

Hugging with a Shower Curtain: Older Adults' Social Support Realities During the COVID-19 Pandemic

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The COVID-19 pandemic led to dire consequences globally, and it has been particularly challenging for older adults. They are at a higher risk of adverse outcomes of the disease [48]. Older adults also use less technology than other age groups [6], so they mostly rely on in-person interactions and services for social support. However, disease mitigation efforts such as social distancing and self-quarantining severely limited in-person interactions, hindering older adults' social support during the COVID-19 crisis. In this paper, we present findings on social support realities from semi-structured interviews with older adults (N=15) living alone in community dwellings. We found that older adults' support roles, support sources, and support concerns evolve as they passed through this time of sweeping change. They are enthusiastic about providing support to people who are older and more vulnerable than themselves. At the same time, their needs for safety, autonomy, and independence create tensions around social support. We propose a framework to illustrate the evolving ecology of social support that can facilitate the holistic design of socio-technical support systems for older adults. We argue against the societal portrayal of older adults as vulnerable individuals. Rather, there is an opportunity to design support systems considering them as anchors in society. Towards that goal, we present design implications for future socio-technical support systems to empower older adults to age in place during a crisis.

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

Additional Key Words and Phrases: social support; older adults; COVID-19; framework

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1 INTRODUCTION

"I have two children, my son is 34 and he lives in the Netherlands. I don't know when I will get to see my son again in real life. I miss them terribly. [...] My daughter, she's 41 and she's very cautious and wears a mask and she's all that. But she was up (at the house) the other day and I just grabbed her and hugged her. I've hugged my children every time I've seen them for their whole lives. And (now) for every time that I see her and not able to hug her, it just breaks my heart." (72-year-old woman, P14, 2020)

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The COVID-19 pandemic caused a myriad of global health, economic, and societal challenges [29] that disproportionately affected older adults. When infected, older adults face a higher risk of adverse outcomes. Around 95% of COVID-19 fatalities in the USA have occurred among people who are 50 and above [110]. Since the outbreak of COVID-19 as a health crisis, older adults have been repeatedly described as more *physically* vulnerable by health officials, politicians, and the media [37, 94, 116, 133]. Further, disease mitigating efforts such as “social distancing” and “self-quarantining” have caused life disruptions and emotional distress among older adults [141]. For instance, 47% of U.S. older adults aged 65 and above experienced major changes in their lifestyles due to the pandemic [27] and they are almost twice as likely to report negative impacts on their daily activities in comparison with those under 50 [28].

Social support is an essential factor for older adults to moderate the pandemic-invoked life stressors [130]. Prior studies suggest that social support is strongly associated with older adults’ well-being (i.e., physical and mental) [10, 71, 127, 152] and life satisfaction [11, 72]. However, older adults’ opportunities for social support have been hindered during the pandemic. They use less technology in comparison to other age groups [6], relying more on in-person interactions and services (e.g., receiving help for household tasks from care partners and socializing with their church communities). Disease mitigation measures have disrupted their in-person support efforts (i.e., seeking and providing support) and their support roles (i.e., as support provider and support receiver). For instance, mitigation measures during the COVID-19 pandemic curtailed opportunities for older adults’ engagement in volunteer activities [132].

Despite concerns and limitations around in-person social support opportunities, we have a limited understanding of older adults’ social support during the COVID-19 crisis due to its unprecedented nature. The limited consideration of older adults’ support roles during the pandemic is in stark contrast with the prevalent discourse around older adults’ physical vulnerability. In this paper, we focus on the following research question: How has older adults’ social support evolved during the COVID-19 pandemic? We conducted semi-structured interviews with 15 older adults living alone in community dwellings. All of our participants are White, female, have a Bachelor’s degree or higher, mid/high socioeconomic status (SES), access the Internet several times a day through multiple devices, and live in the USA. Our findings reflect lived experiences of this particular demographic. We found that older adults in our study engaged in both providing and receiving support. In particular, they were enthusiastic about providing support to people who were older and more vulnerable than themselves. They also reported experiencing tensions while seeking (and providing) support due to safety, autonomy, and independence-related concerns. We propose design directions for future socio-technical support systems to empower older adults’ social support roles.

This paper contributes to HCI and CSCW research in the following ways. First, our work adds to the literature and offers a counternarrative to the societal portrayal of older adults as primarily receivers of care and support. We suggest viewing them as anchors in society in a time of sweeping change. Second, it introduces a support ecology framework (Fig. 1) to illustrate the evolving nature of older adults’ social support sources, support roles, and support concerns that can be used to inform future socio-technical support systems. Third, we discuss how older adults experience and resolve tensions amongst social support, safety, autonomy, and independence during the crisis, and reflect on implications for HCI research with older adults. Lastly, this work proposes design implications for future socio-technical support systems that empower older adults to age in place during a crisis.

In the following sections, we provide an overview of prior social support research in the HCI and CSCW fields for older adults. We then describe our study method and findings derived from our analysis. Finally, we discuss design implications for future socio-technical support systems that could empower older adults to age in place.

2 BACKGROUND

Social support is an important strategy to help people cope with stressful situations in their lives, such as what they might face in a crisis. Among older adults, social support is crucial because it benefits physical and psychological well-being and delays cognitive decline [71, 111, 127]. Research in HCI/CSCW has discussed social support in diversified contexts, such as online health communities [36, 73, 74, 80, 92, 100, 144], education [2, 108, 117, 119], family support [86, 149], crowdsourcing [51, 85], community support [54, 131], persuasive technology [31, 123], crisis support [61], etc. Existing social support work has taken into account diverse populations, for instance, individuals with disabilities [15, 42], eating disorders [137], homeless individuals [147], victims of sexual violence [40, 135], etc. In this paper, we build our understanding on prior work in social support, social support for older adults, and social support in times of crisis.

2.1 Definition and Types of Social Support

Social support is broadly defined as the resources provided by others [33]. Albrecht et al. [1] has provided a well-accepted definition of social support: "*verbal and nonverbal communication between recipients and providers that reduces uncertainty about the situation, the self, the other, or the relationships, and functions to enhance a perception of personal control in one's experience*". Several factors influence the quality of social support, such as provider and recipient's relationship [39], recipient's personality [61], support timings [70], and the nature of stress [34]. Social support has a positive impact on the recipient's physical and psychological health [22, 38, 60].

Social support is a multidimensional construct; however, the research community has yet to attain unanimity about different dimensions [38]. Different scholars have categorized social support in various ways. For instance, Schaefer et al. [120] differentiated three types of social support: emotional, tangible, and informational support. Cutrona and Suhr [40] added two additional types of social support: network and esteem support. The rest of this paper will follow Cutrona and Suhr's characterization to identify five types of social support:

Emotional support is defined as "*specific lines of communicative behavior enacted by one party with the intent of helping another cope effectively with emotional distress*" [21]. This support is provided through love and closeness in a relationship, physical affection, confidentiality, sympathy, listening, understanding, encouragement, and prayer [40].

Tangible support is also known as instrumental support. It refers to providing material aid (e.g., money, food, books) or assistance for direct and indirect tasks (e.g., babysitting, transportation, housework) [36].

Informational support refers to providing advice/suggestions, guidance, and facts/news in order to help recipients solve or manage a problem [47]. It also involves referring recipients to other sources of support and helping to reassess or redefine a crisis situation.

Network support refers to the development of a sense of belonging among people with similar interests and concerns, reinforcement, and expansion of a support seeker's social connections [40]. It involves spending time with recipients, offering access to new companionship, and reminding the recipients about the availability of companionship.

Esteem support is defined as a "*particular type of emotional support that is provided with the intent of enhancing how others feel about themselves and their attributes, abilities, and accomplishments*" [62].

2.2 Older Adults and Social Support

Social support has a significant impact on older adults' physical and mental health [111]. Existing research in gerontology widely agrees that social support prevents cognitive decline, postpones

the onset of dementia, and slows down the progression of Alzheimer's disease [10, 71, 152]. Other studies have examined the positive impact of social support on older adults' life satisfaction [11, 72] and physical activity [127]. In many cases, in comparison to the number of support relationships, the type and perceived quality of the received support has more impact on older adults' well-being [138]. For instance, Ellwardt et al. [45] identified that "intensified emotional support" could buffer cognitive decline among older adults, however, tangible support has no such positive effect on cognitive functioning.

Existing research has explored designing and assessing technological support interventions to provide and improve social support [41, 64, 97, 124, 125]. There has been a strong emphasis on tackling the counterparts of social connectedness, i.e., loneliness and isolation [8]. For example, social supportive robots and intelligent virtual agents have been used as social companions to relieve loneliness [59, 96, 98, 104]. Mival et al. [97] used a robotic dog, AIBO, to speak with older adults during a chess game to provide social companionship, satisfying their network support needs. Robotic and virtual agents can also be used as communication devices to provide informational support or emotional support to older adults living in their homes [56, 57].

Research on social support has also explored web-based technologies. Over the last several years, there has been a growth in the participation of older adults in online communities and social media [17, 81, 145]. These web-based technologies satisfy older adults' network support needs by allowing them to form online relationships with others. Older adults also receive both informational and emotional support from these communities. The research space of web-based support technology for older adults is quite broad and it would be impossible to fully review this space. We note existing reviews on this subject [32, 43]. Coelho et al. [32] presented a summary reviewing social network services (SNS) and other online social applications. They provided suggestions towards inclusive design of SNS solutions considering characteristics of older adults, such as family roles, age-related declines, cultural and health information. In addition, they pointed that SNS can be designed to foster family relationships and offline interactions with family and friends. However, what we find notable from this body of literature is how web-based technologies empower older adults enabling reciprocity and active engagement (i.e., as support receiver and as support provider). This theme is important to this current study as we examine the social support roles of older adults during the pandemic situation and explore provisions for socio-technical support systems.

In addition to the above work on supporting older adults' social connections with family and friends at a distance or with online communities, there exists research exploring the design opportunities for connectedness within a local community context [84, 115]. For instance, Righi et al. [115] explored how to reappropriate social networking sites to support older adults' involvement in local communities through online and offline communication. In their study, they found that participants did not use the language/tools offered by Social Networks Sites (i.e., comments, like buttons, status update) to express themselves in online communities. Instead, they shared information with others through face-to-face conversations. In this sense, design spaces for online communities should explore opportunities to blend proximity and face-to-face interactions while designing online community-based support networks.

Other studies explored the design of technologies for social support and care [35, 99, 112, 126, 151]. These technologies allowed older adults to age in place. For example, in CareNet [35], care partners (adult children) could visually see the activities done by their loved ones on an ambient, frame-like display. The care partners enjoyed knowing about the older adults and used the shared information to improve their caregiving. However, older adults often felt disempowered while using these technologies. They do not actively interact with these systems, hence, experience an absence of agency. In some instances, they also fail to resonate with the values and assumptions that guided the technological intervention [146]. These perceptions influence their usage and they often reject

or abandon these support technologies [25, 78]. Various research approaches such as value-sensitive design [49, 139], persuasive technology [24, 68], and participatory design (PD) [66, 82, 88] are used for designing socio-technical support systems to address autonomy and independence for older adults. However, the development of support systems understanding the holistic view of aging requires effective and successful communication within the research community, older adults, and other stakeholders [50]. Further, balancing care and autonomy impose enormous challenges while designing support technology to empower older adults [50, 103]. Therefore, research is needed to explore how an active support role could be employed in technology design that empowers older adults.

2.3 Social Support in a Time of Crisis

Past HCI research on social support has focused on exploring the role of technology in a time of crisis, when support is needed the most [2, 5, 20, 90, 93, 118, 122]. Crises may range from a personal to a community level, such as getting a divorce, being diagnosed with a disease, going through a relationship breakup, experiencing the death of loved one, living through a natural disaster/health pandemic, etc. Massimi et al. [91], examined the social support needs among bereaved parents and offered design guidelines focusing on interpersonal communication and materiality for technologies that deal specifically with bereavement support.

Other studies have explored technologies to facilitate support exchanges during community crises [20, 26, 30, 52, 101, 107]. A Community crisis can occur following a natural disaster (e.g., flood, cyclone, etc.) or traumatic event (e.g., local tragedy, disease outbreak, etc.). A community crisis puts strain on community resources as well as dwellers' lives. The needs for tangible, emotional, and informational support are heightened by the crisis. In case of a community crisis, socio-technical interventions may serve to bridge the gap between the affected local community and outside support providers who are willing to provide support (e.g., national-level officials). For instance, Glasgow et al. [52] examined how social media (i.e., Twitter) may provide new opportunities of social support within local community (e.g., local officials, first responders, residents) and around the world after a school shooting crisis in the community.

Like other crises, support is needed even more during the global COVID-19 crisis to cope with psychosocial distress. Actions taken to mitigate the spread of COVID-19 (e.g., social distancing, quarantine, business closures, restricted access to physical sites for health care) have impacted in-person support provision [87]. Fear of potential infection further deterred people from accepting support in person. As a result, the ecology of social support has experienced a shift from in-person to online. Therefore, further research is needed to explore the evolving nature of social support and potential avenues for support technology.

In summary, through extensive exploration of existing literature, we sought to understand the fundamentals of social support, the significance of social support in older adults' lives, social support in times of crisis, and existing socio-technical support systems. Social support is significant for older adults, particularly in a time of crisis, like the COVID-19 pandemic. However, the crisis itself disrupted social support due to restrictions on in-person interactions and services. In our research, we focus on older adults' support roles in times of the global pandemic. We also pay attention to the heightened tensions around social support and support concerns (i.e., safety, autonomy, and independence). In the following section, we elaborate on our data collection and analysis process.

3 METHOD

We conducted a qualitative study with older adults living in community dwellings to understand their lived experiences during the COVID-19 pandemic. The study was conducted in a single state located in the Midwest region of the USA during a period of social distancing in summer, 2020.

Table 1. Demographics of the participants

Id	Gender	Age	Race	Education	Occupation before COVID-19	Occupation during COVID-19
P1	F	71	White	Bachelor's Degree	Retired	Part-time
Gray P2	F	80	White	Doctorate Degree	Retired, Volunteer	Retired, Volunteer
P3	F	73	White	Bachelor's Degree	Retired	Retired
Gray P4	F	74	White	Bachelor's Degree	Retired, Part-time, Volunteer	Retired
P5	F	75	White	Bachelor's Degree	Retired	Retired
Gray P6	F	78	White	Doctorate Degree	Part-time	Part-time
P7	F	79	White	Master's Degree	Retired, Part-time, Volunteer	Retired
Gray P8	F	74	White	Doctorate Degree	Retired, Volunteer	Retired, Volunteer
P9	F	78	White	Bachelor's Degree	Retired	Retired
Gray P10	F	81	White	High School Diploma	Retired	Retired
P11	F	69	White	Master's Degree	Part-time, Volunteer	Part-time
Gray P12	F	68	White	Master's Degree	Retired, Part-time	Retired
P13	F	73	White	Master's Degree	Retired, Volunteer	Retired, Volunteer
Gray P14	F	72	White	Master's Degree	Retired	Retired
P15	F	66	White	Master's Degree	Retired	Retired

3.1 Study context

The Center for Disease Control and Prevention (CDC) confirmed the first COVID case in the USA in January, 2020 [128]. As a response to worldwide cases, the World Health Organization (WHO) declared the COVID-19 outbreak a Public Health Emergency of International Concern in January, 2020, and later a pandemic in March, 2020 [46, 67]. Later, the state moved to a five-stage plan [18] and the government restrictions were lifted gradually as the state progressed through each stage. The interviews took place between June to July. During this time, non-essential businesses (e.g., gyms and restaurants) were open at partial or full capacity. Face coverings and social distancing were still recommended by the state government and older adults and individuals with compromised immune systems were encouraged to “venture out cautiously” [18]. The county government also imposed additional restrictions, for instance, mandatory face masks/coverings in public places and restrictions on gatherings at non-commercial events up to 50 people.

Because the government restrictions were lifted gradually over the period of the study, there is a possibility that participants’ lived experience might differ from the context when the restrictions were more strict.

3.2 Participants

We recruited participants between May to early June, 2020. We used a state-wide resource designated to recruit participants for health research to connect with older adults living alone in the community. From that we conducted through snowball sampling. For the study, we recruited 15 older adults and all of them were women. Their ages ranged from 66 to 81, with an average age of 74 years old (Table 1). Most of our participants had a Bachelors degree or higher (N=14). All participants had lived alone in local community dwellings for 10 or more years and had a strong social connection with the community. As detailed in Table 1, 13 participants were retired, 5 were involved in different part-time jobs, and 6 participants engaged in a variety of volunteer activities before the pandemic. During the pandemic, only 3 participants were involved in part-time jobs and volunteer activities. Although we strove to recruit diversely, all of our participants were white, female, mid/high socioeconomic status (SES), and lived in the USA. Therefore, our findings may not describe the experience of other older adults more broadly. The study protocol was approved by the university institutional review board (IRB).

3.3 Procedure

We started the study with an informed consent over emails. We used an online survey to collect demographic and technology usage information. Next, we conducted semi-structured interviews over Zoom (N=14) and phone (N=1). The first author conducted the interviews between mid-June, 2020, to July, 2020. Each interview lasted between 45 to 60 minutes. Each participant was compensated with a \$10 Amazon electronic gift card for their time. The interview was divided into three topics, i.e., lived experience, engagement in life, and usage of different services and facilities.

3.4 Analysis

All interviews were recorded and transcribed for analysis. We then conducted a thematic analysis [55]. Following thematic analysis guidelines [16], the first author conducted an iterative open-coding analysis to become familiar with the transcribed data, and then followed inductive analysis to develop codes related to ways of living, sense of autonomy, psychological response, coping strategies, communication with family and friends, and social support during the pandemic. In our analysis, we categorized social support with the Social Support Behavior Code (SSBC) developed by Cutrona and Suhr [40]. All authors discussed the codes amongst themselves through synchronous meetings to organize them into emerging themes. In this paper, we present the findings on older adults' social support during the pandemic.

4 FINDINGS

The COVID-19 pandemic exposed older adults to unique psychosocial challenges. In many cases, the challenges hinder their normal life. For example, P2 mentioned:

"I can't go anywhere unless it's to get food or go to the doctor or something like that. So I'm much more confined to my living space and my very small neighborhood." (P2)

Social support is viewed as an effective coping strategy during the pandemic as it allows older adults to reframe their lived experiences in a more positive way. However, the unique characteristics of the pandemic situation pose tensions around social support in relation to participants' needs for safety, autonomy, and independence. In the following subsections, we describe participants' social support roles and then discuss the tensions around social support in detail.

4.1 Social Support Roles During the Pandemic

Our findings uncovered that participants played roles as *support recipients* as well as *support providers* during the pandemic. Participants would shift between these two roles at various times, when a support recipient in one instance might act as support provider in another instance. For instance, P14 mentioned that while she increased her risk factors such as meeting friends in person to seek fellowship during the pandemic, she also provided emotional support to her friend who was feeling depressed:

"I have just decided that my risk factors can increase a little bit because I need fellowship, I need friendship, and I need community. So for me that risk is, it's just like the longer you drive the greater the risk and sometimes you just have to drive further because that's the way it is. And that's the way I feel." (P14)

And later:

"One day, a friend of mine called me up and she was crying. And she said, I am so lonely and I'm so depressed, and I need a hug. And I said, listen, first of all, come over here. And she came over." (P14)

In the following subsections, we discuss participants' support roles and different types of support in the context of the pandemic in depth.

4.1.1 Role as Support Recipients. Participants mentioned receiving informational, tangible, emotional, and network support. Our participants did not mention receiving any type of esteem support. Participants primarily received these supports from their family members, friends, and neighbors. However, they also received support from external sources. For example, participants relied on media such as Facebook, CDC website, online news feeds, newspapers, TV, etc., for informational support about COVID-19 updates and resources. A few participants also reached out to professional counselors for emotional support to sustain mental well-being during the stay-at-home orders. Because of these restrictions, most of the participants shifted their support-seeking efforts from in-person interactions to online communities.

Informational Support: Informational support was the most prevalent type of support received by the participants during the pandemic. In most cases, participants sought informational support to satisfy their needs for pandemic-related information, such as daily charts, facts, news, government initiatives, county restrictions, recommended procedures, and healthcare facilities access. For instance, P4 mentioned receiving information about current updates of the COVID-19 pandemic from her neighbors and friends:

"We're (neighbors) all on text together. And so somebody sends a note, hey, Dr. Fauci is on CNN, go out, and listen to this one. So that's how I've gotten a lot of information.

I also have several friends that work here at the hospital [...] and they pass a lot of information on. They told me that our hospitals are full, they've been sending patients down to other hospitals, because of the cases which are scary." (P4)

Even though friends and neighbors were the usual support sources for information about the pandemic, most participants expected this type of support more from other sources such as Facebook, online news feed, insurance website, CDC websites, newspaper, and TV. For instance, P3 mentioned using Facebook primarily to receive COVID-19 information:

"I opened a private Facebook page, so I could still monitor what's going on in my city, and monitor the news, and keep up with the latest on that." (P3)

Another participant (P1) talked about the reliability of received information and considered the local newspaper as a reliable source for informational support during this pandemic. She mentioned:

"I still get the physical newspaper every day, so I feel that that's a reliable source." (P1)

In addition to pandemic-related information, some participants also discussed seeking informational support to navigate online services, specifically online grocery services, during the stay-at-home orders. They usually received such guidance from their close family members, i.e., children. For instance, P2 mentioned calling her daughter to guide her through the online grocery shopping platforms:

"Sometimes I call her while I'm shopping online, and say, I'm stuck here. Can you help me?" (P2)

Some participants also discussed receiving information about resources to help them maintain their psychosocial and emotional well-being. They received the support through referrals from friends. For instance, P9 mentioned reaching out to her therapist friend for suggestions on mental well-being:

"I have a friend who's a former therapist, and he suggested that I need to see someone."
(P9)

Another participant (P5) also mentioned receiving referrals for mental health support from her Facebook friend:

"One of my friends on Facebook mentioned that there's a group, it's called MYND [...] there's a phone number that she listed that if you ever needed [it]." (P5)

In summary, during the pandemic, participants sought informational support to educate themselves about the COVID-19 disease, protective measures against the virus, current cases, imposed restrictions by the government, etc. To attain this support, participants relied on sources such as social media, newspaper, TV, websites, etc. In addition to pandemic-related information, participants sought informational support for online grocery shopping from their close family members. Participants also sought informational support for mental health care from friends and professional counselors.

Tangible support: Participants talked about receiving tangible support both in the form of tasks directly performed by others and in the form of goods received from others.

Some participants mentioned receiving help with household tasks, such as buying groceries or doing household chores, etc. In some cases, the received support was triggered by the pandemic. Participants pointed out that they received more tangible support during the pandemic than before. For example, P2 mentioned receiving tangible support, such as grocery shopping assistance, from her daughter. Before the pandemic, P2 used to buy her own groceries. During the pandemic, her daughter worried about her age-related vulnerability of getting the virus and did not allow her to go to the grocery stores on her own:

"I didn't do it (going to grocery stores) because my daughter is very protective of me, because I'm so old and so I didn't do it. You know, my daughter would buy things for me, and then I couldn't be more sure that I would get what I want." (P2)

In other cases, the support-seeking frequency of tangible support decreased due to the pandemic. For instance, P10 mentioned that she used to receive help with household chores from her neighbors. However, during the pandemic, she reached out to her neighbors only for those tasks that might be physically difficult to do by herself:

"They (next-door neighbors) came over here and did three little odd (tasks) that I couldn't do for me." (P10)

The participants also mentioned receiving tangible support in the form of goods, e.g., food, masks, digital device, money, etc. In most cases, the tangible support was provided to participants to address specific pandemic-resulted challenges. For instance, P7 mentioned that her son gave her a cell phone during the pandemic so that she could continue to be involved in different activities remotely through tele- or video-conferencing and be a part of the community during the stay-at-home orders:

"Most of their's (community clubs) is down to teleconferencing or video conferencing [...] that's what I've tried to tell my son, I got to get a camera on my PC. My son provides the cell phone. And I'm grateful for that, [...] I know I wouldn't be able to afford this if he didn't provide it." (P7)

Another participant (P13) mentioned that her friend brought over cartons of eggs from the local community pantry for older adults. Even though P3 didn't explicitly seek the support, her friend supported her as she has a disability. A few participants also received support to ensure better health protection during the pandemic. For instance, P12 mentioned receiving better protective mask from her friend:

“One of my friends gave me an n95 mask, so I got the real protective ones. So I feel safe. If I have to go into something fairly more risky, I do have something that protects 95%” (P12)

Most participants reported receiving support from their children, close friends, and neighbors. However, only one participant received tangible support (i.e., money) directly from an organization. P3 mentioned receiving monetary support from a few organizations, and the amount of support increased during the pandemic:

“I have been helped by agencies. So I get Food stamps. And normally I only get \$16 a month to help with food. That’s my normal and they’ve increased it to \$200 a month (during the period of the pandemic). And my insurance provides me with \$25 a month towards food and I just got a letter in the mail Friday, saying that starting September 1, they’re providing me with \$50 a month for food.” (P3)

In summary, participants’ tangible support ranges from services (e.g., buying groceries or performing household chores) to receiving goods (e.g., food, mask, money, etc.). They usually received tangible support from their family, friends, and neighbors. Participants also reported that there was an increase in receiving tangible support due to their health risk.

Emotional Support: Receiving emotional support was also quite common among the participants during the pandemic. The unique challenges associated with social distancing and stay-at-home orders triggered the participants to seek emotional support. In most instances, participants sought emotional support to address loneliness, depression and to maintain emotional well-being. For example, P10 mentioned reaching out to her neighbor when she was feeling depressed:

“Last night, I was just having a down feeling, so I notified her (neighbor) [...] and I said, what are you doing. And she said, sitting on the deck, come on down. I said, I think I will. I went down there. And then when I came home, I settled down.” (P10)

Although most participants preferred to receive emotional support from close friends and family members, some participants mentioned that they needed more help than a friend could provide. In these instances, participants reached out to professional counselors for help. For instance, P9 mentioned seeking emotional support from professional counselors to address her depression:

“I started feeling depressed and decided that maybe talking to someone (therapist) about it would be helpful. [...]it got to be a little bit more than a friend can advise.” (P9)

Participants highlighted the significance of physical contact (e.g., hugs, hand-holding, shoulder patting) during the pandemic. For example, some participants wanted to receive emotional support by hugging their family members, despite the increased risk. P9 mentioned getting a hug from her grandchild:

“I snuck a hug from my grandson and he told on me, and I got in trouble.” (P9)

In addition to the traditional support sources, i.e., family, friends, and professional counselors, participants also discussed the significant role companion pets played during the pandemic. They felt that having pets helped them deal with loneliness to some extent during the social distancing and self quarantining. For instance, P14 mentioned how pets provided her emotional support to tackle loneliness during the stay-at-home orders:

“I think having animals, cats, living with me kind of help with the loneliness at times. I get some sparkling water and I go down my guest room [...] and both my animals follow me and they sit on top of me. And it’s like cozy time [...], so that is new. That is like really great and now it’s like I can’t imagine an evening without going down.” (P14)

In summary, participants sought emotional support to tackle depression and loneliness invoked (in some cases, amplified) by the stay-at-home orders and social distancing. Participants desired to

receive emotional support from their close family members, friends, and neighbors. However, a few of them also reached out to professional counselors for support to maintain psychosocial and emotional well-being.

Network Support: Participants revealed several ways they receive network support during normal time, for example, being a part of an community organization with similar interests (church, book club, dance group, exercise group, group of single people, group of widows), having companions, spending time with friend groups/neighbors, and calling individuals. Most of the participants considered community organizations as a common source for network support. However, they were not able to access those community organizations during the pandemic due to disease mitigation efforts (e.g., social distancing, self-quarantining, stay-at-home orders). For example, P11 mentioned instances of missing out being in the church and interacting with the community:

“There’s nobody at the church there now. [...] for me, part of the benefit of going to the church is the community, and to say hello to people, and have the same experience.” (P11)

As the activities of these community organizations shifted to online during the pandemic, most participants mentioned participating in those new online activities for network support. For instance, P6 pointed out her experience of joining church activities over Zoom:

“They (churches) have an online service every Sunday, and I go to that on Zoom.” (P6)

Another participant, P15 talked about the way she maintained companionship with her dance group during the pandemic:

“They (dance group) are doing a weekly Zoom. We haven’t decided what to call it, an event of virtual dance or something. But there is music and they go around, everybody can say hello, and how they’re doing and what’s going on. So that’s been a way to keep in touch with that group.” (P15)

In addition to being a part of several online communities, participants mentioned receiving network support through limited in-person bonding within the neighborhood. For instance, P5, who lived alone in a condominium, talked about bonding with small group of neighbors during stay-at-home orders:

“I’ll go outside and chit chat with them (neighbors), they’re single ladies all around me, and there are some married couples.[...] I do keep those community communications open.” (P5)

As this quote illustrates, although the disease mitigation efforts restricted in-person interactions, most participants engaged in limited in-person opportunities and online communities to satisfy their network support needs.

To summarize, participants reported that they sought informational support, tangible, emotional support, and network support during the pandemic. Although most participants relied on their support networks of family, friends, and neighbors for social support, some participants extended their support networks to incorporate professional counselors. Participants also highlighted a shift from their in-person interactions to online community interactions that impacted their network support. The shift was triggered by disease mitigation measures, such as social distancing and self-quarantining.

4.1.2 Role as Support Providers. Our participants not only received support but also provided support during the pandemic. We found that participants mostly provided tangible and emotional support. They often provided support to those who were older and vulnerable than themselves. Some participants also mentioned providing network support through checking on with people in their social network. In a few instances, participants provided informational support through

advice and suggestions to their peers. However, our participants did not mention providing any esteem support to others.

Tangible Support: This type of support is the most commonly provided by the participants. Participants mentioned providing tangible support to people in their social network who were at higher risk due to having certain chronic conditions or being older and more vulnerable than themselves. In some cases, they reported providing support to community organizations and homeless people.

During stay-at-home orders, most participants provided tangible support to their family, friends, and neighbors by doing outside tasks, specifically buying groceries or other daily necessities (e.g., toilet paper). For instance, P8 mentioned helping out older friends by doing errands for them:

“I have friends who are older than I am, I have been asking them. They said, well, would you mind getting this from the grocery store, when we were having our big toilet paper crisis back. [...] I’ll do that for people, or if I call a friend and ask I’m going to the grocery store. Is there anything I can bring to you?” (P8)

A few participants mentioned seeking family members’ help to provide support to their older peers. For example, P2 supported her neighbor, who lived alone and could not drive to get the groceries. She mentioned buying groceries online with the help of her daughter:

“I go to her (older lady living next door) and talk to her about what she wants, and then my daughter orders it online because she can do it more easily. And we pay for it online with this woman’s debit card and then have the groceries delivered to her.” (P2)

In addition to supporting their peers, some participants mentioned providing tangible support (i.e., running errands, dropping off foods) to young family members (e.g., grandchildren) who had chronic conditions and were at higher health risk during the COVID-19 pandemic. For instance, P7 mentioned dropping off groceries at her granddaughter’s house who has type I diabetes:

“We call it text and tote. If she (granddaughter) texts me then I go get it and drop it off at her house.” (P7)

Some participants also mentioned continuing to babysit their grandchildren. One participant mentioned being a care partner for her ailing parent during the pandemic.

We found that participants’ role as a tangible support provider was not restricted to only family and peers. Some participants reported supporting the community during the pandemic through monetary donations to homeless people and community restaurants. They also mentioned mask donation to local organizations. For instance, P6 mentioned making and donating masks to local organizations to support others:

“I am also making a lot of masks during the COVID period. There are two women who set up an organization where women made masks and they donate them to hospitals, senior homes, and organizations. So I made about 40 or 50 masks.” (P6)

Most participants mentioned performing the role of support providers was beneficial for them. It allowed them an outlet from the confinement of lockdowns and stay-at-home orders. Additionally, the support provider role invoked a sense of purpose to keep going on with the pandemic situation and increased their self-esteem, agency, and sense of independence. For example, P7 pointed out how doing tasks for her family members gave her a purpose during the stay-at-home orders:

“If they (son and granddaughter) need errands run like dropping laundry or checking on the dogs. It gives me an outlet.[...] I dropped the food off or that kind of stuff. So it gives me a purpose. That I think helps me out, that a lot of people don’t have.” (P7)

In summary, participants were enthusiastic about providing support to the people who were older and vulnerable than themselves. In addition, they provided tangible support to their young family members as well as the local community during the pandemic. Most participants viewed their support provider role as mutually beneficial. On one hand, they helped others, and on the other hand, providing support gave them a sense of purpose.

Emotional Support: It is the second most common support provided by the participants during the pandemic. Most participants provided emotional support to their peers through empathy. They resonated with the social isolation their peers experienced and shared these understandings as emotional support. For instance, P1 mentioned reaching out to her friends who might not live alone, yet might feel isolated during the pandemic:

"They (friends) all have people they live with or they live in a town where they would have neighbors close by. I'm really worried about (them), they're also isolated. They may not see anybody, so I've reached out. Sometimes I hear back. Sometimes I won't hear back for a week or so." (P1)

Some participants thought offering emotional support through physical affection (i.e., hugs) was more effective than verbal support, even during the pandemic. For instance, P14 mentioned using an old shower curtain to hug her friend when she was feeling depressed:

"I went and I got an old shower curtain, and I held up the shower curtain, and I just folded my arms around her (friend), because you know sometimes you just need to do those things." (P14)

In summary, participants discussed providing support mainly to their peers who felt isolated during the pandemic. They also pointed out the significance of providing emotional support through physical contact even in the challenging situation of social distancing.

Network Support: We found that most participants showed intentions to reach out more for checking in and be there for those who were living alone like them during the lockdowns and stay-at-home orders. Although participants checked in with others, the aim of their checking was to provide them a sense of *community* and belonging, thus such support is different from emotional support. For instance, P15 mentioned sending checking in messages to her friends who were in a similar context as her (i.e., living alone):

"A few friends who were widowed in the past winter or so and I know they were alone (during the pandemic) and I've tried to send them messages and see how they're doing, and sometimes get together and go for a walk or something, just to make sure they're not too lonely." (P15)

Some participants also discussed *mutual checking* as a provision for network support to friends, family members, and neighbors. For example, P4 mentioned how she and her neighbor developed a tacit understanding to check on each other during the pandemic:

"And then this is the lady (who lived at the) corner from me, we kind of check on one another because if I don't come out to water the flowers or she hasn't seen my car leave, she just called me." (P4)

Some participants highlighted that the unique characteristics of the pandemic triggered mutual checking practices in some instances. For instance, P5 and her sibling started to check on one another regularly at the beginning of the pandemic:

“My brother and I, I call him at eight in the morning, see how he is, and he calls me at eight at night to see if I’ve made it through the day.” (P5)

In summary, even though within their limited capabilities, participants mentioned developing their unique ways, i.e., mutual checking to provide network support to their peers.

Informational Support: Some participants also mentioned providing informational support to their peers. It includes mostly providing advice and suggestions. Most often, the aim of their support is to ensure physical safety of their peers during the pandemic. For instance, P4 suggested her friend that she should refrain from advising strangers to wear masks in public places to avoid potential conflicts and danger:

“If she (one of her neighbor) sees people in the grocery store (without mask), she wants to go over and say something to him and we finally convince her just shut up, and leave for her own sake. Because you don’t know, if they’re going to punch or pull a knife, shoot. I mean, it’s crazy out there, I think.” (P4)

In summary, participants mentioned both receiving and providing support during the pandemic. They exchanged support among their social networks comprising family, friends, neighbors, and in some cases, professional counselors. Their roles as support providers and support recipients were valued equally to sustain different challenges during the pandemic. On one hand, their roles as support recipients allowed them to fulfill their needs (e.g., psychosocial and emotional) during the stay-at-home orders. On the other hand, their roles as support providers gave them a purpose to sustain the unique situation of COVID-19.

4.2 Tensions between Social Support and Safety, Autonomy, and Independence

We found that participants were engaged in both support seeking and support provision during the pandemic. However, the unique conditions and challenges of the COVID-19 pandemic, government rules, and regulations disrupted their social support roles. In some cases, they either discontinued their roles or made compromises. Our findings showed that the pandemic instigated tensions between their social support roles and their needs for safety, autonomy, and independence. In the following subsections, we detail these tensions.

4.2.1 Social Support and Safety. Most participants pointed out their desire to maintain good health and ensure safety as they were repeatedly referred to as more *physically* vulnerable during the pandemic by health officials and media. For instance, P11 pointed out her intentions of staying healthy:

“I’ve been more focused on physically feeling good and staying healthy because, of course, with the virus, I don’t want to get sick.” (P11)

Participants discussed how their need for safety disrupted their social support roles in some instances. They mentioned the disruption was more prevalent in the case of receiving and providing tangible support. For instance, P13 mentioned discontinuing seeking tangible support (i.e., household tasks) from her helper when the stay-at-home orders were initiated. She used to have a helper to support her with household tasks before the pandemic. She had multiple health issues; hence, she did not feel safe receiving help from an outside person:

“There was a person who used to work for me and I really miss having that help. So I had him come over once, [...] he didn’t wear a mask and he would come right up to me and I would just keep backing off. And so I’m thinking, this isn’t safe for me and I can’t have him come back. And when he didn’t do what he needed to do. [...] I just let him go.” (P13)

Some participants also reported ways in which their need for safety created tensions around their role as support providers. For instance, they discontinued engaging in various volunteer activities due to their health concerns. P2 mentioned quitting volunteer services at a community center that supported homeless people due to safety concerns:

"I used to volunteer at Shalom community center, that helps homeless people [...] I did not get sick very often but I did and I thought I got that at the center because those homeless people, its hard for them to stay healthy. I don't blame them or anything, if I got sick working there. I would forget and touch my face after I had given them their mail or something like that. So since the COVID hit I stopped volunteering there." (P2)

In a few cases, participants mentioned continuing their role as support providers when their safety was ensured. For instance, P2 continued providing tangible support to other older adults through the Meals on Wheels service when the authority took adequate safety measures:

"I drive for meals on wheels, I still have that among my volunteer activities because they have arranged it so there is no contact delivery." (P2)

We found that the need for safety also impacted participants' network support roles. Most participants restricted themselves from engaging in various in-person community activities during the pandemic due to the fear of getting the virus. For instance, P5 voiced her concerns about not associated with different community organizations (i.e., church) due to safety issues:

"A couple of years ago, I started going back and attending church services. I stopped that because of the COVID. And even though they have restarted having services outside, I haven't gone so [...] It's not good or bad. It's just I missed the community. But I don't feel comfortable going because [...] I just don't feel like I want to take a chance of being in a group like that." (P5)

In summary, participants reported that the high-risk factors associated with their age during the pandemic constrained their social support roles. Their need for safety dominates their choices for seeking support, such as getting help for household chores, attending community organizations, etc. Their health concerns also confined their provisions to offer support to others compromising their safety (e.g., unwillingness to continue volunteer work).

4.2.2 Social Support and Autonomy. Participants pointed out that the risk factors of the COVID-19 pandemic and disease mitigation measures such as governmental restrictions limited their sense of autonomy. Most participants considered going to the grocery stores and to select produce by themselves to gain autonomy. They felt they need to have the freedom of making the decision about their produce rather than someone else making the decision for them. However, participants felt their loved ones (i.e., family members and friends) often overprotected them because of their age-related risk factors and provided tangible support (i.e., food and groceries) even though they did not explicitly seek the support. Hence, tensions were brewed between social support seeking and maintaining autonomy. For example, P9 described that her loved ones made the decision of not allowing her go to the grocery stores and brought food to the doorstep to keep her safe:

"My sons and my one family friend decided that I should not go to the grocery store [...] they did not want me going to the grocery store, even though I'm healthy. I don't have any reason not to go, they just didn't think it was safe. [...] well, in March and April, I hardly went anywhere. My friends and family bought food for me and brought it to me. They would come and stand outside. I would stand in the door and they would stand outside and we would talk." (P9)

In some cases, we found participants decided not to accept assistance or social support from others to sustain their autonomy. In other cases, participants mentioned compromising their need

for autonomy to reduce the risk of getting infected by the virus. For instance, P11 mentioned how her need for autonomy was repressed by her need for safety:

“Previously, like I said, I like going to the grocery store and I had thought, Oh, I don’t want somebody else picking out my avocados [...], but then the risk felt higher than it was [...] I can deal with somebody can choose my avocado instead of, you know, risking getting sick.”
(P11)

In summary, participants reported a conflict between maintaining autonomy and seeking support. Sometimes, the overprotective behavior from their loved ones thwarted their desire to maintain freedom and agency. In other cases, participants willingly accepted support from others that might have compromised their autonomy.

4.2.3 Social Support and Independence. Most of our participants considered themselves as independent individuals. To sustain their sense of independence, they preferred to conduct most of their daily tasks by themselves rather than seeking support from others. For instance, P12 mentioned that she didn’t feel the need to receive help offered by her friend:

“Our neighborhood would always have a little pitch-in every week, and so I have some friends [...], and somebody from that group told me that if I needed her to do any errands for me she would be happy to do. But I haven’t needed to.” (P12)

Participants pointed out that having their own transportation and financial stability during the pandemic reduced their need of social support, specifically tangible support from community organizations. For instance, P1 mentioned she did not need support because she has her own car and financial resources:

“Honestly, the community has a lot of resources. I haven’t necessarily needed to use that. I’m not really home bound, I have a car. I could go where I want to, if I need something repaired I could call someone. So I don’t (need support). It’s not because I have lack of funds or lack of transportation. So I’m not in that category.” (P1)

Our findings showed that participants’ sense of independence influenced their social support role as support recipients. To maintain their independence, they often performed the role of support providers. In most cases, the participants provided support to people who lived alone, older, and were more vulnerable than themselves. For instance, P15 mentioned:

“I would get something for my neighbor who is older, I would ask her if she wanted something if I was going and get things for her.” (P15)

In summary, these findings showed that participants aspired to lead an independent life, especially when they had resources, such as their own transportation and financial stability. They also played the role of support providers to captivate the sense of independence.

5 DISCUSSION

Our findings illustrate older adults’ experiences as both support providers and support recipients during the pandemic. Older adults in our study provided support not only to their family and friends but also to the broader community. For instance, participants reported donating money, masks, etc., to homeless populations, local restaurants, and community organizations. We recommend considering older adults as resources instead of physically vulnerable individuals during the challenging time of the pandemic. Our findings uncover an evolving nature of support sources, support roles, and support concerns. We propose a framework reflecting on ecology of social support amongst older adults and how it evolved during the pandemic. The proposed framework can be applied to design socio-technical systems that support older adults more holistically in both roles. We find older adults mostly provide and receive emotional, tangible, informational, and

network support. However, esteem support was not prevalent in our results, which focus on the pandemic context. Potential explanations include that 1. we did not explicitly probe for specific types of support in our interviews, 2. esteem support may not come to mind as easily as others types of support, and 3. esteem support may not be impacted as directly by the pandemic as the other types of support. We also witness tensions around social support in relation to older adults' needs for safety, autonomy, and independence. In this section, we first discuss viewing older adults as anchors of society. We present the evolving support ecology framework followed by reflections on the emerged tensions around social support. We conclude our discussion by providing design implications for socio-technical support systems for older adults.

5.1 Older Adults as Anchors During a Time of Sweeping Change

Society usually has associated negative age stereotypes to older populations, for instance, assuming that they had memory or physical impairments due to their age [77, 81, 83]. The outbreak of the COVID-19 pandemic heightened these existing stereotypes. Older adults are portrayed as even more helpless and unfit to contribute to society during the pandemic [37, 94, 116, 133]. We certainly acknowledge the importance of protecting physically vulnerable populations, yet the pandemic is not only about becoming physically ill. Our findings offer a counter-narrative to the bleak portrayal of older adults as solely vulnerable. We recommend considering older adults as resources for a society during a crisis.

Existing research in gerontology has discussed several unacknowledged roles performed by older adults [58, 89, 136]. For instance, older adults perform functions such as bearer of family history, caregiver for grandchildren, financial supporter, daily assistance provider to their friends, and role model for socialization. As with previous research, our study also found that older adults performed the role of support providers by providing support to those who suffered from chronic conditions, were older, or were more vulnerable than themselves. For example, participants mentioned supporting other older adults who lived alone and lacked opportunities to receive support from their social networks. In most cases, they provided tangible support, such as buying groceries, running errands, etc. Many of our participants actively participated in volunteer work, consistent with prior work showing that almost a quarter of older adults volunteer [105]. Although during the pandemic older adult involvement in volunteer activities dropped due to the associated risk, a few of our participants still continued their volunteer work to support other older adults. For example, they continued driving for Meals on Wheels [106] when the service shifted to no-contact delivery. These examples establish older adults' roles as "natural helpers" during the pandemic. Natural helpers are defined as non-family members to whom others can turn for support because of the helpers' concern, interest, and innate understanding [63]. Natural helpers provide emotional support, assist with problem-solving, and offer concrete services. Older adults might perform natural helping roles for their peers/neighbors and provide support through organized block programs.

Older adults in our study also provided network support to their older neighbors during the pandemic through mutual checking. For instance, participants reported having a tacit understanding with their neighbors to check on each other by initiating follow-up calls if they did not see each other coming out to water flowers and so on. Such mutual checking approaches pave the way for the concept of "peer care". Peer care is defined as the relationship among older adults in which they provide informal care and support to one another as they age in place [7, 113, 114]. Traditionally, peer care transforms the burden placed on caregivers and allows opportunities to establish a bilateral relationship among older adults. We found a similar bilateral relationship among our participants as they shifted between their roles of support provider and support recipient. For instance, participants seeking companionship in one scenario provided emotional support to their friends in another scenario. Furthermore, participants noted that providing support to others gave them an outlet and

a sense of purpose. Having a sense of purpose had the benefit of addressing their social isolation and commitment to persevering through the crisis situation. Thus, peer care provides older adults with opportunities for active engagement rather than being a fragile individual.

Our findings revealed that older adults in our study did not restrict themselves to only providing support to family, friends, and neighbors. Rather, they extended their support to the broader community during the pandemic. For instance, participants supported the community by making donations to the homeless and local restaurants to help them survive economic challenges brought on by the pandemic. They also donated masks to various community organizations. This is in contrast to previous research findings. Earlier research has noted when older adults become aware of the limited time they may have left, they often contract their social networks to include only those with whom they have close connections and consider valuable for their well-being [63]. Hence, we argue that older adults' social networks evolved to form collaborative support networks during the pandemic encompassing local community and community organizations.

Further, older adults also possess the strength of life experience and adaptive use of personal memory. They have lived through both personal challenges and difficult historical periods, and crafted a lifelong reflection to thrive in the face of adversity and crisis. While our interview questions did not explicitly explore prior experience, these psychosocial strengths gained over their life course likely influenced what we found. Future HCI and CSCW research could examine this in more detail.

In summary, our analysis revealed various ways older adults provide support to society and create opportunities for collaborative peer support during challenging periods, such as a pandemic. Hence, we argue against the ageist view of older adults as vulnerable. Rather, this study suggests that older adults are important anchors in society during a time of sweeping change.

5.2 Evolving Ecology of Social Support

Analysis of our data revealed an evolving nature of older adults' support sources, support roles, and support concerns as they passed through a time of sweeping change during the COVID-19 pandemic.

Older adults in our study augmented their traditional support sources (i.e., family, friends, and neighbors) with other sources such as community organizations and professional counselors. For instance, a few of our participants mentioned seeking emotional support from professional counselors to maintain psychosocial and emotional well-being, as they felt the need for more than a friend or family member could offer. In addition, they sought network and informational support from different community organizations such as senior centers, churches, etc. In most cases, the support activities from these community organizations were shifted to online activities, and the participants evolved to accommodate this shift. In addition, participants noted an inclination towards other sources, i.e., Facebook, Center for disease Control and Prevention (CDC) websites, newspapers, TV, community bulletin boards, and neighborhood groups to seek information about pandemic spread, measures, government restrictions, updates on local health access, etc.

We found that older adults neither became more support providers nor more support receivers during the pandemic. However, their support roles evolved as they shifted between the roles and types of support in different scenarios. For instance, in some cases, participants mentioned seeking support for household tasks, buying groceries online, etc. In other cases, they provided support to those who were older and more vulnerable than themselves by running errands, helping them with grocery shopping, etc. We found similar instances for emotional support: someone who was feeling lonely providing emotional support to others. Thus, their support roles evolved in response to the pandemic.

Our findings also showed that concerns evolved around the support roles. For instance, participants mentioned safety concerns when accepting and providing support. They pointed out that

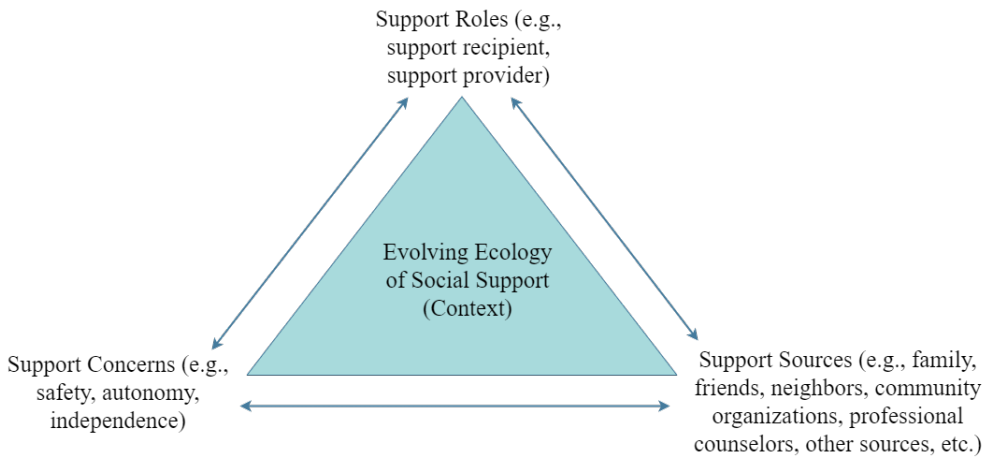


Fig. 1. Evolving Support Ecology Framework

family and friends buying groceries for them striped their decision-making power and restricted their autonomy to some extent. Hence, they hesitated to seek assistance in some cases. At the same time, participants often played the role of support providers to sustain their sense of independence. It is worth mentioning these concerns were heightened by the pandemic, even though these existed before among the older population. In short, we observed an evolution in the ecology of social support as older adults went through the pandemic. This evolving nature of the support ecology might invoke challenges for designers who build support interventions to help older adults to age in place.

Therefore, based on our findings, we present a framework for the evolving support ecology that the HCI and CSCW community can utilize in developing socio-technical systems to empower older adults to age in place during a crisis. We take inspiration from earlier work on support ecology by Prabhakar et al., that captured the transitional arc in a woman's life from pregnancy through the stages of motherhood [109]. Fig. 1 represents the Evolving Support Ecology (ESE) framework, to facilitate designing support interventions for older adults in a crisis. In this support ecology, we identify three evolving key elements, i.e., support roles, support sources, and support concerns. Support roles include roles as support providers and support recipients. Support sources encompass traditional and non-traditional sources, i.e., family, friends, neighbors, community organizations, professional counselors, and other sources. Lastly, support concerns focus on safety, autonomy, and independence.

The three key constructs of the framework are interconnected. Older adults, as support providers, extend assistance to specific sources such as family, friends, neighbors, and community organizations. On the other hand, older adults receive help from some additional sources such as professional counselors and other sources (e.g., Facebook, online news feeds, insurance websites, CDC websites, newspaper, and TV) along with family, friends, neighbors, and organizations. For instance, our participants mentioned delivering tangible aid to the local community by donating masks, money, etc. They received information primarily from sources, such as social media, newspapers, TV, websites, etc., during the pandemic. Older adults' roles are also connected to support concerns. For instance, our participants mentioned being concerned about their autonomy and independence while receiving tangible support from family and friends. This concern was not observed when they were providers. They reported prioritizing their safety when helping others through volunteer

activities during the pandemic. It also reflects that older adults' support concerns also varied based on their resources.

The introduced framework will create opportunities for collaborative peer support systems that take into account the adaptation and evolution of roles, sources, and concerns. Current aging in place socio-technical support systems mostly focus on ensuring older adults' safety, monitoring their behavior, and signaling to the remote care partners [99, 112, 121, 126]. Care partners set the rules and form a unilateral relation that forces the older adults to sacrifice their autonomy and independence. Our proposed framework can be applied to incorporate the factors that help with autonomy (e.g., provide agency to older adults) and reduce the factors that limit autonomy (e.g., rule setting by the care partners) to maintain the balance of independence, autonomy, and safety. For instance, designing systems or tools to create opportunities for collaborative online volunteer activities where older adults could help each other find reliable resources and sustain their roles as support providers and support recipients.

The framework could also be used for future research studies in HCI and CSCW communities. Future research studies could use the proposed ESE framework to study tensions around social support in different settings, for example, parent-child care relationships [134, 143]. Toscos et al. have explored how the support relationship between parent and adolescent child with chronic disease evolved over time [134]. The proposed ESE framework could facilitate the investigation of specific support needs for both care providers (i.e., parents) and receivers (e.g., the child living with chronic disease) regarding interactions among evolved support roles, sources, and concerns.

In summary, our proposed framework captures the evolving nature of older adults' social support ecology during a pandemic crisis. The framework could also be applicable for other age groups, i.e., young adults living alone who may have faced similar experiences as that of older adults living alone during the pandemic. It could also be applied in other crises (mentioned in section 2.3), such as being diagnosed with a disease, death of a loved one, etc. Being diagnosed with a cognitive disorder, such as dementia and Alzheimer's, is a health crisis that impacts older adults' support ecology. For instance, support roles and support sources of older adults living with dementia or Alzheimer's, evolve as they become more dependent on care partners. Older adults' support concerns also evolve when their autonomy and independence are compromised to ensure their safety as they move into care facilities. The proposed framework would facilitate the design of socio-technical support systems as the ecology of support evolves in crises. Future research is still needed to consider the applicability of the proposed framework in other contexts.

5.3 Reflecting on Tensions around Safety, Autonomy, Independence, and Social Support

Our findings revealed tensions around social support, safety, autonomy, and independence. Older adults are often at odds with their loved ones, who prioritize safety over older adults' autonomy and independence [63]. A pandemic normalized safety risk for everyone, allowing older adults to evaluate safety in their decision-making process. We urge researchers in the HCI and CSCW communities to apply the lessons learned during the pandemic to design technologies that support older adults to age in place during a personal crisis (e.g. a health event), such that they are able to balance safety concerns with autonomy and independence.

Existing research has shown that older adults are more inclined to lead an autonomous and independent life even at the risk of safety [9, 12, 44, 148]. This inclination is partly due to the stigma associated with old age. Older adults encounter stigma in various forms that lead them to adopt negative definitions of old age [23, 77, 83]. For instance, older adults often internalize normal aging and associated declines as personal vulnerability. Some older adults resist using assistive devices such as canes, walkers, and alert buttons, sacrificing their safety due to fear of

being viewed as frail and dependent [4, 19, 53, 129, 142]. In contrast to prior research, older adults in our study reported being more concerned about their health and safety during the pandemic. They prioritized their need for safety while seeking and providing social support. For instance, one participant reported not continuing to receive help with household tasks from non-family helpers due to safety concerns. Participants also pointed out that the fear of being exposed to the virus kept them from engaging in volunteer activities. A few older adults in our study found ways to provide support while reducing their risks, for example, driving for Meals on Wheels service with no-contact delivery, making masks, donating money to local restaurants, and helping others buying groceries online. Our findings support the claim that older adults allow themselves to consider their safety during the pandemic in a way that they had not previously. A potential explanation for this change might be unlike the normal aging process, getting affected by the virus and being vulnerable are not perceived as a personal failure. As everyone in their surroundings is dealing with the same issue, individuals might not feel stigmatized because of age.

Prior research has shown that in contrast to older adults, family and friends prioritize the older adults' safety over their autonomy and independence. For instance, children take away the car keys from their older parents due to the fear that they might cause major accidents [63]. They install monitoring systems to ensure their safety from falling and wandering [126]. All these protective steps taken by loved ones prioritize safety over negative consequences for the older adults, such as loss of independence, autonomy, personal satisfaction, identity, and sense of personal power and control [63]. Similar to the prior study, our participants experienced limited freedom during the pandemic due to the influence of others. For instance, participants mentioned that family and friends did not allow them to go to grocery stores and instead bought groceries for them without participants seeking such assistance. We found that most of the participants tried maintaining their freedom and independence by accepting limited assistance from their support networks. However, a few participants mentioned compromising their autonomy and allowing others to make decisions (i.e., grocery purchase decisions) for them as they feared getting infected by the virus. Here, we found that participants put their safety concerns ahead of autonomy and independence.

In summary, pandemic challenges allowed older adults to break free from their internal stigma pertinent to aging and elevate their safety needs. We can translate these findings to augment existing aging in place technology or to new design. We need to think about how we can normalize the natural aging process and associated declines in a way that older adults aspire to uplift safety as a legitimate concern in their support decisions. At the same time, future research can use the findings to design collaborative aging technology that might balance the safety concerns, autonomy, and independence.

5.4 Implications for Design of Socio-technical Support Systems

Here, we propose design suggestions for socio-technical support systems following the ESE framework (Fig. 1), considering the evolving nature of older adults' support roles, concerns, and sources in response to the pandemic. These design suggestions aim at empowering older adults to age in place during a crisis.

5.4.1 Collaborative Technologies for Older Adults. As discussed in section 5.1, we urge considering older adults as resources for a society during a crisis. Towards that goal, we need older adults to be active participants in socio-technical support systems. However, most of the existing assistive support systems only provide opportunities for performing the role of support receivers [35, 99]. These systems primarily focus on supporting care partners while older adults benefit indirectly or in a limited way [35, 112, 126]. Older adults often feel disempowered while using these systems

[25]. Designing for older adults as support providers can help empower them and benefit their communities during a crisis.

Earlier research has established that both the recipients of support and those who provide it benefit [75]. We found that older adults in our study were enthusiastic to provide support to those who were older and more vulnerable during the pandemic. There is a need to design support systems for older adults that can create opportunities for both support provider and support receiver roles during a crisis. We envision a reciprocal design similar to the Presence Clock [65]. The Presence Clock is a pair of analog clocks with LEDs to share two-way presence information (e.g., activity levels) between older adults and their care partners. These reciprocal systems may also be evolved to empower older adults by giving them more agency as active participants in the systems. For instance, a peer care-based support system, the Check-in Tree [7] allows older adults to check-in with their peers. We believe there is an opportunity to design peer care-based support systems for mutual assistance that help older adults assist each other with tasks and services during the pandemic crisis. For instance, a collaborative forum among peers where older adults can post their support needs (i.e., need help with groceries, household tasks, etc.). Other peers can volunteer to provide that support based on their skills and ability. The forum can be extended to provide different types of support, such as dissemination of information about local food resources, local health resources (mental and physical), volunteer opportunities, social engagement activities, etc.

As mentioned in section 5.1, older adults provide support to their peers and family members as well as in their communities (e.g., donating masks, money, etc.). There are opportunities to design socio-technical systems that support older adults to engage in community empowerment during the pandemic. Existing research has started exploring initiatives for community empowerment [13, 54]. For example, community-based intervention, the Food Dollars Program in Boston [13] was designed to promote healthy eating and reduce food insecurity among low-income African American and Latino/Hispanic older adults. This program empowers older adults to be an advocate for neighborhood change by educating them on how to budget for healthy eating and nutrition. Another community-based support system is EatWell, where community people shared their healthy eating experiences in a low SES community [54]. Here, people use their cell phones to create voice memories describing their eating habits as well as listening to the memories created by others. These community-based systems have the potential to empower community members by educating them on community-wide issues (i.e., hunger, poverty, crime, etc.), facilitating a sense of identification among community members, a sense of hope amongst prevalent disparities in their community, and providing a trusted environment to have their voice be heard. We envision designing a similar socio-technological collaborative support system for older adults that include a neighborhood advocacy component. For instance, a trusted platform where older adults and other community members (e.g., young neighbors, local senior centers, local officials, congregational members, volunteers, etc.) can share information to find low-cost or free services and resources located within the community during the pandemic and discuss community-wide issues such as nutrition, safety, etc.

These systems are particularly needed in times of a crisis due to resulting changes in older adults' support needs and opportunities to provide support to others. Thus, facilitating the connection between receivers and providers of support has great potential to benefit older adults and their communities.

5.4.2 Towards Building and Reinforcing Social Ties for Support. So far, we discuss the design implications for socio-technical support systems to create opportunities for social support and support roles in a time of crisis. However, existing research has also emphasized the significance of social ties in mental and physical well-being during a crisis [69, 150]. They are more important

than ever during the pandemic [3]. Social ties can help older adults to get through the challenging period of social distancing and self quarantining. Our findings revealed that participants primarily relied on their existing social networks for support (e.g., family, close friends, widowed women group, etc.) during the pandemic. There is a need to design service programs to strengthen existing social ties. For example, a postal alert service program can be designed leveraging the people in service positions, where postal carriers observe whether an older adult is taking in their mail each day and build an everyday interaction with the older adult. Existing research has also explored the role of religious or faith-based institutions as sources of social ties and social support [79, 140]. These institutions support older adults with transportation, household tasks, house repair, meal preparation, and psychological support [63]. Design could support the implementation of these support roles. For example, a ride-sharing platform could be designed to facilitate collaboration between older adults and different congregational members/volunteers for making trips to their healthcare appointments, grocery stores, etc. Thus, congregational members/volunteers could form long-term social ties with older adults. These long-term relationships can be valuable resources to older adults and their communities during a time of crisis, as adapting existing support networks should be less challenging than establishing new support relationships in that context.

There are also opportunities to design service-oriented program to build new long-term support relationships among two people or a group of people to facilitate support during the pandemic. For example, a service program can be designed to connect one person who needs rides to go to places such as hospital visits, church, grocery stores, etc., with another person who needs help with gardening. They can help each other every week or every month by *trading* different kinds of support and thus able to form a long-term social ties. Social ties could also be developed through service programs such as music, dance, or fitness classes. For example, Kluge et al. [76] emphasized the importance of these classes to form close and meaningful social bonds along with physical fitness among older women in a retirement community. To accommodate the new norm of physical distancing during the pandemic, a potential future design could be a platform of online classes for older adults to form bonds and to watch out for each other.

Overall, support systems designed to build long-term support relations and strengthen existing ties could alleviate psychological problems such as loneliness, social isolation, and depression induced during the pandemic.

5.4.3 Systems to Support Balance between Safety, Autonomy, and Independence. Our findings revealed that participants' social support decisions were influenced by factors such as safety, autonomy, and independence. Participants mentioned taking into account their safety as legitimate concerns and were willing to compromise their autonomy and independence. Some participants reported that they didn't prefer to use online grocery delivery services as they didn't want unknown people to make purchasing decisions for their groceries. However, they compromised their freedom and used those online grocery delivery services as they feared getting infected by the virus during in-person visit to grocery stores. Hence, as a community, we must investigate how we can design systems to support older adults in finding the sweet spot among safety, autonomy, independence, and social support. One possible avenue could be to re-design online delivery systems to improve the experience of autonomy of older adults by providing them a sense of agency. For example, a functionality that allows older adults to choose items in a store using synchronous video or VR could provide a greater sense of agency. We could also design systems around trust-building between older adults and the people who will buy the groceries for them, such as assigning the same person for particular older adults to understand their preferences.

5.4.4 Making Values Explicit in System Design. Participants in our study reported that they felt a sense of purpose while providing support to others. They mentioned that this sense of purpose

helped them to pass through the challenging period of the pandemic. This finding points towards the need to include *values* in support systems. Here, the term *values* broadly means what a person or group of people consider to be important in life [14]. Researchers have started to examine opportunities to address values in design and technology, such as the adoption of the value-sensitive design [49] approach. We must investigate how we can apply a value-sensitive design approach to design support systems for older adults incorporating emotional (an experience that makes them feel connected with the system), social (facilitate and enhance the social ties), learning (offer opportunities for their growth), and contextual (connect the virtual world with real world moments) values. For instance, the collaborative forum (mentioned in section 5.4.1) instills emotional, social, and contextual values into the design to support older adults' goals of developing a sense of purpose during the pandemic.

6 LIMITATIONS

The major limitation of this work is the homogeneous participant group. We used an electronic recruitment method (i.e., a state-wide mailing list of participants for health research) as our starting point and then used snowball sampling from there. Hence, it was not surprising that our sample was biased towards having a high technology literate population. Further, the dominant demographics of the geographic area where the study took place also skewed the participants to being White. Because of the above-mentioned reasons, our sample leaned towards White, female, U.S. residents with high education levels, technology experience, and access to the Internet. Research with diverse participants who are representatives of the entire U.S. aging population is needed. We point to past work that discussed recruiting minority older adults [95, 102] through community sites such as senior centers, libraries, churches, local officials, volunteers, and respite care organizations. Some of these community organizations continued to operate during the worst of the pandemic crisis and had the potential to reach out to the diverse older population.

7 CONCLUSION

Social support is considered an essential component in helping older adults cope with unique psychosocial challenges during the COVID-19 crisis. However, disease mitigation measures and physical vulnerability have impacted older adults' in-person social support opportunities. Based on interviews with older adults, we describe their roles as support providers and receivers. We identified tensions around support concerns, i.e., safety, autonomy, and independence, that made social support particularly challenging during the pandemic. We propose a framework to illustrate the evolving ecology of social support that can facilitate the holistic design of socio-technical support systems for older adults. We argue against the societal ageist view and urged the HCI and CSCW researchers to design support systems considering older adults as a resource. Lastly, we discussed possible design directions of socio-technical support systems that empower older adults to age in place during a crisis.

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REFERENCES

- [1] Terrance L Albrecht and Mara B Adelman. 1987. *Communicating social support*. Sage Publications, Inc.
- [2] Stefania C Alcantara, Mònica González-Carrasco, Carme Montserrat, Ferran Viñas, Ferran Casas, and Desirée P Abreu. 2017. Peer violence in the school environment and its relationship with subjective well-being and perceived social support among children and adolescents in Northeastern Brazil. *Journal of Happiness Studies* 18, 5 (2017), 1507–1532.
- [3] D Aldrich. 2020. Cultivating social ties in the age of physical distancing.
- [4] Faranak Aminzadeh and Nancy Edwards. 1998. Exploring seniors' views on the use of assistive devices in fall prevention. *Public health nursing* 15, 4 (1998), 297–304.
- [5] Nazanin Andalibi. 2016. Social media for sensitive disclosures and social support: the case of miscarriage. In *Proceedings of the 19th International Conference on Supporting Group Work*. 461–465.
- [6] Monica Anderson. 2019. *Mobile Technology and Home Broadband 2019*. <https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/>
- [7] Ingrid Arreola, Zan Morris, Matthew Francisco, Kay Connelly, Kelly Caine, and Ginger White. 2014. From checking on to checking in: designing for low socio-economic status older adults. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1933–1936.
- [8] Ron Baecker, Kate Sellen, Sarah Crosskey, Veronique Boscart, and Barbara Barbosa Neves. 2014. Technology to reduce social isolation and loneliness. In *Proceedings of the 16th international ACM SIGACCESS conference on Computers & accessibility*. 27–34.
- [9] Linda L Barrett and Data Collected By. 2011. *Healthy@ home 2.0*. Washington, DC (2011).
- [10] David A Bennett, Julie A Schneider, Yuxiao Tang, Steven E Arnold, and Robert S Wilson. 2006. The effect of social networks on the relation between Alzheimer's disease pathology and level of cognitive function in old people: a longitudinal cohort study. *The Lancet Neurology* 5, 5 (2006), 406–412.
- [11] Li Bing, Liang Dongmei, and Zhao Qin. 2020. Research on How Social Support Affects the Elderly's Life Satisfaction: Analysis of Intermediate Effect Based on Mental Health and Physical Health. In *Proceedings of the 2020 Artificial Intelligence and Complex Systems Conference*. 16–20.
- [12] Duncan Boldy, Linda Grenade, Gill Lewin, Elizabeth Karol, and Elissa Burton. 2011. Older people's decisions regarding 'ageing in place': A Western Australian case study. *Australasian Journal on Ageing* 30, 3 (2011), 136–142.
- [13] Ann Bookman and Susan M Phillips. 2014. *Healthy Eating and Savvy Saving: An Evaluation of Action for Boston Community Development's Food Dollars Program For Low-Income Elders*. (2014).
- [14] Alexandra Boughton, Arjun Gopalakrishna, Bhavya Udayashankar, and Alexandra Morgan. 2012. Home2Home: a "lightweight" gift-giving portal between homes. In *CHI'12 Extended Abstracts on Human Factors in Computing Systems*. 1243–1248.
- [15] Dawn O Braithwaite, Vincent R Waldron, and Jerry Finn. 1999. Communication of social support in computer-mediated groups for people with disabilities. *Health communication* 11, 2 (1999), 123–151.
- [16] Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative research in psychology* 3, 2 (2006), 77–101.
- [17] Robin Brewer and Anne Marie Piper. 2016. "Tell It Like It Really Is" A Case of Online Content Creation and Sharing Among Older Adult Bloggers. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. 5529–5542.
- [18] Rebecca Loeffler Brian Mosby and Emily Connor. 2020. *Indiana's Roadmap to get Back on Track after COVID-19 Lockdown*. <https://www.littler.com/publication-press/publication/indianas-roadmap-get-back-track-after-covid-19-lockdown>
- [19] Aimée K Bright and Lynne Coventry. 2013. Assistive technology for older adults: psychological and socio-emotional design requirements. In *Proceedings of the 6th International Conference on Pervasive Technologies Related to Assistive Environments*. 1–4.
- [20] Caroline O Buckee, Satchit Balsari, Jennifer Chan, Mercè Crosas, Francesca Dominici, Urs Gasser, Yonatan H Grad, Bryan Grenfell, M Elizabeth Halloran, Moritz UG Kraemer, et al. 2020. Aggregated mobility data could help fight COVID-19. *Science (New York, NY)* 368, 6487 (2020), 145–146.
- [21] Brant R Burleson. 2003. The experience and effects of emotional support: What the study of cultural and gender differences can tell us about close relationships, emotion, and interpersonal communication. *Personal relationships* 10, 1 (2003), 1–23.
- [22] Brant R Burleson, Erina L MacGeorge, ML Knapp, and JA Daly. 2002. Supportive communication. *Handbook of interpersonal communication* 3 (2002), 374–424.
- [23] Robert N Butler. 1969. Age-ism: Another form of bigotry. *The gerontologist* 9, 4_Part_1 (1969), 243–246.
- [24] Miriam Cabrita, Harm op den Akker, Monique Tabak, Hermie J Hermens, and Miriam MR Vollenbroek-Hutten. 2018. Persuasive technology to support active and healthy ageing: An exploration of past, present, and future. *Journal of biomedical informatics* 84 (2018), 17–30.

- [25] Clara Caldeira, Matthew Bietz, Marisol Vidauri, and Yunan Chen. 2017. Senior care for aging in place: Balancing assistance and independence. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. 1605–1617.
- [26] Hjalmar Bang Carlsen, Jonas Toubøl, and Benedikte Brincker. 2021. On solidarity and volunteering during the COVID-19 crisis in Denmark: the impact of social networks and social media groups on the distribution of support. *European Societies* 23, sup1 (2021), S122–S140.
- [27] Pew Research Center. 2020. *About half of Americans say their lives will remain changed in major ways when the pandemic is over*. <https://www.pewresearch.org/fact-tank/2020/09/17/about-half-of-americans-say-their-lives-will-remain-changed-in-major-ways-when-the-pandemic-is-over/>
- [28] Pew Research Center. 2021. *In Their Own Words, Americans Describe the Struggles and Silver Linings of the COVID-19 Pandemic*. <https://www.pewresearch.org/2021/03/05/in-their-own-words-americans-describe-the-struggles-and-silver-linings-of-the-covid-19-pandemic/>
- [29] Indranil Chakraborty and Prasenjit Maity. 2020. COVID-19 outbreak: Migration, effects on society, global environment and prevention. *Science of the Total Environment* 728 (2020), 1–7.
- [30] Pu Cheng, Guohua Xia, Peng Pang, Bo Wu, Wei Jiang, Yong-Tong Li, Mei Wang, Qi Ling, Xiaoying Chang, Jinghan Wang, et al. 2020. COVID-19 epidemic peer support and crisis intervention via social media. *Community mental health journal* 56 (2020), 786–792.
- [31] Hyojin Chin, Hengameh Zabih, Sangkeun Park, Mun Yong Yi, and Uichin Lee. 2017. WatchOut: Facilitating safe driving behaviors with social support. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. 2459–2465.
- [32] José Coelho and Carlos Duarte. 2016. A literature survey on older adults' use of social network services and social applications. *Computers in Human Behavior* 58 (2016), 187–205.
- [33] Sheldon Cohen and S Leonard Syme. 1985. Issues in the study and application of social support. *Social support and health* 3 (1985), 3–22.
- [34] Sheldon Cohen and Thomas A Wills. 1985. Stress, social support, and the buffering hypothesis. *Psychological bulletin* 98, 2 (1985), 310–357.
- [35] Sunny Consolvo, Peter Roessler, and Brett E Shelton. 2004. The CareNet display: lessons learned from an in home evaluation of an ambient display. In *International conference on ubiquitous computing*. Springer, 1–17.
- [36] Constantinos K Coursaris and Ming Liu. 2009. An analysis of social support exchanges in online HIV/AIDS self-help groups. *Computers in Human Behavior* 25, 4 (2009), 911–918.
- [37] UN COVID and Aging Brief. 2020. *Secretary-General's Policy Brief: The Impact of COVID-19 on older persons*. <https://www.un.org/development/desa/ageing/news/2020/05/covid-19-older-persons/>
- [38] Carolyn Cutrona, Dan Russell, and Jayne Rose. 1986. Social support and adaptation to stress by the elderly. *Psychology and aging* 1, 1 (1986), 47–54.
- [39] Carolyn E Cutrona, B Beth Cohen, and Surria Igram. 1990. Contextual determinants of the perceived supportiveness of helping behaviors. *Journal of Social and Personal Relationships* 7, 4 (1990), 553–562.
- [40] Carolyn E Cutrona and Julie A Suhr. 1992. Controllability of stressful events and satisfaction with spouse support behaviors. *Communication research* 19, 2 (1992), 154–174.
- [41] Sara J Czaja, Walter R Boot, Neil Charness, Wendy A Rogers, and Joseph Sharit. 2018. Improving social support for older adults through technology: Findings from the PRISM randomized controlled trial. *The Gerontologist* 58, 3 (2018), 467–477.
- [42] Xianghua Ding, Patrick C Shih, and Ning Gu. 2017. Socially embedded work: A study of wheelchair users performing online crowd work in china. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. 642–654.
- [43] Carlos Duarte and José Coelho. 2019. Design of social network services for and with older adults. In *Ageing and Digital Technology*. Springer, 307–326.
- [44] J Kevin Eckert, Leslie A Morgan, and Namratha Swamy. 2004. Preferences for receipt of care among community-dwelling adults. *Journal of aging & social policy* 16, 2 (2004), 49–65.
- [45] Lea Ellwardt, Marja Aartsen, Dorly Deeg, and Nardi Steverink. 2013. Does loneliness mediate the relation between social support and cognitive functioning in later life? *Social science & medicine* 98 (2013), 116–124.
- [46] Sarah Jung Evans. 2020. *Indiana Governor Holcomb Issues Stay-at-Home Order Due to COVID-19*. <https://ogletree.com/insights/indiana-governor-holcomb-issues-stay-at-home-order-due-to-covid-19/>
- [47] Bo Feng and Erina L MacGeorge. 2010. The influences of message and source factors on advice outcomes. *Communication Research* 37, 4 (2010), 553–575.
- [48] Centers for Disease Control and Prevention. 2021. *Older Adults at greater risk of requiring hospitalization or dying if diagnosed with COVID-19*. <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html>

- [49] Batya Friedman, Peter H Kahn, Alan Borning, and Alina Huldtgren. 2013. Value sensitive design and information systems. In *Early engagement and new technologies: Opening up the laboratory*. Springer, 55–95.
- [50] Markus Garschall, Theo Hamm, Dominik Hornung, Claudia Müller, Katja Neureiter, Marén Schorch, and Lex van Velsen. 2016. Symposium on Challenges and Experiences in Designing for an Ageing Society. Reflecting on Concepts of Age (ing) and Communication Practices. In *COOP 2016: Proceedings of the 12th International Conference on the Design of Cooperative Systems, 23-27 May 2016, Trento, Italy*. Springer, 327–329.
- [51] Victor Giroto, Erin Walker, and Winslow Burleson. 2017. The effect of peripheral micro-tasks on crowd ideation. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. 1843–1854.
- [52] Kimberly Glasgow, Jessica Vitak, Yla Tausczik, and Clay Fink. 2016. Grieving in the 21st Century: Social Media's Role in Facilitating Supportive Exchanges Following Community-Level Traumatic Events. In *Proceedings of the 7th 2016 International Conference on Social Media & Society*. 1–10.
- [53] Rachael Goberman-Hill and Shah Ebrahim. 2007. Making decisions about simple interventions: older people's use of walking aids. *Age and Ageing* 36, 5 (2007), 569–573.
- [54] Andrea Grimes, Martin Bednar, Jay David Bolter, and Rebecca E Grinter. 2008. EatWell: sharing nutrition-related memories in a low-income community. In *Proceedings of the 2008 ACM conference on Computer supported cooperative work*. 87–96.
- [55] Beverley Hancock, Elizabeth Ockleford, and Kate Windridge. 2001. *An introduction to qualitative research*. Trent focus group.
- [56] Sten Hanke, Emanuel Sandner, Samat Kadyrov, and Andreas Stainer-Hochgatterer. 2016. Daily life support at home through a virtual support partner. (2016).
- [57] Sten Hanke, Emanuel Sandner, Andreas Stainer-Hochgatterer, Christiana Tsiourti, and Andreas Braun. 2015. The Technical Specification and Architecture of a Virtual Support Partner. In *AmI (Workshops/Posters)*.
- [58] Sarah Harper. 2006. Sixteen The Ageing of Family Life Transitions. *The Futures of Old Age* (2006), 164–171.
- [59] Marcel Heerink, Ben Kröse, Bob Wielinga, and Vanessa Evers. 2008. Enjoyment intention to use and actual use of a conversational robot by elderly people. In *Proceedings of the 3rd ACM/IEEE international conference on Human robot interaction*. 113–120.
- [60] Andrew C High and James Price Dillard. 2012. A review and meta-analysis of person-centered messages and social support outcomes. *Communication Studies* 63, 1 (2012), 99–118.
- [61] Stevan E Hobfoll, Arie Nadler, and Joseph Leiberman. 1986. Satisfaction with social support during crisis: intimacy and self-esteem as critical determinants. *Journal of personality and social psychology* 51, 2 (1986), 296–305.
- [62] Amanda J Holmstrom. 2012. What helps—and what doesn't—when self-esteem is threatened?: Retrospective reports of esteem support. *Communication Studies* 63, 1 (2012), 77–98.
- [63] Nancy R Hooyman and H Asuman Kiyak. 2008. *Social gerontology: A multidisciplinary perspective*. Pearson Education.
- [64] Alexis Hope, Ted Schwaba, and Anne Marie Piper. 2014. Understanding digital and material social communications for older adults. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 3903–3912.
- [65] Lesa Lorenzen Huber, Kalpana Shankar, Kelly Caine, Kay Connelly, L Jean Camp, Beth Ann Walker, and Lisa Borrero. 2013. How in-home technologies mediate caregiving relationships in later life. *International Journal of Human-Computer Interaction* 29, 7 (2013), 441–455.
- [66] Iolanda Iacono and Patrizia Marti. 2014. Engaging older people with participatory design. In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational*. 859–864.
- [67] IN.gov. 2020. *Information about novel coronavirus (COVID-19)*. <https://www.in.gov/gov/newsroom/updated-4272020-indiana-stay-at-home-order-faq/>
- [68] Stephen S Intille. 2004. A new research challenge: persuasive technology to motivate healthy aging. *IEEE Transactions on information technology in Biomedicine* 8, 3 (2004), 235–237.
- [69] Keiko Iwasaki, Yasuyuki Sawada, and Daniel P Aldrich. 2017. Social capital as a shield against anxiety among displaced residents from Fukushima. *Natural hazards* 89, 1 (2017), 405–421.
- [70] David E Jacobson. 1986. Types and timing of social support. *Journal of health and Social Behavior* (1986), 250–264.
- [71] Bryan D James, Robert S Wilson, Lisa L Barnes, and David A Bennett. 2011. Late-life social activity and cognitive decline in old age. *Journal of the International Neuropsychological Society: JINS* 17, 6 (2011), 998–1005.
- [72] Li Jianxin. 2004. Study on the Relationship between Social Support and Life Satisfaction of the Chinese Elderly [J]. *Population Science of China* 5 1 (2004).
- [73] Jazette Johnson, Rebecca W Black, and Gillian R Hayes. 2020. Roles in the Discussion: An Analysis of Social Support in an Online Forum for People with Dementia. *Proceedings of the ACM on Human-Computer Interaction* 4, CSCW2 (2020), 1–30.
- [74] Eunkyung Kim, Jeong Yeob Han, Tae Joon Moon, Bret Shaw, Dhavan V Shah, Fiona M McTavish, and David H Gustafson. 2012. The process and effect of supportive message expression and reception in online breast cancer support groups. *Psycho-Oncology* 21, 5 (2012), 531–540.

- [75] Marsha King. 2006. Elderly seek to grow old together, form new support groups. *The Seattle Times* (2006).
- [76] Mary Ann Kluge. 2014. Music, movement, and mood: Health promotion classes boost well-being and create social bonds. *Generations* 38, 1 (2014), 31–34.
- [77] Bran Knowles, Vicki Hanson, Yvonne Rogers, Anne Marie Piper, Jenny Waycott, Nigel Davies, Aloha Ambe, Robin N Brewer, Debaleena Chattopadhyay, M Deepak-Gopinath, et al. 2020. The Harm in Conflating Aging with Accessibility. *Commun. ACM* (2020).
- [78] Bran Knowles and Vicki L Hanson. 2018. The wisdom of older technology (non) users. *Commun. ACM* 61, 3 (2018), 72–77.
- [79] Neal Krause and Elena Bastida. 2011. Social relationships in the church during late life: Assessing differences between African Americans, Whites, and Mexican Americans. *Review of Religious Research* 53, 1 (2011), 41–63.
- [80] Aideen Lawlor and Jurek Kirakowski. 2014. Online support groups for mental health: a space for challenging self-stigma or a means of social avoidance? *Computers in Human Behavior* 32 (2014), 152–161.
- [81] Amanda Lazar, Mark Diaz, Robin Brewer, Chelsea Kim, and Anne Marie Piper. 2017. Going gray, failure to hire, and the ick factor: Analyzing how older bloggers talk about ageism. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. 655–668.
- [82] Hee Rin Lee, Selma Šabanović, Wan-Ling Chang, Shinichi Nagata, Jennifer Piatt, Casey Bennett, and David Hakken. 2017. Steps toward participatory design of social robots: mutual learning with older adults with depression. In *Proceedings of the 2017 ACM/IEEE international conference on human-robot interaction*. 244–253.
- [83] Becca R Levy and Mahzarin R Banaji. 2002. Implicit ageism. *Ageism: Stereotyping and prejudice against older persons* 2004 (2002), 49–75.
- [84] Jennifer Liddle, Nicole Pitcher, Kyle Montague, Barbara Hanratty, Holly Standing, and Thomas Scharf. 2020. Connecting at Local Level: Exploring Opportunities for Future Design of Technology to Support Social Connections in Age-Friendly Communities. *International Journal of Environmental Research and Public Health* 17, 15 (2020), 5544–5568.
- [85] Ann Light and Jo Briggs. 2017. Crowdfunding platforms and the design of paying publics. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. 797–809.
- [86] Kai Lukoff, Taoxi Li, Yuan Zhuang, and Brian Y Lim. 2018. Tablechat: mobile food journaling to facilitate family support for healthy eating. *Proceedings of the ACM on Human-Computer Interaction* 2, CSCW (2018), 1–28.
- [87] Chen Luo, Yuru Li, Anfan Chen, and Yulong Tang. 2020. What triggers online help-seeking retransmission during the COVID-19 period? Empirical evidence from Chinese social media. *Plos one* 15, 11 (2020), 1–18.
- [88] Aqueasha Martin-Hammond, Sravani Vemireddy, and Kartik Rao. 2018. Engaging older adults in the participatory design of intelligent health search tools. In *Proceedings of the 12th EAI International Conference on Pervasive Computing Technologies for Healthcare*. 280–284.
- [89] Iveris L Martinez, Donneth Crooks, Kristen S Kim, and Elizabeth Tanner. 2011. Invisible civic engagement among older adults: Valuing the contributions of informal volunteering. *Journal of cross-cultural gerontology* 26, 1 (2011), 23–37.
- [90] Michael Massimi. 2013. Exploring remembrance and social support behavior in an online bereavement support group. In *Proceedings of the 2013 conference on Computer supported cooperative work*. 1169–1180.
- [91] Michael Massimi and Ronald M Baecker. 2011. Dealing with death in design: developing systems for the bereaved. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1001–1010.
- [92] Michael Massimi, Jackie L Bender, Holly O Witteman, and Osman H Ahmed. 2014. Life transitions and online health communities: reflecting on adoption, use, and disengagement. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*. 1491–1501.
- [93] Michael Massimi, Jill P Dimond, and Christopher A Le Dantec. 2012. Finding a new normal: the role of technology in life disruptions. In *Proceedings of the acm 2012 conference on computer supported cooperative work*. 719–728.
- [94] Jimmy McCloskey. 2020. *DJ says elderly people should sacrifice themselves to coronavirus to save the economy*.
- [95] Graham J McDougall Jr, Gaynell Simpson, and Mary Louanne Friend. 2015. Strategies for research recruitment and retention of older adults of racial and ethnic minorities. *Journal of gerontological nursing* 41, 5 (2015), 14–23.
- [96] Sean A McGlynn, Shawn Kemple, Tracy L Mitzner, Chih-Hung Aaron King, and Wendy A Rogers. 2017. Understanding the potential of PARO for healthy older adults. *International journal of human-computer studies* 100 (2017), 33–47.
- [97] Oli Mival, Steward Cringean, and David Benyon. 2004. Personification technologies: Developing artificial companions for older people. *CHI Fringe, Austria* (2004).
- [98] Gloria Muluka-Wesseh. 2021. Robotics and Social Care: The effects of introduction of robotics to social care. (2021).
- [99] Elizabeth D Mynatt, Jim Rowan, Sarah Craighill, and Annie Jacobs. 2001. Digital family portraits: supporting peace of mind for extended family members. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. 333–340.

- [100] Mark W Newman, Debra Lauterbach, Sean A Munson, Paul Resnick, and Margaret E Morris. 2011. It's not that I don't have problems, I'm just not putting them on Facebook: challenges and opportunities in using online social networks for health. In *Proceedings of the ACM 2011 conference on Computer supported cooperative work*. 341–350.
- [101] Shuo Niu, Ava Bartolome, Cat Mai, and Nguyen B Ha. 2021. # StayHome# WithMe: How Do YouTubers Help with COVID-19 Loneliness? *arXiv preprint arXiv:2101.03706* (2021).
- [102] Mary E Northridge, Michele Shedlin, Eric W Schrimshaw, Ivette Estrada, Leydis De La Cruz, Rogelina Peralta, Stacia Birdsall, Sara S Metcalf, Bibhas Chakraborty, and Carol Kunzel. 2017. Recruitment of racial/ethnic minority older adults through community sites for focus group discussions. *BMC public health* 17, 1 (2017), 1–10.
- [103] Novia Nurain, Clara Caldeira, and Kay Connelly. 2021. Older Adults' Experiences of Autonomy During COVID-19 Pandemic. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems*. 1–6.
- [104] Luca Odetti, Giuseppe Anerdi, Maria Paola Barbieri, Debora Mazzei, Elisa Rizza, Paolo Dario, Guido Rodriguez, and Silvestro Micera. 2007. Preliminary experiments on the acceptability of animaloid companion robots by older people with early dementia. In *2007 29th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*. IEEE, 1816–1819.
- [105] Committee on an Aging Society (U., National Research Council, National Research Council Staff, Committee on an Aging Society, Institute of Medicine, Symposium on Unpaid Productive Roles in an Aging Society (1983: Washington, DC?), Institute of Medicine Staff, and Aging Society Committee. 1986. *Productive Roles in an Older Society*. National Academy Press.
- [106] Meals on Wheels. 2021. *Meals on Wheels America*. <https://www.mealsonwheelsamerica.org/find-meals>
- [107] Leysia Palen and Amanda L Hughes. 2018. Social media in disaster communication. *Handbook of disaster research* (2018), 497–518.
- [108] Sun Young Park. 2018. Social support mosaic: Understanding mental health management practice on college campus. In *Proceedings of the 2018 Designing Interactive Systems Conference*. 121–133.
- [109] Annu Sible Prabhakar, Lucia Guerra-Reyes, Anne Effron, Vanessa M Kleinschmidt, Maggie Driscoll, Charles Peters, Vanessa Pereira, Majdah Alshehri, Tom Ongwere, and Katie A Siek. 2017. "let me know if you need anything" support realities of new mothers. In *Proceedings of the 11th EAI international conference on pervasive computing technologies for healthcare*. 31–40.
- [110] AARP Rachel Nania. 2021. *95 Percent of Americans Killed by COVID-19 Were 50 or Older*. <https://www.aarp.org/health/conditions-treatments/info-2020/coronavirus-deaths-older-adults.html>
- [111] Majja Reblin and Bert N Uchino. 2008. Social and emotional support and its implication for health. *Current opinion in psychiatry* 21, 2 (2008), 201–205.
- [112] Vincent Rialle, Norbert Noury, and Thierry Hervé. 2001. An experimental health smart home and its distributed internet-based information and communication system: first steps of a research project. *Studies in health technology and informatics* 2 (2001), 1479–1483.
- [113] Yann Riche. 2007. PeerCare: challenging the monitoring approach to eldercare. In *IFIP Conference on Human-Computer Interaction*. Springer, 628–630.
- [114] Yann Riche and Wendy Mackay. 2010. PeerCare: supporting awareness of rhythms and routines for better aging in place. *Computer Supported Cooperative Work (CSCW)* 19, 1 (2010), 73–104.
- [115] Valeria Righi, Sergio Sayago Barrantes, and Josep Blat. 2012. Older people's use of Social Network Sites while participating in local online communities from an ethnographical perspective. In *CIRN 2012 Community Informatics Conference; 2012 Nov 7-9; Prato, Italy. Wellington: Monash University; 2012*. Monash University.
- [116] Adrianna Rodriguez. 2020. *Texas' lieutenant governor suggests grandparents are willing to die for US economy*.
- [117] Mary Beth Rosson, John M Carroll, and Hansa Sinha. 2011. Orientation of undergraduates toward careers in the computer and information sciences: Gender, self-efficacy and social support. *ACM Transactions on Computing Education (TOCE)* 11, 3 (2011), 1–23.
- [118] Sabirat Rubya. 2020. *Enhancing Access to Peer Support Through Technology for Recovery from Substance Use Disorders*. (2020).
- [119] Martin Saerbeck, Tom Schut, Christoph Bartneck, and Maddy D Janse. 2010. Expressive robots in education: varying the degree of social supportive behavior of a robotic tutor. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 1613–1622.
- [120] Catherine Schaefer, James C Coyne, and Richard S Lazarus. 1981. The health-related functions of social support. *Journal of behavioral medicine* 4, 4 (1981), 381–406.
- [121] K Scharnberg. 2006. Family watch: Distant children can keep an eye on elderly parents. *The Chicago Tribune* (2006).
- [122] Bryan Semaan. 2019. 'Routine Infrastructuring' as 'Building Everyday Resilience with Technology' When Disruption Becomes Ordinary. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (2019), 1–24.
- [123] Jaemyung Shin, Bumsoo Kang, Taiwoo Park, Jina Huh, Jinhan Kim, and Junehwa Song. 2016. Beupright: Posture correction using relational norm intervention. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing*

Systems. 6040–6052.

- [124] Candace L Sidner, Timothy Bickmore, Bahador Nooraie, Charles Rich, Lazlo Ring, Mahni Shayganfar, and Laura Vardoulakis. 2018. Creating new technologies for companionable agents to support isolated older adults. *ACM Transactions on Interactive Intelligent Systems (TiiS)* 8, 3 (2018), 1–27.
- [125] Candace L Sidner, Charles Rich, Mohammad Shayganfar, Timothy W Bickmore, Lazlo Ring, and Zessie Zhang. 2015. A Robotic Companion for Social Support of Isolated Older Adults. *HRI (Extended Abstracts)* 289, 10.1145 (2015), 2701973–2702103.
- [126] AJ Sixsmith. 2000. An evaluation of an intelligent home monitoring system. *Journal of telemedicine and telecare* 6, 2 (2000), 63–72.
- [127] Gabrielle Lindsay Smith, Lauren Banting, Rochelle Eime, Grant O’Sullivan, and Jannique GZ Van Uffelen. 2017. The association between social support and physical activity in older adults: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity* 14, 1 (2017), 1–21.
- [128] AJMC Staff. 2021. *A Timeline of COVID-19 Developments in 2020*. <https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020>
- [129] Robert Steele, Amanda Lo, Chris Secombe, and Yuk Kuen Wong. 2009. Elderly persons’ perception and acceptance of using wireless sensor networks to assist healthcare. *International journal of medical informatics* 78, 12 (2009), 788–801.
- [130] Barbara Stepko. 2020. *Older Adults Report Better Mental Health Than Younger Ones During Pandemic*. <https://www.aarp.org/health/conditions-treatments/info-2021/older-mental-health.html>
- [131] Emily Sun, Ross McLachlan, and Mor Naaman. 2017. MoveMeant: Anonymously Building Community Through Shared Location Histories. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. 4284–4289.
- [132] Stephanie Tierney and Kamal R Mahtani. 2020. *Volunteering during the COVID-19 pandemic: What are the potential benefits to people’s well-being?* <https://www.cebm.net/covid-19/volunteering-during-the-covid-19-pandemic-what-are-the-potential-benefits-to-peoples-well-being/>
- [133] Jonathon S. Tobin. 2020. *In Italy’s Coronavirus Crisis, the Elderly Are Left to Die. Will Trump Let America Follow?*
- [134] Tammy Toscos, Kay Connelly, and Yvonne Rogers. 2012. Best intentions: health monitoring technology and children. In *Proceedings of the SIGCHI conference on Human Factors in Computing Systems*. 1431–1440.
- [135] Emily Tseng, Diana Freed, Kristen Engel, Thomas Ristenpart, and Nicola Dell. 2021. A Digital Safety Dilemma: Analysis of Computer-Mediated Computer Security Interventions for Intimate Partner Violence During COVID-19. *people* 18, 22 (2021), 28–29.
- [136] Teresa BK Tsien and Guat Tin Ng. 2010. Older adults as caregivers in Hong Kong. *China Journal of Social Work* 3, 2-3 (2010), 231–245.
- [137] Gabrielle M Turner-McGrievy and Deborah F Tate. 2013. Weight loss social support in 140 characters or less: use of an online social network in a remotely delivered weight loss intervention. *Translational behavioral medicine* 3, 3 (2013), 287–294.
- [138] Bert N Uchino. 2009. Understanding the links between social support and physical health: A life-span perspective with emphasis on the separability of perceived and received support. *Perspectives on psychological science* 4, 3 (2009), 236–255.
- [139] Steven Umbrello, Marianna Capasso, Maurizio Balistreri, Alberto Pirni, and Federica Merenda. 2021. Value Sensitive Design to Achieve the UN SDGs with AI: A Case of Elderly Care Robots. *Minds and Machines* (2021), 1–25.
- [140] Juliana Van Olphen, Amy Schulz, Barbara Israel, Linda Chatters, Laura Klem, Edith Parker, and David Williams. 2003. Religious involvement, social support, and health among African-American women on the east side of Detroit. *Journal of general internal medicine* 18, 7 (2003), 549–557.
- [141] Myrra Vernooij-Dassen, Frans Verhey, and Maria Lapid. 2020. The risks of social distancing for older adults: a call to balance. *International psychogeriatrics* 32, 10 (2020), 1235–1237.
- [142] Kieran Walsh and Aoife Callan. 2011. Perceptions, preferences, and acceptance of information and communication technologies in older-adult community care settings in Ireland: A case-study and ranked-care program analysis. *Ageing International* 36, 1 (2011), 102–122.
- [143] Yan Wang, Jinfeng Zhang, Bin Wang, and Haojie Fu. 2020. Social support from adult children, parent–Child relationship, emotion regulation strategy, and depressive symptoms among Chinese older adults. *Research on Aging* 42, 9-10 (2020), 281–290.
- [144] Yi-Chia Wang, Robert Kraut, and John M Levine. 2012. To stay or leave? The relationship of emotional and informational support to commitment in online health support groups. In *Proceedings of the ACM 2012 conference on computer supported cooperative work*. 833–842.
- [145] Jenny Waycott, Frank Vetere, Sonja Pedell, Lars Kulik, Elizabeth Ozanne, Alan Gruner, and John Downs. 2013. Older adults as digital content producers. In *Proceedings of the SIGCHI conference on Human Factors in Computing Systems*. 39–48.

- [146] Jenny Waycott, Frank Vetere, Sonja Pedell, Ameer Morgans, Elizabeth Ozanne, and Lars Kulik. 2016. Not for me: Older adults choosing not to participate in a social isolation intervention. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. 745–757.
- [147] Jill Palzkill Woelfer, Amy Iverson, David G Hendry, Batya Friedman, and Brian T Gill. 2011. Improving the safety of homeless young people with mobile phones: Values, form and function. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 1707–1716.
- [148] Gillian Woolhead, Michael Calnan, Paul Dieppe, and Win Tadd. 2004. Dignity in older age: what do older people in the United Kingdom think? *Age and ageing* 33, 2 (2004), 165–170.
- [149] Svetlana Yarosh, Sarita Schoenebeck, Shreya Kothaneth, and Elizabeth Bales. 2016. "Best of Both Worlds" Opportunities for Technology in Cross-Cultural Parenting. In *Proceedings of the 2016 chi conference on human factors in computing systems*. 635–647.
- [150] Maoxin Ye and Daniel P Aldrich. 2019. Substitute or complement? How social capital, age and socioeconomic status interacted to impact mortality in Japan's 3/11 tsunami. *SSM-population health* 7 (2019), 100403.
- [151] Quan Zhang, Lingmei Ren, and Weisong Shi. 2013. HONEY: a multimodality fall detection and telecare system. *Telemedicine and e-Health* 19, 5 (2013), 415–429.
- [152] María-Victoria Zunzunegui, Beatriz E Alvarado, Teodoro Del Ser, and Angel Otero. 2003. Social networks, social integration, and social engagement determine cognitive decline in community-dwelling Spanish older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 58, 2 (2003), S93–S100.

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