recovery group through Zoom and how they organised an event to cheer up the local residents:

> "It was a bushfire recovery group. We were still locked down, but a group of interested people got together to create an event for the town to help the town heal. I'd go to a lot of meetings about getting this event set up, and that involved getting funding and then actually organising the event. And that involved Zoom meetings and those sorts of things until we were actually allowed to meet. We ran an event that we had to fence off a precinct and we had live music and we had free food organised. And you had to be a local to attend, and people came together, and it was the first time nearly all year we had been able to meet as a community."

P18 shared her experience of using Facebook and emails to keep members of a fundraising group connected and informed during the pandemic. She described how the group raised money online to fight against a company that planned to open a mine in the area:

> "During that time, we had to make money [to pay] for the lawyers. It cost more than a million dollars for the council and million dollars for the public, more than that. Everyone was trying to make things, and you're in lockdown, how do you make money? It was mainly a lot of people who were making masks, I think about 12 hours a day. And then they had to advertise what they were doing online. So they advertised on Facebook and $5, $10, $15, and then they would leave them at the front gate. Facebook was critical, and email was critical, over this last two years, keeping our community informed, keeping the whole community informed."

These examples demonstrate how video conferencing and social media platforms were used as mediators in the preparation and organisation of events during the pandemic. They not only provided older adults with the opportunity to participate in civic agendas that can inform decision-making and contribute to society, but also acted as important sources of social support and helped our participants to form and strengthen social bonds within the community group.

*4.2.4 Learning knowledge and developing new skills.* We found that many participants attended knowledge-based social groups after their retirement to learn skills and knowledge. Those groups usually have sessions that invite guest speakers from different fields to deliver lectures on various topics. The topics can range from health, farming, local history, bird watching, Tai Chi, nutrition to technology, music, and philosophy. Our participants considered these sessions to be important parts of social interaction in their lives and a useful medium for staying connected to the world.

P14 participated in a music appreciation group, a cryptic crossword group, and a group about Apple devices during the pandemic over Zoom. She told us that participating in these group sessions was a "lifesaver" to her. Similarly, P2 shared her experience of being part of an online health and wellbeing program organised by a local organisation:

> "It's a health and wellbeing programme, and they're trying to get people more mobile. They have physiotherapists and psychologists who come into the group as a support. We have a guest speaker who'll talk about nutrition, alcohol, exercise, heart health, cancer, all sorts of health subjects. And then usually we break into a group at the end. And then at the end we have a little local group, which consists of people in our own small area. And then we just discuss various issues and talk about how we're feeling and what we've been doing. I found it terrific."

One benefit of organising online group sessions is that people can invite guest speakers who live in different parts of the world:

> "For every meeting, we would have a speaker. I arranged for a speaker that owned an art gallery in Alice Springs. She took us through all of the Aboriginal art that she promotes and sells and described what it was. And we've had speakers from Italy. We've had people down in Sydney who can't come up for one reason or another. So Zoom has allowed us to spread out the reach of the speakers that we've got." (P16)

P28 described his experience of attending online Zoom sessions to learn about spirituality. He described those sessions as a "boon" for him as he had never used a video conferencing tool before. He felt excited that he was able to attend sessions based in India, which helped him learn the topic in more depth:

> "India is very rich in their ancient scriptures like the Bhagavad Gita and the Upanishads and with antique literature as such. I had been exposed to that over the last 20 years or so after my retirement, but this COVID period gave me an opportunity to refresh my knowledge and add to the information. The Zoom meetings in India could not have been possible on any other means of contact. We used to have our one-to-one meetings when I used to be in India, but such a thing would not have been possible to carry on extensively a dialogue on serious subjects like sociology or philosophy with my friends if it was not for the Zoom."

The examples above show how communication technologies provided opportunities for older adults to stay productive during the pandemic by learning new things and developing skills. It goes beyond supporting interpersonal connections to help older people stay engaged in life, discover new interests, and pursue lifelong learning. This was also a positive outcome of the switch to online activities during the pandemic: people were able to expand their engagement in online learning as more opportunities became available.

*4.2.5 Entertainment, distraction, and mental stimulation.* During the time of staying at home, many participants joined online activities with family and friends to entertain themselves. For example, P38 described her experience of joining a 'games night' with her family through the Viber Messenger application. They played a game called Pictionary, where the computer generated a picture, and each member took turns picking a name from a suggested list, drawing it with the mouse, and the others had to guess what it was. P38 described it as a "very fun experience" and "good distraction", which shows that online social activities could bring joy and distract people from negative emotions they experienced during the pandemic.

Playing online games with friends not only brought joy to our participants, but it also enabled their social interaction with family and friends:

> "I play a game on the phone called Words with Friends, and it's very easy too. You can just press a button and send a message to people anywhere. I play with friends and relatives and a man in India and people who are far away. And so, I can just say a sentence to them very easily every day, so that was a great social thing for me." (P15)

In addition, we found that some participants played online games with friends to keep their minds active. For example, P16 played Trivia games with members of a breakfast club through Zoom and Kahoot in his spare time during the lockdown. Kahoot is a learning platform that supports multiple-choice quizzes. He helped a 92-year-old member and his wife to sign up and get on the games to stay active. P13 said that she sometimes played a game called *MindPal* with her grandson, which involved the practice of mathematical and language skills. Similarly, P5 did quizzes and played Trivia games with her friends through Zoom meetings. She said:

> "The games that I play on the computer are all mind things. Finding hidden things in pictures and things that are going to make me brain work. One of the games I play is the Pacific Bay, and it's sort of a crime related thing, you got to find up to 12 things."

The examples above show that digital social participation was important in the time of the pandemic, which helped our participants relieve the boredom of staying at home for a long time, get distractions from the pandemic environment, and remain active cognitively when resources were limited.

### 4.3 Perceptions of the Transition from In-person to Online Social Activities

The COVID-19 situation has driven the transition of many face-to-face social activities to be organised online. Our analysis shows that participants had different attitudes and opinions on this transition. Some participants preferred face-to-face interaction with people; some felt that online social activities worked better for them; others thought it was about the same. In this section, we present their varied perceptions and factors that influenced their experience.

*4.3.1 Online social activities lack personal, intimate, and incidental interactions.* Fourteen participants explicitly said that they would prefer to participate in social activities in-person rather than online if possible. P30 would rather interact face to face, saying that participating in social events online was only a temporary solution and could never replace in-person interaction: "It's not true replacement. There's nothing like individual interaction."

P34 had similar opinions, commenting that while it was great to participate in the Zoom meetings provided by a family history group and to hear the speakers, "it's not the same as being there and being able to talk to other people, which is more personal". The following examples

show that these participants value the personal, intimate, and communal feelings that occur more often in face-to-face social activities and physical interactions:

> "I would much prefer to sit down with somebody with a beer, or a cup of coffee, and shoot the breeze, or talk about something deep and meaningful. And if it is something deep and meaningful, and very, very personal, I'd prefer it to be face-to-face." (P22)

> "Humans are meant to communicate face-to-face; we're meant to shake hands; we're meant to hug; we're a tribe, and the glue that keeps us together is the physical interaction." (P12)

> "There was a fairly deflated atmosphere [on Zoom]. It lacks the communal feel, the face-to-face human activity that we all like, to be able to be close to people and share activities on a personal basis, individually and collectively. The Zoom calls don't have that warmth and humanity that face-to-face has." (P29)

Another thing that our participants felt missing during lockdown was the incidental interactions between people. Many participants mentioned that when they attended online social activities from home, they missed the opportunity to have casual chats with people they encountered on the way, which was an important part of social interaction in their lives. P15 described why she preferred face-to-face participation rather than online:

> "We're country people, and country people know a lot of people, and we do have a lot of interaction. When we go down the street to do our shopping, we'd never come home without meeting someone that we knew and having a little chat and discussing things and information about what's been happening in our lives or in the towns that they live in. But no, we were very pleased to be able to do that [online social activities], but of course, face-to-face is much better."

In addition, some participants preferred interacting with people face-to-face because they could access richer information in the meetings through body language and eye contact:

> "When you are in a physical committee meeting, you can read the body language of the rest of the people in the room, whether they're there because they want to be and whether they're interested. I couldn't find any of that stuff on Zoom. It doesn't allow you to actually be in the meeting." (P12)

The examples above show that although online communication technologies provided alternative options for people to continue their participation in social activities, in-person communication was highly valued by our participants because it entails more personal, intimate, and incidental interactions with people.

*4.3.2 Online social activities are more rigid and difficult to manage.* Unlike face-to-face meetings where people have time discuss freely, in discussions with video conferencing tools, people usually need to talk one by one, or otherwise it can become chaotic. This affected our participants' experience of participating in online social activities and even discouraged some people from continuing the participation:

> "It's a substitute, but it doesn't compare to being with people because only one person can talk at once on Zoom. We were finding that we had to curtail our behaviour so that

> we weren't all talking at once. It was quite stilted. Some days it was better than others, other times it was excruciating." (P13)
>
> "It really wasn't successful. Everybody was demotivated. A Zoom call was very stilted. People talking over each other. It was very rigid. All those activities I've been talking about, fell away completely during COVID." (P29)
>
> "I'm not comfortable with Zoom. I'm not against it, but I don't feel quite comfortable doing it… I just don't like people to see me, especially strangers. It's not so bad if it's friends. And the thing is, a lot of people don't know the rules. So a lot of people speak over each other when it's a group thing." (P8)

Similarly, P21 told us that when her social group started to organise online sessions during COVID-19, many members decided to drop out because it did not work well:

> "Well, not as many people got onto the Zoom because they aren't comfortable with it. People talk over one another on the Zoom. I've noticed that it was chaos, and that the numbers dropped off. People lost interest. They didn't enjoy it. And it got fewer and fewer people. That was the problem."

As we can see from the examples above, social meetings held through videoconferencing tools need to be carefully facilitated and managed. The role of the facilitator, or as P18 described, the "MC" (master of ceremony) is very important in the control of group meetings. Otherwise, the group activities can easily get out of order and fall into chaos, which could create negative experiences and hinder further participation.

*4.3.3 Online social activities are more convenient and easier for people to express themselves.* Contrary to previous views, some participants said they preferred to participate in social activities online and would rather continue the online participation after the end of restrictions. P14 and P17 both thought that attending social activities online worked better, because they could be more relaxed and save time for travelling:

> "The groups that I'm in have all agreed that we actually prefer Zoom. We don't particularly want to have to get up, get properly dressed, get ourselves to the centre, and then sit in a room with all these other people… Nobody knows what I'm wearing from the waist down, and I don't have to travel anywhere." (P14)
>
> "You could be more relaxed in your own place. You can have your tea cooking away while you're doing something or while you're cooking. And also with yoga, for instance, you can opt out of doing some of the exercises or take a break." (P17)

The quotes above also show the flexibility and convenience our participants experienced when participating in online activities from home. P3 benefited from the freedom of control when she was doing Zumba group sessions online, as she could practice at her own pace:

> "It's made it a lot easier with Zumba online. I don't want to go to the place. I'm very happy doing it in my home. I just turn the video off, that's a big advantage. In a regular class, I would feel, I don't know the steps or a bit self-conscious about it. But with the video off, it's wonderful. I can work it all out myself. Freedom to learn the steps or slow down or do half of them or take a break or adjust the heating."

The virtual nature of technologies also allowed more people to be involved in the social activities as there were no constraints of location and space:

> "If we want to have a meeting, we can have people from all over different states, all meet together at the same time, which physically together we would find that very hard to do. It really does have its place in making things a lot more convenient." (P32)

> "It was interesting to think that, press one button and here we are, we all came up on the screen. And there was the lady in Scotland, that was an interesting experience. (P12)

In addition, some participants considered interacting with people online as a "bonus" to them because they felt safer without being looked at and it was easier for them to express themselves. P8 told us that the most favourite feature of Zoom to her is turning off the camera because she felt uneasy when being looked at by strangers: "That's my favourite thing. Turn the camera off. Mute me." Some participants felt that it was easier to express themselves and to speak in front of people during online activities:

> "And the current affairs where we used to meet in a room could only be held by Zoom. But actually, I rather preferred Zoom for the current affairs discussion. I think body language didn't come into it. You could just talk. But in the class with body language, sometimes you got intimidated and couldn't speak. You feel more comfortable talking to people using Zoom. It saved the day for me." (P25)

> "The positive aspect is that if you are on Zoom, probably you are less self-conscious about what you are talking, and you can express yourself more freely compared to when you are on a one-to-one, face-to-face discussion. Because at that time, you can probably see the expressions on the audience that is around you, and that at times makes you feel somewhat awkward if facial response is not good enough. But while you are on Zoom, you can express yourself more confidently and without any reservations of any vibes that may be negatively flowing." (P28)

In comparison to the examples in section 4.3.1, it can be seen that while some people felt that they lost the richness of information conveyed when communicating online as they could not display and see body language, this was perceived by others as a benefit as they could feel more confident expressing themselves by being less worried about their body language and more focused on the speech.

*4.3.4 Online tools work better for specific types of social activities.* According to our participants' descriptions of their experiences, we found that when transferring social activities that used to be conducted in-person to an online platform, specific types of activities worked better, while some were not ideal. Knowledge-based activities such as attending lectures and seminars worked well online. Facilitators and invited speakers usually take control of the sessions, and they often have clear pre-planned agendas. P26 participated in online group sessions over Zoom to learn knowledge during the lockdown, and she felt the experience was about the same as attending face-to-face sessions:

> "I tried to learn Mandarin, and I think this year that's about science and technology. I think I did a bit of that last year during the first year of COVID, but all the classes were conducted via Zoom. It's not a lot of difference because we do share the screen. We do

> watch the screen, and then the presenter kind of spoke to us. So, it's not a lot of difference apart from not being in the same room with all my friends."

However, activities that involved moving bodies and getting instructions, such as exercising and dancing, did not work well online for some of our participants. One important reason affecting their experience was the setup of technology and the limited space for body movement when staying at home:

> "I've got to move furniture to do yoga in the lounge room. And wearing glasses, I find that difficult trying to do yoga. And head up, head down…" (P2)

> "Because you've got the camera on your desk, and you put a mat down or a blanket down to do your yoga on. Because I wear glasses to see the screen, you have to have your long-distance ones on, not your computer glasses. So, the word to explain it, it was discombobulated. It means disorienting." (P12)

P14 thought gym activities did not work for her as well because she could not get instructors from the coach easily when using a desktop computer:

> "I tried a couple of gym sessions online. They didn't work for me. If the teacher was observing a person and giving them feedback, everyone else in the group had to wait around. That got a bit tedious. But also, what you can see, I'm in a very small room and I'm using a desktop, which isn't particularly portable. So it was just not possible to actually engage in some of the gym activities with the setup I've got. I gave up in the end."

In addition, it was very difficult to transfer activities involving synchronous sound feedback to online platforms because of the delay. P15 participated in weekly online band rehearsals over Zoom when she could not have in-person rehearsals with other members. While it was a great opportunity for her to keep practicing during the time of staying at home, the live rehearsal experience was very problematic:

> "We started experimenting with the more live sort of online rehearsal. Because of the delay in the sound, you couldn't have people all playing together. So we'd all go on mute, and we'd play along to the music. But like playing the flute, the flute is often the softest instrument in the band, and not being able to hear my part and not having a conductor if the time was challenging all the time. Sometimes I didn't have a clue where I was in the music or where I was playing. But then, when we did get back to live rehearsals and we were playing the pieces, I found that at least having the notes under my fingers was a help when we came back to live rehearsals."

Similar challenges were observed by P39 in his experience of attending online choir rehearsals. The latency in the voices made it almost impossible to sing together. To cope with this issue, they adopted similar solutions to the previous band group by just muting themselves:

> "We found that everybody has to be muted, because otherwise, it's just terrible because there's different delays and all that. The leader of the choir, the choir master, that's the only one whose sound is on. Everybody else is muted and you sing along at home. And that way, of course, nobody can tell whether you're any good or not."

The examples above show that when transferring offline activities to online platforms, some types of activities work better than others. In particular, activities that involve body movement

and synchronous sound feedback were found difficult and problematic when organising through digital platforms. We believe that it is important for system designers to be aware of the limitations and to identify ways to improve the situation.

## 5 DISCUSSION

This study aimed to understand older adults' experiences of participating in online social activities during the COVID-19 pandemic when in-person social interactions were drastically affected. Overall, our analysis suggests that online social activities were important during COVID-19 for older adults. They were not only helpful for older adults to stay connected to other people but also for them to stay engaged in multi-layered meaningful activities. Based on Waycott et al.'s [66] framework on the use of technology for social connection in later life and Levasseur et al.'s [34] description of six levels of social activities, we present a new taxonomy of four types of meaningful activities for older adults' digital social participation: (1) communication and interaction with people; (2) collaboration with people; (3) lifelong learning enrichment; and (4) contributions to society. Our analysis also provides insights into factors that could affect older adults' experience of social participation when transferring offline activities to online platforms. We present four lessons derived from the analysis about implications for future technology and system design: (1) integrating physical and material artefacts into online social activities; (2) supporting more incidental and casual interactions; (3) designing systems that are easier for activities to be facilitated and managed; and (4) designing systems that work better for activities that require synchronous feedback.

### 5.1 Supporting Digital participation in Multi-layered Meaningful Activities

Our findings show how communication technologies enabled older adults to participate in various types of social activities, including art activities, sports classes, crafting practices, membership in unions, cultural activities, and games. These activities helped older people to connect with like-minded people, share care, encouragement, and support, participate in civic agendas that inform decision-making, learn new things and develop skills, and experience entertainment, distraction, and mental stimulation.

Waycott et al. [66] proposed a framework to describe three interrelated dimensions that characterise the experience of social connection in later life: personal relationships, community connections, and societal engagement. Our findings show that participating in social activities through digital tools could help older adults to build social connections in all three dimensions. First, through connecting with like-minded people, our participants gained personal support and companionship from other people and built new social relationships (e.g., P7's experience of connecting with members of a book club over Zoom). Second, participation in social activities helped our participants to engage with different groups and to acquire a sense of belonging to the local community (e.g., P15's connection with a local church group; P28's experience of connecting with an Indian culture group). Third, our participants used digital tools creatively to make contributions to society and connect themselves to the world (e.g., P12's experience of attending 'tidy town' meetings).

In addition, these activities provide multi-layered value and benefits for older adults. Levasseur et al. [34] described six levels of social activities based on levels of involvement of the individual with others and goals of the activities,: (1) doing an activity in preparation for connecting with others; (2) being with others (alone but with people around); (3) interacting with others (social

contact) without doing a specific activity with them; (4) doing an activity with others (collaborating to reach the same goal); (5) helping others; (6) and contributing to society. Adapting from their taxonomy for social activities among older adults (offline and online) and Waycott et al.'s [66] framework on the use of technology for social connection in later life, we propose four levels of meaningful activities for older adults' digital participation (Fig. 1):

- Level 1: Communication and interaction with people. This refers to social activities that can support older adults' communication with others and involve the exchanges of social contact. Previous research and our findings both suggest that older adults value intimate and deep communication with others [26, 49]. Reciprocity is highly valued in the communication process, in which the befriender can benefit and the older people feel valued through mutual help [32]. Our participants not only gained companionship from members of the social group activities but also exchanged encouragement, care, and support during their online interactions, which helped them overcome difficulties during the pandemic.
- Level 2: Collaboration with people. This refers to social activities that involve working with other people on the same project collaboratively. The example of P5's experience of having painting materials delivered to every member of the group and sharing their painting work with others show that digital technology can support distant collaboration, which provides a sense of co-presence with others. This is especially important for older adults' social connectedness during the COVID-19 pandemic when they had to stay at home.
- Level 3: Lifelong learning enrichment. This refers to social activities that can provide the opportunity for older adults to learn new things and enrich their life experiences. Many of our participants joined the University of the Third Age (U3A) after their retirement. Organisations like the U3A can allow older adults to engage in courses and lectures on a wide range of topics. With more courses and lectures being delivered online, it became easier for our participants to participate as they could simply open their computers and start exploring the topics that they were interested in. The enrichment experience of lifelong learning was found to be associated with older people's satisfaction level and their sense of purpose in life in previous studies [21, 37, 58].
- Level 4: Contributions to society. This refers to social activities that enable older adults to feel connected to the wider world and make contributions that can have a positive impact on society. Many of our participants were involved in volunteer work at the time of the interview. They see it as "a meaningful thing to spend time doing" when they got more time after retirement (P19). The ageing literature considers this to be 'productive ageing', which not only benefits older adults by helping them to stay active and gain the recognition of others [28], but it can also make economic contributions to society through their work [23].

We believe that these four levels of online social activities are meaningful to older people's lives. We consider these levels to be parallel, meaning that one is no more 'superior' than the others. The purpose of the framework is to provide a way of categorisation for understanding the meaningfulness of older people's digital participation. It also suggests that the value of communication technologies is not limited to interpersonal relationship and connectedness. More attention should be paid to the role of technology as a mediator at each level, which can support various types of activities that are meaningful to individuals' lives.

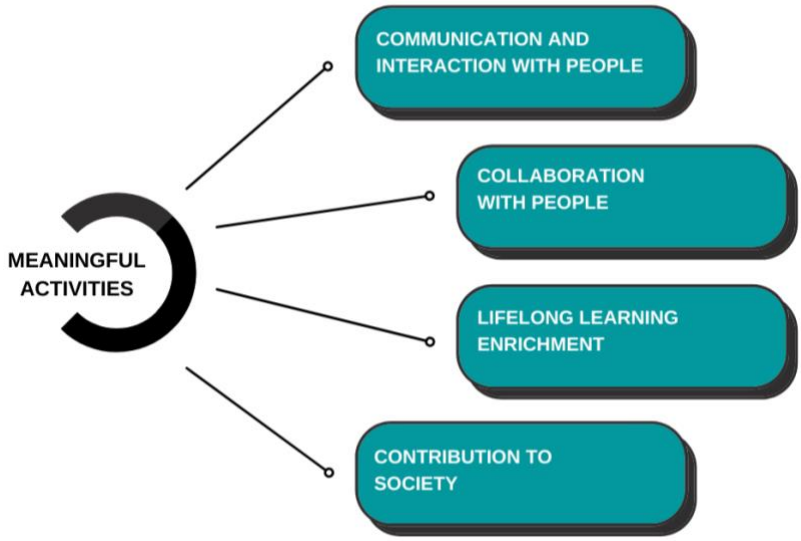


Fig. 1. Taxonomy of multi-layered meaningful activities for older adults' digital participation

### 5.2 Implications for Technology and System Design

Our analysis shows that older adults have different perceptions of the transition from in-person social activities to online ones. This was affected by several factors, such as the nature of the activity (synchronous vs. asynchronous), the organisation of activity (orderly vs. chaotic), the type of communication (chit-chat vs. formal conversation), and the nature of work (collaborative vs. individual). Based on the list of factors, we propose four design implications for the future design of technology and system for online social participation. While these lessons were learned at the time of the COVID-19 pandemic, they can also be applied in other circumstances where online participation and interaction is preferred or needed.

*5.2.1 Integrating physical and material artefacts into online social activities.* Our findings include many stories of online social activities being creatively supported by physical and material objects, such as P5's description of receiving quilting packages before meeting with the quilting group online (in Section 4.1), and P27's experience of receiving birthday cakes from her daughter before they celebrated her birthday over Zoom (in Section 4.2.2). The former case shows the value of material objects in providing a sense of co-presence in online collaborative work, and the latter case shows that physical objects can carry a greater sense of intimacy when interacting with people online. This echoes Hope et al.'s [26] claim that materiality plays an important role in older adults' social communications. Their participants felt cared for when someone else sent them material artefacts as they can show care and thoughtfulness. We believe that physical objects can be better integrated into the design of online social activities in the future to create sense of intimacy and co-presence for participants of online social activities.

*5.2.2 Supporting more incidental and casual interactions.* When comparing in-person social activities with online ones, participants who preferred in-person options thought that they missed the incidental and casual interactions when interacting face-to-face. Social activities delivered

through videoconferencing tools usually have only limited time for attendees to engage in casual conversations, such as greetings and sharing about recent lives. These casual and incidental interactions are important for reducing the feeling of social isolation and increasing people's social engagement [36]. While features such as breakout rooms and private chats allow people to have one-on-one conversations, they are not intuitive enough for older people and certainly not yet comparable to face-to-face communication when people can easily have private chats and conversations. Studies on videoconferencing technology have explored the ways that designers could support private conversations during online meetings, such as multi-channel voice [68] and instant messaging [48]. We believe that the design of these tools should be more inclusive by taking older adults' needs into account and involving more older people into the design process.

*5.2.3 Designing systems that are easier for activities to be facilitated and managed.* We can see from Section 4.3.2 that a key difference between in-person activities and online ones is that it is more challenging to facilitate and manage online meetings. Our participants experienced "chaos" when people were talking over one another on Zoom. This indicates the need to design systems that are easier for activities to be facilitated and managed. There are some existing practices that explore the management of turn-taking during online conversations (e.g., [20, 61]). A recent system designed by Hughes and Roy [27] used circles to represent seatings and orbs to indicate who raised their hands, who is currently in the queue, and who had already been called on. We think that these innovative practices could be embedded into older adults' participation in online social activities, but they should be carefully applied so that they would not cause further confusion for attendees.

*5.2.4 Designing systems that work better for activities that require synchronous feedback.* Our findings show that when transferring in-person social activities to online platforms, activities that require synchronous feedback did not work well due to the latency. While these activities could go back to being conducted face-to-face when restrictions are lifted, there still exists value for researchers to explore ways that can better support the organisation of those activities online, so that the activities can be accessible for those who live remotely or unable to attend due to physical limitations. Daffern et al. [18] conducted an online survey study with choirs to understand 'virtual choir' activities during the COVID-19 pandemic. They had similar findings that it was difficult for live virtual choirs sing together and hear each other when using teleconferencing software due to the limitations of the software and internet speeds. While there are existing systems that have overcome the latency issues and work well for real-time feedback [54], they usually require expert-level infrastructure, which was not suitable for home internet connections [18]. We believe that more work can be conducted to develop systems that work well for activities that require synchronous feedback, and they should be able to be easily accessed through home internet environments.

While this study presents an initial exploration of factors that can influence older people's impressions of the transition to online social activities, we believe that more work could be conducted to systematically compare and evaluate older people's participation in social activities through different platforms, including the use of different devices to participate in online social activities. Additional research in this area would reveal further opportunities for digital tools to be better designed to meet the needs and preferences of older people.

## 6 CONCLUSION

The COVID-19 pandemic has caused significant disruptions to people's lives, and it is important for all people to stay connected to overcome the difficulties. This research investigated older adults' experiences of participating in online social activities during COVID-19. We found that online communication technologies have provided many older adults with the opportunity to not only connect with their social networks but also engage them in multi-layered meaningful activities that can enable care, encouragement, support, civic participation, lifelong learning, entertainment, distraction, and mental stimulation. While many of the online social activities described in this paper were pandemic-driven and ad hoc choices for organisations, they have led us to contemplate whether there is value for these online options to continue to exist, or even to be developed into more sophisticated, comprehensive online spaces where older adults can freely navigate and participate in the activities they enjoy. We believe the answer is affirmative, but technology and system designers need to be more careful in their practice and take factors that could affect their online participation experience into consideration.

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## A APPENDICES

### A.1 Participants Demographics and Self-reported Technology Use

| ID | Age | Gender | Metropolitan /Regional | Marital Status | Living Status | Communication Technologies Used During the COVID-19 Pandemic |
|---|---|---|---|---|---|---|
| P1 | 84 | F | Metro | Married | With partner | Zoom, Facetime, Facebook, email, texting, phone call |
| P2 | 66 | F | Metro | Married | With partner | Zoom, Facebook, WhatsApp, email, texting, phone call |
| P3 | 68 | F | Metro | Widowed | Alone | Zoom, Facebook, WhatsApp, email, texting, phone call |
| P4 | 68 | F | Metro | Married | With partner | Zoom, Facebook, email, texting, phone call |
| P5 | 84 | F | Metro | Divorced | With children | Zoom, Facetime, Facebook, email, texting, phone call |
| P6 | 74 | F | Metro | Married | With partner | Skype, Facebook, WhatsApp, email, texting, phone call |
| P7 | 71 | F | Metro | Divorced | Alone | Zoom, Skype, Facebook, WhatsApp, email, texting, phone call |
| P8 | 75 | F | Metro | Married | With partner | Zoom, Facebook, Messenger, email, texting, phone call |
| P9 | 71 | F | Metro | Divorced | Alone | Zoom, Skype, WhatsApp, Facebook, Twitter, email, texting, phone call |
| P10 | 78 | F | Metro | Widowed | Alone | Zoom, Facebook, Twitter, Messenger, email, texting, phone call |
| P11 | 82 | F | Metro | Widowed | Alone | Facebook, Messenger, email, texting, phone call |
| P12 | 81 | F | Regional | Divorced | Alone | Zoom, WhatsApp, email, texting, phone call |
| P13 | 68 | F | Regional | Married | With partner | Zoom, Facebook, WhatsApp, email, texting, phone call |
| P14 | 79 | F | Metro | Widowed | Alone | Zoom, email, texting, phone call |

| | | | | | | |
|---|---|---|---|---|---|---|
| P15 | 73 | F | Regional | Married | With partner | Zoom, Facebook, Messenger, email, texting, phone call |
| P16 | 81 | M | Regional | Married | With partner | Zoom, Facetime, WhatsApp, email, texting, phone call |
| P17 | 80 | F | Metro | Never married | Alone | Zoom, email, texting, phone call |
| P18 | 73 | F | Regional | Married | With partner | Zoom, Facebook, email, texting, phone call |
| P19 | 69 | M | Metro | Married | With partner | Zoom, Facetime, Facebook, WhatsApp, WeChat, email, texting, phone call |
| P20 | 69 | F | Regional | Married | With partner | Zoom, Facebook, Messenger, email, texting, phone call |
| P21 | 73 | F | Metro | Divorced | Alone | Zoom, Facetime, Facebook, Messenger, email, texting, phone call |
| P22 | 69 | M | Regional | Separate | Alone | Zoom (once), email, texting, phone call |
| P23 | 66 | F | Metro | Married | With partner | Zoom, Facetime, Facebook, WhatsApp, WeChat, email, texting, phone call |
| P24 | 75 | M | Metro | Separate | Alone | Facetime, Facebook, Instagram, email, texting, phone call |
| P25 | 75 | M | Metro | Divorced | Alone | Zoom, email, texting, phone call |
| P26 | 71 | F | Metro | Married | With partner | Zoom, Facetime, Facebook, WhatsApp, email, texting, phone call |
| P27 | 65 | F | Metro | Separate | Alone | Zoom, Microsoft Teams, WhatsApp, email, texting, phone call |
| P28 | 76 | M | Metro | Married | With partner | Zoom, WhatsApp, email, texting, phone call |
| P29 | 73 | M | Metro | Married | With partner | Zoom, Facetime, WhatsApp, Messenger, email, texting, phone call |
| P30 | 83 | F | Metro | Never married | Alone | Zoom, WhatsApp, email, texting, phone call |
| P31 | 75 | F | Metro | Widowed | Alone | Zoom, Facebook, Messenger, email, texting, phone call |
| P32 | 70 | F | Regional | Married | With partner | Zoom, WhatsApp, Messenger, Facetime, email, texting, phone call |
| P33 | 84 | F | Metro | Widowed | Alone | Zoom, Facebook, Messenger, email, texting, phone call |
| P34 | 77 | F | Metro | Widowed | Alone | Zoom, Facetime, Facebook, Messenger, email, texting, phone call |
| P35 | 67 | F | Metro | Married | With partner | Zoom (once), WhatsApp, Signal, email, texting, phone call |
| P36 | 66 | F | Metro | Divorced | Alone | Zoom, email, texting, phone call |
| P37 | 75 | F | Metro | Divorced | Alone | Facebook, email, texting, phone call |
| P38 | 70 | F | Metro | Widowed | Alone | Zoom, Skype, Messenger, Viber, email, texting, phone call |
| P39 | 70 | M | Metro | Married | With partner | Zoom, Houseparty, email, texting, phone call |
| P40 | 83 | F | Metro | Never married | Alone | Zoom, Facebook, email, texting, phone call |

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