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Chapter 1 Building Social Connections: A Framework for Enriching Older Adults' Social Connectedness through Information and Communication Technologies

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Abstract
Aged care providers and researchers are increasingly exploring the use of communication technologies to help older people remain connected to the world as they age. These initiatives often aim to counteract the negative effects of social isolation, thereby aiming to compensate for deficiencies associated with old age, rather than aiming to build on and enrich the social connections that people find valuable in later life. In this chapter we present a framework that aims to inform the design of technologies for enriching older people's social lives. Drawing on research from the field of social gerontology that provides insight into the multiple ways older adults experience social connection and isolation, the framework describes three interrelated dimensions that characterise the experience of social connection in later life: (i) personal relationships, (ii) community connections, and (iii) societal engagement. A person may experience inadequacies in one or more of these dimensions, to varying degrees and intensity. However, enrichment in one dimension could potentially compensate for a sense of disconnection in other dimensions. We argue that this conceptualisation of social connection in later life is useful for informing the design of technology-based interventions. We illustrate how information and communication technologies (ICTs) can be designed and used to enrich the three different kinds of social connections by drawing on examples from the human-computer interaction literature that have demonstrated the value of new technologies for enriching different dimensions of social connectedness in later life.

Keywords
social connectedness; social isolation; communication technology; older adults

Highlights

- Social isolation can be addressed by enriching social connectedness
- Older adults experience different dimensions of social connectedness
- Technology programs can be designed to target specific dimensions of social connectedness

1.1 Introduction

Information and communication technologies (ICTs) offer a wealth of opportunities to enable people to stay connected to each other and to the world around them. While there are some concerns about using ICTs for social interactions, especially around privacy and security, the feeling of being connected to other people is ultimately a good thing. Social connection is particularly important in later life, as it is believed to guard against deterioration in cognitive and mental health, as well as physical health problems and early mortality (Bruggencate, Luijkx, & Sturm, 2017; Cornwell & Waite, 2009; Steptoe, Shankar, Demakakos, & Wardle, 2013).

Given the importance of social connectedness for healthy ageing, many community organisations, aged care providers, and policy makers have developed, and continue to develop, strategies and programs that aim to help older people build social connections (Raymond et al., 2013). Examples of such programs include the "Men's Shed" movement (McGeechan, Richardson, Wilson, O'Neill, & Newbury-Birch, 2017) and various befriending schemes (Lester, Meed, Graham, Gask, & Reilly, 2012). Perhaps unsurprisingly, in recent years, social programs have included technology-based interventions and activities, ranging from the use of social robots for companionship (Kachouie, Sedighadeli, Khosla, & Chu, 2014) to community groups that help older people learn how to use games and communication applications on tablet devices (e.g., Beh, Pedell, & Doube, 2015).

Many of these social programs aim to alleviate older people's experience of social isolation. Social isolation describes situations in which people have limited opportunities to engage with other people. It can occur at any age, but issues associated with ageing – such as deteriorating health and mobility – can make some older people more vulnerable to isolation. Alleviating social isolation in old age is a significant societal concern that can presumably be achieved by enhancing social connectedness. Social connectedness can be defined as the opposite of social isolation: it is the "feeling of connectedness to others and to a community or neighbourhood" (Bruggencate et al., 2017, p.1). In this chapter, we argue that it also encompasses connectedness to the broader society or the world around us.

By emphasising social connectedness, rather than focusing solely on isolation, we can develop technology-based initiatives that aim to *enrich* connectedness rather than alleviate isolation. This reframing aligns with arguments in the human-computer interaction literature that suggest much can be gained when technology designers recognise the knowledge, experiences, and preferences older adults bring to technology-based initiatives, rather than designing technologies that aim to compensate for deficiencies (Righi, Sayago, & Blat, 2017; Rogers, & Marsden, 2013; Vines, Pritchard, Wright, Olivier, & Brittain, 2015). In order to be effective, technology-based programs that aim to enrich older adults' social lives need to

be based on strong conceptual understandings of how social connectedness is experienced by older adults. This chapter aims to provide such an understanding to inform and motivate the design of technology-based programs. Before we introduce our framework for enriching older adults' social connectedness, we first discuss the related concepts of social isolation and loneliness and provide an overview of research examining common experiences of social connection (and, conversely, isolation) in later life.

1.2 Social isolation and loneliness

The concept of social isolation has been widely used by researchers from a range of disciplines (see reviews by Pate, 2014; Zavaleta, Samuel, & Mills, 2014; Zavaleta, Samuel, & Mills, 2017). The term is often assumed to have self-evident meaning and it overlaps with numerous other terms used in the discourse on ageing and social engagement, making it difficult to arrive at an established understanding of what it means for an older person to be socially isolated. Social exclusion, for instance, commonly used in policy discourse, refers to the social and economic barriers that cause certain groups to be disempowered in society (Bonner, 2006). Social capital, meanwhile, refers to the networks and connections an individual has and the value they hold for providing access to support and resources (Forsman, Herberts, Nyqvist, Wahlbeck, & Schierenbeck, 2013; Putnam, 2000). While related to social isolation, these are broad concepts that can obscure attempts to define and understand individual experiences of social isolation.

The most commonly accepted definition of social isolation focuses on the number of social contacts a person has and how often they see other people. That is, social isolation is viewed as an objective reality associated with limited opportunities for social interaction (de Jong Gierveld, van Tilburg, & Dykstra, 2006; Steptoe et al., 2013). According to this view, a distinction can be made between social isolation and loneliness, where loneliness is an individual's negative perception of deficiencies in personal relationships (including both quality and quantity of relationships), while social isolation refers to "the absence of relationships with other people" (de Jong Gierveld & van Tilburg, 2006, p. 583). Loneliness occurs when a person *feels* alone; social isolation occurs when a person *is* often or always alone. This distinction may be overly simplistic for these complex experiences. A person who lives alone may not be isolated and, according to de Jong Gierveld and colleagues, loneliness "is not directly connected to objective social isolation; the association is of a more complex nature" (de Jong Gierveld, et al., 2006, p. 486). In other words, a person can be socially isolated, but not feel lonely, or feel lonely even when in company.

Social isolation and loneliness, however, remain difficult to disentangle (Pate, 2014). They are often used interchangeably. Additionally social isolation is commonly measured using scales designed to assess loneliness, such as the de Jong Gierveld and the University of

California (Los Angeles) loneliness scales (de Jong Gierveld & van Tilburg 2006, Hughes, Waite, Hawkley, & Cacioppo, 2004; Sansoni, Marosszeky, Sanoni, & Fleming, 2010). Several authors have argued that social isolation is a complex phenomenon that encompasses both objective and subjective experiences (e.g., Hawthorne, 2006; Nicholson Jr, 2009; Victor, Scambler, & Bond, 2009; Zavaleta et al., 2014). For instance, Nicholson (2009) identified five components of isolation, based on a systematic review of research that has examined social isolation in old age: 1) number of contacts, 2) feeling of belonging, 3) fulfilling relationships, 4) engagement with others, and 5) quality of network members. These attributes include features that can be quantified (e.g., number of contacts), and those that could be considered more subjective (e.g., feeling of belonging).

Our aim in this chapter is to understand the *experience* of social connectedness in order to inform the design of technology-based interventions. To achieve this aim, we do not believe it is useful to focus solely on isolation, nor to focus on isolation without also considering loneliness. Technological interventions cannot be designed to solely target the objective aspects of isolation (for example, increasing the size of a person's social network), while leaving the subjective aspects of loneliness unaffected. Even though intervention programs such as one-to-one befriending schemes and organised group activities often aim to increase frequency of social contact, the consequence is that they also provide social support, friendship, and opportunities to participate in meaningful activities. These are arguably subjective, experiential components of isolation. Furthermore, they can be reframed as experiences of *social connectedness*. We have adopted this perspective in our framework.

1.3 Dimensions of social connectedness

To understand the experience of social connectedness, valuable insights can be gleaned from recent studies that focus on older adults' perceptions and experiences of social connectedness in the home, the local community, and beyond (e.g., Cloutier-Fisher, Kobayashi, & Smith 2011; de Donde, de Whitte, Buffel, Dury, & Verte, 2012; Forsman et al., 2013; Stewart, Browning, & Sims 2015; Victor et al., 2009). A common theme underlying this body of research is that social isolation and connectedness consist of "multiple realities" (Victor et al., 2009, p.38). A framework for conceptualising older adults' experience of social connectedness, then, needs to allow for the multiple ways in which connection can be experienced. In this section we draw on this research to discuss three interrelated dimensions that characterise older people's experience of social connectedness: personal relationships, community connections, and societal engagement.

1.3.1 Personal relationships

The first dimension refers to an individual's personal relationships, and how these impact on the lived experience of social connectedness. In definitions of social isolation that prioritise

frequency of contact, living alone is seen to be a key predictor of isolation. The notion of "living alone", however, requires interrogation. Living alone is not the same as being alone: an older person who lives with busy family members may spend most of their waking hours alone, while a person who lives alone can still enjoy close personal relationships. In addition, those who live with others may ostensibly have close social contacts but in reality lack a sense of support and companionship. This point is illustrated by the contrasting examples presented in an interview study by Cloutier-Fisher and colleagues (Cloutier-Fisher et al., 2011). They found that while some of their interviewees experienced social isolation upon the death of a spouse, at least two interviewees experienced a new freedom to socialise and felt more connected to others when they became widowed. While close personal relationships are important, then, the impact of these relationships on the experience of social connectedness can vary substantially (de Jong Gierveld et al., 2006).

A common problem for older adults who are socially isolated is a perceived lack of social support. That is, they feel they do not have people to talk to about problems or to ask for help (Cornwell & Waite, 2009). Feeling supported, however, is only one component of a meaningful personal relationship. Studies have shown that older adults value opportunities to engage in reciprocal communication and want to be able to contribute to the family by providing support to younger generations (Lester et al., 2012; Lindley, Harper, & Sellen 2009). These opportunities to contribute and feel valued can be more important to some individuals than feeling supported. In some cultures, for instance, higher value is placed on being a source of advice for younger people, rather than having someone to share one's feelings with (van der Geest, 2004, cited in Jylha & Saarenheimo, 2010).

Programs for enriching the personal aspects of social connections, then, should not only provide social support, but also aim to demonstrably value the contributions of those being supported. In an evaluation of several befriending schemes in England, Lester et al. (2012) found that recipients valued the friendship and shared experiences that emerged as they got to know the volunteer who visited or telephoned them regularly. In successful schemes, this friendship extended beyond providing support and instead became a reciprocal relationship in which the befriender benefited and the older person felt valued (e.g., through sharing food and advice on relationship issues). In contrast, unsuccessful schemes were "non-reciprocal," with the emphasis on service provision and "checking-up rather than developing a meaningful friendship" (Lester et al., 2012, p. 317). This first dimension highlights the importance of interventions that affirm and value *personal contributions to relationship building*.

1.3.2 Community connections

The second dimension extends beyond relationships with close family and friends, to acknowledge the significance of connection with the local community. Social isolation and loneliness can be experienced when people have limited opportunities to engage in meaningful activities in the community (Forsman et al., 2013). Meaningful social activities include being involved in sports clubs, religious organisations, or community groups. Cloutier-Fisher et al. (2011) emphasised that peripheral social ties are important, highlighting the sense of belonging that comes from being a member of a sports club or church group. For their interviewees, these community connections provided a buffer that protected people when they experienced losses within their more immediate social circle.

Other studies have suggested that connections within a neighbourhood community are important for enhancing older people's feelings of belonging (e.g., Buffel, Phillipson, & Scharf, 2013; de Donder, et al., 2012; Forsman, et al., 2013). A focus group study with older adults in Finland highlighted the importance of neighbourhood context (Forsman, et al., 2013). Many of the participants in this study had lived in the same place for a long time and gained assurance from knowing their neighbours and the neighbourhood well. Location provided a context for their social lives. A familiar neighbourhood functions as a "stable foundation for everyday life and well-incorporated regular routines, as well as close relationships with neighbours and other acquaintances" (Forsman et al., 2013, p. 822). This argument is supported by earlier social isolation research which demonstrated that evolving neighbourhoods and relocation can result in social isolation (Weiss, 1973).

The importance of neighbourhood connections aligns with the notion of "civic socialising," a term coined to describe the social interactions that take place in local neighbourhood settings (Stewart et al., 2014). Stewart and colleagues examined the short but frequent interactions that occur between older adults and local shopkeepers. They found these interactions are important for enabling older adults to affirm their identity as independent and socially valued members of the local community. The connections described by Stewart and colleagues are what we might call "low fidelity" ties. They involve limited expectations of friendship and support, but provide important opportunities for regular and frequent interactions that ensure older adults are known and visible within the local community. Being disconnected from the local community and from group-based activities can result in the loss of a sense of belonging. The notion of a sense of belonging underlies many discussions of social isolation and appears to be important in particular for understanding older people's experience of isolation. Interventions, then, should aim at providing opportunities for group-based social activities to enhance people's sense of belonging within social groups and to emulate the community connections people experience in neighbourhood settings.

1.3.3 Societal engagement

The third dimension refers to an individual's broader engagement with society, beyond local community connections. We define societal engagement broadly, to encompass not only a person's access to information and resources, but also their ability to contribute – even in small ways – to society. A person who is engaged in society can still experience a paucity of personal relationships and insufficient community connections, but they might derive a sense of connection (and therefore reduced isolation) from maintaining an interest in political issues, social concerns, or events that take place in the world around them. In this respect, societal engagement refers to engagement with ideas, activities, and information, rather than engagement with other people (although it can incorporate social connections).

An example of this form of engagement can be seen when television is used to maintain connection to the outside world, reportedly common in older people who spend substantial time alone (Queen & Stawksi, 2014; van der Goot, Beentjes, & van Selm, 2012). Television can be used to provide a connection to the world (e.g., watching the news) or as a substitute for activities that people cannot physically engage in – for example, watching sermons on television instead of attending church (van der Goot et al., 2012). In the latter example, the reduced opportunities to connect with the local community church (second dimension), are partially mitigated by the opportunity for societal engagement (third dimension). For some, however, television viewing is an inferior substitute for more active forms of engagement. One interviewee in van der Goot et al.'s (2012) study reported that she now "depended on television to participate in society" by watching current affairs programs, but she saw this as poor compensation for previous activities such as serving on the board of a museum (p. 158). This example shows that societal engagement can encompass not only feeling connected to the outside world, but also having opportunities to contribute in some way to society. Social enrichment initiatives, then, should provide older people with a sense of purpose, an opportunity to engage in meaningful activity, and help to maintain their connections with society through activities, ideas, and information.

Furthermore, a person's engagement with society can be threatened by digital exclusion – that is, not having the ability or resources to access digital information. Older adults may be particularly at risk of being disconnected from the world if they do not use or have access to digital technologies. More services and information are now shared and accessed electronically (Siren & Knudsen, 2017) and those unable to benefit from these service will be at risk of isolation. This form of isolation can affect older people who live with others, particularly when they live with a spouse or peer who is similarly disconnected. Several authors have suggested that new technologies and services need to be designed with older users in mind in order to overcome digital exclusion (e.g., Coleman et al., 2010; Lindsay, Jackson, Schofield, & Olivier, 2012; Siren & Knudsen, 2017).

1.4 A framework for informing the design of technology-based social programs

Table 1.1, below, presents the three dimensions of social connectedness alongside corresponding guidelines for technology-based interventions. In order to enrich a specific dimension of social connectedness, technology programs can be designed to target experiences of social connectedness that fall within that dimension. In the following discussion, we demonstrate how the framework aligns with existing research into the design and use of social technologies with older adults. What follows is not meant to be an exhaustive discussion of existing research; rather we aim to draw on selected examples to illustrate the kinds of technology-based initiatives that can enrich each dimension of social connectedness.

Dimensions of Social Connectedness	Examples	Technology interventions should:
Personal relationships	• perceived personal support and companionship; • meaningful and reciprocal relationships; • feeling valued by others	• provide a sense of presence or connection with significant others; • facilitate reciprocal communication; • value older adults' contributions
Community connections	• feeling a sense of belonging in local community; • engagement with social groups (e.g., sports, church, cultural groups)	• emulate neighbourhood connections; • foster a shared sense of purpose around personal interests; • facilitate belonging while overcoming limitations of access to community groups
Societal engagement	• connection and contribution to ideas, information, and society; • feeling a sense of purpose or engagement; • digital literacy – being connected to the world online	• facilitate access to and sharing of information; • support meaningful and creative activities; • address digital literacy and access

Table 1.1 A framework for informing the design of programs to enhance social connectedness

1.4.1 Technologies for enriching personal relationships

In order to address the personal relationship dimension of social isolation, technology-based interventions can be designed to create *a sense of presence or connection* between people. This can be achieved through direct communication – for example by exchanging messages – or through ambient technologies that provide a sense of presence without direct communication. An ambient technology could be a display that represents other people and is

always on or visible in the background while a person goes about their daily activities (Lindley, 2012; Wadley, Vetere, Hopkins, Green, & Kulik, 2014). Such technologies can ensure a person who is physically alone does not *feel* alone. Note, these technologies may not alleviate loneliness, but they can provide a sense of the *presence* of another person.

Existing communication technologies, such as social media, can be used for both direct communication and to create a sense of presence by enabling people to view and (optionally) respond to updates from their family members and friends. Much research suggests that social media can be valuable for enhancing older adults' connections with family members and friends (Chen & Schulz, 2016; Khosravi, Rezvani, & Wiewiora, 2016). Indeed, the motivation to stay connected to and keep track of family members – particularly grandchildren – is said to be one of the reasons that older people are embracing social technologies like Facebook (Jung & Sundar, 2016).

In addition to widely available social media applications, there are many examples of purpose-built communication tools designed to be used by older adults to foster connection with significant others. These include touch-screen messaging devices, such as the "Wayve", a prototype device designed for sharing photographs, text messages, and handwritten notes and drawings, with a situated display so it could be communally used and viewed in the home (Lindley, 2012). A small-scale trial of the Wayve device revealed that being able to share handwritten notes and drawings, that were then visible on the situated display, facilitated lightweight, creative, and playful messaging between grandparents and grandchildren. The messaging device thereby supported playful *reciprocal communication* between the generations (Lindley, 2012).

Purpose-built communication tools offer particular promise for individuals who are in the later stages of old age: the so-called "oldest old" (aged over 80) (Neves, Franz, Munteanu, Baecker, & Ngo, 2015). People in this age group may be affected by frailty and cognitive decline, which can make it difficult to learn to use new technologies and to maintain an active social life (Waycott et al., 2016). In an attempt to address these challenges, Neves and colleagues developed a communication application designed for use on a tablet device, which they deployed in a two-month study with "frail, institutionalised" older adults (Neves, Franz, Munteanu & Baecker, 2017). The goal was to foster communication with close family members. Sharing some similarity with the Wayve device, the application supported lightweight asynchronous communication: users could touch a "wave" icon, which translated into an email that said "I'm thinking of you", and share audio and video messages, and photographs. Most of the residents who used the device "reported feeling more engaged with their families" (Neves et al., 2017, p. 13). However, this engagement required active participation from family members. Unsurprisingly, participants whose family members did not respond to messages did not find the tool valuable for fostering social connectedness.

This again emerged as a key finding following another trial of the application (Neves, Franz, Judges, Beermann, & Baecker, 2017). In both studies, when friends or family members were not actively involved in using the application, the participants' contributions did not appear to be valued or reciprocated, resulting in a lack of interest in using the tool. It is important, then, that technology-based initiatives, and the social structures that support them, are designed to not only provide social support, but to also ensure people *feel valued* for their contributions to reciprocal communications. In addressing the personal relationships dimension of social connectedness, older adults should not be construed as passive users of a communication technology, but should have opportunities to actively contribute and share knowledge with others, particularly to enrich existing relationships.

1.4.2 Technologies for facilitating community connections

Feeling connected to the local community or being a member of a group that centres around shared interests can foster a sense of belonging that is particularly important for older adults, as it enables people to embrace and express an identity that goes beyond "being old" (Cloutier-Fisher et al., 2011; Stewart et al., 2014). To create this sense of belonging, social technologies can be designed to emulate the social connections that occur in neighbourhood settings. For example, online communities can offer a sense of connectedness among groups of people who are geographically dispersed but share common interests or experiences (Burmeister, 2012).

In our prior work we designed and deployed a photo-sharing application that was used by small groups of older adults who were all clients of an aged care provider but lived independently (Waycott et al., 2013; Waycott et al., 2014; see also Waycott & Vines, this volume). Participants did not know each other prior to the project but over the course of several months they developed new friendships by sharing captioned photographs and messages with each other. Because the tool emphasised photo-sharing, it allowed for creative and personal self-expression. For instance, one of the oldest participants in the first field study – John, a retired engineer aged 93 – shared approximately 100 captioned photographs over the course of three months. Many of these photographs provided insightful and poignant reflections on his experience of ageing. His peers felt they could relate to these reflections and appreciated the candour, creativity, and humour John showed. They responded with empathy and shared snippets from their own lives. Although participants' contributions were sometimes sporadic, the group-based photo-sharing activity still created a sense of community, as highlighted in this comment made by a participant during a post-study interview:

> *"I think that [this] has given me a sense of belonging to a group. I'm not a great seeker out of group activities, mainly because I don't like to make time*

> *commitments given that lots of things crop up such as medical appointments and so on that interrupt me almost without notice. So I haven't sought out U3A or anything like that, though I'd like to. So this is a group which I can belong to in my own time which is unique […]. It's an in-house, own time friendship group."*

Technologies can also be designed to enhance sociality within an existing neighbourhood. For instance, interactive displays installed in various locations in a town could be used to share local information or video footage showing community activities (Light, Howland, Hamilton, & Harley, 2017). Such displays could potentially foster community connectedness by encouraging more people to attend events and by prompting serendipitous discussion around the displays.

Interactive displays can promote sociality in more confined neighbourhoods too; for example, in residential aged care settings. Residential care homes can be lonely places for residents, and moving into a care home often involves a loss of a sense of belonging (Grenade & Boldy, 2008; Lindley & Wallace, 2015). In these community spaces there is a great need for programs that foster social connectedness between residents. Dahl and Löfström (2018) conducted workshops with various care home stakeholders and developed potential design solutions, including a concept that involved an interactive map of the local area to be displayed on a touch-screen tabletop device. In earlier research that involved a similar concept, Gaver and colleagues demonstrated the "photostroller" – a device for viewing digital photographs that represented history in the local community, which was trialled in an aged care home (Gaver et al., 2011). Its use as a shared artefact in this setting appeared to facilitate sociality: residents viewed the content together and responded to the photographs with stories about their life.

These examples show that community connections can be facilitated by technologies that support the sharing of mutual interests and experiences. Place provides common ground for sociality around displays or artefacts that focus on local community events, but other shared interests can also be accommodated in technology-based programs. This was a key lesson from a five-year research-through-design study by Righi and colleagues (Righi, Sayago, & Blat, 2018). Their research involved co-designing technologies with older adults who were members of a local lifelong learning community. One of the goals of the project was to develop digital games that would appeal to older adults. Unsurprisingly the authors found that old age was not the primary identity for their participants. They had diverse interests and were members of multiple communities. Therefore it was impossible to design a game that would meet the interests of *all* older adults. Instead, participants were encouraged to create their own games that aligned with their personal interests (e.g., quiz games focusing on particular domains of knowledge). In order to address the community connections dimension

of social connectedness, then, technology-based programs can be designed to foster a shared sense of purpose around personal interests.

The experience of ageing, loss, or living with a disability can also be the glue that provides a sense of connection between people in online communities. For instance, Brewer and Piper (2017) developed a voice-based online blogging community for older adults with vision impairment. The older adults who joined the community liked being able to share experiences "with people with the same challenges" (p. 7). For these participants an online community was valuable because it overcame some of the challenges of physically attending a face-to-face meeting, such as organising accessible transport or managing scheduling conflicts. This online community therefore facilitated a sense of belonging while overcoming limitations of access to community groups, which can be a significant problem for some older adults as they face health and mobility deteriorations.

1.4.3 Technologies for enhancing societal engagement

New technologies can be particularly important for enabling older people to feel connected to the wider world, beyond family, friends, and local community. Social media, for instance, can be used to not only facilitate communications with close personal relationships, but also to provide a sense of connection to the world. This can be seen in the example of a well-known video blogger who, under the name "Geriatric1927" (born in 1927) posted hundreds of videos on YouTube, in which he shared stories about his life and thoughts about everyday issues (Harley & Fitzpatrick, 2009). In an analysis of the videos and the commentary they elicited from a large and global audience, Harley and Fitzpatrick found that video blogging enabled Geriatric1927 to share his experiences, engage in reciprocal learning with his audience, and benefit from enhanced social contact with the outside world. Given his regular commentary about the benefits he experienced by posting videos, it is reasonable to argue that Geriatric1927's engagement with the wider world online mitigated any isolation he may have experienced in other dimensions of social connectedness.

A similar example comes from research by Brewer and Piper (2016) who investigated how and why older adults engage in online "blogging". Drawing on interviews with bloggers aged 65 to 82, they found that sharing content online provided opportunities for older adults to craft and refine their identities as they entered retirement and approached old age. Furthermore, participants valued blogging as a tool for self-expression that enabled them to express personal reflections in longer-form writing than was normally possible via social media. In addition, they used blogging as a way to reach out to a broad audience. Some participants monitored their audience engagement via reader statistics, and used this information to inform decisions about future blog posts. They also felt connected to, and supported by, their audience. These older adults used ICTs to engage with society by sharing

carefully crafted information with a wide audience, thereby supporting their engagement in meaningful and creative activities. Technology-based programs can be designed to facilitate this society-level engagement by ensuring older adults have access to, and opportunities to engage in, activities like blogging.

Online game-playing can provide a similar opportunity for societal engagement. Shirley Curry, for instance, is known as the "gaming grandma" (Messner, 2016). She began playing computer games when her son gave her his old computer in the 1990s. From those humble beginnings, she now plays a variety of online fantasy games, such as Skyrim, and shares video recordings that show her playing these games on YouTube. Through these YouTube videos, Shirley (aged in her early 80s at the time of writing) has attracted a faithful following. She even tries to reply to the hundreds of comments and emails she receives.

We acknowledge that the example of Geriatric1927 and Shirley Curry may be considered somewhat unique but they nevertheless illustrate the potential influence of social media on societal engagement. As shown in these and other examples (e.g., Waycott et al., 2013), there are opportunities for older adults to use internet technologies in new and creative ways to not only access information, but to also create and share content, thereby enhancing societal engagement.

However, just as technologies can be used to empower older people, ICT can also be disempowering (Hill, Betts, & Gardner, 2015). We currently live in a hyper-connected information-rich society and there is a very real danger that those who do not use ICTs could be left behind and disenfranchised by their "non-use". Our relationship with technology, however, can be complicated, and there are many reasons why older adults might choose to reject new technologies (Knowles & Hanson, 2018). Nevertheless, for those who feel left behind, societal engagement can be enhanced through community-based digital literacy programs that support older adults in learning how to use digital devices and applications (e.g., Beh et al., 2015; Delello & McWhorter, 2017). Learning to use internet technologies can provide new opportunities for older adults to connect to other people or join online groups, thereby addressing the personal relationships and community connections dimensions. But just knowing how to use technology can help address the societal engagement dimension of social connectedness by ensuring people feel as though they are part of the information society (Hill et al., 2015). These digital literacy programs, then, are vital for addressing the societal engagement dimension of social connectedness.

1.5 Conclusion

In this chapter we have drawn on social gerontology literature to present a framework that describes three interrelated dimensions that characterise older adults' experiences of social

connectedness. We acknowledge that there is overlap between the three dimensions and that others have characterised social isolation and loneliness in different ways (e.g., Machielse, 2015; Zavaleta et al., 2014). The purpose of this framework, however, is not to provide an authoritative account of social isolation, but to illustrate how technology-based programs and interventions can be designed to address social isolation by enriching different dimensions of social connectedness.

By understanding the multi-faceted ways in which people might experience social connectedness, we can begin to identify how technology-based programs should respond. In order to address the personal relationships dimension, technology initiatives should aim to provide a sense of presence or connection between people, facilitate reciprocal communication, and provide a way of acknowledging the value of people's contributions to the communication. To enrich the community connections dimension, online communities can be designed to emulate the sort of connections one might normally find in local neighbourhood settings. In addition, programs should aim to foster a shared sense of purpose within a social group and to create a sense of belonging while overcoming limitations that normally prevent people from participating in these types of social groups. Finally, in order to enhance people's broader societal engagement, technology-based programs can be designed to enable people to access and share information, engage in meaningful and creative activities, and provide support for the development of digital literacy skills and access to new technologies.

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